

Comments received during the external review of the second order draft of the thematic assessment of invasive alien species and their control.
The review period was from 15 December 2021 to 15 February 2022

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Besek, Jordan Fox	No	Chapter 1	0	0	0	0	Generally, I find this review to be a quite comprehensive review of Invasive Species science as is. Beyond some minor notes below, I have one major critique. As a social scientist with historical interests, I appreciate the addition of sections 1.5.6, 1.5.7 and 1.5.8. Nevertheless, these sections seem to stand alone, bifurcated from the rest of the chapter, especially the sections above it. In other words, it seems like these were placed here by one author in order to cover these bases, but their import is not felt in other sections (possibly authored by someone else), which appear to proceed as if problems over how to conceptualize invasion, whether or not that is the correct term, political/historical factors and shifting baselines, stark binaries, etc., are largely unimportant outside of these specific sections (aside from some discreet nods here and there). Now, of course, I am not calling for an overhaul, as I realize that such critiques are not the goal of the report, however I do suggest that the authors attempt to consider these issue when explaining invasive species problems elsewhere, adding a line here or there to drive home the ways in which whether or not a species is "invasive" is a human decision (and all the politics and history that go along with that) made through ecological circumstances.	Thank you, further efforts have been made to incorporate social sciences better across the entire chapter and report.
Bharat, Alka	No	Chapter 1	0	0	0	0	Add sub-heads for distinct domains	Thank you for your comment, we have clarified the structure of longer sections by adding sub-headings.
Estoup, Arnaud	No	Chapter 1	0	0	0	0	I found a number of redundancies (at the sentence if not paragraph level) in the chapter = same things mentioned several times. I understand that this is sometimes justified by the structure of the chapter and in a way somewhat « useful » to strengthen key take-home messages. However, at least through a last polishing step, a global effort could be done to remove some non-useful redundancies that makes the chapter sometimes a bit « lengthy and heavy » to read.	Thank you for your comment. We have revised the chapter accordingly
Government of Armenia (Aghasyan, Levon)	Yes	Chapter 1	0	0	0	0	Overall all chapters are too long and should be shorten without cutting any key information.	Thank you for your comment. We have reduced the overlaps and shortened the chapters where possible.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	0	0	0	0	Treatment of crops and livestock is inconsistent in this Chapter. Sometimes they are considered to be IAS like any other, sometimes they are implicitly ignored, and occasionally they are explicitly recognized, such as on Page 43, Table 1.1, unit of analysis #10. It must be said that the recognition of "Cultivated areas" in Table 1.1 does not seem to have had any impact on the rest of the Chapter. There should be a Box on how the assessment addresses crops and livestock, explicitly, at the beginning of this chapter, and this issue needs to be addressed consistently throughout the Chapter and the rest of the assessment.	Thank you for your comment, we have clarified this point in the definition of IAS. Table 1.1 outlines the units of analysis where invasive alien species can be found but do not imply that all species in cultivated areas are invasive alien species
Government of China	Yes	Chapter 1	0	0	0	0	"Alien" is also a relative concept, which relates to the temporal scale under discussion, i.e. from which time point it can be tracked in history. Its natural distribution may exist 1000 years ago, but not 100 years ago. It also relates to the spatial scale. A species may be treated as an alien species in a specific country, but not invasive within the same country. Alien species are easy to be defined according to the national boundary, which may not conform to their natural distribution areas. In addition, within the same country, the 'alien' is not easy to be defined according to the natural boundaries. Therefore, it is more appropriate to define word "alien" based on the boundary of management rights, not to define according to the boundary of natural distribution.	Thank you. Experts follow the definition outlined in the scoping document (approved by the IPBES member states at their 6th Plenary), which mentions "natural range of distribution".
Government of China	Yes	Chapter 1	0	0	0	0	"Impact" is also a relative concept, how to accurately evaluate it? In addition to negative impacts, alien species also have possible positive impacts. The negative impacts of those with high utilization value can be easily controlled and turned into treasure.	Thank you for your comment. Please refer to Section 1.3.4 and Chapter 4 methodology for more information on this point.
Government of China	Yes	Chapter 1	0	0	0	0	"Invasive" is a relative concept. In addition to the capacity of propagation itself, it also relates to the resistance of the ecosystem where the invasive alien species grow. A standard is required to define whether alien species are necessarily invasive or not. It is easy to invade a destructed ecosystem and it is difficult to invade a complete natural ecosystem.	Thank you, we have clarified the definition of invasive alien species, which now hopefully address your concerns. The concept of invasibility is also included in Chapter 1.
Government of China	Yes	Chapter 1	0	0	0	0	There is another stage "damage" following "spread". The whole process should be: transport, introduction, establishment, spread and damage.	Thank you, invasive alien species have impacts, by definition. This has been clarified.
Government of Germany	Yes	Chapter 1	0	0	0	0	General comment: Proposal: We encourage the authors to include "policy-makers" explicitly as addressee of this assessment, for instance as follows "policy and decision makers."	Thank you, we have revised the draft accordingly
Government of New Zealand (Perry, Joanne)	Yes	Chapter 1	0	0	0	0	Chapter 1 general comments - This is an excellent chapter, comprehensive and well written. As a general recommendation for this and other chapters, where possible it would be good to include the common names alongside the taxonomic names for ease of reading by non technical specialists. For example on page 44 where there is a photo montage of IAS, the figure description on page 45 should also include the common names for the species in question.	Thank you, we have added the common names where possible.
Government of Sudan (Mohammed, El Khitma)	Yes	Chapter 1	0	0	0	0	The assessment is well desinged and covers all the concerns regarding IAS, the language of the report is simple and understandable. However, the arrangement of the ideas need to be concerned. As for example when you speak about certain issue e.g the impacts or threats of IAS it should be to be finalized then move to another issue such as the efforts made for managing IAS , drivers of IAS and so on. The chapter is also very long parts of it can be moved to other chapters.	Thank you for your comment. The structure of the chapter has been revised to reduce overlaps, and the sections have been shortened.
Maclean, Kirsten	No	Chapter 1	0	0	0	0	The word 'Indigenous' appears throughout the chapter with a small letter 'I'. Advise the editors/authors to capitalise 'Indigenous' whenever it occurs as this shows due respect to the value of Indigenous people, their knowledge and their contribution to this important area of work. This is the accepted practice among researchers and leaders (some of whom are also Indigenous) working with Indigenous peoples, leaders and research partners.	Thank you for your comment. While we agree that capitalising 'Indigenous' may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it..
Marchante, Elizabete	No	Chapter 1	0	0	0	0	"Convention on Biological Diversity" appears several times written in full throughout the text - maybe CBD can be used after the first appearance?	Thank you, we have addressed this in the final draft
Pan, Xubin	No	Chapter 1	0	0	0	0	Does the first chapter need the "Executive summary"?	Thank you for your comment. Executive summaries report on chapters' key findings. Chapter 1 being an introductory chapter, does not present any key findings and therefore does not include an executive summary.
Participants of ILK dialogue workshop (Florence Daguitan)	No	Chapter 1	0	0	0	0	For IPLCs, IAS are not immediately judged as harmful unless proven detrimental to an ecosystem; e.g golden kohol in the paddy fields; chromoleana odorata in banana farms, lantana camara in the pastureland. If proven harmful, they are then considered as "pests" and IPLCs proceed to look for them and experiment on how to manage and control them	Thank you, this has been added to Chapter 1
Participants of ILK dialogue workshop (Kalicharan Marandi)	No	Chapter 1	0	0	0	0	SPM A, Ch 1: Ipomea carnea (bush morning glory) is common IAS in Odisha state of India. However, there are as many as 60 IAS in Odisha. In our language we call it "Amari"	Thank you for this interesting example. A box on IAS names has been added to the draft, but as this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Participants of ILK dialogue workshop (Katie Kamelamela)	No	Chapter 1	0	0	0	0	Ch 1, SPM C, D: It is also important to highlight the diversity of practice and use around IAS across islands, within families and communities and between generations. Relational species/kinship species are very important in these considerations. There is also an impact on perception and use depending on higher historical and genealogical stories, about how or who introduced certain species. E.g. pig could be classified as IAS but is crucial to contemporary subsistence and ceremonies.	Thank you, this has been highlighted in Chapter 1.
Participants of ILK dialogue workshop (Katie Kamelamela)	No	Chapter 1	0	0	0	0	IAS often seems to be an economically driven term driven by agriculture and tourism. IPLCs are then asked to respond to a scientist's point of view of invasive species, but it may not inherently be a shared perspective. It is very complex for IPLCs. The very concept of IAS is potentially problematic.	Thank you for your comment.This issue is introduced in section 1.6.7.1 (Indigenous and local knowledge)
Uludag, Ahmet	No	Chapter 1	0	0	0	0	I think Millenium ecosystem assessment should be mentioned in this text where is appropriate such as drivers.	Thank you, the millennium ecosystem assessment is already mentioned in Chapter 1.
Diaz, Sandra	No	Chapter 1	1	1	1	1	General: This is an excellent introductory chapter. The effort to align with IPBES concepts and classifications is commendable and greatly improves the usefulness of this assessment. I only have small suggestions about this. The introduction is clear, through, with great figures. I particularly liked sections 1.5.6 to 1.5.9, which I found comprehensive and refreshing.	Thank you for your comments, much appreciated.
Evans, Thomas	No	Chapter 1	1	1	1	1	As a general comment, there seem to be few alien bird examples in this chapter. I have added some information below.	Thank you for your feedback.
Evans, Thomas	No	Chapter 1	1	1	9	10	Repetition of this point which is already stated at the start of the paragraph: 'far-reaching consequences for nature's contributions to people and good quality of life'	Thank you, this has been deleted

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Rojo, Iskra	No	Chapter 1	4	4	1	16	I think if the main subject of this assessment is invasive alien species the first write letters must be the concept invasive alien species, not like a foodnote	Thank you for your comment. The footnote has been removed.
Rojo, Iskra	No	Chapter 1	4	8	1	160	I think that the introduction of the theme is not clearly established, as well as its importance	Thank you, the chapter has been revised and now hopefully addresses your concerns.
Diaz, Sandra	No	Chapter 1	4	4	3	4	consider replacing " a major threat to nature and 3 nature's contributions to people..." with " a major threat to native nature and its contributions to people oaround the world". This is because technically speaking IAS are part of nature, see wider explanation in comments to conceptual framework figure.	Thank you, we followed your suggestion to clarify in the conceptual framework that for purposes of this assessment, although IAS are part of Nature, we will not focus on this aspect in this assessment.
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	4	5	3	3	Using footnote and referencing figure 1.1 for the definition is repitive. Suggest to delete footnote. Note also that Figure 1.1 is actually a Table, not a Figure.	Thank you, the footnote has been removed
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	4	5	3	41	Should start the text of the Introduction with a definition of what are IAS, and not leave it to a footnote. In Footnote 1 and Figure 1, this definition (and also Section 1.3) would appear to include crops and livestock. Is it really the objective of IPBES (or the CBD) to control the management of eminently beneficial organisms? Also, why should IAS be "introduced directly or indirectly by people"? Invasive alien species that introduce themselves, and those introduced by other species than people, should also be included. It is contradictory to this definition to have an entire Section 3.3.7 in Chapter 3 that is entirely about "natural direct drivers". It is difficult and subjective to identify human introduction, especially "indirectly" (Footnote 1), as opposed to "without unintentional intervention of humans" (Fig.1). This is particularly true in an era of climate change, i.e. not only the present time. These difficulties should be discussed in the text.	Thank you, the footnote has been removed. The definition has been set by IPBES member states in the scoping document (approved at IPBES 6) and may not be changed.
Grossart, Hans-Peter	No	Chapter 1	4	4	3	40	Introduction: I miss the concept of disturbance and the ir consequences in creating niches for invasive species, e.g. increased wild-fires will also lead to establishment to an increased fraction of invasive, alien species...	Thank you for this comment. We mention disturbance in a number of places including within a box on restoration and another on fire but do not explicitly define it as a concept.
Marchante, Elizabete	No	Chapter 1	4	4	3	3	I do not think the footnote is necessary as the same definition is repeated in Figure 1.1, which is also cited here.	Thank you, the footnote has been removed
Odé, Baudewijn	No	Chapter 1	4	4	3	3	I like to reflect on the definition in footnote 1: I understand the focus on species, but especially in plants human cultivation and ennoblement of species may result in plant races that thrive much better than the original and may be better adapted to less favourable circumstances. So, within a species, artificial races may become invasive in the native range of a species or invasive outside its range. Sometimes these races are the result of (partial) hybridisation (heterosis) or a mixture of different origins. Especially when these cultivated races are capable to overtake native races of the same species, their impacts may be neglected under the present definition. I think the examples in Chapter 3 (3.2.4.3) show the potential impacts, also in the native range of a species.	Thank you, this point has been clarified in section 1.3.1
Facon, Benoit	No	Chapter 1	4	4	4	4	Provide more precision when first using the term "good quality of life". At least, add the footnote here rather than p31 1838 "Please refer to the IPBES core glossary for the definition of IPBES conceptual framework terms: nature, nature's contributions to people, good quality of life, direct and indirect drivers of biodiversity change, and anthropogenic assets".	Thank you, we have added a footnote with reference to the IPBES core glossary for the terms nature, nature's contributions to people and good quality of life.
Government of Germany	Yes	Chapter 1	4	4	5	7	Clarification needed: Based on the SPM, which states that for 44% of species extinctions, IAS are the main driver (see Figure SPM.2), it seems that IAS are not only among the major drivers but rather "THE" main driver of extinctions. Please check.	Thank you, we have removed this statement from the SPM, which was causing a lot of confusion
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	4	4	6	6	Replace "extinctions" with "extirpations" -- "local species extinctions" is a contradiction in terms, because "extinction" means that no individuals are living anywhere.	Thanks for this suggested change. We have included it in the new version.
Government of Germany	Yes	Chapter 1	4	4	6	6	Proposal: The terms "terrestrial", and "freshwater" do not seem to have been defined in either the IAS assessment or the IPBES. It would be useful to know how exactly they are defined. Rationale: Freshwater systems are embedded in terrestrial environments.	Thank you. Your request has been forwarded to the IPBES MEP and Bureau, as it is beyond the scope of this assessment to define terrestrial and freshwater.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	4	4	8	8	add ...have dramatically altered "some" habitats...Otherwise this suggests that all habitats have been altered	Thank you, we have decided not to adopt this change, as the sentence does not imply all habitats.
Government of Germany	Yes	Chapter 1	4	4	11	12	Clarification is needed: it is not clear what is meant by "remarkable progress"- in particular, when it comes to "managing them (chapter 5)". Chapter 5 shows that there still seem to be quite substantial challenges in the management of IAS - in marine ecosystems in particular. It would therefore be useful to make this statement more explicit or nuanced in order to reflect the findings of chapter 5 more accurately.	Thank you, we have changed this word to "considerable"
Government of Germany	Yes	Chapter 1	4	4	15	16	Proposal: It is suggested to add "policy". The sentence would read (insert in bold): "... potential options for policy- and decision-making ..." - You may wish to carry out these changes in other parts of the chapter as well.	Thank you, we have revised the sentence accordingly
Facon, Benoit	No	Chapter 1	4	4	18	40	This section deals about the the consequences of human activities on the climate change that will undoubtedly exacerbate the impacts of biological invasions. It may be useful to indicate here that human activities are also at the origin of the expansion of international trade and human-altered habitats in similar ways worldwide (= global environmental homogenization). And both factors have a strong impact on invasions (see for instance Hufbauer et al. in Evol Appli (2012)).	Thank you, this section has been shortened and trade has been included earlier as suggested
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	4	4	18	18	The citation refers to establishments, rather than introductions.	Thank you for this suggestion. We have chosen not to include it in the assessment, because the reference refers to first records and although most will be established the term introduction is more parsimonious
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	4	4	18	40	This paragraph becomes confusing when description of past trends in IAS is suddenly mixed with contextual factors expected to influence future impacts. Suggest breaking this paragraph into two, one on trends of IAS and their impacts to date, the other on expected trends and exacerbating factors. Direction to address multiple drivers at the same time verges on policy prescriptive.	Thank you for your comment. We have revised the text accordingly.
Rojo, Iskra	No	Chapter 1	4	4	18	40	It focuses more on the climate when the main topic has not been well established and in chapter 2 it is mentioned that invasive species are not only related to climate change	Thanks for this suggested change. We have provided additional context to this section and referred to Chapter 3 in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	4	4	19	19	insert "by humans" after "introductions"	Thank you, we have revised the text accordingly
Chien, Herfin	No	Chapter 1	4	4	21	21	Prayer animal as invasive species is understudies everywhere in the world and can be an isolated category, separated from "cultural benefit". There I suggest to add "religious purpose" into economic, recreational, cultural benefit or religius purpose; please add Magellan, K. (2019). Prayer animal release: An understudied pathway for introduction of invasive aquatic species. Aquatic Ecosystem Health & Management, 22(4), 452-461.	Thank you, this article is included in Chapter 1
Government of Germany	Yes	Chapter 1	4	4	28	30	Proposal: We find this sentence slightly confusing. We think that the following could be meant: "The recent report (IPCC, 2021) of the Intergovernmental Panel on Climate Change (IPCC) provides unequivocal evidence of the profound ..." - Please check.	Thank you, we have revised the text accordingly
Alaux, Christine	No	Chapter 1	4	4	29	30	The « : » corresponding to the title of the report leads to an inappropriate breaking of the sentence. It would be better to write, for example, The recent Intergovernmental Panel on Climate Change (IPCC) report (IPCC, 2021), « Climate Change 2021: The Physical Science Basis », documents the unequivocal evidence...	Thank you, we have revised the text accordingly
Marchante, Elizabete	No	Chapter 1	4	4	31	36	This sentence needs some REFS to back it up, even more because the sentence starts with "... undoubtedly..."	Thank you, this sentence has been deleted.
Evans, Thomas	No	Chapter 1	4	4	35	35	Underlying factors? Should this be 'underlying drivers'?	Thank you, we have revised the text accordingly
Besek, Jordan Fox	No	Chapter 1	4	4	36	37	It would make sense to state here, on the first page, not only that "these drivers of environmental change" should be "addressed concurrently and not considered in isolation," but that these drivers themselves are interactive, and change through each other (as Box 1.1 makes clear, and again in lines 320-321, 378-381, and beyond).	Thank you, we have revised the text accordingly
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 1	4	4	41	41	In the definition of native species the last line specifies that native species that have adverse effects are not considered invasive alien species but there are native species that have been translocated and are native to the country but alien to the region. Also there are native species that due to climate change are becoming dominant and even a problem without leaving their native area. While they may not be considered "alien" could they be considered native invasive species?	Thank you for your comment - we agree that this can be the case but it is not within the scope of this assessment. However we do mention such species.

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Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 1	4	4	41	41	in the general definition for invasive species include not only organisms but also propagules or parts of such organism that could survive and reproduce https://www.cabi.org/isc/definitionsanddatasources	Thank you for your comment - these are part of the species.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 1	4	4	41	41	In the impacts box given that it states that alien species can provide benefits, consider adding "impacts can thus be either positive or negative". In this case the definition for invasive alien species should specify "and are generating a negative impact on local ecosystems..."	Thank you for your comment - this is explained in the main text but the scoping document definition has been agreed.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 1	4	4	41	41	Please include these definitions in the Glossary, they are essential definitions for the topic of interest and should be included there as well.	Thank you, definitions of invasive alien species, alien species and impacts have been added to the glossary
Outinen, Okko	No	Chapter 1	4	5	41	42	Figure 1.1: middle column (Established). "Established (synonym naturalized) alien species sustain self-replacing populations for several life cycles or for a given period of time..." The word 'several' is vague. I would remove the words 'for several life cycles or' and leave everything else as it is.	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Sagoff, Mark	No	Chapter 1	4	5	41	45	Figure 1.1: These definitions are clear and authoritative. I have a grammatical quibble in the phrase "introduced directly or indirectly by people into places out of their natural range of distribution..." The pronoun "their" grammatically refers to the last antecedent noun, "people." This suggests that it's the people not the species that are out of their natural range. What I applaud in these definitions is the unambiguous implication that native and alien species differ not in their biology (there are no characteristic biological differences between them) but in their history. In the absence of historical knowledge, it is impossible to differentiate between native and alien species.	Thank you for this suggestion. We have clarified the point in the text that follows but the definition is quoted was agreed within the scoping document
Government of Canada (Ariey-Jougard, Rachel Tu-Van)	Yes	Chapter 1	5	5	41	42	This comment is Figure 1.1. In the top box, IAS are deemed IAS if they are introduced by people. However, non-human mediated pathways also exist (e.g., floods, natural dispersion). As such, it could be beneficial to include other pathways, while noting that most actions may be done to address human-mediated pathways. These pathways are included in Chapter 2 Table 2.1. On "Impacts": IAS are generally understood to be considered invasive alien species when they have a negative impact on the environment, the economy, or society. Including alien species that may have benefits (especially as it seems that a lot of the examples provided relate to agricultural crops) would dilute the purpose of the assessment and may make the assessment less useful for governments and actors trying to address the threat of IAS. On "established": the authors include naturalized as a synonym to established; however, an alien species could become naturalized without becoming an IAS (that would have negative impacts). As such, adding a definition of naturalized and showing how it is different from established would be helpful. Furthermore, since IAS are considered IAS once established, it may be preferable in this chapter and the assessment as a whole to use the word establishment when speaking of IAS. this may avoid confusion.	Thank you for your comment. We include the pathways you describe for secondary spread but noting that the definition of IAS includes human actions in the movement of the species. The Assessment focuses on negative impacts but in line with the scoping document acknowledged positive impacts too where appropriate. The term established is used throughout but naturalised is given as a synonym.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	5	5	41	41	Figure 1.1: Native Species: not clear why "this definition excludes products of hybridization involving alien taxa" since an alien parent could be introduced by non-human agency. This marks one of the weaknesses of defining IAS as necessarily including human agency.	Thank you for your comment - this is explained in the text.
Grossart, Hans-Peter	No	Chapter 1	5	5	41	41	Figure 1.1, in the last row under impacts, I miss the word ecosystem functions, biochemical cycles, which is more than is currently described...	Thank you for your comment - this is captured in Nature's Contributions to People.
Uludag, Ahmet	No	Chapter 1	5	5	41	42	Figure 1.1: An alien species can be "established" or "naturalized" without being invasive. See line 293, 325 and 326 which has the same idea with me.	Thank you for your comment - we agree and the definition of alien species does not mention impact but the definition of INVASIVE alien species includes impact
Uludag, Ahmet	No	Chapter 1	5	5	41	42	Figure 1.1: definition can be better "any kind of organisms" instead of "animals plants or ..."	Thank you for your comment - this text is within the agreed definition published in the scoping document
Uludag, Ahmet	No	Chapter 1	5	5	41	42	Figure 1.1: does "introduced" necessarily invasive? Is not an alien species "introduced"?	Thank you for your comment - this is captured in the definition
Uludag, Ahmet	No	Chapter 1	5	5	41	42	Figure 1.1: should be added "ecosystem services" or "socio-economy" because "ecosystems and species" do not cover impact on ecosystem services directly. My idea can be seen on line 108 and 216	Thank you for your comment - this is captured in Nature's Contributions to People.
Uludag, Ahmet	No	Chapter 1	5	5	41	42	Figure 1.1: What if a species arrived by migrating birds without human involvement but established most probably due to climate change or any other effect? It is alien but this definition exclude it. Furthermore, biogeographic area can be used in this definition.	Thank you for your comment - we expand in the text on your point.
Uludag, Ahmet	No	Chapter 1	5	5	41	42	Figure 1.1: word "exotic" has been used in many documents but word "interesting" is in definition of exotic, makes this harmful species kind, lovely. So, it should be avoided to use. See. Cambridge dictionary.	Thank you for your comment - exotic remains a synonym.
Ahimbisibwe, Imran	No	Chapter 1	5	5	42	45	Figure 1.1: it is important to note that in the standard definition of IAS in CBD, puts emphasis on the phrase "alien". Implying that when a native species becomes invasive in its natural range of distribution, it does not become an IAS. However when a species is dispersed by whatever means beyond its natural range of distribution, the new arrival is considered an IAS. The chapter should clarify on the ambiguity of different definitions of IAS terms and give a standard definition that is consistent with CBD. What if species are dispersed by migrating birds, animals or swarms of locusts that cross continents? does it mean that these are not covered by the IAS program ?. it is true that most of the historical introductions were anthropogenic nevertheless "introduced by people" limits the scope of the rather broader coverage of CBD target. consider removing "introduced by people" from the definition to avoid creating a loophole for introductions of IAS by profit minded individuals. A stricture should be recommended in CBD to make it an offence to introduce intentionally or unintentionally an IAS outside its natural distribution range.	Thank you for your comment. The definition adopted by IPBES member states differs from the CBD one (please refer to the scoping report for this assessment, adopted at IPBES-6.
Chien, Herlin	No	Chapter 1	5	5	42	42	Figure 1.1: Have we consider the interactive impact between climate change (mentioned on p. 7, line 96 yet it is not clear in this Figure 1) and migratory activities of invasive species due to natural pressure? Or are we only accounting "human" influence of invasive species? Moinka, S. A., & Howard, G. W. (2010). Climate change and invasive species: double jeopardy. Integrative Zoology, 5(2), 102-111.	Thank you for your comment - this is addressed in the report.
Estoup, Arnaud	No	Chapter 1	5	5	42	45	Figure 1.1 – column « Dispersal (or spread) » – add at the end of the text in this column (...by current or or by means of human-mediated transportation).	Thanks for this suggested change of wording. It is an improvement and we have adopted it.
Facon, Benoit	No	Chapter 1	5	5	42	42	According to the definitions given in the figure 1.1, an invasive species corresponds to a species "generating an impact on local ecosystems and species" and alien means "introduced in a given region linked to human activities". So there could be invasive native species as for instance the wild boar <i>Sus scrofa</i> in Europe. In the first column, you wrote: "Some native species can spread or undergo rapid population increase and have harmful impacts. Despite their adverse effects, such native species are not considered invasive alien species (Wallingford et al., 2020). I agree but these species could be considered as invasive native species. See for instance Valery et al. in Oikos (2013).	Thank you for your comment - we agree that this can be the case but it is not within the scope of this assessment. However we do mention such species.

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Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	5	5	42	42	<p>Fig 1.1 would be better presented as a text box, with the footnotes contained within it. It's very useful to have this definition presented in detail.</p> <ul style="list-style-type: none"> - Alien: Equating direct with intentional and indirect with unintentional introductions does not seem warranted. Escape is an example of direct but unintentional action - these species are deliberately transported. A release would provide the contrasting direct and intentional action. - Dispersal: Clarity could be added by noting that dispersal can be by individuals or propagules. - Impacts: please see related note below. <p>The definition also needs to be applied consistently throughout the assessment: in this draft, non-problematic cultivated species sometimes seem to be included with invasive species. Microbial species are treated inconsistently: in some parts of the text, disease-causing organisms and pests that spread with their host IAS do not seem to be considered to be IAS. A decision as to whether these are included is important to be able to interpret findings such as in Chapter 4, where few impacts are reported from microorganisms.</p> <p>The CBD definition is widely used and it could be considered for use here, rather than increasing the number of competing definitions. Noting that negative impacts under the IPBES definition should consider not only negative impacts on nature, but negative impacts on nature's contributions to people and good quality of life, it may be logical for the IPBES definition to be broader than those used by the CBD and IUCN. A comparison among the definition used for the assessment, the IPBES core definition and the CBD and IUCN definitions, and in particular the identification of any areas where the definitions are not equivalent, would be helpful.</p>	Thank you for your comment - we have addressed these points in the main text. We have removed the link between indirectly and directly and unintentionally and intentionally. We have applied the definition consistently throughout. The definition aligns with the scoping document.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	5	5	42	42	<p>Figure 1.1: The Canadian review team team struggled with the issue of impacts in the IAS definition. The definition needs to be clear that alien species must have (at least some) negative impacts before they are considered invasive, in keeping with the typical usage of the term (including definitions in the IPBES core glossary and the one used by the CBD). We recognize that the current definition has come forward through the IPBES scoping process, yet it does not meet the needs for this assessment, which is intended to provide information and policy-relevant options. For the assessment to be useful, it must be very clear what would be covered by such a policy.</p> <p>In particular, Chapter 1 should make clear that i) cultivated species are not invasive unless they establish in areas where they are undesirable, ii) alien weed species are invasive even if they occur only in cultivated areas, and iii) established and spreading alien species with only positive known impacts (hypothetical examples might include successful biocontrol agents or species used in restoration) may be potential invasive species but are not considered invasive until and unless negative impacts are observed.</p>	Thank you for your comment - we have clarified these points and added clarification in the main chapter text in relation to domestic and managed species. "Domestic or managed animals and plants are not considered to be invasive alien species while they remain in captivity or managed by humans but such species that establish populations in the wild and follow the definition would be termed invasive alien species"
Government of Germany	Yes	Chapter 1	5	5	42	42	<p>Clarification is needed: The second column in figure 1.1 states "Native species that expand their natural range without intentional or unintentional human involvement, for example in response to changes in land use and climate change, are not considered to be alien species." It is suggested to revise this sentence in order to make it clearer whether the examples given refer to man-made or non-man-made drivers. Currently, both drivers are taking effect predominantly due to human involvement while in an historic/ long-term perspective these processes also took place naturally.</p>	Thank you for your comment - we have clarified the text with "other anthropogenic drivers such as "
Government of Germany	Yes	Chapter 1	5	5	42	45	<p>Figure 1.1: Clarification required:</p> <p>For the purpose of the assessment, the definition of IAS was provided under Annex III to decision IPBES-4/1. We acknowledge that this definition is quite general in the sense that it just talks about "impact", without specifying, whether the term "impact" includes detrimental as well as beneficial effects of IAS. It is therefore suggested to follow up on the IAS definition by providing some more specific information on how the definition is being applied in this assessment. Without such additional information (which should be provided early on in this report), the narrative of the assessment may be difficult to understand (e.g. L277 mentions beneficial impacts in a section that is actually targeting detrimental impacts). Please always specify what kind of impact is meant - negative, positive, or both? And among impacts on the local ecosystem and species, impacts on biotopes and ecosystem services should be added too. Please note, whereas it is important to acknowledge beneficial impacts of alien species, it may be questionable to define those alien species as IAS that have exclusively beneficial impacts.</p>	Thank you for your comment - we have clarified this throughout
Government of Germany	Yes	Chapter 1	5	5	42	45	<p>Proposal: Figure 1.1: Please ensure that all technical terms are clearly defined when they are used for the first time in the report. Some definitions seem to be missing altogether (for instance, "biological invasions"). Please make sure that all definitions allow a clear separation between terms (e.g. invasive alien species vs. alien species) and use the terms consistently throughout the entire report.</p>	Thank you for your suggestion, we have revised the draft accordingly
Government of Germany	Yes	Chapter 1	5	5	42	42	<p>Clarification is needed: The second column in figure 1.1 states "Native species that expand their natural range without intentional or unintentional human involvement, for example in response to changes in land use and climate change, are not considered to be alien species." It is suggested to revise this sentence in order to make it clearer whether the examples given refer to man-made or non-man-made drivers. Currently, both drivers are taking effect predominantly due to human involvement while in an historic/ long-term perspective these processes also took place naturally.</p>	Thank you for your suggestion - we have a separate Box on pathways
Marchante, Elizabete	No	Chapter 1	5	5	42	45	<p>Figure 1.1: Perhaps this figure could be named Table - when I first saw it I thought it was missing a caption because it looks more like a table.</p>	Thank you, the table is now a figure
Martin, Jean-Louis	No	Chapter 1	5	5	42	42	<p>Figure 1.1. What about crop species that are for many non native to the area were they are grown. As these are sometimes given as examples to minimize the issues related to non native species would a special comment mentioning that most crops species have been selected towards human needs and in the process for most of them have seen their potential to thrive without human help highly reduced making them very unlikely to become problematic invaders. I mention this here in case the question has not been dealt with. E.g. see Chapter 2 page 152 lines 5485 to 5500</p>	Thank you for your suggestion - we have included mention of crops "Domestic or managed animals and plants are not considered to be invasive alien species while they remain in captivity or managed by humans but such species that establish populations outside of captivity or cultivation and would be termed invasive alien species. " but we have decided not to include further detail. Chapter 2 refers to pests and diseases brought introduced into cultivated areas.
Pan, Xubin	No	Chapter 1	5	5	42	42	<p>Figure 1.1: Is it a Figure or Table or Box?</p>	Thank you, the table is now a figure
Alaux, Christine	No	Chapter 1	6	6	46	74	<p>Box 1.1: It would be better to include in Box 11 some photographs of the invasive plants mentioned as <i>Melinis minutiflora</i>, <i>Urochloa brizantha</i> or <i>Bromus tectorum</i>, or even of a fire linked to these plants</p>	Thank you, we have added a photo to the box
White, Michael	No	Chapter 1	6	6	52	52	<p>Box 1.1: The world is a sphere not a cube, it does not have corners</p>	Thank you, we have revised the text accordingly
Government of Canada (Arsenault, Andre)	Yes	Chapter 1	6	6	61	64	<p>Box 1.1: It is not just the amount of fuel, it is the continuity, and flammability that lead to severe fires and fundamental change to the natural plant community and associated ecological processes.</p> <p>I suggest the following change</p> <p>In Mediterranean climates and other semi-arid ecosystems, some land use practices, such as overgrazing, has resulted in significant increases in invasive alien European grasses such as <i>Bromus tectorum</i> that increase fuel load, continuity, and flammability and creates a positive feedback between severe grass fires and the invasive plant that results in many negative changes of natural grasslands and shrub steppe ecosystems and services (e.g., Western North America, see Pyke et al., 2016).</p>	Thank you, we have made some changes, but prefer to keep the sentence short
Government of Canada (Arsenault, Andre)	Yes	Chapter 1	6	6	64	66	<p>Box 1.1: This sentence is not clear "In areas of the Southern hemisphere with Mediterranean and temperate 64 climates, shrubs and trees native to fire-prone ecosystems may cause extreme changes in fire regimes. " Perhaps you mean when fire adapted species become introduced in new ecosystems?</p>	Thank you, we have changed the beginning of the sentence but think it is clear and easy to understand as is
Marchante, Elizabete	No	Chapter 1	6	6	64	68	<p>Box 1.1: The examples with <i>Acacia</i> spp used in Le Maitre et al 2011 are not restricted to the southern hemisphere, so I suggest deleting "Southern Hemisphere" from line 64 and adding "Europe" to line 66.</p>	Thank you, we have revised the draft accordingly
Government of Canada (Arsenault, Andre)	Yes	Chapter 1	6	6	68	70	<p>Box 1.1: I propose a change because the potential feedback has not been observed yet but is likely to occur. Similar positive potential feedback between invasive alien species and fires has been projected for <i>Pinus</i> across several ecosystems in the southern hemisphere (Cóbar-Carranza et al., 2014; Taylor et al., 2017).</p>	Thank you, but we have enough evidence to say that it has been observed (see additional reference added)
Marchante, Elizabete	No	Chapter 1	6	6	72	74	<p>Box 1.1: It is missing a REF to back up this sentence</p>	Thank you, we have added a reference
Facon, Benoit	No	Chapter 1	6	6	76	89	<p>I would add the scientific challenge in addition to the environmental, economic, social and cultural challenges.</p>	Thank you for your comment. We agree that there are scientific challenges but this list refers to impact categories of biological invasions.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Marchante, Elizabete	No	Chapter 1	6	6	80	80	And countries that have legislation don't implement it uniformly - maybe it's worth including this idea, that is, it's not enough to have legislation, you have to implement it. See eg https://ec.europa.eu/commission/presscorner/detail/en/ip_22_748 regarding implementation of EU IAS Regulation	Thank you, this is further developed in Chapter 6.
Marchante, Elizabete	No	Chapter 1	6	6	83	89	Long sentence. I suggest making a point after "...has emerged".	Thank you, the text has been revised accordingly in the final draft
Sagoff, Mark	No	Chapter 1	6	7	88	91	This statement is true. One could add that alien species vastly outnumber native ones on many or most oceanic islands and many other places -- especially if one takes into account the evolution of new species that results, e.g., by hybridization. See Thomas, C. D. (2017). Inheritors of the Earth: How nature is thriving in an age of extinction. Hachette UK. One can imagine an environment in which a blooming, buzzing confusion of alien and novel species outnumber native ones, both in variety and population counts, by an order of magnitude, and engage in almost all of the ecological interactions found there. This kind of environment, which may be or become dominant, would not in the least contradict the IPBES findings, which reserve the concepts "nature" and "biodiversity" to native or naturalized species untainted by the human stain. These may have all vanished over a century ago. See George Perkins Marsh, <i>The Earth as Modified by Human Action</i> (1874; rev. ed., 1885).	Thank you, this is developed in Chapter 2.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	7	7	90	90	Saturation would be a signal that ecosystems were "full" and no niches remained for new IAS. When discussing the effectiveness of controls, it would be more appropriate to say numbers of IAS are not levelling off.	Thank you, we have revised the text accordingly
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	7	7	99	102	Language in this chapter seems to be addressed to non-specialists, and it may therefore be worthwhile to make it clear that the pandemic is the result of the rapid expansion of a coronavirus beyond its native range, clearly identifying the virus as an IAS.	Thank you for your comment - viruses are not considered to be species and so cannot be included as an IAS in this context.
Government of Germany	Yes	Chapter 1	7	7	99	99	Clarification is needed: The IPBES glossary provides a definition of "nature" which includes different views, which may not see "nature and people" as separate entities. Separating "nature and people" in this introductory section may therefore need some more explanation against the background of the definition used by IPBES.	Thank you, but we do not think this goes against the IPBES definitions. Nature and people can be seen as separate and interacting entities (see Global Assessment)
Sagoff, Mark	No	Chapter 1	7	7	99	103	I am not sure that any alien species figured in the pandemic. The cave bats were native to China; the original proto-virus was collected and identified by the Wuhan Institute of Virology and possibly souped up at its lab (by gain-of-function research) and leaked. Human beings (not bats) then transmitted it worldwide. It is not clear that invasive alien species were involved, unless humans, who may have developed, introduced, and certainly spread the virus are considered alien species. The virus itself is not a living thing but a sort of machine, I think. Not sure it can be considered a species or even an organism..	Thank you for your comment - we agree with your statement but the point is made about the links between disease and biodiversity change.
Besek, Jordan Fox	No	Chapter 1	7	7	103	105	If the overly vague and largely unhelpful term "the Anthropocene" is going to be invoked, I would recommend that the authors also connect the global rise of AIS to colonialism, which can be done through citing Alfred Crosby's <i>The Columbian Exchange</i> (1972) or <i>Biological Imperialism</i> (1986). These deal with much more definite times and processes than the Anthropocene, a concept whose temporal and spatial boundaries are still up for debate. I will also note that these books should be included figure 1.2, as they are the initial studies on the biology of the Columbian exchange and colonialism, processes Elton himself saw as major landmarks. (Crosby's work is indeed cited in section 1.5.6. pp. 1133-1134.)	Thank you, we have revised the text to clarify
Government of Germany	Yes	Chapter 1	7	7	104	104	Proposal: Please be aware that the concept of anthropocene has been an object of critique as it conceals different responsibilities and vulnerabilities, power imbalances and inequalities by its use of the species category (a whole range of critical publications can be found here: https://www.annualreviews.org/doi/10.1146/annurev-anthro-102218-011317) It is therefore suggested to make this critique visible (e.g. by introducing it in a footnote) when using the term in the running text (here and also in other parts of this chapter, the assessment and SPM). See also p. 46 l. 1164-1167 in this chapter.	Thank you, we have revised the text to clarify
Government of Sudan (Mohammed, El Khitma)	Yes	Chapter 1	7	7	105	119	to avoid contradiction, the para may start with; Despite the rapidly growing threat that.....up to the end of line 119 concerns over the impacts (line 105).....up to the end of line 116.	Thank you, we have added a sentence to address this comment
Tassin, Jacques	No	Chapter 1	7	7	108	108	nature and environment are absolutely not the same	Thank you, we have revised the text accordingly
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	7	7	117	119	The statement that "the rapidly growing threat that invasive alien species pose to nature, nature's contributions to people, and good quality of life remains overlooked and, in some cases, poorly understood by policy and decision makers" needs to be further nuanced. In particular, this threat has long been recognized by the agriculture and food sector, which has taken action against alien invasive weeds and epizootics, in particular, and established global instruments: the International Plant Protection Convention (revised in 1997) and the World Organization for Animal Health (OIE, established in 1924) which are discussed later in the assessment.	Thank you, we have revised the text accordingly
Rojo, Iskra	No	Chapter 1	7	8	121	160	Box 1.2: I would not call the existence of these proposals goals yet because they need to be evaluated and some are still under construction. It is an important advance but its mere existence will not magically solve the problems	Thank you, we have renamed them "policy targets"
Government of Canada (Ariey-Jouglaard, Rachel Tu-Van)	Yes	Chapter 1	7	7	126	127	Box 1.2: It could be worth referencing Article 8(h) of the Convention on Biological Diversity to showcase how addressing IAS is at the core of the Convention. https://www.cbd.int/ib/2009/about/cbd/	Thank you, we have revised the text accordingly
Evans, Thomas	No	Chapter 1	7	7	130	130	Box 1.2: The ending of this paragraph does not flow with next paragraph.	Thank you, we have revised the text accordingly
Government of Canada (Ariey-Jouglaard, Rachel Tu-Van)	Yes	Chapter 1	8	8	144	147	I would like to suggest that the authors review what is the broader policy context of the CBD. It aims at conserving (vs. saving) biodiversity, as well as ensuring the sustainable use of biodiversity (there is a third goal too linked to fair and equitable access). This sentence may need to be revised to more closely fit with the CBD policy context.	Thank you, we have edited the text accordingly.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	8	8	146	146	Box 1.2: the CBD does not have a mandate to enhance benefits for people, only to ensure use of biodiversity is sustainable and that benefits from genetic resources are equitably shared.	Thank you, we have edited the text accordingly.
Martin, Jean-Louis	No	Chapter 1	8	8	150	150	Box 1.2: doesn't saying that the Aichi objectives "were not met in their entirety" read like an euphemism? See "Xu, H., Cao, Y., Yu, D., Cao, M., He, Y., Gill, M., & Pereira, H. M. (2021). Ensuring effective implementation of the post-2020 global biodiversity targets. <i>Nature Ecology & Evolution</i> , 5(4), 411-418."	Thanks for your comment. This is further developed in Chapter 6
White, Michael	No	Chapter 1	8	8	150	152	Box 1.2: Let's be honest: not a single Aichi target was completed by 2020: our best hope is now SDGs. A worry is that returning to Aichi means the SDGs fail too.	Thanks for your comment. This is further developed in Chapter 6
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	8	8	152	152	Box 1.2: this is policy prescriptive and therefore outside the mandate of IPBES	Thank you, we have removed this sentence
Ahimbisibwe, Imran	No	Chapter 1	8	8	155	158	let us remove ambiguity from Target 6 of GBF: "Manage pathways for the introduction of invasive alien species, preventing, or reducing their rate of introduction and establishment by at least 50%, and control or eradicate invasive alien species to eliminate or reduce their impacts, focusing on priority species and priority sites." suggested statement of new Target 6: Identify and block pathways of invasive alien species, preventing their introduction and establishment by at least 90%, control and eradicate them, to eliminate their impacts, focusing first, on priority species and sites. Justification for suggested changes in target 6 is mainly the concern that the first half of the statement denotes a different implication from that of CBD text. Whereas CBD clearly and specifically calls for prevention of introduction (Article 8h), target 6 in GBF quoted above seeks to "manage pathways for the introduction of IAS" these are two different propositions. Besides the term "manage" is broad and can be easily misinterpreted while "prevent" is specific and clear. let me again enlighten authors on the use of the terminology "invasive" this implicitly refers to the nature or behavior of the species that cannot be managed. if they were just alien species then management systems would apply but in the present circumstances it is illogical to attempt to manage IAS. The designers of CBD in Rio were fully aware of the policy option of management but they did not include it in the text simply because they categorized the species as invasive - they invade and decimate populations of native species, establish and dominate the newly occupied range leading to distortions and destructions of habitats. The changes are unacceptable socially and undermine the provisioning and regulating roles of ecosystems. Furthermore we are obliged under the United Nations principle of intergenerational equity to correct utterly the mistakes we made or repair the damages we inflicted on nature such that we don't pass on the brunt of environmental degradation to the next generation. We should therefore aim higher than 50% to close all pathways of and eradicate IAS	Thank you, we have included the target as approved by the CBD COP-26.
Government of Argentina	Yes	Chapter 1	8	8	155	160	Box 1.2: We request to delete the reference to the target 6 of the first draft of the post 2020 global biodiversity framework. This is a process underway, the first draft has not been agreed nor negotiated by Parties, it cannot be placed in a box regarding "international policy goals for invasive alien species" because it is not a goal that has been approved. In particular, it is confusing to have it together with the SDGs and the Aichi Biodiversity Targets, which have been multilaterally negotiated and agreed.	Thank you, we have included the target as approved by the CBD COP-26.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Evans, Thomas	No	Chapter 1	9	10	161	162	Figure 1.2 There are no bird examples. Maybe you could add an example of a widespread bird e.g., the Common starling (<i>Sturnus vulgaris</i>) to the USA? In chapter 2 at lines 742 to 745 the starling introduction to the USA is discussed and a reference provided that you could use (Linz et al 2007).	Thank you, we have added a bird example, but from another region to ensure regional balance
Evans, Thomas	No	Chapter 1	9	10	161	162	Figure 1.2. Some alien species have common names included and others do not (e.g., red-eared slider). Further, some are described in plural e.g., European rabbits; other not e.g., Cane toad.	Thank you, this has been harmonized in the revised version
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	9	11	161	167	Figure 1.2: Should move Figure 2 up closer to the first reference to it on Page 6 Line 72.	Thank you, we have moved the figure earlier as suggested
Marchante, Elizabete	No	Chapter 1	9	9	161	161	Figure 1.2: Not sure this is relevant, but for <i>Acacia dealbata</i> there is earlier introductions at least in France, in the 1790s (Sheppard et al 2006, https://doi.org/10.1111/j.1365-3180.2006.00497.x ; and <i>Ponderia crassipes</i> is a synonym for <i>Eichhornia crassipes</i> that is used in pages 43 and 128	Thank you, we have revised the text accordingly
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	9	10	162	162	Figure 1.2 - text on figures seems a bit fuzzy; suggest to use a larger or different font to improve the readability	Thank you, we have revised the figure accordingly
Facon, Benoit	No	Chapter 1	9	10	163	163	Figure 1.2: The scale change of the x-axis between the first part (p9) and the second part (p10) of the figure 1.2 is disturbing to correctly apprehend the evolution of the number of first records of alien species	Thank you, we have revised the figure accordingly
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	10	10	162	162	Figure 1.2: Ballast water management Convention was 'published' (signed/adopted) in 2004, but entered into force in 2017. To be consistent with the other entries, suggest using 2004 and stating 'Adoption of ...'	Thank you, we have revised the figure accordingly
Government of USA	Yes	Chapter 1	10	10	162	162	Fig. 1.2 does a poor job of capturing major events. For example, Rachel Carson's book is of little significance. It was mostly about pesticides. However missing are major events such as the first plant regulatory agreement: "International Convention on Measures to be taken against <i>Phylloxera vastatrix</i> " and the "Plant Quarantine Act" in 1912 in the US	Thank you, we have added the "International Convention on Measures to be taken against <i>Phylloxera vastatrix</i> " but not the "Plant Quarantine Act" in 1912 in the US to ensure regional balance in the examples
Ahimbisibwe, Imran	No	Chapter 1	11	11	171	171	in the terms of references for authors it should be indicated clearly that their work must be consistent with articles of UN CBD. Introducing new ideas or views that contradict work already covered tantamount to irrelevancy and a waste of time. IAS are detrimental to biological diversity and to socioeconomic aspects in SEPLS in the context of CBD. this assessment seeks to explicate more on this position and to come up with policy options to address the problems at hand. authors that acknowledge economic benefits of IAS are therefore straying in attempt to rewrite CBD or mislead the process. let them be advised to stick to facts as stipulated in the CBD document. Article 8 h of CBD states that parties shall prevent the introduction of IAS, control and eradicate IAS that threaten ecosystems, habitats and species. it does not talk about harnessing them for their economic benefits.	Thank you, the scope of the assessment is outlined in the scoping report, approved by IPBES member states at their 6th Plenary
Government of Canada (Aricy-Jougard, Rachel Tu-Van)	Yes	Chapter 1	11	11	171	173	As mentioned earlier, including benefits of IAS should be done carefully. There may be instances where, in a specific location, mitigation efforts may provide some benefits, but generally, IAS are considered IAS when they have negative impacts.	Thank you, we have revised the text accordingly and noted the importance of context
Rojo, Iskra	No	Chapter 1	11	11	174	174	Maybe say "practices (preventive, corrective and mitigating)" to start establishing semantic categories to be used later	Thank you, we have revised the text accordingly, following the assessment's terminology
Grossart, Hans-Peter	No	Chapter 1	11	11	183	206	Box 1.3: I miss the point that often invasive species remain unrecognized for a long time, in particular microorganisms, which prevents effective mitigation measures...	Thank you, these questions have been set by the IPBES member states in the scoping report for this assessment.
Ahimbisibwe, Imran	No	Chapter 1	11	11	188	189	Box 1.3: it is not clear what the term management implies here. Control of IAS or to manage their pathways in order to prevent their introduction (see lines 155-158) is where the term management is acceptably deployed. but management of IAS for economic benefits is quite different. CBD does not provide for management of IAS that produce economic benefits. it rather calls for eradication of IAS that degrade the environment irrespective of their economic value. put simply CBD was developed to protect biological diversity from anthropogenic activities with negative environmental impacts among other things. introducing in this assessment the idea of management of IAS for economic benefits is not only unlawful but also is reasoning in circles that drags the debate on and on for ages, which has become phenomenon with all multilateral environmental agreements. the question as phrased is not necessary or is out of context. Should be stated thus: What global-policy level initiatives would assist in invasive alien species prevention? omit the term management please.	Thank you, these questions have been set by the IPBES member states in the scoping report for this assessment. A definition of management is provided in the glossary
Evans, Thomas	No	Chapter 1	11	11	198	198	Box 1.3: 'Would there be value in developing'... would this be better phrased as 'What are the benefits of developing...'	Thank you, these questions have been set by the IPBES member states in the scoping report for this assessment.
Ahimbisibwe, Imran	No	Chapter 1	11	11	201	202	Box 1.3: when the assessment starts asking about benefits of IAS in ecosystem services and biological diversity, it is explicitly contradicting CBD. implying that either the assessment or CBD is irrelevant in this process. Recall that the designers of CBD in Rio 1992 were fully aware of economic merits of IAS. However it was agreed by parties after careful consideration that environmental costs of IAS do not justify their economic significance. consequently the convention opted for their eradication instead given their negative impact on ecosystem and human health and on biological diversity. Events in Rio portrayed global reaction to ramifications of unsustainable utilisation of natural resources for rapid economic development goals with grim repercussions for human life survival on planet earth. the role of current assessments is to update baselines established during the development of CBD and to support implementation of CBD Articles. It is therefore technically wrong for the assessment to introduce new ideas or views that contradict the principles laid down by parties in Rio.	Thank you, these questions have been set by the IPBES member states in the scoping report for this assessment.
Ahimbisibwe, Imran	No	Chapter 1	11	11	205	206	Box 1.3: the controversy now sets in. this is a clear indication of how the assessment is getting derailed. let there be no confusion, CBD deals with prevention of introduction and not management of IAS for economic exploitation.	Thank you, these questions have been set by the IPBES member states in the scoping report for this assessment.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	11	11	205	206	Box 1.3: should delete or rephrase question (k). For example: "How to prevent and manage harm to biodiversity caused by species that contribute to economic activities?" This assumes that such species (e.g. crops and livestock) are not defined as invasive alien species.	Thank you, these questions have been set by the IPBES member states in the scoping report for this assessment.
Rojo, Iskra	No	Chapter 1	12	12	218	218	to emphasize that it is done with the conjunction of all the actors, including politicians and science as co-responsible	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Government of Sudan (Mohammed, El Khitma)	Yes	Chapter 1	12	12	222	223	This is inline with the above comment	Thank you for your comment. It is noted.
White, Michael	No	Chapter 1	12	12	224	225	Many discarded industrial fishing items and bits of oceanic plastic transport IAS	Thank you for this comment. We agree, but feel it is too specific for inclusion here.
Uludag, Ahmet	No	Chapter 1	13	13	171	171	"The authors acknowledge" I respect the authors but this is an IPBES document.	Thank you, we have revised the text accordingly
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	13	13	244	244	Should add "agro-ecosystems" or "cultivated areas" since the effect of IAS is quite particular in these ecosystems and discussion of them must include the ecosystem service of providing food, which is illustrated in Figure 1.9 on Page 32.	Thank you, this sentence has been deleted, but the aim was to introduce the broad context (terrestrial, marine and freshwater areas include agro-ecosystems). The units of analysis are introduced later in the chapter
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	13	13	251	251	Figure 1.3 - note that the order of icons in Chapter 1 schematic is different than the legend - suggest to change the order in the legend to match the figure (i.e. globalization and citizen science). Also, text for each chapter is very small and difficult to read on the figure. Please increase/use different font.	Thank you, the figure has been revised accordingly.
Government of Germany	Yes	Chapter 1	13	13	251	251	Proposal: Figure 1.3: We congratulate the design team to this illustrative and neat figure. However, we strongly recommend to replace the icon for ILK in consultation with the Task Force for ILK. The current icon is loaded with stereotypes of indigenous people (as half-naked people) reflecting exoticization and othering.	Agreed, we have changed this
Grossart, Hans-Peter	No	Chapter 1	13	13	251	251	Legend Figure 1.3: order of adaptation and citizen science should be reversed...	Thank you, the figure has been revised accordingly.
White, Michael	No	Chapter 1	13	13	251	251	Figure 1.3: Great schematic, well done	Thank you for your feedback.
Evans, Thomas	No	Chapter 1	13	13	252	252	Figure 1.3 The text for 6 Future Options doesn't quite flow. Instead of 'and provides' maybe 'including'?	Thank you, the figure has been revised accordingly.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	13	13	258	258	"recommendations" should be "options"	Thank you, this has been revised in the final draft
Evans, Thomas	No	Chapter 1	14	14	268	269	Figure 1.4 The text for the FAIR principles is quite small. Maybe type it?	Thank you, the figure has been revised accordingly.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	14	14	268	268	Figure 1.4. Domains boxes: should rephrase as "social, bio-based economical, environmental, taxonomic". The bio-based economical domain should be distinguished from the social domain, given the importance of IAS to them.	Thanks for this suggested change. We have included it in the new version, except for bio-based, which is not very clear to the authors

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Grossart, Hans-Peter	No	Chapter 1	14	14	268	261	Figure 1.4: I miss AI (artificial intelligence) as a tool	Thank you, this level of detail is not included in the figure.
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	14	14	269	269	Figure 1.4 - all text should be made legible (e.g. FAIR principles, and axes labels in the mini plots)	Thanks for this suggested change. We have included it in the new version.
Chien, Herlin	No	Chapter 1	14	14	270	270	Figure 1.4: Have we consider the inclusion of citizen science (mentioned in Line 283 yet not clear in Figure 1.4) in this graph Figure 1.4? In Sources or knowledge/sampling? for instance	Thank you for your comment, this inclusion is too specific for such a high level figure.
Htar Maung, Molley	No	Chapter 1	16	16	290	290	Subtitle 1.3. should be changed as "Invasive alien species: Their identity and importance (or) impacts"	Thank you for your feedback. We have not altered the text because the title is quite similar and clear as stands.
Bliss, Cebuan	No	Chapter 1	16	17	291	336	As per discussion in the meeting with the co-chairs last month, suggest in this section, or elsewhere, clarifying how introduced domestic animals are classified e.g. certain non-native livestock, fish, plants and 'game' such as pheasants	Thank you, this has now been clarified in the revised version
Government of Canada (Turkington, Thomas)	Yes	Chapter 1	16	16	291	291	The damage due to some invasive alien species is certainly recognized, but perhaps differentiating damaging IAS as compared to beneficial IAS may be useful. Evaluation of potential plant species for food, forage, etc. in the past was certainly much less regulated. However, more thorough regulatory evaluations and approvals are currently in place, which will help to limit the damaging aspects of IAS. Also one needs to note that we have unmodified natural environments versus highly modified environments so IAS may impact these differently. Perhaps there needs to be clarification regarding damaging versus beneficial IAS, and to recognize that regulatory evaluations and approvals help to limit damaging aspects related to evaluation of potential plant species for food, forage, fibre, etc., especially where the intention is to release them into an already highly modified environment.	Thanks for this suggested change. We have included it in the new version.
Grossart, Hans-Peter	No	Chapter 1	16	17	291	337	Chapter 1.3.1, I would also add the aspect of novel communities due to a stochastic mixture of species which haven't been together before...	Thank you for your comment. We address novel communities in a later section within the chapter so have not added this context here.
Ahimbisibwe, Imran	No	Chapter 1	16	16	292	305	also highlight the phrase Invasive and define it. Not all alien species are invasive. The definition of invasive can include: outcompete native species in feeding and reproduction hence dominating the new range of distribution, causing extinction of native species and ecosystem malfunctioning with grim consequences for socio-economic, cultural and ecological aspects. the term invasive is fundamental in defining IAS for it explicitly indicates that they are not manageable and are destructive therefore their introduction must be prevented and for those already established must be eradicated in accordance with Article 8h of CBD.	Thank you for your feedback. We have highlighted the term invasive alien species.
Government of Canada (Ariey-Jougard, Rachel Tu-Van)	Yes	Chapter 1	16	16	292	305	This paragraph should take into account comments made earlier regarding the definition of IAS, their negative impacts, the distinction between naturalized and established, as well as consider all pathways of introduction and spread. Additionally, other IAS definitions, such as the one from the CBD to which 197 Parties adhere to, should maybe be used as well. This definition and others are mentioned in lines 330-334, and given the consensus around the adverse impacts of IAS, should maybe be used more prominently for this assessment.	Thank you for your comment. We have added adverse and negative to clarify.
Government of Germany	Yes	Chapter 1	16	16	292	305	It still doesn't become clear in the definition of invasive alien species whether or not only negative or positive and negative impacts are meant to be included. We believe that it should be made clear that what defines an invasive alien species are, by definition, the negative impacts.	Thank you for your comment. We have added adverse and negative to clarify.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 1	16	16	292	293	according to the definitions table established means self sustaining, since this row is referring to alien species, established or not, so it should read "The term alien (non-native, exotic, introduced, non-indigenous) species refers to species whose presence in a region is attributable to human..."	Thank you for your feedback. We have deleted "established".
Marchante, Elizabete	No	Chapter 1	16	16	292	292	another synonym of alien is allochthonous	Thank you, we have revised the text accordingly
Evans, Thomas	No	Chapter 1	16	16	293	297	Just want to flag the use of established at 293 and 297. Do you need to say established at 293? I think it could be deleted.	Thank you for your comment. We have deleted "established".
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	16	16	293	294	As noted for Fig 1.1: "direct" does not exactly align with "intentional" introductions. Clarity would be improved if the parenthetical text were removed.	Thank you for your comment. We agree and have deleted directly and indirectly.
Marchante, Elizabete	No	Chapter 1	16	16	293	293	As said a few lines later, an alien species may not establish, so I suggest deleting the word "established" on this line to avoid misinterpretation; "presence" is enough.	Thank you for your comment. We have deleted "established".
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	16	16	294	294	Human actions can also enable alien species to overcome physiological barriers through, for example, temperature-controlled transport vectors; suggest to state 'biogeographical and physiological barriers'	Thank you for your comment. We agree that there can be physiological barriers but in the context of the definition it is the biogeographical barriers that are important.
Latombe, Guillaume	No	Chapter 1	16	16	296	297	Put "invasive alien species" in bold, to help locating the definition	Thank you for your feedback. We have highlighted the term invasive alien species.
Ahimbisibwe, Imran	No	Chapter 1	16	16	301	305	The quoted IPBES's definition of IAS (...generating an Impact on ecosystems and species.) differ from the description of IAS in CBD text ("those alien species which threaten ecosystems, habitats and species.") in the former the impact can be positive or negative but please note that CBD addresses those IAS that cause negative impacts on biological diversity and ecosystem services. whether or not the difference is deliberate it creates inconsistencies. whereas the definition of IPBES is open and therefore deals with both IAS with negative and positive impacts, however CBD was designed to eliminate IAS which threaten ecosystems or have negative impacts. The implication is such that IPBES's definition creates room for authors to myander in various impacts of IAS and there is an observed inclination of chapter 1 (one) to economic benefits attached to IAS and their subsequent management rather than to prevention and eradication of negative IAS as agreed by the parties that developed the treaty. Typical derailment of the convention from its original objectives and this is totally unacceptable. We are not renegotiating the convention we are a CBD family striving to achieve its stated objectives.	Thank you, the definition adopted for this assessment has been approved by IPBES member states and differs from the CBD one.
White, Michael	No	Chapter 1	16	16	301	305	Good definition, clear and unambiguous	Thank you for your feedback.
Sagoff, Mark	No	Chapter 1	16	16	307	308	"Invasive alien species are generally considered as being out of place because the species are non-native and are judged to be causing environmental harm." The obvious question arises: "judged by whom?" More important is the question, "What kind of judgment is this?" Political? Economic? Cultural? Spiritual? Probably all of these. It is not in any way a scientific judgment, however, since there is no way to measure environmental harm in biological terms. One can define "environmental harm" in any way one likes, but the definition is an a priori stipulation or a social convention not a scientific finding.	Thank you for your comment. We reflect on these points within the sections on perceptions and values.
Marchante, Elizabete	No	Chapter 1	16	16	308	308	there is a "to" after "... judge to be..." that may be deleted	Thank you for your comment. We have deleted "to".

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sagoff, Mark	No	Chapter 1	16	16	314	315	The concept "biological diversity" must be defined. The Intergovernmental Science-Policy Platform on Biodiversity should say what is meant by "biodiversity." Everything depends on this. The term may refer to either of two opposing or nearly contradictory things. First, it may refer to the richness and variety of species, in all their ecological relationships and genetic potential, at a place. In that case, nonnative species introductions have greatly increased plant species richness in many regions of the world at the same time that they have led to the creation of new hybrid polyploid species by bringing previously isolated congeners into close contact -- quoted from Vellend et al. Annu. Rev. Plant Biol. 2017. 68:3.1–3.24. If one takes this view, then the U.N. Area de Conservación Guanacaste contains a lot of biodiversity; according to its website (https://whc.unesco.org/en/list/928/) it is "home to an extraordinary variety of life forms. Next to the approximately 7,000 plant species, more than 900 vertebrate species have been confirmed. ... Invertebrate diversity is extraordinary with an estimated 20,000 species of beetles, 13,000 species of ants, bees and wasps and 8,000 species of butterflies and moths." As conservationist Daniel Janzen has shown, however, little or any this wildlife is likely to be native to the area; almost all of it entered the preserve as a result of human activity. Until the 1960s, the area was used (and burned) as pasture and planted to alien pasture grasses; it was all under one production regime or another. Janzen, D. H. 2000. Costa Rica's Area de Conservación Guanacaste: a long march to survival through non-damaging biodevelopment. Biodiversity 1(2):7-20. The glorious profusion of plant and animal life occurred in large part because conservationists allowed, indeed, promoted wildlife native to other regions to populate the area. The same kind of story is told of many other places -- Ascension Island is the "poster" example -- where an environment depauperate of native wildlife has been transformed through human activity into a biological wonderland. The first definition of "biodiversity" includes alien naturalized species even though they occur as a result of human introduction, accidental or intentional, in other words, even if the species are corrupted by the human stain or taint. The second opposing definition, which the study under review adopts, excludes from the concept "biodiversity" alien species, that is, species introduced (and thus tainted) by human activity. The IPBES report follows the influential article in Science magazine in which a gathering of prominent ecologists state: "Our definition [of biodiversity] excludes exotic organisms that have been introduced." Sala, O.E., Chapin, F.S., Armesto, J.J., Berlow, E., Bloomfield, J., Dirzo, R., Huber-Sanwald, E., Huenneke, L.F., Jackson, R.B., Kinzig, A. and Leemans, R., 2000. Global biodiversity scenarios for the year 2100. Science, 287(5459), pp.1770-1774. The chapter under review implicitly adopts this second definition; it should make it explicit. Since introduced species cannot by definition add to biodiversity, they must diminish it, insofar as they make any difference at all. There is nothing wrong with defining "biodiversity" to exclude introduced species; indeed, the argument that introduced species harm or diminish biodiversity follows as a tautology. The document should be explicit about this. On page 6, the chapter observes, "recent studies indicate that the number of new alien species is steadily increasing and there is no sign of saturation worldwide" ll. 89-90. If the concept "biodiversity" excludes alien species, then even if they outnumber native species in richness and population size a billion-to-one, they can only harm or diminish biodiversity. The report should always be clear that introduced species can only diminish and never increase biodiversity as an a priori assumption; otherwise it hides its principal assumption in a shell-game of switched and hidden definitions.	Thank you for your comment. Ipbes defines biodiversity as "the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part. This includes variation in genetic, phenotypic, phylogenetic, and functional attributes, as well as changes in abundance and distribution over time and space within and among species, biological communities and ecosystems." (see core Glossary)
Government of USA	Yes	Chapter 1	16	16	320	326	The terminology used here "invasive", "naturalized" are appropriate for plants but are not applicable to other types of organisms such as insects. In particular, the term "naturalized" is not appropriate for non-plants and the term "established" is preferred.	Thank you for your comment. We have altered the text accordingly
Lázaro-Lobo, Adrián	No	Chapter 1	16	16	322	324	Maybe the authors could delete "at considerable distances from the parent and/or site of introduction" because they already indicate that "have the potential to spread over long distances".	Thank you for your comment. We have altered the text accordingly
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	16	17	326	330	The work discussed here would use the term alien (non-native, etc) but NOT invasive. It is important to make this distinction. The way it is written currently, it is saying that invasive alien species are defined differently, but I don't agree that is the case. Invasive is typically used to indicate rapid spread and/or negative impact. It should be noted that many studies are conducted at the more conservative level because impacts are difficult to predict, make take time to be documented and are therefore frequently underreported, or simply unknown.	Thank you for your comment, we have clarified this sentence and hopefully address your concerns
Duistermaat, Leni	No	Chapter 1	17	17	338	338	To know how many invasive alien species there are, identification of the species, i.e. knowing the scientific name, is important because that is the key to all other information. However, species identification is not always straightforward, especially not if the country/continent of origin of the species is unknown. Vascular plants global identification keys including all species of a genus or family are rare, they mostly deal with species of a single continent or region. Taxonomic work, even in relatively well-known groups as vascular plants is highly needed. (see comment below on chapter 2, p. 62, line 1797)	Thank you for your comment, this has been included as a gap in this assessment
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	17	17	342	345	While propagule pressure is mentioned in the next paragraph, it should be considered the primary factor dictating the number of IAS. It is misleading to start with the sentence about islands and coasts without taking pp into context. Suggest to rework these paragraphs to talk foremost about pp and to omit any 'trends' where pp was not taken into account	Thank you for your comment. We have altered the order of the paragraphs.
Government of Mexico	Yes	Chapter 1	17	17	357	357	I propose to replace by ...become self-sustaining... ; and establish self-sustaining populations	Thank you for your comment. We have edited the text accordingly.
White, Michael	No	Chapter 1	17	17	360	360	Not all societies are cash-based, maybe better saying 'GDP is one method of tracking IAS spread'	Thank you, but this sentence doesn't imply that GDP is the only method in determining alien species richness globally
Government of China	Yes	Chapter 1	17	17	362	364	There have been increasing examples in that alien species from different taxonomic groups may experience shifts of realized climatic niche which causing the occupation of habits differing from their provenance. (Fitzpatrick et al. 2007, Capinha et al. 2014, Li et al. 2014, Early & Sax 2014, Parravicini et al. 2015). Reference: Fitzpatrick, M.C., Weltzin, J.F., Sanders, N.J. & Dunn, R.R.(2007) The biogeography of prediction error: why does the introduced range of the fire ant over-predict its native range? Global Ecology and Biogeography, 16, 24–33. Capinha, C., Rodder, D., Pereira, H.M. & Kappes, H. (2014) Response of non-native European terrestrial gastropods to novel climates correlates with biogeographical and biological traits. Global Ecology and Biogeography, 23, 857–866. Li, Y., Liu, X., Li, X., Petitpierre, B. & Guisan, A. (2014) Residence time, expansion toward the equator in the invaded range and native range size matter to climatic niche shifts in non-native species. Global Ecology and Biogeography, 23, 1094–1104. Early, R. & Sax, D.F. (2014) Climatic niche shifts between species' native and naturalized ranges raise concern for ecological forecasts during invasions and climate change. Global Ecology and Biogeography, 23, 1356–1365. Parravicini, V., Azzurro, E., Kulbicki, M. & Belmaker, J.(2015) Niche shift can impair the ability to predict invasion risk in the marine realm: an illustration using Mediterranean fish invaders. Ecology Letters, 18, 246–253.	Thank you for this suggestion. We have chosen to include the references
Estoup, Arnaud	No	Chapter 1	17	17	364	364	Please add the reference Hufbauer et al. 2012 Evo Appl doi: 10.1111/j.1752-4571.2011.00211.x (which provides an evolutionary perspective of the phenomenon mentioned in the sentence)	Thanks for this suggested change. We have included it in the new version but not where indicated here but in two other places.
Uludag, Ahmet	No	Chapter 1	18	18	292	292	"exotic" see number 4 above.	Thank you for your feedback. We have included commonly used terms / synonyms and exotic is one of these.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	18	18	367	367	Fig 1.5: this is an interesting cartogram, perhaps better described as the number of "known" alien taxa, since research effort is clearly reflected in the results. The figure is less successful in showing marine taxa as the relative sizes of marine regions are less familiar. Perhaps an inset map similar to Fig 2.4 in an equal-area projection would provide suitable context.	Thank you for your comment. We have added "documented"
Grossart, Hans-Peter	No	Chapter 1	18	18	367	370	Figure 1.5: I don't like that freshwater is combined with terrestrial as freshwaters are ver different habitats and harbor very specific communities with different invasive species, even those being introduced from the sea. I suggest to treat freshwater separately, the data are there!!!	Thank you, but authors note there is not always a neat separation so prefer to keep it as it is.
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	18	18	368	372	Figure 1.5 Caption - need to clarify that this is the number of taxa 'reported from' the regions...to be consistent with the many gaps/caveats that are discussed elsewhere. Also need to clarify, is this the number of 'established' taxa reported? Is the "Gaps..." section meant to be part of the caption? Suggest to delete the hard return between the two sentences and keep them together. I also suggest to increase the size of the figure if possible.	Thank you for your comment. We have added "documented"

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Sudan (Mohammed, El Khitma)	Yes	Chapter 1	18	22	374	566	A part of it can be moved for example under chapter for 4 to keep the chapter short and to prevent repetition. The same for other chapter	Thank you for your comment. The text presented provides a link to Chapter 4.
Grossart, Hans-Peter	No	Chapter 1	18	19	374	418	It should be added that often the impact is unknown as many invasive species, in particular microbiomes including fungi, remain undetected, but can have substantial consequences for ecosystem structure and their functioning.	Thank you for this comment. This is covered in Chapter 4.
Evans, Thomas	No	Chapter 1	18	18	378	380	Economical aspects at 378; economic aspects at 380.	Thank you for your comment. The text has been edited.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	18	18	383	396	If crops and livestock are to be considered IAS, an explicit statement needs to be made about their benefits, particularly the ecosystem service of providing food.	Thank you, this has been clarified in the definition
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	18	18	384	386	This is not clear. Suggest revising along the lines of "It is useful to discriminate between measurable changes in physical or social parameters and value-laden decisions on whether such changes are beneficial or detrimental."	Thank you for your comment. The text has been edited.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	19	19	398	398	Alien species are not considered invasive unless they are both established and having impact. This sentence can be corrected by dropping the word "invasive" at its head.	Thank you for your comment. The text has been edited.
Marchante, Elizabete	No	Chapter 1	19	19	398	400	I think this sentence needs some clarification because if no alien species is not established it is not considered invasive.	Thank you for your comment. The text has been edited.
Outinen, Okko	No	Chapter 1	19	19	398	400	This comment is for the entire document but spotted in Chapter 1 first. Is there a definition for "widespread"? What does it mean in terms of distribution when a species is regionally/locally/ or even globally widespread? We have struggled with this with regards to marine IAS in the Baltic Sea and defined widespread as "Species is present in all regions/areas/countries where suitable habitats and environmental conditions occur".	Thank you for your comment - we are reluctant to define widespread because there is not an agreed definition.
Marchante, Elizabete	No	Chapter 1	19	19	407	412	May be interesting to cite a recent study about this: Yang et al 2021, https://doi.org/10.1038/s41467-021-27603-y	Thank you, this reference has been added to Chapter 1
Estoup, Arnaud	No	Chapter 1	19	19	409	409	Replace « ... and, indeed, more broadly alien species introductions » by « ... which in return favour the introduction and settlement of additional alien species »	Thank you for your comment. The text has been edited.
Brooks, Thomas	No	Chapter 1	19	20	420	456	Box 1.4: The debate documented on Lines 441-451 should also be captured at the level of the title of Box 1.4, further to eg Murcia et al. (2014). Using the term "novel ecosystems" alone at Line 420 only presents one side of this debate. Suggest expanding to eg "Invasional meltdown or novel ecosystems?" or similar.	Thank you for your comment - title changed to "Role of biological invasions in novel ecosystems."
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	19	20	420	456	Box 1.4: Again, if crops and livestock are to be considered IAS, surely agro-ecosystems should be identified as "novel ecosystems".	Thank you, this has been clarified in the definition
Grossart, Hans-Peter	No	Chapter 1	19	20	420	456	Box 1.4: Also here, I miss the role of the unseen. Microbes often remain undetected, in particular as there is no real baseline. We microbial ecologists struggle to distinguish native from non-native species, this is a real problem!	Thank you, but this issue is covered elsewhere
Marchante, Elizabete	No	Chapter 1	19	20	420	456	Box 1.4 is mentioned only in line 487, so I suggest moving this Table for after that. Also suggest to clearly mention novel ecosystems in the text, to be clearer the connection.	Thank you, we have made sure to mention the boxes before.
White, Michael	No	Chapter 1	19	20	420	456	See this for neopelagic habitats Haram, et al. "Emergence of a neopelagic community through the establishment of coastal species on the high seas." Nature Communications, Dec. 2. 2021.	Thank you, the reference has been added
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	19	20	422	456	Box 1.4: - the examples require more context if they are to be understood as truly novel ecosystems. The replacement of red squirrels by grey squirrels does not, on the face of it, argue that their ecosystem has become an entirely new and unknown thing. - There is a value element that could be considered here. In the contexts of climate change and restoration, novel ecosystems will emerge. Alien species in such systems are not disrupting "natural" systems, and may perform roles that are visible and highly valued (prevention of erosion, perhaps) - potentially leading to the perception that they are a solution, and contrasting with the way they are generally seen as a problem for native ecosystems.	Thank you for your comment - we have expanded the box to state "including consideration of the role of novel ecosystems in mitigating the adverse effects of global change in different contexts. " Additionally we have deleted the example of the squirrel pox because it is unclear as you mention.
Hofstra, Gerrit	No	Chapter 1	19	19	426	426	Box 1.4: The word plethora is unnecessary suggestive	Thank you, the text has been revised accordingly in the final draft
Estoup, Arnaud	No	Chapter 1	19	19	432	432	Box 1.4: warning = double parenthesis	Thank you, we have checked the parenthesis in the final draft.
Estoup, Arnaud	No	Chapter 1	19	19	433	433	Box 1.4:warning = double parenthesis	Thank you, we have checked the parenthesis in the final draft.
Facon, Benoit	No	Chapter 1	20	20	444	456	Box 1.4: It is clear that the threshold is strongly dependent on the type of ecosystem (e.g. primary forest vs agricultural environment). Rather than a case-specific approach, it might be useful to distinguish several major types of environment.	Thank you for your comment - we have added clarity to the text but this level of detail is beyond the scope of chapter 1
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	20	20	458	459	A common case that merits mention here is when an alien brings its pests and diseases with it.	Thanks for this suggested change. We have included it in the new version.
Rojo, Iskra	No	Chapter 1	20	20	458	456	Is there information on the socio-cultural and economic contexts in which there is greater vulnerability and alteration by invasive species?	Thank you for your comment - we include this important context in other sections for example case study on islands
Marchante, Elizabete	No	Chapter 1	20	20	463	467	A REF for invasional meltdown could be added, Simberloff & Holle 1999	Thank you, the reference has been added
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	20	20	464	467	repetitive, long sentence. Consider simplification - suggest deleting "that increase the overall impacts of those invasions [in]to"	Thank you for your comment. The text has been edited.
Chien, Herlin	No	Chapter 1	20	20	465	465	A reference to "invasional meltdown" should be added. Ex. Simberloff, D., & Von Holle, B. (1999). Positive interactions of nonindigenous species: invasional meltdown?. Biological Invasions, 1(1), 21-32; Simberloff, D. (2006). Invasional meltdown 6 years later: important phenomenon, unfortunate metaphor, or both?. Ecology Letters, 9(8), 912-919.	Thank you for your comment. The text has been edited.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	20	20	465	465	the Simberloff & Von Holle citation should be repeated here to support the "invasional meltdown" terminology	Thank you for your comment. The text has been edited.
Facon, Benoit	No	Chapter 1	20	20	478	482	Concerning the importance of taking into account the match between the invading species and the recipient environment, it might be interesting to refer to Facon et al. In TREE (2006).	Thank you for your comment. The text has been edited.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	20	20	487	495	This paragraph does not fit under the heading of section 1.3.3 (What are impacts in the context of invasive alien species?) and should be moved to a new section which outlines the value of understanding of invasion dynamics to inform management practices that limit negative impacts.	Thank you for your comment - the short section here on ecological networks provides insights into the effects of complex dynamics on impacts
Grossart, Hans-Peter	No	Chapter 1	20	21	487	524	I miss the aspect of evolutionary changes including rapid adaptation which will greatly impact network topologies and hence the outcome/impacts of invasive species...	Thank you, we have revised the text accordingly
Government of China	Yes	Chapter 1	21	21	505	506	The combined impacts of multiple established alien animals on natives may be diminished (Ross et al. 2004, Liu et al. 2018). Reference: Ross, D. J., C. R. Johnson, C. L. Hewitt, and G. M. Ruiz. 2004. Interaction and impacts of two introduced species on a soft-sediment marine assemblage in SE Tasmania. Marine Biology 144: 747–756. Liu, X., S. Wang, Z. Ke, C. Cheng, Y. Wang, F. Zhang, F. Xu, X. Li, X. Gao, C. Jin, W. Zhu, S. Yan, and Y. Li. 2018. More invaders do not result in heavier impacts: The effects of non - native bullfrogs on native anurans are mitigated by high densities of non - native crayfish. Journal of Animal Ecology 87:850-862.	Thank you for your comment - we have added these references
Government of USA	Yes	Chapter 1	21	21	512	512	Change word in to on	Thank you for your comment. The text has been edited.
Htar Maung, Molley	No	Chapter 1	21	21	513	516	Can add the fact: "land/farm invasion where local people grows farm product for food security".	Thank you, these impacts are further covered in Chapter 4, here we only provide an example and cannot add more.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	21	22	526	542	This paragraph should be revised to fit clearly under the heading of section 1.3.3. Some material might be better moved to the para pg 39 lines 1040-1056.	Thank you for your comment. We have turned this into a box and introduced it in the main chapter text.
Grossart, Hans-Peter	No	Chapter 1	21	22	526	542	Not only climate change but also the combination with evolutionary changes driven by invasive species are largely unknown and increase the uncertainty of predictions!	Thank you, this is covered elsewhere. This paragraph focuses on climate change.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Arsenault, Andre)	Yes	Chapter 1	22	22	536	540	The mountain pine beetle is native to Canada and thus relating this to invasions is mis-leading. Also, although climate change is facilitating the spread of the species, it is not the only factor involved. The range of species and the range of severity of disturbance is a different thing.	Thank you, this example has been deleted.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	22	22	565	566	Box 1.5: remove as policy-prescriptive, or limit the statement as critical to understanding the threats posed by IAS (in which case it is somewhat repetitive).	Thank you for your comment. The text has been edited.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	22	22	568	570	Does the Seebens et al paper really explore the causes of rapid growth in invasion reseach? Suggest this sentence be removed, as it does not add value.	Thank you for your comment. The text has been edited.
Facon, Benoit	No	Chapter 1	23	23	568	588	In fig 1.1, invasive alien species are defined as generating an impact on local ecosystems and species. I find it disturbing that there is no longer any reference to this impact in fig 1.6 summarizing the invasion process.	Thank you for your comment. The notion of impacts is included in the term "invasive", by definition.
Facon, Benoit	No	Chapter 1	23	23	568	570	This sentence does not seem necessary to me. This information has already been written many times before	Thank you for your comment. The text has been edited.
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 1	23	23	577	578	Figure 1.6 - Captivation and cultivation as barriers seem misplaced within the table. They are not necessarily a barrier to invasion, or not the only one. They could be interpreted as pathways of invasion; however, should that be the intent of the figure, it is unclear why those two would be singled-out. Furthermore, within management interventions, "control and management" seem to be missing, as well as rapid response. I understand that rapid response could fit within mitigation or eradication; however, it is a common term used that should probably be reflected in the figure. On the other hand, mitigation measures is not often used within the context of IAS as they are more associated with climate change mitigation.	Regarding the first statement: The terminology is based on the Blackburn et al. framework. We decided to keep it this way.Regarding the second statement: The terminology now follows the one from the invasion curve terminology.
Government of Germany	Yes	Chapter 1	23	23	577	588	Clarification is needed on Figure 1.6: Although it is very useful for the glossary of this assessment to include a definition of "containment," it might also be useful to explain in more detail what the other intervention categories, such as "mitigation," actually mean. It is therefore suggested that not only the terms "containment/prevention/mitigation/eradication" be used, but also that the main characteristic of each intervention category be indicated to show how they complement each other, for example "containment" may be 'emergency management at early stages' and "mitigation" would rather include measures to reduce the intensity or severity of the problem. Such explanations would make this appealing figure more self-explaining.	text has been added to the Figure description as suggested
Grossart, Hans-Peter	No	Chapter 1	23	23	577	579	Figure 1.6: I miss the points adaptation (including trait plasticity) and evolution which may be quite important for invasion!	Adaptation and evolution are species centered processes and not related to human interventions. As well it is not sure if the comments relate to adaptation and evolution of native species in response to invasions or to processes related to the alien species. In any case authors think this is beyond the scope of this figure and the message it wants to convey.
Karayannis, Theofanis	No	Chapter 1	23	23	577	578	I appreciate that this Figure 1.6 comes from an existing reference, however I can't help but notice something that seems peculiar. Specifically at the lower part of the figure (on management interventions) prevention seems to come after containment, which seems quite peculiar as by definition prevention comes before anything else, and in addition prevention is most relevant for the transport stage but that's shown in a broken line indicating that it 'may have some relevance'.	Thank you for this comment. This issue as been fixed and the figure has been updated to accommodate this.
Government of USA	Yes	Chapter 1	23	23	578	578	in Fig. 1.6, the action "containment" is misplaced - it should target the spread phase, not the introduction phase	We disagree with this statement. Containment has been defined for the assessment as: "application of measures in and around an infested area to prevent spread of invasive alien species. Containment may also apply in the context of keeping an invasive alien species out of a defined geographic region within a broader infestation (in pest management this is also termed "area-wide management") (FAO, 2019)." (see Glossary). This definition highlights the relevance of "containment across invasion stages. Accordingly, and in line with figure 1.8 we have adjusted the "containment intervention" in the figure.
Government of USA	Yes	Chapter 1	23	23	578	578	In Figure 1.6, prevention could be applied from the very beginning. I would argue that regulations prohibiting importation of certain products are aimed at preventing introduction of alien species and would be termed prevention.	Thank you for the comment. This has been adjusted.
Chien, Herlin	No	Chapter 1	23	23	579	579	Figure 1.6: Is it possible to expand or close the loop of invasion process by considering the adding of restorative activities as the reverse of invasion process in Figure 1.6 or a separate new Figure?	Thank you for your comment - we agree that this is an important concept but is beyond the scope of this figure.
Government of Germany	Yes	Chapter 1	23	23	579	588	Figure 1.6 clarification required: The conceptual model and the Fig. 1.6 are based on a different definition of the term invasive. When this is adopted throughout the assessment conflicting definitions should be explained The concept of Blackburn et al. 2011 and of others mentioned here relates to establishment and spread - not to impact. Even if this is discussed chapter 4, it would be preferable to explain this here. Please ensure definitions are aligned as far as possible and use them consistently throughout the entire report.	Thank you - this is included within the definition.
Sagoff, Mark	No	Chapter 1	24	24	596	596	No species on earth meets the requirement that it produces self-sustaining populations encompassing multiple generations. Every species requires the presence of other species for food, pollination, and so forth. What, then, does "self-sustaining" mean? It means "not sustained at least intentionally by human beings." The definition of an invasive alien species depends on its relationship to human beings in at least two ways. First, humans must be involved in its transport beyond "natural" boundaries. The concept "natural" is itself understood as the absence of human influence (corruption, sin, etc.). Second, it must not depend on human will or intention for its survival and reproduction over many generations. Why are human beings exceptional in these ways? Why do they curse species into invasiveness by transporting them but bless them into appropriateness by sustaining them?	Thank you for your comment.
Estoup, Arnaud	No	Chapter 1	24	24	597	597	The sentence fragment « The unified framework does not extend to consideration of impacts » seems in contradiction to the definition effort of alien INVASIVE species in the introduction section	Thank you for your comment. The text has been edited.
Estoup, Arnaud	No	Chapter 1	24	24	601	601	Please also cite other key Evolutionary review papers that are more generic than tree invasion = Facon et al. 2006 TREE DOI: 10.1016/j.tree.2005.10.012 ; Dlugosh et al. 2015 Mol Ecol doi: 10.1111/mec.13183 ; Estoup et al. 2016 Annu. Rev. Ecol. Evol. Syst. doi: 10.1146/annurev-ecolsys-121415-032116	Thank you for your comment. The text has been edited.
Facon, Benoit	No	Chapter 1	24	24	619	622	In fig 1.1, alien species is defined as species whose presence in a region is attributable to human actions, intentional (i.e., directly) or unintentional (i.e., indirectly), that enable them to overcome biogeographical barriers. But here an alien species may arrive within a new region through natural spread. I think it is necessary to clarify this point.	Thank you for your comment. The text has been edited.
Government of USA	Yes	Chapter 1	24	25	625	654	Box 1.6: Release may be intentional "disposal" as an act of convenience to rid oneself of unwanted organisms such as pets that have grown too large, expensive or time consuming to be cared for. Release may also be motivated by an inability to kill the pet organisms after having bonded with it.	Thank you for these examples. We have however decided to keep this box high level.
Lázaro-Lobo, Adrián	No	Chapter 1	24	24	625	639	Box 1.6: "Convention on Biological Diversity (CBD)" is repeated three times, maybe the authors could put CBD the second and third time.	Thank you, this has now been edited accordingly
Faulkner, Katelyn	No	Chapter 1	25	25	641	654	Box 1.6: The definitions for the pathway categories differ from those outlined in the guidance document for the scheme (i.e. Harrower et al. 2018). They are probably from the original CBD document, but will be important to make it clear which definitions are in use, and to make sure that they are standardised across the chapters of the assessment. The pathway data from Chapter 2 appear to be from Saul et al. (2017), which I believe used slightly different definitions from those outlined in Harrower et al. (2018) Harrower CA, Scalera R, Pagad S, Schönrogge K, Roy HE (2018) Guidance for interpretation of CBD categories on introduction pathways. Technical note prepared by IUCN for the European Commission. Saul W-C, Roy HE, Booy O, Carnevali L, Chen H-J, Genovesi P, Harrower CA, Hulme PE, Pagad S, Pergl J, Jeschke JM (2017) Assessing patterns in introduction pathways of alien species by linking major invasion databases. Journal of Applied Ecology 54: 657–669.	Thank you, we have harmonized this point in Chapter 1.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of USA	Yes	Chapter 1	25	25	643	645	Box 1.6: This may be intentional "disposal" as an act of convenience to rid oneself of unwanted organisms, such as pets that have grown too large, expensive, or time consuming to care for.	Thank you for your comment. The text has been edited.
Hofstra, Gerrit	No	Chapter 1	25	25	667	668	The release of mink from fur farms by animal welfare activists is certainly not unplanned	Thank you for your comment. The text has been edited.
Grossart, Hans-Peter	No	Chapter 1	25	26	672	708	Also here I miss adaptation and rapid evolution...	Thanks these issues are now covered in Chapter 1.
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	25	26	677	679	Add reference, as Catford et al. 2009 does not mention colonization pressure. Possible citation could be Lockwood et al. 2009. https://doi.org/10.1111/j.1472-4642.2009.00594.x	Thank you for your comment. The text has been edited.
Ellers, Jacintha	No	Chapter 1	26	26	688	688	In this line it is stated that small introduced populations are likely to fail, but I think this statement needs to be modified. The statement may be based on sexually reproducing eukaryotic species, such as animals, but even in these taxa it has been shown that even single or very few introduced individuals can give rise to viable invasive populations. For example in the case of the introduction of the Anolis cristatellus in Dominica (Eales et al 2010). Particularly if inseminated females are introduced, sperm storage and multiple paternity may boost genetic variability of the offspring. Moreover, in many cases aliens species reproduce asexually or concern microbes (virus), for which population size is not a limiting factor for invasion success. Therefore I suggest this sentence to be removed or modified. (Ref: Eales, J., Thorpe, R. S., & Malhotra, A. (2010). Colonization history and genetic diversity: adaptive potential in early stage invasions. Molecular ecology, 19(14), 2858-2869.)	Thank you, we have added "with a few notable exceptions" and references
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	26	26	688	691	The sentence on "Small introduced populations..." is a generality that has some notable exceptions. Suggest to add one or two sentences showing the other side of this statement, explaining that there are examples where small initial population sizes/low genetic diversity are not limitations, and that such constraints can be overcome through repeated introduction events through time or 'selection' within the transport pathway. For example, Briski et al. 2018, Roman and Darling 2007; https://esajournals.onlinelibrary.wiley.com/doi/10.1002/fee.1820 https://doi.org/10.1016/j.tree.2007.07.002	Thank you, we have added "with a few notable exceptions" and references
Government of Netherlands (Ellers, Jacintha)	Yes	Chapter 1	26	26	688	688	In this line it is stated that small introduced populations are likely to fail, but I think this statement needs to be modified. The statement may be based on sexually reproducing eukaryotic species, such as animals, but even in these taxa it has been shown that even single or very few introduced individuals can give rise to viable invasive populations. For example in the case of the introduction of the Anolis cristatellus in Dominica (Eales et al 2010). Particularly if inseminated females are introduced, sperm storage and multiple paternity may boost genetic variability of the offspring. Moreover, in many cases aliens species reproduce asexually or concern microbes (virus), for which population size is not a limiting factor for invasion success. Therefore I suggest this sentence to be removed or modified. (Ref: Eales, J., Thorpe, R. S., & Malhotra, A. (2010). Colonization history and genetic diversity: adaptive potential in early stage invasions. Molecular ecology, 19(14), 2858-2869.)	Thank you, we have added "with a few notable exceptions" and references
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	26	26	694	697	"invasibility of the environment" is not really an accepted tenet anymore - this has been overruled by propagule pressure studies. Suggest to remove this and update this sentence to review the predictors that have been found important when PP is taken into consideration such as resource availability (as in, what's good for the native species is also good for the non-native species). Alternatively, the change in ideas through time could be covered, for example citing how invasibility was an early concept, but things like disturbance have since been correlated with PP. Example refs: Colautti et al. 2006 https://doi.org/10.1007/s10530-005-3735-y ; Zenni and Nunez 2013 https://doi.org/10.1111/j.1600-0706.2012.00254.x	Thank you for your comment. Authors have included these references but have decided to retain the term "invasibility of the environment" as it is an important concept of biological invasions
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	26	26	699	704	These three sentences are conflicting and have irregular terminology. The key characteristics are habitat characteristics not community characteristics, and they don't determine the 'ability of the species' to invade. Suggest to rephrase these sentences with careful attention to correct terminology.	Thank you, we have removed the word characteristics and clarified this sentence
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	26	26	705	705	"density" - term not clear - "population density" instead?	Thank you for your comment. The text has been edited.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	27	27	722	722	Box 1.7: "caused" should read "enabled" here	Thank you for your comment. The text has been edited.
Estoup, Arnaud	No	Chapter 1	27	27	725	725	Box 1.7: Please add the reference Hufbauer et al. 2012 Evo Appl doi: 10.1111/j.1752-4571.2011.00211.x (which provides an evolutionary perspective of the phenomenon mentioned in the sentence)	Thank you for your comment - this reference has been added to chapter 1
Facon, Benoit	No	Chapter 1	27	27	730	747	Box 1.7: You can perhaps note here the constraint between the productivity of agrosystems with low diversity but with a high rate of invasibility and the lower productivity of agrosystems that are more diverse but better armed against invasion.	Thank you for your comment - this is beyond the scope of this section
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	27	27	730	740	Box 1.7: This paragraph is confusing - the opening sentence suggests there is increasing evidence, but then the closing sentence says evidence is lacking. This part also seems outdated and does not reflect the driving influence of propagule pressure.	Thank you for your comment. We revised it in the new version.
Government of USA	Yes	Chapter 1	27	27	739	740	Box 1.7: should this read "... critical issues for combining restoration with control of invasive...", rather than "combing"?	Thank you for your comment. We revised it in the new version.
Marchante, Elizabete	No	Chapter 1	27	27	739	740	Box 1.7: the final sentence is incomplete?	Thank you for your comment. We revised it in the new version.
Grossart, Hans-Peter	No	Chapter 1	27	28	753	784	Spread, here I miss a description of potential vectors, which are highly important for many species which cannot travel long distances by themselves...	Thank you for your comment - the text has been amended to include "An alien species can spread in various ways for example through natural dispersal or transport alongside human activities (see Section 1.4.1)."
Evans, Thomas	No	Chapter 1	28	28	759	760	There are often? (instead of 'There often are')	Thank you for your comment. We revised it in the new version.
Government of USA	Yes	Chapter 1	28	28	760	760	Seems counterintuitive	Thank you for your comment - this text has been reordered for clarity.
Ellers, Jacintha	No	Chapter 1	28	28	777	778	The sentence states that evidence for adaptive evolution within populations of newly introduced alien species is lacking, with a reference to Bertelsmeier & Keller 2018. However, in this paper these authors only state that evolutionary adaptation does not play a role in determining the probability of secondary introductions (the so-called bridgehead effect). Evolution can play a role in the survival and establishment of newly introduced alien species, for example plenty of example are known of alien plant species that have evolved reduced investment in herbivory-repelling secondary metabolites after introduction elsewhere. Also it is generally accepted that the long lag time between introduction, establishment and invasiveness/spread, could be due to evolutionary adaptation of species to the novel circumstances. So I suggest the statement in line 777-778 to be adjusted to reflect this better.	Thank you for your comment. We revised it in the new version.
Government of Netherlands (Ellers, Jacintha)	Yes	Chapter 1	28	28	777	778	The sentence states that evidence for adaptive evolution within populations of newly introduced alien species is lacking, with a reference to Bertelsmeier & Keller 2018. However, in this paper these authors only state that evolutionary adaptation does not play a role in determining the probability of secondary introductions (the so-called bridgehead effect). Evolution can play a role in the survival and establishment of newly introduced alien species, for example plenty of example are known of alien plant species that have evolved reduced investment in herbivory-repelling secondary metabolites after introduction elsewhere. Also it is generally accepted that the long lag time between introduction, establishment and invasiveness/spread, could be due to evolutionary adaptation of species to the novel circumstances. So I suggest the statement in line 777-778 to be adjusted to reflect this better.	Thank you for your comment. We revised it in the new version.
Government of Canada (Bailey, Sarah)	Yes	Chapter 1	28	28	778	781	It's not clear what this sentence is trying to say - that greater population density in the introduced range explains why secondary spread happens instead of additional introductions from the native range? This ignores many other factors, such as distance/transport pathways. In reality, secondary spread happens while there continues to be transport from the native range (unless the pathway has been shut off). Suggest to rework or delete this part	Thank you for your comment - this text has been deleted.
Facon, Benoit	No	Chapter 1	29	30	787	813	Figure 1.8: Perhaps a paragraph is missing explaining the difference between terrestrial systems and closed freshwaters on the one hand and marine systems and interconnected waters on the other.	Thank you for the comment. The coverage of Panel A is terrestrial and enclosed freshwater and coastal by land (e.g., terrestrial ecosystems, catchment basins, coastal systems and salt marshes), while that of Panel B is an open water system (e.g., marine, and brackish and water connected systems). This is now explained in the figure legend.
Faulkner, Katelyn	No	Chapter 1	29	29	787	795	Figure 1.8: It's great that this figure (Figure 1.8) shows the invasion curve for both terrestrial and open-system water environments. We usually only see this curve from the terrestrial perspective.	Thank you for the comment. The coverage of Panel A is terrestrial and enclosed freshwater and coastal by land (e.g., terrestrial ecosystems, catchment basins, coastal systems and salt marshes), while that of Panel B is an open water system (e.g., marine, and brackish and water connected systems). This is now explained in the figure legend.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of USA	Yes	Chapter 1	29	29	787	787	in Fig. 1.8, "containment" should only target the spread phase. The term biosecurity applies across the entire invasion continuum so it is incorrect to show it only relevant to pre-entry phase. Replace the term "early detection" with "surveillance"	Containment is implemented in various contexts/situations including where the invasion stage of the species of interest is unknown. The figure is reflecting such variations. For the definition of "containment" we refer to here, see Glossary. The term biosecurity has been revised as "border biosecurity" which is specifically applied to pre-entry phase. Early detection referred to in the figure is management objective while surveillance is an action to achieve such objectives. Therefore, we decided to keep the current term.
Grossart, Hans-Peter	No	Chapter 1	29	29	787	786	Figure 1.8: Also here, terrestrial and freshwater systems should be separated as their management is fundamentally different and many mitigation strategies as well!	We present two panels (A and B) because management approaches and responses can vary depending on whether the affected ecosystem is terrestrial or enclosed by land (e.g., terrestrial ecosystems, catchment basins, coastal systems and salt marshes) or an open water system (e.g., marine, and brackish and water connected systems), rather than depending on whether it is terrestrial, freshwater or marine. This is now clarified in the legend
Chien, Herlin	No	Chapter 1	29	29	788	788	Figure 1.8: the four phases of Figure 1.8 is not clear in Marine and water connected systems (spread and widespread are merged into one phase by using the same color?) This part is not clear to readers. In fact it is not clear to readers what is the logic behind the different target set for Terrestrial and closed water systems vs Marine and water connected systems (missing managing ecosystem? same for the position of these targets? such as why managing ecosystem is placed at the far right for Terrestrial and closed water systems?)	In marine and connected water ecosystem, currently there is no effective management option for either spread or widespread stage. Therefore it makes no sense to discriminate them and thus they are represented by the same color in Panel B. We present two panels A and B because management approaches and responses can vary depending on whether the affected ecosystem is terrestrial or enclosed by land (e.g., terrestrial ecosystems, catchment basins, coastal systems and salt marshes) or an open water system (e.g., marine, and brackish and water connected systems). The coverage of each panel is now clarified in the legend. We did not include "managing ecosystem" in Panel B because it has not been considered as a possible option in marine and connected water systems. The position of boxes and text in the figure has been improved in the latest version.
Pan, Xubin	No	Chapter 1	29	29	800	800	"2009" rather than "2010".	Thank you for your comment, this reference has been deleted from the report.
Outinen, Okko	No	Chapter 1	29	30	804	807	What is the definition for 'widespread phase' of a species? The final words of the sentence provide a relatively vague definition "when the probability of detrimental biophysical or socio-economical impacts is high". How high of a probability is needed to reach widespread phase?	Thank you for your comment - we are reluctant to define widespread because there is not an agreed definition.
Government of Germany	Yes	Chapter 1	29	29	830	833	Proposal: You may wish to include the "private sector" in the bracketed listing of IPBES-relevant stakeholders as well.	Thank you, this sentence has been revised and refer to a section on categories of stakeholders
Government of Canada (Arsenault, Andre)	Yes	Chapter 1	31	38	814	1029	This section is too theoretical and seems to tiptoe around the actual drivers of alien species invasion. It would be appropriate for chapter 1 to clearly state what are the main drivers of alien species invasion including anthropogenic disturbances, and uncontrolled importation of invasive species by industry.	Thank you, chapter 1 introduces drivers (what they are and how they are considered in this assessment), Chapter 3 assess the drivers and concludes on which are the main drivers
Rojo, Iskra	No	Chapter 1	31	31	821	825	How are these IPBES data retrieved now?	Thank you for your comment, but we are not sure we understand this question: the data is retrieved from the reports.
Pan, Xubin	No	Chapter 1	31	31	838	838	The definition of these terms should be included into the Glossary.	Thank you for your comment, these terms are defined in the IPBES core Glossary, as indicated in the footnote
Diaz, Sandra	No	Chapter 1	31	31	841	842	replace "and nature's contributions to people can be maintained..." with " and positive contributions of nature to people can be maintained" or " and nature's benefits to people can be maintained" (negative contributions = nature's detriments to people; positive contributions= nature's benefits to people)	Thank you, we have revised the draft accordingly
Sagoff, Mark	No	Chapter 1	31	31	846	846	The footnote advises, "Please refer to the IPBES core glossary for the definition of IPBES conceptual framework terms: nature..." The glossary states that by "nature" IPBES means "the natural world." In the context of IPBES, "nature" refers to the natural world with an emphasis on its living components. What is meant by the "natural world"? Nature. The definition is vacuous. The term "nature," as John Stuart Mill wrote, can refer to either of two things. First, the term may denote "the aggregate of the powers and properties of all things. Nature means the sum of all phenomena, together with the causes which produce them; including not only all that happens, but all that is capable of happening." In this sense, the opposite of "natural" is "supernatural." The term "nature" may also mean "not everything which happens, but only what takes place without the agency, or without the voluntary and intentional agency, of man." The opposite of the "natural" in this sense is the "artificial." Plainly, IPBES adopts the second definition, which places Humanity outside of Nature as a separate and disturbing force. There is nothing wrong with this, but it should be made explicit. The question whether Nature and Humanity exist in separate albeit interacting realms is not a scientific one because no empirical evidence can be given to bear on the issue. It is a theological question. Theologians in Christian seminaries often pose this question in terms of whether Nature fell with Man after the exclusion from Eden or whether Nature still exists as an Edenic ideal. I have written a long analysis of this matter – see https://thebreakthrough.org/journal/issue-5/a-theology-for-ecomodernism See also, Robbins and Moore on the Edenic sciences https://www.researchgate.net/profile/Paul-Robbins/publication/275450416_Ecological_anxiety_disorder_Diagnosing_the_politics_of_the_Anthropocene/links/5581754708aea3d7096fe731/Ecological-anxiety-disorder-Diagnosing-the-politics-of-the-Anthropocene.pdf	Thank you for this interesting comment. The mandate of the IPBES invasive alien species assessment is not to redefine the term nature, and will continue to refer to the IPBES-approved definition of this term (included in the IPBES core Glossary)
Facon, Benoit	No	Chapter 1	32	32	847	851	Figure 1.9: It might be useful to explain the color code used in the figure 1.9	Thank you, we have revised the figure and caption accordingly
Grossart, Hans-Peter	No	Chapter 1	32	32	847	850	Figure 1.9: I miss climate change as a driver as it is hard to assign it as a natural or anthropogenic driver.... I would name it separately and that would link to the IPCC-IPBES common studies.	Thank you, please refer to Chapter 3 for a full description of drivers. In this figure, we aim at showing how this assessment is framed by the IPBES Conceptual Framework (by sticking, as much as possible to its original design)
Estoup, Arnaud	No	Chapter 1	32	32	848	848	Figure 1.9: The meaning of « Intrinsic value » in the figure is unclear : please define/make it clear at least in the legend of the figure.	Thank you, we have added a supplementary material with the conceptual framework and all its definitions
Estoup, Arnaud	No	Chapter 1	32	32	848	848	Evolution as a driving force of biological invasion is not mentioned, although this is clearly the case. I will come back to this point in more details for chapter 2 and 3. Regarding Figure 1.9, Evolution as a driving force of biological invasion should be mentioned either as a direct driver in the figure	Thank you, we have addressed this in the final draft, and have added this topic. However, we have decided not to change the IPBES Conceptual Framework.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Diaz, Sandra	No	Chapter 1	32	33	853	873	Description of adaptation of IPBES conceptual framework to IAS: this is an excellent effort. I highly commend it. I have some suggestions that would make this coordination even higher: Arrow 5 is about policies and regulations, thus indirect, thus the position in the diagram is correct. However, Arrow 7 is about direct actions (restoration, etc) there are not policy, there are things societies physically "do" to ecosystems, therefore technically this should not emanate from indirect drivers, but rather from "anthropogenic drivers". The fact that they are propelled by institutions, etc. is already covered in arrow 5. As for arrows 3 and 4, a general comment: IAS have the unique condition of being part of the drivers and ALSO they are part of nature, according to the IPBES definition and most definitions. Specifically according to IPBES definition nature is the living world at all levels, not only ecosystems, but also individual species, genotypes, domesticated species, etc etc. This has a couple of implications for the figure and narrative: The authors could state straight away that, although IAS are part of nature, this assessment focuses on them as drivers of change, and perhaps indicate, in the diagram, with an asterisk in nature, and a sentence in the description of the figure, this fact. This will also be compatible with using impacts "on the rest of nature" or "on native nature, on native/local biodiversity" etc. As for arrow 4, in the original CF: originally arrow 9) it was used to describe all those impacts of direct drivers that did not go through the living world, for example a volcanic eruption directly burns you (nothing "alive" between the driver and people). In the case of IAS, they are alive, so technically according to the original framework, all their effects on people are through your twin arrows 3; some are benefits, some are detriments. Even a new parasite that enters the human gut without going through the ecosystem is a part of nature causing a negative NCP. You state this clearly in the narrative, so my suggestion to make this fully compatible with the CF would be to simply remove arrow 4, and, when talking about arrows 3, explain that the effects of IAS on people can be direct or through other components of ecosystems.	Thank you for these good suggestions. We have revised the figure accordingly
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 1	32	32	853	855	It is unclear why the term "biodiversity change" is used here when the IPBES Global Assessment uses the term "biodiversity loss". The intent of why this term is used should be made clearer. This also applies to figure 1.9	Thank you for your comment - we have used biodiversity change in acknowledging that species richness can increase or decrease. This term is also used in Chapter 3.
Chien, Herlin	No	Chapter 1	32	32	855	855	(arrow 1)	Thank you for your comment. There is no arrow 1 in the figure, but to clarify we have indicated "box 1"
Diaz, Sandra	No	Chapter 1	32	32	856	856	consider replacing "effects on nature" with "effects on the rest of nature". IAS are part of nature.	Thank you, we have clarified now that, although IAS are part of nature, they are considered as drivers in this assessment.
Evans, Thomas	No	Chapter 1	32	32	857	857	Do you need the word global here? They can interact with impacts at any scale.	Thank you, we have revised this accordingly
Diaz, Sandra	No	Chapter 1	32	32	858	858	consider replacing "modify nature" with "modify local nature"	Thank you, we have clarified now that, although IAS are part of nature, they are considered as drivers in this assessment.
Chien, Herlin	No	Chapter 1	32	32	866	866	Figure 1.9: arrow 2 and 5 seems to overlap? Not sure, but the current drawing is difficult to understand	Thank you, this has been clarified below the figure
Evans, Thomas	No	Chapter 1	32	32	867	867	which are driven? (instead of 'which is driven')	Thank you for this suggested change, we have adopted it
Government of USA	Yes	Chapter 1	33	33	814	814	should this be "conceptual basis" and not "conceptual bases"?	Thank you for your comment - this is conceptual basis.
Rojo, Iskra	No	Chapter 1	33	34	880	913	Box 1.8: & Figure 1.10 : & Nature's contribution to people is used as a synonym for ecosystem services and in written terms they are not; you would have to choose one for all the text	Thank you, we have revised the draft to make sure nature's contributions to people is used throughout, where appropriate
Diaz, Sandra	No	Chapter 1	33	33	882	882	Box 1.8: Consider replacing "integrated" with "integral"	Thank you for this suggested change, we have adopted it
Grossart, Hans-Peter	No	Chapter 1	34	34	910	913	Box 1.8: Figure 1.10: I miss recreation as an important factor! I also suggest to differentiate between terrestrial, freshwater and marine systems!	Thank you, the IPBES IAS assessment follows the categories of NCPs as defined by IPBES and previous IPBES assessments, including the Global Assessment
Diaz, Sandra	No	Chapter 1	34	34	913	913	Box 1.8: The original source of the NCP figure is Diaz et al. 2018 Science. It was reproduced with permission in Brondizio et al. 2019.	Thank you, we have changed this accordingly
Grossart, Hans-Peter	No	Chapter 1	35	36	956	979	Confidence level: it is an important and difficult point as often invasions are recognized years after their happening... I suggest to name this as a problem, in particular for microbes.	Thank you for your comment, it is true, but this also happens with many biological problems. We therefore do not think we need to explain anything more.
Government of Germany	Yes	Chapter 1	36	36	967	968	Proposal: Figure 1.11: It is suggested to use two colors for the certainty scale instead of shading in order to contrast it more clearly with the other two scales (level of agreement / quan. and qual. of evidence) which are given the same shade/ tone at the moment.	Thank you, but this figure has been approved by IPBES member states and is extracted from the guide to develop assessments. It therefore cannot be changed.
Grossart, Hans-Peter	No	Chapter 1	36	37	982	1017	Drivers of invasion, I miss rapid evolution, i.e. eco-evolutionary aspects!!	Thank you, we have included this in the revised version
Sagoff, Mark	No	Chapter 1	37	37	1002	1002	The expression "native biodiversity" suggests there may be such a thing as "non-native biodiversity." Is such a thing possible? If so, does IPBES seek to protect or promote non-native or only native biodiversity? The distinction is a historical not a biological one; it depends on whether the creature in question, whatever its traits, has been stained by human activity. I believe IPBES should be clear that there is no such thing, conceptually, as non-native biodiversity. If it admitted the possibility of non-native biodiversity, it would have to contend with the empirical finding that there is an awful lot of it -- possibly a lot more than native biodiversity. There is also the possibility that much of the interesting work to be done in ecology studies changing rather than "intact" ecosystems.	Thank you for your comment - biodiversity = native and non-native species and the text above this line is not a contradiction to this. Furthermore we are not making a statement here about what to protect or what not to protect just highlighting that as a driver biological invasions differ from other drivers in this way.
Evans, Thomas	No	Chapter 1	37	37	1007	1007	Is 'promoter' the right term?	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	37	37	1012	1017	language here is policy prescriptive and should be recast as conditional: to reduce threats, these elements are important.	Thank you, we have revised the text accordingly
Brooks, Thomas	No	Chapter 1	38	38	1018	1018	Fig 1.12 is useful, but it is very important to add "Species" as a hexagon in the middle of the middle row, after "individual" and "population" but before "community" and "ecosystem", not least given that the bulk of the impacts documented throughout this Assessment are at the species level	Thank you for your comment - the categorisation of organisation level that we have adopted is commonly used.
Government of USA	Yes	Chapter 1	38	38	1026	1026	Figure 1.12: intentional release acknowledged of goldfish into ponds.	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	38	40	1032	1088	this section is on complexity and context-dependency of invasions and their impacts. It does not fit under a heading of a conceptual basis, and the material is repeated in other parts of the chapter. Suggest that discussion of this topic be consolidated as a new section 1.3.3.4	Thank you for your comment. We have revised the structure of Chapter 1 accordingly.
Grossart, Hans-Peter	No	Chapter 1	38	40	1032	1088	Some points are a bit repetitive to avoid. Could be shortened.	Thank you, we have revised the chapter accordingly
Marchante, Elizabete	No	Chapter 1	39	39	1054	1056	this sentence does not make sense... "find" should be replaced by "threat" or equivalent?	Thanks for this suggested change. We have included it in the new version.
Uludag, Ahmet	No	Chapter 1	39	39	1054	1056	It can be added that focusing to find alternatives, a local species to replace IAS instead of eradication can help getting rid of IAS.	Thank you for this comment, but this level of detail is not needed in Chapter 1
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	39	39	1063	1063	is critical to what?	Thanks for this suggested change. We have changed critical to important.
Government of Argentina	Yes	Chapter 1	39	39	1065	1076	We recommend to reflect on the necessary time extension that the analyses of invasions should cover, what would be a proper baseline for this study. For example, the IPBES assessment on land degradation recommended a natural state baseline	Thank you for your comment. This is a complex topic and we have focused throughout on ecosystem resilience and maintaining function rather than a specified baseline.
Estoup, Arnaud	No	Chapter 1	39	39	1076	1076	Here you might add the following two sentences at the end of the section : «Studies over different time periods of invasion cases (occurrence, range variation, variation in life history traits, genetic variation,...) could also shed lights on the long term dynamics of invasive species in their invaded range. One now have a number of biological models of invasive species that would allow characterizing the evolution of invasive situations after more than 20 years of invasion. »	Thank you for this comment, but this level of detail is not needed in Chapter 1
Evans, Thomas	No	Chapter 1	39	39	1076	1076	Reference date needed here.	Thank you, this has been revised in the final draft
Marchante, Elizabete	No	Chapter 1	39	39	1076	1076	REF is incomplete	Thank you, this has been revised in the final draft

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sagoff, Mark	No	Chapter 1	40	40	1084	1084	The Chapter states, "it is important to find ways to communicate this complexity without inducing inaction or hopelessness." Also, indifference. Also, skepticism. The formula, "A preponderance of experts agree that p" is certain to induce indifference, skepticism, inaction, hopelessness, and resentment. It is the kind of approach that hucksters have used for more than a century to sell soap and other nostrums. Experts agree ... so what? I happen to have a lot of wild amur honeysuckle and oriental bittersweet – both invasive species – in my backyard. Apparently, most experts agree that because these beautiful plants are invasive species, they are out to get me, and I should be at pains to get rid of them. But then I am told that invasive species are sometimes beneficial. It's all very complex. I get it when an expert explains the causal connection between a given organism at a given place at a given time to anything I care about. But vacuities about "nature," "biodiversity," and benefits and costs to humanity in general create not just an invitation to indifference, inaction, skepticism, hopelessness, and resentment. They create a suction.	Thanks for this comment. We have deleted the word hopelessness.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	40	40	1090	1098	In addition to IPBES regions and subregions, the assessment also frequently refers to "regions," (eg Table 2.21) which seem to be sometimes countries and sometimes subnational units in the terrestrial realm, and marine ecoregions in the marine. A description of the framework would be appropriate here, and could explain details on how overseas territories are handled (is Greenland distinct from Denmark?) and the source of the marine ecoregional boundaries.	Thank you, a sentence has been added in the chapter referring to a full description of the regions
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 1	42	42	1103	1103	Please clarify if the reference IPBES, 2019 – 1103 chapter 1, supplementary materials, refers to IPBES, 2019a as found in the final references	Thank you, it does indeed. This has been corrected.
Evans, Thomas	No	Chapter 1	42	43	1105	1105	Table 1.1. There are no bird examples in this table. Maybe you could add: the Common myna (<i>Acridotheres tristis</i>) and Rose-ringed parakeet (<i>Alexandrinus krameri</i>) to 9. Urban/semi-urban; the Common starling (<i>Sturnus vulgaris</i>) to 10. Cultivated areas; the Weka (<i>Gallirallus australis</i>) to 17. Coastal areas; the Superb lyrebird (<i>Menura novaehollandiae</i>) to 2. Temperate and boreal forests and woodlands.	The examples could not be added because of all examples for this table were chosen from the most cited papers based on a systematic literature review
Grossart, Hans-Peter	No	Chapter 1	42	43	1105	1105	Table 1.1: I like the clear separation of freshwaters from terrestrial regions!!! Should be done in a systematic and consistent way. However, I miss the American lobster and the Shanghai crab given in the below figure. Just as suggestion: one could take the same examples in the table and the pictures!	Thank you for your comment. The same examples are presented in the table 1.1. and fig. 1.14, as well as common names were added. The American lobster and the Shanghai crab were not presented in the figure.
Lázaro-Lobo, Adrián	No	Chapter 1	42	42	1105	1105	Maybe you could add <i>Baccharis halimifolia</i> as an example in 8. Wetlands.	Thank you for your comment. The example could not be added because of all examples were chosen based on a systematic literature review
Evans, Thomas	No	Chapter 1	43	43	1105	1105	Table 1.1. Does Category 17 make sense? 17. Coastal areas intensively and 'multiply' used by 'human'	Thank you, we follow the categorisation of units of analysis as adopted by previous IPBES assessments.
Government of USA	Yes	Chapter 1	43	43	1105	1106	Table 1.1: 15. Open ocean pelagic systems (euphotic zone): American comb jelly is more an estuarine species than open ocean? http://www.iucngisd.org/gisd/species.php?sc=95	Thank you for your comment. The text has been deleted.
Evans, Thomas	No	Chapter 1	44	44	1108	1104	Figure 1.14. It's a shame there are no bird photo examples? I have photos of rose-ringed parakeets if that helps!	Thank you for your comment. All pictures of species in the figure 1.14 match the examples from table 1.1.
Pan, Xubin	No	Chapter 1	44	44	1113	1113	Figure 1.14: The middle one can be turned 90 degree.	Thank you, agreed.
Government of USA	Yes	Chapter 1	45	45	1105	1105	Table 1.1: in table under #17, "coastal areas intensively and multiply used by human" does not make sense	Thank you, we follow the categorisation of units of analysis as adopted by previous IPBES assessments.
Díaz, Sandra	No	Chapter 1	45	45	1115	1119	Figure 1.14: Photo montage: please consider adding common names to the scientific ones, for better uptake by non-specialist readers	Thank you, common names have been added.
Government of New Zealand (Perry, Joanne)	Yes	chapter 1	45	45	1115	1119	Figure 1.14: 1115-1119 insert species common names also	Thank you, common names have been added.
Luisa Nunes, Ana	No	Chapter 1	45	45	1115	1119	Figure 1.14: Scientific names of some species have typos (e.g. <i>Procambarus clarkii</i>) and for others the species epithet is wrongly written with a capital letter	Thank you, typos have been corrected in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 1	45	45	1117	1119	Figure 1.14: The following names should be corrected: remove the word <i>Turra</i> in <i>Pinus mugo</i> it is the authority, not part of the name of the species. <i>Procambarus clarkia</i> should be <i>Procambarus clarkii</i> . The word <i>vison</i> should not be capitalized in <i>Mustella vison</i> . King crabs is not a latin name substitute for <i>Lithodidae</i> family. <i>Undaria Pinnatifida</i> should be <i>Undaria pinnatifida</i> . The word <i>maenas</i> in <i>Carcinus maenas</i> should not be capitalized. The word <i>taxifolia</i> should not be capitalized.	Thank you, this has been corrected in the final draft.
Marchante, Elizabete	No	Chapter 1	45	45	1118	1118	there is a misspelling in <i>Procambarus clarkia</i> , it should be <i>Procambarus clarkii</i> ; lines 1118, pag 42, 126 and table 1.4, Supp material 1.3	Thank you, this has been corrected in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	45	45	1129	1132	Biologists have made similar findings. Consistency of findings across disciplines is worthy of mention.	Thank you, this has been revised in the final draft
Díaz, Sandra	No	Chapter 1	45	45	1133	1133	replace "Colombian" with "Columbian"	Thank you, this has been corrected in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	45	45	1134	1134	while few would disagree that global trade and industrial economies continue to be a major driver of species introductions, in a text targeted to policy support, value-laden terms such as "imperial capitalism" either need to be replaced with more value-neutral terms or their use justified within the text. Globalization is raised as a key issue (line 2038-2045); language could be made consistent with that section (excepting the final sentence in that para, which is emotive and policy prescriptive).	Thank you, we have revised this text and no longer refer to capitalism
Sagoff, Mark	No	Chapter 1	45	45	1134	1135	The text states, "few would disagree that imperial capitalism has been and continues to be the main driver of species introductions." I guess this is right, but China, a communist not capitalist society, now dominates world trade. Fascist, authoritarian, feudalistic, theocratic, and slave-based economies, which offer the historical alternatives to capitalism, did contribute to the problem of invasive species, but not on the scale of capitalism. In the Great Leap Forward from 1959-1961, Mao starved to death about 30 million of his citizens. But during those years imperial capitalism caused the introduction of many invasive species. Does IPBES recommend a turn toward Maoism or Fascism or Stalinism? If not, what alternative does it suggest to capitalism?	Thank you, we have revised this text and no longer refer to capitalism
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 1	45	45	1137	1137	The use of the word "pests" is very commonly used as a synonym for invasive species it would be good to add the definition and difference amongst these terms either here or in the glossary.	Thank you for your comment. We have changed the term pest to plants and animals with negative impacts on crops
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	46	46	1156	1158	The framing of this sentence is troubling. Presumably historians have also provided data to construct historically accurate narratives, and who has been duping historians into producing misleading ones?	Thank you for your comment. We have deleted this sentence.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	46	46	1164	1166	This sentence contains two ideas; the citations should be split appropriately. Caluya 2014 is not included in the reference section	Thank you - this has now been split into two sentences and the reference added.
Htar Maung, Molley	No	Chapter 1	46	46	1164	1164	The meaning of "Failures to differentiate between humans" is not clear.	Thank you for your comment. We have reworded this sentence.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Ahimbisbwe, Imran	No	Chapter 1	46	51	1173	1337	Much of the works and material produced in this chapter for instance on perceptions and values is to a large extent academic and theoretical. The panel of experts should guide authors on consistency with CBD. We passed the problem construction phase where this information would have informed decisions of parties prior to signing of the treaty. Representatives of parties to conventions speak on behalf of voters they represent. Whether or not people have different perceptions on IAS at this particular time is immaterial unless it is an attempt to rewrite the convention. Authors are portrayed in the draft assessment to be pechant to defending IAS as beneficial to society and economy hence advocating for management of IAS contrary to CBD Articles which call for prevention of introduction and eradication of IAS. There are certain basics and principles of law that authors should bear in mind. One, a convention is a legal document that binds parties to stipulated commitments of mutual interest. Third parties can only challenge the content of the agreement if it were illegal by going to court. It is therefore a waste of resources both mental energy and material to compile academic theory to prove the contrary also known as reasoning in circles. Two, IPBES is a platform and not a CoP (Conference of Parties) therefore it does not qualify to amend the treaty or contradict its content. IPBES is obliged to build on existing work of designers of CBD to facilitate its implementation and achievement of its objectives as stipulated in the United Nations treaty. Thirdly, Individuals who feel that IAS should be managed irrespective of their demerits on biological diversity are using a wrong platform to communicate their views to a wrong audience and this may be regarded as negligence of duty of the panel of experts who supervise the work of authors. Having said that however, there is still room for improvement since this is just a draft. Hopefully the final document will be as consistent as the global biodiversity assessment report 2018 which was a job well done.	Thank you for this comment. IPBES is different from the CBD and this assessment is guided by the scoping document (approved by IPBES member states).
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	46	46	1174	1178	Precision in language is lacking here, and it could be recast somewhat - perhaps something like: Social and cultural dimensions of invasive alien species encompass people's awareness, perceptions, values, attitudes, and interests. The study of these dimensions helps to better understand social conflicts, etc...	Thank you for your comment. We have reworded this sentence.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	46	47	1190	1203	the reason to include the detailed description of this study is not clear.	We think this is important to highlight as it is a rare effort to examine social perceptions. We added the word "rare"
Grossart, Hans-Peter	No	Chapter 1	47	47	1191	1205	Biases: there is for sure a great bias in detection of species and this depends on which organisms and where the invasions occur. In particular microorganisms are often not in the focus of invasion biologists...	Thank you, we agree with your comment. These biases have been mentioned elsewhere
Government of Canada (Alexander, Steven)	Yes	Chapter 1	47	48	1210	1254	Here the authors highlight four conclusions draw from Schelhas et al (2021). Points 1 - 3 are presented and summarized. Point 4 goes beyond the conclusion drawn to noting that "This Assessment has attempted to correct this tendency...". This is a critical point to be made but its current placement seemed inconsistent with how 1-3 were presented.	We seperated this para from the perefceding list
Marchante, Elizabete	No	Chapter 1	47	48	1210	1254	Compared with other sections, maube this part is more developed - maybe summarize a bit more?	Thank you for your comment. We have revised the text accordingly.
Marchante, Elizabete	No	Chapter 1	47	47	1220	1220	There is a more recent Eurobarometer on this: https://europa.eu/eurobarometer/surveys/detail/2194	Thank you, added
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	48	48	1238	1248	Warnings from scholars are not part of public perception. The sentence on lines 1238-1240 can be deleted, with citations moved to the supporting text. The sentence on lines 1247-1248 should begin "Indigenous voices and values are under-represented..."	Thank you for your comment. We have changed the text accordingly.
Wong, Nicholas	No	Chapter 1	48	48	1238	1246	In considering not using derogatory terminology, in much invasive species public education and outreach world, the term "alien" is avoided. This is not inline with what the scientific community and policy makers use. Is there any opportunity to discuss this?	Thank you for your comment. This assessment follows the scoping report (approved by the IPBES member states), which includes the "invasive alien species" terminology.
Atchison, Jennifer	No	Chapter 1	48	48	1247	1254	In this section re scholarship on invasive species and Indigenous people, the text could make the connection to social justice concerns for Indigenous people managing IS - see Head, L. and Atchison, J., 2015. Entangled invasive lives: indigenous invasive plant management in northern Australia. Geografiska Annaler: Series B, Human Geography, 97(2), pp.169-182.	thank you for the reference, we have added it to the text
Government of USA	Yes	Chapter 1	48	48	1247	1254	The issue of invasive species origin use in names (i.e. "Asian" "Japanese", "European" "American") has been flagged as a potential source of human discriminatory bias as being associated with the negative connotations of invasive species. Consequently there is a call to de-couple origins from common names of various invasive species.	Thank you, we have revised the draft accordingly (where possible).
Government of Canada (Alexander, Steven)	Yes	Chapter 1	48	48	1257	1257	It wasn't clear what is meant by the phrase 'social and ecological values.' How are the authors differentiating between social values and ecological values?	Thank you, this has been revised in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	48	48	1260	1270	Much of this paragraph is about development of the research field (rather than the perceptions themselves), which does not fall within the scope of the assessment. If retained, "social imaginary" requires definition.	Thank you, this has been revised in the final draft
Government of Canada (Alexander, Steven)	Yes	Chapter 1	48	49	1274	1275	In Table 1.2 there were some redundancies notes within the column on the right. For example - 'Social and cultural value systems' is included under 'Socio-cultural contexts' while also being included as 'Value systems' and 'Belief systems' under 'Individuals'	Thank you, we have revised the table accordingly
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 1	48	49	1274	1275	Table 1.2 This table is very helpful. It could benefit from including more Indigenous perspectives (e.g., relationship to the land, traditional foods, culture). If those cannot be included in this table as it is from another article, they should be mentioned in that section (recognizing that there is a whole section on Indigenous perspectives).	Thank you, we have revised the table accordingly
Government of USA	Yes	Chapter 1	49	50	1276	1297	Box 1.9: In the United States, the term Asian carp has largely been replaced by the term Invasive Carp to identify the 4 species of carp. Box 1.9 should be updated throughout with the new inclusive common name.	Thank you for your comment. The text has been updated.
Government of USA	Yes	Chapter 1	49	49	1279	1279	Box 1.9: delete period between "America" and "in"	Thank you, this has been corrected in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	49	49	1282	1282	Box 1.9: This may seem bizarre to some, but jumping away from danger is not unusual. Jumping may have increased awareness of these species, but this fact is not connected to the text in the rest of the box and could be removed. Consistency in terminology would suggest "spread" rather than "migration" of these fish.	Thank you for your comment. The text has been updated.
Estoup, Arnaud	No	Chapter 1	49	49	1358	1358	Dubois et al. 2017. This reference is not in the reference list at the end of the chapter. More generally, after a few checkings I found that a number of references cited in the text were not present in the reference list at the end of the chapter.	Thank you, this has been revised in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	50	50	1299	1299	Box 1.10: This box contains some very interesting points, but is written in an academic style that will be difficult for non-specialists to navigate. "Calling out" and the necessity for additional research is policy prescriptive, even if it is attributed to research results rather than people	Thank you, we have revised the text following this comment in the final draft.
Rojo, Iskra	No	Chapter 1	51	51	1345	1354	It should be said that historically and currently there are still privileges of certain economic and even political actors who carry out practices that promote invasive species	Thank you, the box on "conceptual perspectives from the social sciences" covers this point.
Sagoff, Mark	No	Chapter 1	51	51	1348	1349	The text states, "The extension of legal rights to animals and nature imposes moral and legal limits on acceptable human uses of the environment...." No one takes seriously the extension of legal rights to nature. In 1974, late in my career, I scoffed at the idea - see Sagoff, M., 1974. On preserving the natural environment. The Yale Law Journal, 84(2), pp.205-267. I wonder if IPBES needs to resurface the notion now.	Thank you for your comment. Some people do take this seriously, this is why the assessment includes this topic.
Latombe, Guillaume	No	Chapter 1	52	52	1376	1382	A mention to conservation welfare, which also focuses on the welfare of individuals, but in a more fashion more in line with traditional conservation approaches (i.e. from an optimisation perspective) than compassionate conservation could be added. See e.g. Beausoleil, N. J. (2020). I am a compassionate conservation welfare scientist: Considering the theoretical and practical differences between Compassionate Conservation and Conservation Welfare. Animals, 10(2), 257.	Thank you, but this assessment cannot go into this level of detail, and needs to focus on invasive alien species
White, Michael	No	Chapter 1	52	52	1396	1401	SDG 18 good idea	Thank you for your feedback.
Htar Maung, Molley	No	Chapter 1	53	53	1405	1405	Good findings	Thank you for your feedback.
Rojo, Iskra	No	Chapter 1	53	53	1418	1438	in some cases cultural practices can also introduce or maintain species and should be mentioned	Thank you, this is properly dealt with in Chapter 3 (drivers)
Government of USA	Yes	Chapter 1	53	53	1423	1423	seems like there should be another "of" after "many" (to read ... impressive diversity of many of natures's"	Thank you, this has been corrected in the final draft.
Government of Canada (Alexander, Steven)	Yes	Chapter 1	53	53	1427	1430	It would be helpful for the reader to expand upon these with concrete examples and/or definitions. For example, what is meant by data dispersal or accessibility.	Thank you for this comment we have added data and information flow, accessibility of information,
Pan, Xubin	No	Chapter 1	54	54	1450	1456	L1476-1481	Thank you, this has been revised in the final draft
Rojo, Iskra	No	Chapter 1	54	54	1468	1468	Only whitness?	Thank you, this has been revised in the final draft
Government of Canada (Alexander, Steven)	Yes	Chapter 1	54	54	1477	1481	This is almost verbatim to the last sentence in the paragraph above (lines 1452-1456)	Thank you for your comment. We have revised the text.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Alexander, Steven)	Yes	Chapter 1	55	58	1483	1654	Overall, this is a really interesting and important section. However, it wasn't clear why so many examples and the depth that it went into for Ch. 1 which serves as the introduction and thus wondered whether some of the material might be better placed in other chapters?	Thank you for your comment. We have revised the text as suggested.
Government of USA	Yes	Chapter 1	55	55	1519	1519	delete period between "...Ill omens" and "that disturb..."	Thank you, this has been corrected in the final draft.
Sagoff, Mark	No	Chapter 1	56	56	1533	1534	In the upland the Christians On the lowland the sorghum fields ... These two lines say it all. Christians divide Nature and Humanity on the grounds that God created them separately. In Paradise Lost, Satan argues that God is not omnipotent enough to separate Man from Nature and therefore Nature, because of Original Sin, fell together with Man. Milton so well works out the issues that he is rightly regarded as the Principal Dead White Man of the Western Canon. Spoiler alert – God does triumph over Satan but not easily. It's not easy to keep Humanity and Nature separate enough to suppose that native and alien species, even though there are no characteristic or general biological differences between them, belong to different natural kinds for scientific purposes. You must believe as many Christians do that native is Edenic; alien, being anthropogenic, is stained and corrupted by the Original Sin. I say this because in the uplands is the IPBES among the Christians who separate Humanity and Nature; sorghum fields in the lowlands are the inevitable result. Call it "imperial capitalism" if you like, but it is imperial Christianity which brings Capitalism along with it. The IPBES struggles to reconcile the Christian doctrine of the separation of Man and Nature with the lack of any biological or scientific evidence that these are two separate natural kinds. I suppose that within any aboriginal or indigenous community there are many views and opinions, but there may be an overall resistance to the Christian doctrine that Humanity and Nature belong to different realms and that indigenous people (as early ecologists thought) belong to Nature.	thank you for these interesting comments; we do include indigenous/non-western view points throughout the assessment
Government of USA	Yes	Chapter 1	56	56	1546	1548	This sentence on climate change impacts on pest outbreaks seems out of place here and should be put in a section on climate change.	Thank you for your comment. This section has been entirely revised and the comment is no longer relevant.
Government of Canada (Alexander, Steven)	Yes	Chapter 1	56	56	1558	1558	There is a rouge parenthetic with a reference that doesn't seem to be linked to a specific sentence	Thank you, this has been revised in the final draft
Government of China	Yes	Chapter 1	56	56	1558	1560	Deleted this sentence. The reference (Byg & Salick, 2009) only involved Tibetans' perceptions and views on climate change, and did not involve invasive alien species.	Thank you, we have reworded this point and removed the reference.
Government of USA	Yes	Chapter 1	56	56	1558	1558	not sure why "(Crowley, 2014)." and "(Salmon, 2000)" are listed separately, and both with periods after?	Thank you, this has been corrected in the final draft.
Government of USA	Yes	Chapter 1	57	57	1587	1587	remove comma between "makers" and "in Michigan"	Thank you, this has been corrected in the final draft.
Government of USA	Yes	Chapter 1	57	57	1599	1611	So do these species meet the definition of "invasive" or are they simply non-native species that have benefits?	Thank you. Some invasive alien species can have benefits
Government of USA	Yes	Chapter 1	57	57	1604	1605	not sure why "(Macnaughton et al 2015)" and "(Homma, 1996)" listed separately?	Thank you, this has been corrected in the final draft.
Government of Canada (Alexander, Steven)	Yes	Chapter 1	57	58	1608	1629	A few observations here. Compared to other species, there seemed to be much more text focused on Prosopis which resulted in it seeming a bit unbalanced. Second, it was also noted that this material was found across 3 different paragraphs - two of those being partial paragraphs so there is an opportunity for some improvement to the flow and structure to this particular section of text.	Thank you for your comment. We have entirely revised this paragraph to address these comments.
Government of Canada (Alexander, Steven)	Yes	Chapter 1	57	58	1608	1649	The inclusion of both latin and common names was not consistent throughout this particular section of text. In some instances it was just one or the other. Did notice and appreciate the inclusion of Indigenous names for particular species!	Thank you, this has been revised in the final draft
Government of USA	Yes	Chapter 1	58	58	1649	1649	need space between "(Weston et al., 2012)" and "have been"	Thank you, this has been corrected in the final draft.
Government of Canada (Alexander, Steven)	Yes	Chapter 1	58	58	1653	1654	I appreciate the sentiment expressed here, though it doesn't necessarily align with the text included previously in this section which suggests that it is not only important to learn from Indigenous communities but to involve them in the assessments, research, and monitoring.	Thank you, this section has been revised and is now more consistent.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	59	59	1657	1679	The approach here, providing context in plain language that serves to frame the rest of the section, is very effective and could perhaps be used elsewhere as well.	Thank you for tyour feedback, we have tried to revise the rest of the chapter accordingly
Government of Argentina	Yes	Chapter 1	59	59	1666	1667	This statement "Social and environmental justice and equity are central concerns for the development of good quality of life regardless of the economic context" (line 1666) is confusing. Additionally, it is not understood what he means by "environmental justice". The same observation is made regarding the following statement "Good quality of life and health encompass not just physical health, but psychological health, including the satisfaction created by cultural expression and stability, spiritual fulfillment, and reliable access to resources necessary to thrive as a human." being."	Thank you, we have removed the first sentence to address this comment.
Government of USA	Yes	Chapter 1	59	59	1687	1688	final sentence, suggest replacing "be" with "are"	Thank you, this has been corrected in the final draft.
Sagoff, Mark	No	Chapter 1	60	60	1709	1711	"local reports of sexual assault under cover of dense invasive Acacia invasions have been made." Perhaps the Chapter should do more to explain how the cover of invasive (but not native) plants promotes sexual assault. Are there fewer sexual assaults where there are fewer invasive plants? The text suggests a causal relation between sexual assaults and invasive plants. Why?	Thank you, authors have brought more nuance to the statement.
Government of Argentina	Yes	Chapter 1	60	60	1716	1716	Table 1.3 (line 1716) includes "good quality of life" as examples of "subcategories": security, material and non-material assets (food, housing, etc.), health, social, cultural and spiritual relations (includes friendship), and freedom of action. It is considered that these relationships are not based on science and the purpose of including such a variety of elements in a definition is unknown, as well as the impossibility of evaluating them objectively to define whether or not there is a "good quality of life"	Thank you for your comment, authors argue that we need to include qualitative items in order to bring the humanities into IPBES assessments
Grossart, Hans-Peter	No	Chapter 1	60	60	1716	1720	Table 1.3: I miss recreation...	Thank you, this has been added.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	60	61	1721	1757	The scope of Box 1.11 should be broader than disease transmission and consider examples of the impact of various IAS on good quality of life. One example should be the impact of weeds and pests on the ecological service of providing food.	Thank you, other impacts are covered in Chapter 4
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 1	61	61	1726	1732	Box 1.11: In this paragraph it seems as though pathogenic microorganisms themselves are not considered invasive species. Even though they are introduced by invasive species, they themselves are also invasive species. It should be clarified.	Thank you, the end of the box has been revised to clarify this point.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	61	61	1727	1732	Box 1.11: this sentence omits the most obvious example, IAS that are disease-causing organisms, which are well-covered later in the box.	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Facon, Benoit	No	Chapter 1	61	61	1734	1742	Amsellem L. et al. (2017). Importance of microorganisms to macroorganisms invasions : is the essential invisible to the eye ? (The Little Prince, A. de Saint-Exupery, 1943). In : Bohan D. A. (ed.), Dumbrell A. J. (ed.), Massol F. (ed.). Networks of invasion : empirical evidence and case studies. <i>Advances in Ecological Research</i> , 57, p. 99-146.	Thank you for your suggestion - reference added
Grossart, Hans-Peter	No	Chapter 1	61	61	1734	1742	Box 1.11: Fungal parasites, in particular Oomycetes Phytophthora species, have profound implications on our environmental health, but also on our food security as they destroy large % of the global food production! Now we also have the pig's pest, etc.	Thank you for your comment - the text has not been changed because although these are good examples they are included within the statement "Parasites (including pathogenic bacteria, fungi and viruses) can be introduced into an invaded range alongside an invasive alien species"
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	61	61	1747	1749	Box 1.11: this sentence is policy prescriptive as written and should be revised into a sentence about what an integrated approach could accomplish.	Thank you, this has been revised in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	61	61	1752	1753	Box 1.11: "can be viewed as" is inappropriate here, as they meet all the elements of the IAS definition. There seems little value in introducing uncertainty in the definition, and unless authors wish to note the uncertainty in describing viruses as organisms, it would be more appropriate to say they "are." This leads to a richer comparison between public health and conservation approaches.	Thank you, the text has been revised accordingly in the final draft

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Estoup, Arnaud	No	Chapter 1	61	66	1823	2032	It is surprising to me that in this « Model » section The reconstruction of routes of introduction/invasion using model-based methods, molecular markers and first observation dates are not mentioned (see Estoup&Guillemaud 2010 Mol Ecol https://doi.org/10.1111/j.1365-294X.2010.04773.x for a review and Gautier et al 2021 MER https://doi.org/10.1111/1755-0998.13557 for a very new model-based approach to reconstruct such routes which is particularly efficient when using large NGS datasets). Routes of invasion/introduction correspond to the reconstruction of the geographic pathways - and demographic characterization - taken by individuals of the same species between one or more native or invasive source populations and one or more invading populations. The reconstruction of invasion routes helps designing strategies to prevent the introduction of exotic pest species. Having say that, I am not sure where this modelling point could be added in this long section.	Thank you for this comment, we now added information and references about reconstruction of routes across the "Scenarios and Models" sub section in chapter 1.
Government of USA	Yes	Chapter 1	62	62	1758	1758	Figure 1.15: The image is blurry and difficult to read. It would be beneficial to replace with a higher quality image.	Thank you, this has been revised in the final draft
Government of Argentina	Yes	Chapter 1	62	62	1762	1790	Box 1.12: From our perspective it is inappropriate to address one health and one biosecurity on the same footing. One is backed by several UN resolutions, while the other lacks multilateral assessment by governments. We recommend to rethink this box in light of this reality.	Thank you, we have redrafted the box to address this concern
Government of Argentina	Yes	Chapter 1	62	62	1763	1790	Box 1.12: On page 62, the box for "One Health and Biosecurity" contains numerous inconsistent statements. A relationship is made between the "One Health" concept and CBD and it is stated that "Recently a One Biosecurity approach has been outlined that would examine the impacts of invasive alien species across sectors including health, agriculture, and the environment". It should be considered that the propagation of new terms and the attempt to force new visions whose definitions are not clear can lead to analyzes without a scientific basis. An example of this could be the last sentence of that box "Good quality of life cannot be properly viewed in isolation; it is part of social-ecological systems that integrate animal and plant health with ecosystem health and resilience with human health". Although the first definition of "good quality of life" contained elements related to economic development (housing, access to food, etc.), this definition does not include a reference to economic development.	Thank you, this box has been entirely revised and hopefully addressed your comment.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	62	62	1765	1797	Box 1.12: a definition should be clearly stated as such. What are the relevant risks?	Thank you, included in the glossary
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	62	62	1767	1767	Box 1.12: Did you mean the "Food and" Agriculture Organization of the United Nations (FAO)?	Thank you, this has been revised in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	62	62	1772	1774	Box 1.12: The notion of "One Health" is that environmental and human health are interdependent - that this is really only one health, rather than each component having its own health. While sustainability requires health, the description provided here miscasts the connection.	Thank you, this box has been entirely revised and hopefully addresses your comment.
Golivets, Marina	No	Chapter 1	63	63	1802	1802	Change "factors" to "information".	Thank you for your comment. We respectfully disagree as factor and information are two different things regarding modelling.
Golivets, Marina	No	Chapter 1	63	63	1809	1809	Remove "and quantify".	Thank you, this has been revised in the final draft
Latombe, Guillaume	No	Chapter 1	63	63	1812	1812	"based on established relationships" is vague. Relationships between what? A process, expressed as an equation, is also a relationship (e.g. between the energy level of an individual and the distance it can travel). Maybe clarify: "based on observed, correlative relationships between the variable to be predicted and other environmental, economic or social predictors"	Thank you for this comment, he have reformulated the sentence accordingly, clarifying the relationship between the species and environmental, economical or social conditions
Latombe, Guillaume	No	Chapter 1	63	63	1813	1813	"alternative possible future states" of what?	Thank you for this comment, he have reformulated the sentence accordingly, clarifying the relationship between the species and environmental, economical or social conditions
Government of Germany	Yes	Chapter 1	64	64	1827	1846	Clarification is needed: If integrated assessment models are another important group of models, why are they not included as a fifth group of model types?	Thank you for this comment, we did not consider IAMs as a modelling type because IAMs do not follow a specific modelling "type" as the ones explained later (e.g., correlative) but rather can consist of different individual models that are coupled. We clarified this information in the document by adding the information that our choice was based on the main model types identified in IPBES 2016
Golivets, Marina	No	Chapter 1	64	64	1832	1834	Consider changing "(also" to "(a.k.a." or "(also called" for clarity.	Thank you, this has been addressed in the final draft.
Latombe, Guillaume	No	Chapter 1	64	64	1834	1835	Add: "and generate the variables of interest through simulations" at the end of the sentence	Thank you for this comment, although we agree with your suggestion, we followed the definitions provided in IPBES 2016, therefore and in order to maintain the definitions in a standard format we will keep the original text (IPBES 2016, Summary for policymakers of the methodological assessment report on scenarios and models of biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services).
Golivets, Marina	No	Chapter 1	64	64	1835	1835	A period at the end of the sentence is missing.	Thank you, this has been addressed in the final draft.
Golivets, Marina	No	Chapter 1	64	64	1838	1838	Unclear why integrated assessment models are not included in the list above.	Thank you for this comment, we did not consider IAMs as a modelling type because IAMs do not follow a specific modelling "type" as the ones explained later (e.g., correlative) but rather can consist of different individual models that are coupled. We clarified this information in the document by adding the information that our choice was based on the main model types identified in IPBES 2016.
Latombe, Guillaume	No	Chapter 1	64	64	1838	1846	It would be good to explain in a bit more details how these models work. Are they quantitative, qualitative, both? Are they more correlative or process-based? What kind of projections or predictions do they enable us to do? Etc.	Thank you for this comment, given that these models do not include biological invasions at the moment we are not able to discuss this modelling type in more detail due to space constraints.
Golivets, Marina	No	Chapter 1	64	64	1847	1847	Change " for example to" to ", for example, ".	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	64	64	1847	1854	not all of the examples are models, resulting in a paragraph that does not fit well into this section	Thank you for this comment, we followed the definitions provided in IPBES 2016 were a broad definition of models is considered regarding expert-based models and approaches (IPBES 2016, Summary for policymakers of the methodological assessment report on scenarios and models of biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services)
Golivets, Marina	No	Chapter 1	64	64	1866	1867	Strictly speaking, correlative models do not allow to identify casual relationships. I would suggest dropping "casual".	Thank you for this comment, the word presented in the text is "causal" not "casual", therefore we believe "causal" fits the definition.
Latombe, Guillaume	No	Chapter 1	65	65	1870	1871	It is important to mention that these approaches have a lower information content, since they do not provide any information on species composition, for example, and therefore fewer insights overall. There is therefore a threshold between the ease of application and what information you can extract from the model.	Thank you for this comment, analysing your text we agree with some of the concerns your raised, nonetheless and generalizing the potential problem, we concluded that the modelling technique choice is very context dependent in relation to the scientific or policy question we want to test
Latombe, Guillaume	No	Chapter 1	65	65	1875	1877	What would "commonly used variables" be? If they are commonly used, why do we need proxies? I think there is a problem of formulation here.	Thank you for this comment, we have reformulated the sentence accordingly.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Latombe, Guillaume	No	Chapter 1	65	65	1887	1897	The logic of this paragraph is not fully clear, or I feel something is missing. I think it is important to explain that models calibrated from data in native ranges can fail at predicting species distribution outside of the native range. Ealy & Sax (2014) provide a great and clear illustration of this. Early, R., & Sax, D. F. (2014). Climatic niche shifts between species' native and naturalized ranges raise concern for ecological forecasts during invasions and climate change. <i>Global ecology and biogeography</i> , 23(12), 1356-1365.	Thank you for this comment, we have reformulated the sentence and add the reference accordingly. Nonetheless, please note that there is another paper concluding the complete opposite https://www.science.org/doi/abs/10.1126/science.1215933 "Climatic Niche Shifts Are Rare Among Terrestrial Plant Invaders", both are now presented in the assessment.
Latombe, Guillaume	No	Chapter 1	65	65	1899	1909	As for SDMs vs other correlative approaches, there is a tradeoff. Mechanistic models should be able to better extrapolate outside of observed conditions since they are based on system dynamics, but in practice they are much harder to parameterise and calibrate (not only computationally but also from a methods perspective), and are more computationally intensive.	Thank you for this comment, we agree and we added information regarding the limitations of mechanistic models in the text.
Golivets, Marina	No	Chapter 1	65	65	1905	1909	Please revise the punctuation here.	Thank you, this has been revised in the final draft
Golivets, Marina	No	Chapter 1	65	66	1910	1916	The paragraph about hybrid models is quite short. It would benefit from listing the systems for which this approach was successfully used, explaining the difficulties associated with this methods, etc.	Thank you for this comment, although we agree with your suggestion, due to space constraints we can only provide the general information regarding each modelling technique. Hybrid models as a combination of other type of modelling techniques already described, are presented shortly.
Latombe, Guillaume	No	Chapter 1	66	66	1918	1951	It may be good to explain how scenarios can offer a context in which to run models to get quantitative projections for the future	Thank you for this comment, the link between scenarios and models is presented in the last four sentences of this sub section and further explored in the Scenarios and models review "Box 1.: Scenarios and models in invasive alien species research – patterns and trends".
Golivets, Marina	No	Chapter 1	66	66	1924	1927	Consider changing "(also" to "(a.k.a." or "(also called" for clarity.	Thank you, this has been addressed in the final draft.
Golivets, Marina	No	Chapter 1	66	66	1926	1926	A period at the end of the sentence is missing.	Thank you, this has been addressed in the final draft.
Government of Germany	Yes	Chapter 1	66	66	1927	1930	Clarification is needed: Don't "target-seeking scenarios" also fall in the category of "intervention scenarios"? Please review Figure SPM.2 in the SPM for Biodiversity and Ecosystem Services Scenarios and Models" (IPBES, 2016).	Thank you for this comment, as suggested, we have changed the terminology "intervention scenarios" to "policy-screening scenarios" in order to follow the IPBES 2019 terminology.
Golivets, Marina	No	Chapter 1	66	66	1936	1936	Consider changing "they" to "those" for clarity.	Thank you, but we think the sentence is clear as it is, and have decided not to accept this change.
Golivets, Marina	No	Chapter 1	66	66	1937	1937	Remove "While".	Thank you, this has been revised in the final draft
Latombe, Guillaume	No	Chapter 1	66	66	1937	1937	Delete the first "Why" of the sentence.	We have removed "while", assuming this was the reviewer's suggestion.
Government of Germany	Yes	Chapter 1	66	66	1942	1942	Clarification is needed: In Figure 1.12. (p. 38) the temporal scales are defined as short term (until 2030), medium term (until 2050) and long term (until 2100). Here they are stated as short (until 2050) and long term (until 2100). Please reconsider if time ranges need an alignment (throughout the chapter, whole assessment and SPM) and scientific grounding by providing a reference.	Thank you for this comment, we have standardised the temporal classifications across the whole assessment.
Marchante, Elizabete	No	Chapter 1	66	66	1947	1947	The reference Roura-Pascual et al 2021 is not in the reference list	Thank you, this has been revised in the final draft
Rojo, Iskra	No	Chapter 1	67	68	1953	2031	Box 1.13: Link better with 1.1	Thank you, we have added a sentence in the opening paragraph to address this comment
Golivets, Marina	No	Chapter 1	67	67	1987	1987	Box 1.13: Change "Terrestrial" to "terrestrial".	Thank you, this has been addressed in the final draft.
Golivets, Marina	No	Chapter 1	68	68	1994	1994	Box 1.13: "of the 182 papers" is redundant to the information presented at the beginning of the sentence.	Thank you, this has been revised accordingly
Golivets, Marina	No	Chapter 1	68	68	1995	1995	Box 1.13: A period at the end of the sentence is missing.	Thank you, this has been addressed in the final draft.
Golivets, Marina	No	Chapter 1	68	68	1996	2007	Box 1.13: It could be also interesting to know what and how many drivers were considered in models and how often non-additive effects of those drivers. were modeled.	Thank you for this comment, more information about the drivers resulting from this systematic review, are presented in the Drivers chapter of the IAS assessment. In chapter 1 the idea is to present the general results of the review. Detailed and more thematic specific results can be found across the assessment in the respective chapters.
Golivets, Marina	No	Chapter 1	68	68	2002	2002	Box 1.13: Here you use "expert-based systems" and earlier in the text, "expert-based model" and "expert-based approach" are also used. Consider using the same wording throughout.	Thank you, this has been harmonized in the revised version
Golivets, Marina	No	Chapter 1	68	68	2006	2006	Box 1.13: It is surprising that there were no studies on taxonomic and functional diversity.	As the systematic review result you can find in the category "ther model features" that 1% of the models applied to invasive alien species focused and intraspecific diversity (including genetic or trait diversity). Note that our systematic review as just applied to studies addressing alien species, models, and scenarios.
White, Michael	No	Chapter 1	69	69	2034	2047	The lack of Global Environmental Justice is the glaring gap.	Thank you, but this statements goes beyond the scope of this assessment
Sagoff, Mark	No	Chapter 1	69	69	2055	2055	"There are many threats to biodiversity today." This is true if "biodiversity" is defined to comprise only native species. If the term includes non-native species, with all their blooming, buzzing ecological activity and genetic potential, it's a different story. Biodiversity at least at local levels seems to be burgeoning rather than under threat.	Thank you for this comment. The authors agree but do not see how it negates the general statement in question,
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	69	69	2056	2057	this is strongly policy prescriptive - suggest deletion	Thank you, this has been revised in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	69	69	2067	2069	this is not clear - adaptation may be a policy response.	Thank you, agreed.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 1	70	70	2101	2103	This promotes the idea of protected areas as pristine areas - protected areas are managed for the conservation of nature but this does not mean they unused by humans, and the "fortress" conception of protected areas should not be promulgated. There is no reason to expect protected areas not to be affected by invasive species, although one might expect lower numbers. Adaptation is frequently the best available management response. The issue is well handled in box 2.6	Thank you, we think this is what is stated here already
White, Michael	No	Chapter 1	70	70	2101	2110	Eco-tourism walks can compact delicate soil habitats in forests	Thank you for this comment - we have not changed the text but are appreciative of the insight
Government of Germany	Yes	Chapter 1	70	70	2103	2105	Proposal: Suggestion to replace "nature parks" with "protected areas", as nature parks are potentially only one out of several PA categories	Thank you, but this statements goes beyond the scope of this assessment
Grossart, Hans-Peter	No	Chapter 1	70	70	2111	2117	Parasites should be an important key issue as well including zoonoses, e.g. see CORONA and many other pathogens!	Thank you, this is why they are included in our key issues
Facon, Benoit	No	Chapter 1	70	70	2112	2113	Amsellem L. et al. (2017). Importance of microorganisms to macroorganisms invasions : is the essential invisible to the eye ? (The Little Prince, A. de Saint-Exupery, 1943). In : Bohan D. A. (ed.), Dumbrell A. J. (ed.), Massol F. (ed.). Networks of invasion : empirical evidence and case studies. <i>Advances in Ecological Research</i> , 57, p. 99-146.	Thank you - this reference has been added.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	70	70	2112	2117	Should also mention that invasive alien micro-organisms also cause new diseases in crops.	Thank you - plant diseases have been added
Government of Argentina	Yes	Chapter 1	70	70	2119	2190	Box 1.14: It should be noted in this box that in many countries citizen science is not a valid method to assess environmental threats nor a recognized input for decision making	Thank you for this comment - this is beyond the scope of the box but is considered in Chapter 5
White, Michael	No	Chapter 1	70	70	2119	2110	Box 1.14 This is akin to the original meaning of 'amateur. Someone who was interested, so did it.	Thank you for this comment - we have revised the box.
Besek, Jordan Fox	No	Chapter 1	73	73	2192	2192	I see no reason to use the term "Anthropocene" here, when, as used in the section directly above (line 2038) the term "globalization" will do just fine. (My apologies for sounding like a broken record).	Thank you, this has been revised in the final draft

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Germany	Yes	Chapter 1	74	103	2204	3625	Proposal: It looks like only literature sources published in English are being cited. However, our experience is that a lot of important information on the impact of invasive alien species is being published in local languages only. This points towards a bias of the analysis / the document regarding the western world / evidence from scientists and managers in countries able and willing to write in English and publish internationally.	True, this is also highlighted in knowledge gaps sections across the assessment, but many of the cited references are reviews that may have other sources.
Jeschke, Jonathan	No	Chapter 1	79	79	2490	2492	This reference is no longer "in press" but published, hence the citation can be updated.	Thank you, this has been revised in the final draft
Jeschke, Jonathan	No	Chapter 1	81	81	2563	2566	This reference and others published in the journal PNAS do not use the full title of this journal: only "Proceedings of the National Academy of Sciences" is given, whereas the full title is "Proceedings of the National Academy of Sciences of the United States of America". This comment also applies to other chapters. Perhaps "of the United States of America" was intentionally omitted, but it seems odd not to mention at least "USA", as there are also "Proceedings of the National Academy of Sciences India". Therefore, omitting USA is ambiguous.	Thank you, we have reviewed our lists of references in the final draft and made sure journals and papers appeared as they should
Jeschke, Jonathan	No	Chapter 1	97	97	3346	3346	Please remove "Scopus." (this is not part of this reference).	Thank you, this has been revised in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 1	108	108	3630	3632	Supplementary material 1.2: Unit 10 on Cultivated Areas notes that they "involve the planting of non-native crop species or rearing of livestock, the introduction of non-native plants" but do not state whether these introductions are IAS. This must be made explicit one way or the other. Some of the text here contrasts agro-ecosystems and "native species" but this is not made explicit. See also general comment on Page 0 above.	Thank you, this point has been clarified in the definition section - noting that units of analysis are a general IPBES method to classify ecosystems and is not specific to IAS
Ahimbisibwe, Imran	No	Chapter 1	113	113	3637	3638	illustrations of IAS are obtained from the most cited papers but it appears the assessment report will skip profound IAS related biological diversity hotspots of global significance that portray best the subject matter. for instance introduction of the predator Nile perch in Lake Victoria the largest tropical Lake in the world and the subsequent decimation of 500+ species of Haplochromine (Cichlids) endemic to Lake Victoria by the invasive predator Nile perch is reported by various scientists as the worst in an ecosystem (L.Kaufman et al 1997,L.J.Chapman 2005, Greenwood 1974,Seehausen 1996,Jackson 2000, Pringle 2005, Ogutu-Ohwayo 1994,Schofield and Chapman 1999,M.Njuri et al 2005) Nile perch fishery, the largest in Africa, yields 1 million tons of fish for export (African Great Lakes International Conference 2017). let this not be the cause of silence about the adverse effects of the exotic Nile perch fishery on biological diversity in particular and on the Lake's ecology in general in the IAS context. furthermore introduction of Nile perch in Lake Victoria altered the balance of ecosystem goods and services and redistributed the flow of benefits to the detriment of local economy and livelihoods. I propose that authors should be invited to report on Nile perch invasion in Lake Victoria. A project on eradication of invasive Water Hyacinth weed (Eichhornia crassipes) on Lake Victoria, implemented by Environmental Protection Information Centre (EPIC) with financial support from Satoyama Development Mechanism (SDM) is in progress. A link was provided in my comments of FOD, should you require updates please contact SDM Secretariat.	Thank you, the Nile perch is an example very well developed in Chapter 4.
Alaux, Christine	No	Chapter 1	113	132	3650	3651	In the column "Example data", introduce photographs of the species cited. This will make the whole thing more attractive. Or arrange these photographs in a block after.	Thank you, we have already introduced a photo montage in the main chapter text with examples of taxa
Alaux, Christine	No	Chapter 1	113	132	3650	3651	The table is too long; it would be preferable to split it into several small successive tables. A solution: put a first title "Ecosystem Terrestrial" then below a first subtitle "Unit of analysis: Tropical and subtropical dry and humid forests" then below the table corresponding to the 4 columns. And so on with the second subtitle "Temperate and boreal forests and woodlands" followed by the table corresponding to 4 columns, etc...	Thank you for this comment - the final layout will ensure the table is accessible.
Brooks, Thomas	No	Chapter 2	0	0	0	0	Does the title of Ch 2 need to be expanded to be called "Status and trends in alien species"? From my read, it is about introductions and alien species, which is not equivalent to status and trends in IAS in themselves (although it is a precondition for understanding these). A possible exception is the "top 10" tables (eg Table 2.4 for mammals) which do seem to focus in on IAS, rather than alien species overall.	Thank you for your comment. At this stage, we cannot change the chapter title, but we tried to clarify this aspects within the chapter introduction to avoid confusion.
Estoup, Arnaud	No	Chapter 2	0	0	0	0	I found a number of redundancies (at the sentence if not paragraph level) in the chapter = same things mentioned several times. I understand that this is sometimes justified by the structure of the chapter and in a way somewhat « useful » to strengthen key take-home messages. However, at least through a last polishing step, a global effort could be done to remove some non-useful redundancies that makes the chapter sometimes a bit « lengthy and heavy » to read.16 – Estoup Arnaud (on behalf of INRAE-SPE department) 2 – 0 – 0 – Check that all references cited in the text are present in the reference list	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. The chapter text has been edited to increase the flow of reading and reduce redundancies where appropriate.
Estoup, Arnaud	No	Chapter 2	0	0	0	0	The three sections dealing with evolutionary aspects of biological invasions (which are actually three boxes; i.e. box 2.3, 2.4 and 2.5) (i) have several important missing points, (ii) brings not-much if nothing to chapter 2 and turns out to be rather even off topic for this chapter 2. They hence should be moved into Chapter 3 under the form of a special section # 3.6 (and not under the form of boxes), with section 3.6 becoming 3.7 in chapter 3, after taking into account all comments and complementary information that will be detail below. More specifically build a section entitled "Evolution as a driving force of biological invasion" preferentially using the following structure: subsection 1/ The genetic basis of evolution during invasion (corresponding to the content of Box 2.4 + modifications proposed below); then subsection 2/ Evolution and adaptation observed during biological invasions (corresponding to the content of Box 2.5 + modifications proposed below); and then sub-section 3/ Evolution during invasions: monitoring, management and future directions? (corresponding to the content of Box 2.3 + modifications proposed below). See also points 21 to 31 for my concrete suggestions to improve the content of the boxes that will be the basis of the future section 3.6 "Evolution as a driving force of biological invasion " in Chapter 3.	Thank you for the comment. We have chosen to keep the boxes in chapter 2 according to the required chapter content outlined in the scoping document of the assessment. The other comments related to this box are answered in respect to the specific comments.
Faulkner, Katelyn	No	Chapter 2	0	0	0	0	For the book on biological invasions in South Africa (i.e. van Wilgen et al. 2020) consider referencing specific chapters, or at least be consistent - in some places the book as a whole is cited (e.g. line 2881) and in others specific chapters are cited (e.g. Weyl et al. (2020) on line 2902). Each chapter has its own doi.	Thank you for your comment. Depending on the context, it may be reasonable to refer to either individual chapters or the full book. We re-checked the references and think that it is clear as it is right now.
Faulkner, Katelyn	No	Chapter 2	0	0	0	0	Introductions for biocontrol haven't really been highlighted in this chapter. Perhaps there was a specific choice made to focus on 'harmful' invasive species. But technically these are invasive species that have benefits. There are also some countries, that have strong biocontrol programmes, such as South Africa and Australia, and so have had many alien organisms introduced for this purpose.	Thank you for your comment. We do not distinguish between biocontrol agents and other organisms in this chapter and pathways of introduction, which are covered in chapter 3. Furthermore, impacts (positive and negative) are addressed in chapter 4).
Faulkner, Katelyn	No	Chapter 2	0	0	0	0	It would be great to either group the results maps and the completeness of records maps together so that they could be compared, or to create maps that consider both, so you could easily see, for example, which regions have a low number of species, but records which are relatively complete vs regions that have a low number of species, but the records are relatively incomplete	Thanks for this suggested change. This is indeed a great idea and we revised all figures related to taxonomic groups in the suggest way. For each taxonomic group, all relevant figures are now shown together.
Government of Armenia (Aghasyan, Levon)	Yes	Chapter 2	0	0	0	0	would be very important to have an analysis of data gaps. Which countries haven't any database, valuable research on IAS, what are the reasons. It would help policy makers target main gaps in development of national strategies and priorities	Thank you for the comment. Information on data gaps are included throughout the chapter in each section and in the figures (e.g., Figure 2.8 on the completeness of available taxonomic data globally). Additionally, information gaps are highlighted in the summary for policy makers.
Government of Canada (Ariey-Jouglaard, Rachel Tu-Van)	Yes	Chapter 2	0	0	0	0	This chapter is very helpful and brings a lot of information. It recognizes the gaps in data that we continue to face on this issue. Including more on how gaps influence what we think we know, or how the status and trends may influence the global approach to IAS would make this chapter even more useful.	Thank you for this comment. We have made sure we included a warning that the observed patterns were largely influenced by the importance of data gaps. See in particular Point 5 of the Executive Summary.
Government of Canada (Arsenault, Andre)	Yes	Chapter 2	0	0	0	0	This chapter is very well written and data rich. It may useful to mention something about the threat of invasive species on species at risk.	Thank you for your comment. Information about the threats to species at risk belong to the impact chapter and cannot be included in this chapter. Please refer to Chapter 4 for more information on impacts

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	0	0	0	0	The information collated in this chapter is truly impressive, particularly given the difficulty of the data gathering task. The organization of its presentation successfully supports rapid location of information that is relevant to a particular area or taxon, and redundancy is helpful in this regard. Some general comments - patterns of occurrences are carefully described, followed by a description of biases in data. The biases are so large as to bring into question whether the patterns observed are due to those biases, or due to genuine biological patterns. The reader needs some guidance on the degree to which patterns are, or might be, "real." - the description of data gaps is very repetitive, varying little across the subsections - this material could perhaps be condensed into a section early in the document. Subsections could focus on any deviations from the overall pattern of data gaps - given data limitations, it is understandable that the text focuses on alien species, rather than invasive alien species. It would be helpful to have an additional sentence in each subsection that provides information (perhaps expert opinion) on how invasives may differ from aliens in general - even if it is only to note that it's unknown	Thank you for these 3 comments. For the first one, we have made sure we included a warning that the observed patterns were largely influenced by the importance of data gaps. See in particular Point 5 of the Executive Summary. For the second point, we realize that our chosen structure implies repetitions, but the suggested change would imply that readers would need to read the entire chapter to assess global patterns and deviations from it, and we thought it would be better to provide all info for all parts, even if it meant some repetitions for readers that will read the whole chapters. As you mentioned yourself, some redundancy here is helpful. For the third point, there is no information for each subsection to distinguish alien species from alien invasive species, so this request, although in theory very valuable, is impractical and we have not been able to follow it
Government of Germany	Yes	Chapter 2	0	0	0	0	General comment: The general approach of chapter 2 in reporting information through different perspectives and the resulting structure of the chapter (sections: Global trends and status of invasions; Trends and status of invasions by IPBES regions; Trends and status of invasions by IPBES units of analysis) is highly welcomed. However, because of this structure some information is reported several times in different sections of the chapter (e.g.: information on Boiga irregularis is conveyed in sections 2.2, 2.3, and 2.4, on pp. 27, 103, and 120). Please check and ensure that repeated and therefore redundant information is avoided as far as possible.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. As we expect most readers to be selective in the sections they read, we believe that repetition of relevant information and examples in appropriate places throughout the chapter is justified and we decided to stick to this practice.
Government of Germany	Yes	Chapter 2	0	0	0	0	General comment: When reading chapter 2 it is repeatedly difficult to understand if the given statements/ findings were reported for invasive alien species, alien species, or naturalized alien species. Please check if the given information throughout the chapter is always referring to the correct category of alien species. Furthermore, please make sure that the reader can easily recognize to which group of species the given information refers to. You might want to consider to structure the text clearer with additional paras and/or sub-headings.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We have carefully reviewed the chapter and assured that the statement clearly refer to the appropriate category (e.g., alien species, established alien species or invasive alien species)
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	0	0	0	0	Chapter 2 - general comment - this is a very comprehensive and well written chapter.	Thank you for the positive feedback, much appreciated.
Guareschi, Simone	No	Chapter 2	0	0	0	0	Overall, in order to help the reader, I think it is important to specify where cited species are considered IAS geographically. For example: "Species A" (Native: South America; IAS: Asia, Europe, North America) ideally with the supporting references. For example, in line 672 and in the list in lines 684 – 689 page 22	Thank you for your comment. Authors have decided not to address this comment as it would considerably increase the length of this report and decrease readability. Please consult Chapter 1 for more information on nomenclature
Htar Maung, Molley	No	Chapter 2	0	0	0	0	Comment on entire chapter (2): Knowledgeable, very specific and detailed paperwork	Thank you for your feedback.
Participants of ILK dialogue workshop (Gakemotoh Satu)	No	Chapter 2	0	0	0	0	Ch 2, SPM A, B: Umbrella thorn is spreading like wildfire in the west of Okavango delta, compromising abundance of grass species, dominated areas where pastoralists have suffered severe loss drought in 2014 and 2015, particularly due to limited grass species in area. However, goats can survive as they browse from this species. Actors have not made it one of the invasive species in the area, for reasons that are unclear, but it is quickly spreading over and occupying places, occupying barren spaces, and people are scared for the future if this continues as it brings sever challenges for the farming community. There is also another herb that is encroaching, that we see when driving along roadways. Open areas by roads are usually occupied by grasses and now taken by herbs. Where used to see good grasses we now see the herb.	Thank you for your comment. As the SPM only provides the key messages of the findings of the full assessment, examples are usually not provided in the SPM.
Participants of ILK dialogue workshop (Te Tui Shortland)	No	Chapter 2	0	0	0	0	I believe the map on data gaps for chapter 2 should show data gaps for Aotearoa. There are absolutely data gaps for many private lands, publicly managed lands and close to 100% for Maori land in our region.	Thank you for your input. There are certainly many gaps on sub-national spatil units including private land, which, however, cannot be shown on a global map. We do now explicitly mention the data gaps on private lands and lands managed by Indigenous people and local communities in section 2.2.
Rebello, Alanna	No	Chapter 2	0	0	0	0	Overall this was a very interesting read and a huge body of work. Well done to all involved!	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Rebello, Alanna	No	Chapter 2	0	0	0	0	Policy recommendation emerging from this work: shouldn't some of the pathways attempt to be addressed? For example greater regulation and enforcement in the ornamental plant and pet industries? Regulation is extremely poor, for example in South Africa	Thank you for your comment. Please refer to Chapters 5 and 6 for regulations and legal enforcement options for invasion pathways
Rebello, Alanna	No	Chapter 2	0	0	0	0	Somewhere in this book is the complex socio-political and economic drivers of invasion addressed? For example the issues of certain industries (e.g. forestry) blocking the development of biological controls amongst others? These very tricky issues need to be brought into the light. Not sure if this is the chapter to do this in, but it should be tackled somewhere.	Thank you for your comment. Please refer to Chapter 3 on drivers of biodiversity change affecting biological invasions
Uludag, Ahmet	No	Chapter 2	0	0	0	0	Each subsection about regions should have a map to show how did you divided continenets to subregions.	Thank you for your comment. We have now included a reference to chapter 1 and an online source, where the IPBES regions and sub-regions are explained in detail, which reads as "A description of the IPBES regions and sub-regions including a spatial representation is provided in chapter 1 (1.6.4 and Fig. 1.14) and online (https://doi.org/10.5281/zenodo.5719431)."
Kenward, Robert	No	Chapter 2	1	257	1	10378	The use of "consumption" instead of "hunting" may be appropriate throughout this chapter in the context of establishing mammalian alien invasive species. The source of categorisation of drivers is a recent database, the Distribution of Alien Mammals database (Biancolini et al. 2021), from which there seems to be no peer-reviewed publication. The material is based on file formats impenetrable to the non-specialist and its categories could usefully be re-evaluated for this assessment, and for a peer-reviewed publication, with assistance of a game biologist, to assess introductions in an adequately comparative way for all taxa, including sources and whether the introduced species is genuinely invasive.	Thank you for your comment. We would like to stick to the term "hunting" and not consumption as we follow the categorisation of the published database DAMA.
Rojo, Iskra	No	Chapter 2	1	171	1	6213	Nature's contribution to people is used as a synonym for ecosystem services and in written terms they are not; you would have to choose one for all the text	Thank you for your comment. Authors have revised the assessment to follow the IPBES Conceptual Framework terminology throughout - when appropriate.
Rojo, Iskra	No	Chapter 2	1	171	1	6213	The trends correspond to the trends of the available information, this can be a large interpretation bias	Thank you for your comment. Indeed, concrete numbers are prone to biases, which is the reason why we provided estimates about biases shown as maps of data gaps, and address the potential throughout the chapter.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	1	2	2	84	The logical progression and simple sentence construction of this summary is effective and could be applied to other chapters. Point 10 could perhaps be folded into point 5 on uneven data availability.	Thank you for this suggestion. We feel that distinguishing this information in an additional point allows to provide more information, in particular quantitative. Because the suggestion does not seem very strong, we have left the structure as is
Lieurance, Deah	No	Chapter 2	1	1	5	6	Every second day gave me pause...brain wend to seconds first as in time, perhaps every other day would click more immediately with the reader.	Thank you, this has been addressed in the final draft.
Sagoff, Mark	No	Chapter 2	1	1	5	5	"Available data suggest that one new alien species has been recorded every second." It would take a little more than a day, then, to record 37,591 new alien species. In a year there are 31,536,000 seconds. In three years, that would be 100,000,000 new alien species recorded. This does appear to be an understatement, as the text suggests.	This was seemingly a mis-understanding as the statement refers to "every second day" rather than "every second": "Available data suggest that one new alien species has been recorded every second day somewhere in the world – but even this is likely an underestimate (established but incomplete)(2.1.2).
Evans, Thomas	No	Chapter 2	1	1	11	11	a(n) identifiable rise	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Lembrechts, Jonas	No	Chapter 2	1	1	11	11	an identifiable rise	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	1	1	11	11	varied by, perhaps better/more fluent as: 'though numbers varied per...'	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	1	1	11	11	Please change "a identifiable rise" to "an identifiable rise".	Thank you, this has been addressed in the final draft.
Government of Argentina	Yes	Chapter 2	1	1	14	20	Chapter 1 has strongly underline the lack of information before 1970 and the great time lag when establishing the date of introductions. We therefore do not understand how it can be "well established" that 40% of the last two centuries introductions have occurred since 1970. We recommend to review this statement.	Thank you for comment. We changed the confidence statement to "established but incomplete".
Government of Germany	Yes	Chapter 2	1	1	14	15	Proposal: The percentage of IAS given in this key message ("Forty percent of documented alien species introductions over the last two centuries have occurred since 1970") differs from the statement given on p. 3, l. 107 ("37% of all documented alien species introductions having occurred since 1970"). You might want to check and align the given figures.	We have changed the percentage of documented alien species to fit the reported number in the text based on Seebens et al. (2017).
Lembrechts, Jonas	No	Chapter 2	1	1	14	27	Point 3 and 4 have largely the same text	We removed the sentence on introduction pathways under point 3 and consolidated it with the information provided under point 4.
Li, Bo	No	Chapter 2	1	1	14	14	Change "forty percent" to "thirty-seven percent" to keep this number consistent with that in main text.	Thanks for this suggested change. We have included it in the new version.
Li, Bo	No	Chapter 2	1	1	14	27	Points 3 and 4 are repetitive, which needs to be avoided.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We have carefully reviewed the chapter and assured that the statement clearly refer to the appropriate category (e.g., alien species, established alien species or invasive alien species)
Lieurance, Deah	No	Chapter 2	1	1	14	27	These two points, 3 and 4 repeat one another in supporting information, I am guessing there is intent to this, but would suggest ending #3 at lin 17.	Thank you for the helpful comment. We have revised points 3 and 4 to remove the overlap.
Faulkner, Katelyn	No	Chapter 2	1	1	17	21	The text on these lines (under point 3) is repeated under point 4. Probably an error.	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	1	1	17	27	The text of lines 17-21 and lines 24-27 are identical. Should delete the final sentence of para.3.	Thanks for this suggested change. We have included it in the new version.
Government of USA	Yes	Chapter 2	1	1	17	21	The sentence starting with International appears to be better suited to be included under the 4th point and not under conclusion 3.	We removed the sentence on introduction pathways under point 3 and consolidated it with the information provided under point 4.
Pan, Xubin	No	Chapter 2	1	1	17	21	L24-27	Thanks for this suggested change. We have included it in the new version.
Rebello, Alanna	No	Chapter 2	1	1	17	21	There seems to be an error here, the paragraph is the same as that for point 4, but it belongs better supporting point 4. Point 3 needs something supporting the date threshold mentioned specifically (1970).	Thanks for this suggested change. We have included it in the new version.
Evans, Thomas	No	Chapter 2	1	1	18	18	historically responsible for the introduction of plants and...	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 2	1	1	19	19	vertebrate (singular)	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 2	1	1	23	27	Executive summary: Point 4 is the same as Point 3? Delete?	Thank you for the helpful comment. We have revised points 3 and 4 to remove the overlap.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	1	1	23	24	The pathways do not vary, but their importance does - both absolute and relative importance. A possible revision: The importance of introduction pathways varies over time and across taxonomic groups.	Thanks for this suggested change. We have included it in the new version.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	1	1	23	27	bullet 4 needs to be expanded to include other intentional introduction pathways including farmed and hunted species for recreation. This has occurred historically via Acclimatisation Societies, but also via intentional illegal introductions by coarse fishers, etc. A number of years back New Zealand had a very avid coarse fisher who was illegal releasing marron into private ponds on peoples properties, he was found to be breeding the marron up in tanks in a disused petrol station facility..Likewise the illegal introduction of rabbit calicivirus by South Island Farmers a number of years back has seriously impacted on the effectiveness of this virus as a tool for invasive rabbit control	Thank you for your comment. In chapter 2, we do not address drivers of introductions in much detail, as this is the topic of chapter 3. Please note that we revised the executive summary.
Heger, Tina	No	Chapter 2	1	1	23	24	Here, a confidence statement is missing (well established?)	Thank you for your comment. We removed this statement from the executive summary.
Government of Mexico	Yes	Chapter 2	1	1	31	31	add for some taxonomic groups, mainly invertebrates, microorganismos, marine species and freshwater species	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	1	1	32	32	critical for what?	critical for understanding; we feel this is self-explanatory and have chosen not make the sentence more complex in order to avoid diluting the importance message
Evans, Thomas	No	Chapter 2	1	1	37	37	hamper the publication of a robust	Thank you, this has been addressed in the final draft.
Outinen, Okko	No	Chapter 2	1	2	44	46	"The global distribution of alien species worldwide shows marked hot spots of high alien species richness in North America, Europe and Australasia...". These are large regions, perhaps it would be better to add few words explaining where these hot spots are, e.g., Pacific coasts of North America, Southern Europe, or something similar. If one reads only the executive summary, he/she might get inadequate/wrong picture.	Thank you for your comment. Indeed, the regions share the largest number of alien species also on a continental scale. Further details are provided in the chapter text. We would therefore prefer to stay general in the executive summary.
Evans, Thomas	No	Chapter 2	2	2	46	46	However, lower research intensity (delete the)	Thank you, this has been addressed in the final draft.
Lieurance, Deah	No	Chapter 2	2	2	56	60	The bold statement says all taxa except mammals, but your supporting evidence is only about vascular plants. aAny supporting evidence for other taxonomic groups?	Thank you for this comment. We have revised the section and included more information on the known trends of new introductions of alien species for all taxonomic groups. We now additionally include references to the relevant sections in the chapter.
Government of Germany	Yes	Chapter 2	2	2	62	65	Proposal: Given percentages for terrestrial, marine and freshwater habitats do not sum up to 100%. Please check the data or apply some information on the remaining share.	Thank you for your comment. The remaining studies represented cross-realm studies, which were not counted. Please note that we revised the executive summary and removed this statement.
Ulugad, Ahmet	No	Chapter 2	2	2	62	65	Yes, it is true but misleading because there are more species in terrestrial areas. It might be added.	Thank you for your comment.
Evans, Thomas	No	Chapter 2	2	2	68	68	organism groups? Maybe 'groups of organisms' or 'taxonomic groups' instead?	Thank you, this has been addressed in the final draft.
Pouteau, Robin	No	Chapter 2	2	2	70	72	I wouldn't say that models, scenarios and projections are largely lacking, but that although there are many models, scenarios and projections available, they largely lack of convergence	Thank you for the comment, we have revised the statement.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	2	2	74	84	Closing knowledge gaps only closes knowledge gaps - until applied, knowledge does not help address challenges. For greater policy relevance, this point should be explicit on how improved knowledge would enable more effective management. The counter-argument here would be that we already know enough to take action: alien species pose threats and that prevention is the best approach.	How improved knowledge would enable more effective management would be a discussion belonging to the Management chapter, and we cannot expend on it here. This chapter is about basic knowledge, which admittedly is not sufficient to address challenges, but which is nonetheless necessary. We have thus not modified our text
White, Michael	No	Chapter 2	2	2	81	84	CBD 1992 said countries should prevent IAS arriving, especially by sea, & conduct EIAs! 30 years!	Thank you for your comment
Grossart, Hans-Peter	No	Chapter 2	3	4	85	174	I suggest to include a short statement on potential vectors which in crease with hum activities and population density, etc.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel that the highlighted section already incorporates this statement sufficiently.
Ulugad, Ahmet	No	Chapter 2	3	3	89	90	Weed is more subjective word. It should be replaced plant seeds although we consider all species in a feild weed not regarding to their harms or benefits.	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	3	3	94	94	Change "was" to "is"?	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	3	3	96	96	it would be interesting to know if these were mainly deliberate or accidental introductions. One could assume that species that were valued for economic or cultural reasons would be introduced deliberately.	We are talking here about "a variety of species" introduced over centuries by several empires; obviously, there were both intentional and accidental introductions. There is no real point here in getting into this discussion, especially given that records do not provide sufficient data to back up any speculation we could make at this level of generality
Government of Argentina	Yes	Chapter 2	3	3	101	108	It is important to underline that this paragraph only accounts for documented introductions, so it should be clarified that due to the knowledge gaps introductions in the past could have been higher than expected	Thank you for the comment, we have included such a statement.
Evans, Thomas	No	Chapter 2	3	3	104	104	group(s) region(s) - plural to be consistent with use of these terms at line 105	Thank you, this has been addressed in the final draft.
Yang, Qiang	No	Chapter 2	3	3	106	106	Would be nice to give a short explanation for this phenomenon	Thank you, we have added a sentence to clarify
Lieurance, Deah	No	Chapter 2	3	3	110	113	Could consider adding wildlife improvement with erosion control (e.g., Lonicera maackii in the midwest for wildlife improvement (I think this is in Luken and Thieret 1997))	Thank you for your comment. We revised the executive summary and do not refer to specific drivers any more.
Li, Bo	No	Chapter 2	3	3	115	232	Figure 2.2 (line 115) was cited in front of Figure 2.1(line 133). The sequence of Figure 2.1 and 2.2 should be changed.	Thank you for spotting this error, which we corrected.
Evans, Thomas	No	Chapter 2	3	3	117	117	it is therefore	Thank you, this has been addressed in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	3	3	117	117	If IAS are defined as "introduced directly or indirectly by people" (Chap.1), then should it be surprising that "the introduction of alien species is tightly coupled with human activities"? Does that not go by definition? Is this not therefore a trivial statement which should be deleted or qualified?	Unfortunately, many statements can be considered as obvious or trivial for some and yet need constant reminders for others. Explicitly stating that IAS are linked with human activities is not only important for this reason, it has also been the focus of major studies aimed at demonstrating or quantifying it and is therefore not as useless as suggested here
Lembrechts, Jonas	No	Chapter 2	3	3	117	117	it is therefore unsurprising	Thank you, this has been addressed in the final draft.
Rojo, Iskra	No	Chapter 2	3	3	117	129	And biodiversity loss	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Sagoff, Mark	No	Chapter 2	3	3	117	117	"The introduction of alien species is tightly coupled with human activities." The introduction of alien species logically requires human activity or involvement. If the same species naturalized without human assistance it would not be alien. The reason that the introduction of alien species is tightly coupled with human activities is logical or conceptual not causal. It's not the activity that matters; it is the blemish or corruption with which humanity (inherently sinful) stains the world.	Thank you fro the comment. We have reformulated this sentence
Rebelo, Alanna	No	Chapter 2	3	3	125	125	"Anthropogenic disturbances such as..." what about agriculture and forestry? Those are disturbances (critical to our economies) which have driven a lot of the invasions. I also don't like the fact that "deforestation" is placed first in the list (unless it is clearly defined as applying to more ecosystems than just forests?). It's name suggests only the destruction of forests, but there are many ecosystems in the world that are not forests which can be destroyed. I suggest moving this driver lower in the list, and starting with the more general drivers like "habitat destruction" which apply to more ecosystems.	Thanks for this suggested change. We have included it in the new version.
Estoup, Arnaud	No	Chapter 2	3	3	128	128	Please add the reference Hufbauer et al. 2012 Evo Appl doi: 10.1111/j.1752-4571.2011.00211.x (which provides an evolutionary perspective of some of the features mentioned in the sentence)	Thank you for your comment. As we already included a number of references, we would like to keep it as it is to keep the text readable.
Li, Bo	No	Chapter 2	4	4	130	143	In Figure 2.1, some small figure need to add the unit, such as GDP and Human migration.	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	4	4	135	143	Fig. 1.2: why does the figure title allude to "correlates of biological invasions" when apparently no data is presented on numbers of biological invasions? These graphs just show presumed drivers as a function of time. The easiest fix would be to change the title to describe what is actually depicted. Also, are the dots data points? If so, what are the solid lines?	The term "correlates" here refers to variables that have been demonstrated to be statistically linked to the number of biological invasions. As they are numerous and varied, it is practical and relevant to refer to them under a common term in this figure. The dots are indeed data point and there is no need for a solid line (we are not showing a correlation here)
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	4	4	135	135	Figure 1.2: this figure contains an error in the y-axis of the human migration plot - certainly more than 2000 people have migrated in recent years.	Thank you for your comment. The numbers for human migration (and shipping) represent only a proxy variable for the trends due to the lack of comprehensive data since 1800. We clarified this now in the legend and in the figure
Government of USA	Yes	Chapter 2	4	4	135	135	Figure 2.1: Aquaculture not included?	This figure just represents a selection of main drivers and other drivers were not included due to restriction in data available and space.
Yang, Qiang	No	Chapter 2	4	4	135	136	Figure 2.1: recheck the unit of the y-axis for the panel "Human migration"	This unit is "Number of people" and thus correct as it is. Please note that these numbers just represent proxies for true human migration flows, which is now clarified in legend text and figure.
Lembrechts, Jonas	No	Chapter 2	4	4	136	136	Figure 2.1: Tourism panel in the figure seems cut-off at the bottom (unless no earlier data is available; yet even then I think it would be clearer to have the y-axis start at 0 to show that tourism did not come totally out of nothing)	Thank you for your comment. We scaled the y-axis now that it starts at 0.
Evans, Thomas	No	Chapter 2	4	4	150	150	eradication and management (delete .)	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	4	4	150	152	And 'Flags of Convenience' for shipping. Often flag nations have weak eco-enforcement	Thank you. Unfortunately we were not able to understand the comment and have not made any changes
Li, Bo	No	Chapter 2	5	5	158	161	Need cite some references to support this sentence.	Thank you for your comment. We have revised this section and removed the sentence.
Li, Bo	No	Chapter 2	5	5	166	167	This part of the sentence is a bit awkward, please rewrite.	Thank you for the comment, the sentence has been revised.
Evans, Thomas	No	Chapter 2	5	5	167	167	has been reflected (delete are)	Thank you, this has been addressed in the final draft.
Geerts, Sjik	No	Chapter 2	5	5	167	167	In "likely has been reflected" delete "are"	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	5	5	167	167	has been reflected	Thank you, this has been addressed in the final draft.
Faulkner, Katelyn	No	Chapter 2	5	7	176	221	This section discusses pathways of introduction. In terms of management pathways, species and sites need to receive attention, but this chapter mainly focuses on biological invasions in terms of species and sites with only this small section dealing with pathways. There is some discussion in the other sections of the chapter on specific pathways for specific introductions, but it would be useful if species by pathways analyses and sites by pathways analyses were included in the chapter, as species by sites analyses have been. This would allow one to get an understanding of how pathways vary across taxonomic groups and regions. Such analyses have been done.	Thank you for your comment. We certainly appreciate your point but have chosen to keep this paragraph as is in the introduction to our chapter.
Government of Germany	Yes	Chapter 2	5	5	178	178	Clarification required: Please check if the movement of "alien species" or "invasive alien species" is addressed here.	Thank you for the comment. While the CDB (2014) reference explicitly focusses on invasive alien species, the pathway framework proposed in Hulme et al. 2008) refers to all alien species. Hence the statement is correct.
Evans, Thomas	No	Chapter 2	5	5	180	182	This is an important point and I'm not sure it is that clear as currently written? How about: Pathways should be distinguished from routes of introduction; pathways describe how and by which means a species has entered a new region; a route of introduction is a geographic route between two locations.	Thank you for this suggestion. We have chosen to include it in the section.
Estoup, Arnaud	No	Chapter 2	5	5	181	181	Please add the reference Estoup & Guillemaud 2010 Mol Ecol https://doi.org/10.1111/j.1365-294X.2010.04773.x after "two locations »	Thank you, we have removed this specific part of the text, but have added this reference elsewhere in the chapter
Preisser, Evan	No	Chapter 2	5	5	181	181	describe	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Grossart, Hans-Peter	No	Chapter 2	5	6	187	188	Table 2.1: I miss human-induced vectors such as aerosols, sediments, etc.	Thank you for the comment. Table 2.1 provides the definitions as published in the CBD document on pathways so we do not add additional information here.
Yang, Qiang	No	Chapter 2	5	6	187	189	Table 2.1: better to give an example for the pathway "unaided"	Thank you for your comment. We would like to keep this structure as provided by CBD.
Evans, Thomas	No	Chapter 2	5	5	188	188	Table 2.1 You repeat the pathway class in the description which isn't necessary. So the definition for row one could just start with: 'The intentional introduction...' This can be applied to all rows in the table which would be more concise.	Thank you for this suggestion. We have changed the start of the descriptions.
Government of China	Yes	Chapter 2	5	5	188	188	Release in nature pathway also includes those religious release of animals due to lack of ecological and conservation knowledge (Severinghaus & Chi 1999, Liu et al. 2012). Reference : Severinghaus, L.L., Chi, L. (1999) Prayer animal release in Taiwan. Biol Conserv 89, 301–304. Liu, X., M. E. McGarrity, and Y. Li. (2012). The influence of traditional Buddhist wildlife release on biological invasions. Conservation Letters 5:107-114.	Thank you for this suggestion. We have included religious purposes in the table.
Government of USA	Yes	Chapter 2	5	6	188	188	Table 2.1: Under transport-contaminant: This can also be intentional, particularly with pets, disposed of due to inconvenience, cost, size, etc. by release into the wild.	Thank you for this suggestion. We have chosen to include it in the section. The definitions are direct quotes from the CBD document on "Pathways of introduction of invasive species, their prioritization and management (CBD 2014a) and we prefer not to change these.
Rebelo, Alanna	No	Chapter 2	5	5	188	188	Table 2.1: Pathway: "Escape from confinement" - please add forestry here as an example. This is a critical one in South Africa.	We have now added this term
Government of Argentina	Yes	Chapter 2	6	6	187	187	Table 2.1: Among transport contaminants, only contaminants from commodities are included, stating "Transport Contaminant refers to the unintentional movement of live organisms as contaminants of a commodity that is intentionally transferred through international trade, development assistance, or emergency relief. This includes pests and diseases of food, seeds, timber and other products of agriculture, forestry, and fisheries as well as contaminants of other products." We request to delete references to commodities given that all international trade can translate into unintentional movement of live organisms	Thank you for your comment. This table presents the categorisation of pathways as defined by the Convention of Biological Diversity (CBD), which we are not supposed to change.
Rebelo, Alanna	No	Chapter 2	6	6	188	188	Table 2.1: Pathway: Corridor - what about roads? Do these fit here? If yes, add them, otherwise can you indicate where this would fit in terms of pathways? Many alien plants spread along road verges.	We agree that roads could fit here (but also to Unaided, this can be discussed), but have not added it as we do not aim at exhaustivity here (and many other pathways could be listed). The objective of this table is to provide a classification of major pathways, aided with some chosen examples
Evans, Thomas	No	Chapter 2	6	6	194	194	delete 'of'	Thank you, this has been addressed in the final draft.
Government of USA	Yes	Chapter 2	6	6	194	194	change "highly" to "high"	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	6	6	200	204	It seems likely that we would have the most complete data for species that were deliberately moved, that is, the release and escape pathways. It's not clear here whether the patterns described are based on counts of known aliens, or a modelled result that takes biases in data availability into account. Also for Fig 2.2. If these are counts, a statement on the proportion of aliens with unknown pathway would be helpful context. Are years based on date of establishment or discovery?	Thank you for your comment. The data are based on observations of alien species and the year of first discovery. We included a statement about the lack of pathway information in the figure legend (i.e., pathway information was lacking for 36% of entries).
Evans, Thomas	No	Chapter 2	6	6	207	207	introduction(s) purpose(s)	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 2	6	6	208	208	The recent 200 years? Should this be 'the last 200 years'?	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 2	6	6	209	214	Personally I don't think you should start a sentence with the word 'And'. To be honest I don't really understand this paragraph. I think it needs thought all the way to line 214.	Thank you for your comment. We revised the sentence, which now reads "Given that the majority of information on historic invasion dynamics is available for plants".
Faulkner, Katelyn	No	Chapter 2	6	7	212	214	Invasive organisms have indeed been introduced through a wide range of pathways, but there have been a number of studies that have shown that some pathways are more likely than other pathways to introduce species that become invasive. See references below: Pyšek P, Jarošík V, Pergl J (2011) Alien plants introduced by different pathways differ in invasion success: unintentional introductions as a threat to natural areas. PLoS ONE 6: e24890. Faulkner KT, Robertson MP, Rouget M, Wilson JRU (2016) Understanding and managing the introduction pathways of alien taxa: South Africa as a case study. Biological Invasions 18: 73–87.	Thank you for your comment. We added the suggested references to the revised version of the text.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	6	7	212	214	The meaning of this sentence is unclear.	This sentence has now been removed
Li, Bo	No	Chapter 2	7	7	210	210	Change "are" to "is"?	Thank you. We have made this change.
Yang, Qiang	No	Chapter 2	7	7	215	216	Figure 2.2: can give a short explanation of why there is a seemingly decline in the alien species number at the right end of the two top panels to avoid confusion.	Thank you for this suggestion, which we adopted in the legend of the revised version. The drop is likely due to the lack of recent data.
Lembrechts, Jonas	No	Chapter 2	7	7	217	217	Figure 2.2: Absolute numbers (top) and relative share (bottom) of alien species...	Thank you for your comment. We have taken your suggestion and modified the figure legend accordingly.
Lieurance, Deah	No	Chapter 2	7	7	217	217	Figure 2.2 The subcategory figures are hard to read with all the overlapping lines.	Thank you for your comment. As it is not the main focus of this chapter, these figures should just provide a general idea of the main trends, and should not take too much space.
Yang, Qiang	No	Chapter 2	7	7	226	227	Box 2.1 does not define the tree categories of alien species. Consider rephrase the text within the brackets to "See Figure 1.1 in Chapter 1 for definitions". Moreover, Figure 1.1 is not a figure, but a table or box.	Thanks for this suggested change. We have included it in the new version.
Geerts, Sjirk	No	Chapter 2	7	7	227	230	In L227 the reader is referred to Fig. 1.1 (Chapter 1) for definitions. However the term 'casual' used in the next sentence, is not mentioned in Fig. 1.1 or anywhere in chapter 1. But used a few times in chapter 2 without defining it clearly.	Thank you for spotting this. The term is now defined in Chapter 1 and a link to the glossary has been added.
Evans, Thomas	No	Chapter 2	8	8	233	233	to 'which' alien species	Thank you, this has been addressed in the final draft.
Lieurance, Deah	No	Chapter 2	8	8	234	243	This is a general comment. I know this is a North American perspective, but we've been having some very deep discussions about invasive species terminology that is harmful to marginalized communities. I believe that at some point we must move away from the term 'alien' as it has very negative connotations here with our immigration politics. Perhaps one of the issues with a common terminology is cultural difference in what words are acceptable and that there is an evolution with language.	Thank you for your comment. This point is partly addressed in Chapter 1, but this assessment's mandate and terminology is set out in the assessment scoping report, approved by IPBES member states at their 6th Plenary.
Sagoff, Mark	No	Chapter 2	8	8	234	243	Well written. There is no standard vocabulary.	Thank you for your feedback.
Pan, Xubin	No	Chapter 2	8	8	241	241	Figure 2.1 is not relevant here.	Thanks for this suggested change. We have included it in the new version.
Yang, Qiang	No	Chapter 2	8	8	241	243	this sentence is confusing, consider split it to two simple ones	Thanks for this suggested change. We have included it in the new version.
Government of Germany	Yes	Chapter 2	8	8	257	257	Clarification required: Please define "biological invasions".	We now refer the reader to the Glossary for the definition of "biological invasions"
Rebelo, Alanna	No	Chapter 2	9	9	280	280	This line is somewhat contradictory. The authors state that the word species also refers to subspecies? Also the form of the two concepts is confusing: "species" speaks to an entity, whereas "intraspecific variation" is a concept/process. How can the "term species" include "intraspecific variation"? Perhaps this is just a wording issue that can be ironed out, but it is confusing as it currently reads.	This sentence has now been rephrased

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Evans, Thomas	No	Chapter 2	9	9	281	281	with in a species? Maybe 'of' a species?	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Government of USA	Yes	Chapter 2	9	9	281	281	change "with in" to "within"	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Sagoff, Mark	No	Chapter 2	9	9	281	282	The text states, "a species can respond differently to biotic and abiotic interactions depending on traits such as genotype or cytotype..." This might be the context to add phenotypic plasticity which is a huge factor in the ecological fitting of alien species.	Thanks for this suggested change. We have included it in the new version.
Grossart, Hans-Peter	No	Chapter 2	9	9	294	311	Please mention that often invasive species remain unrecognized if you don't run high resolution monitoring activities also including microbes...	Thanks for this suggested change. We have included it in the new version.
Evans, Thomas	No	Chapter 2	9	9	304	304	in the following?	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Rebelo, Alanna	No	Chapter 2	9	9	304	304	Remove "in the following", this is redundant.	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Evans, Thomas	No	Chapter 2	9	9	309	309	in the following?	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Hirsch, Tim	No	Chapter 2	10	10	318	333	The relationship between the listed databases and GBIF is a little confusing in this paragraph, since at least two of the databases (the database of macrofungi and GRIIS itself) are actually available through GBIF. In the case of GRIIS, GBIF is the primary means by which the data may be accessed and cited, so it feels misleading to say that 'data from GBIF ... were not included in this master database'. While the reasons for excluding GBIF occurrences as a primary data source are understandable on the point about heterogeneity regarding geographic status, it is not fully accurate to say that they lack invasion status - this can to some extent be derived from cross-linking between occurrences filtered by country and the GRIIS checklists (e.g. on GBIF species pages), and through use of 'establishment means' as a filter for occurrences, although the latter is admittedly much under-used. Some nuancing of this section at least to explain the relationship with GBIF and the dependency of GRIIS on the GBIF platform would be appreciated.	Thank you for your comment. Indeed, this was mis-leading and not full correct. We adjusted the wording to avoid such confusion. Please note that we also extended the description of the methodology, which takes advantage of GBIF (and OBIS) records beyond the data from GRIIS and macrofungi.
Yang, Qiang	No	Chapter 2	10	10	326	327	what do you mean by saying "due to the heterogeneity of information regarding the biogeographic status in these repositories (Meyer et al., 2016)? Making it more explicit will be better.	Thank you for your comment. This has been considered in the revised version of the text
Grossart, Hans-Peter	No	Chapter 2	10	10	348	355	For me it is not clear under which criteria the data and studies were selected to be included. I would like to have some more methodological details, such as key words for searching for the data, etc.	All references for the underlying data are provided in the preceding paragraphs, and all data sets are freely available online. These databases were selected for integration as they are freely available, published and have a global focus. We rephrased the text to make this clearer.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	10	10	350	350	A definition of casual status should be included in the glossary	We agree that a definition was needed and have now added one to chapter 1 and the report glossary
Lázaro-Lobo, Adrián	No	Chapter 2	10	10	350	350	What do you mean by "locations"? Countries?	Thanks for your comment. We clarified this point in the revised version. Locations mostly refer to countries but also included sub-national units such as islands.
Evans, Thomas	No	Chapter 2	10	10	352	353	in the following?	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Estoup, Arnaud	No	Chapter 2	10	10	357	359	The sentence fragment « interactions depending on traits such as genotype or cytotype » is not clear to me. You might rather write "interactions depending on phenotypic traits themselves depending on genotypes or cytotypes »	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	10	11	357	379	this introduces rather more confusion than clarity. The number of species in databases will of course vary across databases that consider different taxonomic groups. It would be more useful here to provide a description of the different methods for determination of "establishment," explain any inconsistencies with "established" as defined in Fig 1.1, and describe how the assessment copes with these differences. The master database seems like it is the best available information, so reporting of ranges from other databases for mammals, birds and vascular plants is not an obvious choice. Correlation between GRIIS and other databases could reflect the same species being reported through different paths rather than any consistent spatial biological patterns - and Pearson correlations across an unspecified regional framework are uninterpretable in any case, as distributional assumptions are unlikely to be met.	Thank you for your comment. Our choice is indeed subjective. However, in absence of an alternative suggestion, which would likely be as subjective, and given the stage of the report, we have chosen to keep our initial strategy. Please do not that the Pearson correlations are a way to provide evidence that our choice is not affecting results, not a way to test distributional similarities across regions.
Evans, Thomas	No	Chapter 2	10	10	362	362	a more rigour?	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	10	10	362	362	rigorous	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 2	11	11	377	377	except for?	Thank you, authors have edited this sentence, following the recommendations of a different review comment
Preisser, Evan	No	Chapter 2	11	11	377	377	except in the	Thank you, this has been addressed in the final draft.
Hirsch, Tim	No	Chapter 2	11	11	383	388	The reference to use of records from GBIF and OBIS to 'obtain information about alien species occurrences at deviating categorization' is currently opaque, with no citation referring to the actual data used. To follow the transparency standards now expected of IPBES assessments, as well as the GBIF Data Use Agreement, it is essential that the records sourced from GBIF are cited using the DOI or DOIs provided at the time of download. If these are no longer available, GBIF Secretariat can help in generating a DOI for citation. This will enable the use of these records in the IPBES assessment to flow back to the individual data publishers/providers and thus help to demonstrate the value of shared data.	Thank you for your comment. We added now the DOIs of all downloads in the data management report. Note that we downloaded the data in chunks of 21 individual data packages resulting in 21 DOIs. Thank you for your offer.
Government of Germany	Yes	Chapter 2	12	21	389	618	Proposal: The text refers to data from different types of "regions". These regions denote e.g. IPBES regions, countries, or groups of countries (continents, sub-continents). When referring to the term "regions", please be more precise /consistent from which type of region the data /information originates. You might also want to consider using different terms for different types of regions.	Thanks for your comment. We have better clarified in that point of the text the marine regions we considered
Yang, Qiang	No	Chapter 2	12	12	389	389	title of section 2.2. It would be better to make the section title more specific, for example "Global trends and status of invasions of different taxonomic groups". The current section title reads more like a title for the whole chapter 2	Thanks for this suggested change. We have included it in the new version.
Lieurance, Deah	No	Chapter 2	12	12	407	407	fix parentheses [mostly for insects (Aukema et al., 2010; Nahrung & Carnegie, 2020)]...elsewhere you have (mostly for insects) (Aukema et al., 2010; Nahrung & Carnegie, 2020)	Thank you, this has been corrected in the final draft.
Rebelo, Alanna	No	Chapter 2	12	12	418	418	Remove "to finish"	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	12	12	428	428	by far the most	Thank you, this has been addressed in the final draft.
Rebelo, Alanna	No	Chapter 2	12	12	439	439	Numbers (should be plural)	Thank you, this has been addressed in the final draft.
Grossart, Hans-Peter	No	Chapter 2	13	13	441	444	In Africa, exports might be high, but imports relatively low and thus trading (including live animals, plants, etc.) goes mainly in one direction. This should also explain lower numbers! A similar trend can be seen in Europe, i.e. when you compare West with East Europe!	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	13	13	441	441	understood why	Thank you, this has been addressed in the final draft.
Uludag, Ahmet	No	Chapter 2	13	14	441	493	It cannot be only reason because Turkey has less alien species comparing to number of plants have. Definitely less work has been done but it is good enough to show over 12000 species in this territory. When we think in similar manner, less work cannot be the main reason if species have already been recorded not regarding to native/non-native status. Snetence can be made less strong. My example from plants.	Thank you for your comment. We rephrased the sentence to provide a more balanced picture of the role of under-sampling.
Preisser, Evan	No	Chapter 2	13	13	445	445	as classified by	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	13	13	446	449	Reporting correlation coefficients would be of interest here.	Thank you for your comment. The correlation coefficients were >0.95 for all IPBES regions. We added this information in the revised version.
Preisser, Evan	No	Chapter 2	13	13	448	448	likely that trends	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Faulkner, Katelyn	No	Chapter 2	13	13	452	457	Figure 2.3: The numbers reported in Figure 2.3 for Africa seem way off. Zengeya and Wilson (2020) report almost 2000 alien species for South Africa alone, the vast majority of these (if not all) are established, with one-third (~700) invasive. So ~2000 established species and ~500 invasive species for all of Africa is likely to be a huge under-estimate. I understand that a standardised dataset was used, but might just be worth pointing out that this estimate for the continent, is actually similar to the scale of the issue for one country on that continent. Zengeya TA, Wilson JR (2020) The status of biological invasions and their management in South Africa in 2019. South African National Biodiversity Institute, Kirstenbosch and DSI-NRF Centre of Excellence for Invasion Biology, Stellenbosch, 71 pp. https://doi.org/10.5281/zenodo.3785048	Thank you for your comment. We have incorporated in the text.
Li, Bo	No	Chapter 2	13	13	453	453	Figure 2.3: Remove the second "numbers".	Thanks for this suggested change. We have included it in the new version.
Lieurance, Deah	No	Chapter 2	13	13	453	453	minor comment, but I think the thickness of the lines in Figure 2.3 should be the same for the legend and the plot. I would make the lines in the plot the same thickness as the legend.	Thank you for your comment. We would like to keep the line thickness low in the plot as in some areas the lines would occupy quite some space, which would make the figure harder to read.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	13	13	460	467	It's important to distinguish whether findings are related to the number of known alien species, or the (estimated) number of alien species believed to be present. Without such information, it is difficult to interpret patterns reported in this section in light of the uncertainties that are described starting at line 530 - are these likely to be data artefacts or biological patterns? The analysis starting at line 593 is more readily interpretable. The section on marine shelves (lines 5118-5139) provides an excellent example of how sampling effort can drive observed patterns and allows the reader to grasp the uncertainty in available data.	Thank you for your comment. We have now added a sentence explaining that the observed patterns are dependent upon the data, and that the large data gaps make it difficult to distinguish data artifacts from biological patterns
Camacho, Rulco A.	No	Chapter 2	14	15	188	189	Table 2.1:Escape from Confinement. Under definition, this should say "Escape from confinement", not just "Escape"	Thank you, this has been addressed in the final draft.
Grossart, Hans-Peter	No	Chapter 2	14	14	468	469	Figure 2.4: again I would like to see freshwater separated from terrestrial as these habitats and mechanisms of invasion can be quite different (see my comment for chapter 1)	Thank you for your comment. Unfortunately, this is not possible as we are not aware of any source, which would allow us to separate terrestrial from freshwater species in a consistent way.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	14	14	478	493	This paragraph states that mechanisms are not understood, but then explains the pattern in the final sentence	We do not believe there is a lack of consistency here. We claim that the mechanisms are poorly understood and cite two factors that have been put forward to explain it. This doesn't mean understanding is complete yet, unfortunately
Li, Bo	No	Chapter 2	14	14	478	482	Here, please note that 1) Invasive plant density is positively correlated with human development index (Weber & Li 2008). 2) Most of well-developed countries are in temperate regions. Reference: Weber, E. & Li, B. 2008. Plant invasions in China: what is to be expected in the wake of economic development? BioScience, 58 (5): 437-444. https://doi.org/10.1641/B580511	Thanks for this suggested change. We have included it in the new version.
Pouteau, Robin	No	Chapter 2	14	14	478	481	The described pattern "highest numbers of alien species reported at mid-latitudes" is the same in the North and South hemispheres so I wouldn't use the term "a marked North-South pattern" and would keep "a marked latitudinal gradient"	Thank you, this has been addressed in the final draft.
Yang, Qiang	No	Chapter 2	14	14	478	478	remove "North-South pattern". When I first read this, I was expecting you will do the comparison between the Southern and the Northern Hemisphere	Thank you, this has been addressed in the final draft.
Rebelo, Alanna	No	Chapter 2	14	14	481	482	The mechanisms that drive this pattern? It is lack of data. The tropical regions are all understudied. This point is made in line 492, but should be moved to the start (i.e. line 482)	This is only part of the explanation, as shown in Chong et al. 2021 (cited there). Lower propagule pressure is also an explanation. We have therefore left this part unchanged.
Pouteau, Robin	No	Chapter 2	14	14	482	489	L482-486 a serie of reasons why the tropics might be more 'invasive' are given while L488-489 it is said that the tropics do not differ in their 'invasibility'. Here I think there is a subtlety that could be easily misunderstood	Thank you for your comment. This has been better rephrased in the final draft.
Government of USA	Yes	Chapter 2	14	14	486	493	The last sentences of this paragraph seem to be arguing that tropical systems are not different than temperate systems because islands can be invaded. Islands usually have high numbers of endemic species, but fewer species overall than comparable areas of continental landmass. Thus, if the idea that high biodiverse areas (like tropical forests) are more resistant to invasive, one would also expect that island ecosystems (tropical or temperate) would be more vulnerable to invasive. Although reduced sampling effort in tropical countries may be part of the story, I do not think that is all of it.	Thank you for this comment. We have revised those sentences for clarity in the final draft.
Lembrechts, Jonas	No	Chapter 2	14	14	488	488	Not sure if the 'however' is in place here. Would a 'thus' not do better, to show that the previous sentence could explain why the reasoning above - that there are reasons to expect tropical regions are less invasive - are unlikely to be correct?	Thank you for your comment. This has been added in the final draft
Preisser, Evan	No	Chapter 2	14	14	489	490	invasibility', i.e., they do not have any characteristics	Thank you for your comment. This has been better explained in the final draft.
Preisser, Evan	No	Chapter 2	14	14	491	492	due to factors such as lower import	Thank you, this has been addressed in the final draft.
Camacho, Rulco A.	No	Chapter 2	15	15	191	192	Is "Escape" really considered an "Intentional" pathway, when the process of escaping is "Unintentional"?	Thank you for your comment. The definition of the pathway classes follows the official definition in the CBD document on pathways and we stick to these here.
Estoup, Arnaud	No	Chapter 2	15	15	497	498	Table 2.2. Please cite taxonomic groups in decreasing number of species (as for other tables of this type; e.g. Table 2.3).	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	15	15	497	497	Table 2.2 add horizontal lines between amphibians/insects & algae/fungi	Thank you for your comment. Lines are already present, maybe there was some problem in pdf visualization
Li, Bo	No	Chapter 2	15	15	499	505	In Table 2.3, change "location" to "number of regions".	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	15	15	504	504	Table 2.3: "Location" or "Regions"?	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	16	16	521	528	Perhaps biogeographical forces too: post-colonisation IAS may be unable to leave	Thank you for this interesting comment.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	16	16	523	528	Is information available on the sampling effect for islands? Given the profound effect of invasive species on island biotas, awareness of threats is likely to be high and may give rise to higher levels of effort in detection and reporting. Small islands would tend to have few remote areas, leading to a greater probability that alien species will be observed.	We agree and have added this point
Li, Bo	No	Chapter 2	16	16	526	528	Add chapter number.	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	16	17	544	558	You're talking about 6 phyla in the tekst, yet 15 phyla in the figure legend?	Thank you for spotting this error, which we corrected.
Grossart, Hans-Peter	No	Chapter 2	16	16	546	547	For most fungi the data are not reliable, i.e. for Basidiomycota and Ascomycota often morphological features are used, but modern molecular tools often proof these wrong. Also other microbes are hardly studied.	Thank you, this has been addressed in the knowledge gaps.
Grossart, Hans-Peter	No	Chapter 2	17	104	563	3589	I wonder whether on consequently distinguish between terrestrial, freshwater and marine species!!! Again, freshwater species are not comparable with terrestrial once...	Thank you for your comment. We are aware of this issue, but it is important to assess status, trends and knowledge gaps for the different groups, in relation also to the IPBES Units of Analysis and Regions, and different pathways and drivers
Lembrechts, Jonas	No	Chapter 2	17	17	568	570	three times distinct - distinguished - distinct in 3 lines; change distinguished to observed?	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	17	17	572	572	acclimatization societies: this term is not clear to me	Thank you for your comment. We have clarified the meaning in the text.
Li, Bo	No	Chapter 2	17	17	573	573	Change "1950ies" to "1950's".	Thank you, this has been addressed in the final draft.
Yang, Qiang	No	Chapter 2	18	18	584	585	Figure 2.6: why not display the period 1500-1800 on the figure. As you mentioned that introductions of birds and mammals mostly in three distinct phases: 1500 to 1700; 1700 to 1900; and since 1950ies. Readers might also to have a visual comparison between the two early phases.	Thank you for your comment. Including the time period 1500-1800 would make the figures hard to read as all dynamics would be squeezed to the very right. Not much has been going on before 1800.
Yang, Qiang	No	Chapter 2	18	18	593	593	"Global patterns of alien animal distribution"	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	20	20	613	613	marine regions seem to be missing from Fig 2.7	Thank you for your comment. Marine records are not as comprehensively available as terrestrial records and are not considered in these maps.
Rebello, Alanna	No	Chapter 2	20	20	614	615	"Figure 2.7: Numbers of established alien animals per region" add "species". It is number of species, not numbers of animals, right? Add "animal" to "Colors indicate established alien species per region".	We agree and have corrected this
Alaux, Christine	No	Chapter 2	21	38	620	1262	At the end of each sub-chapter, insert a few photographs of the species mentioned by positioning them in line below the final table. For example, in subchapter 1.2.2.1, insert three photographs of Rattus rattus, Felis catus and Canis lupus on line 699	Thank you for this nice idea. However, due to space constraints, we will be unable to do this.
Rebello, Alanna	No	Chapter 2	21	21	622	622	Purposely introduced? Knowingly introduced? Have been documented? This statement only considers a couple of pathways, however what about those that people were unaware of (pests, pathogens etc)? I suggest adding a word to qualify this statement accordingly.	Note that we wrote that mammals were among the first introduced, not the first. The sentence is correct as is and was left unchanged
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	21	21	637	637	Could "many" be quantified, from the 241 known?	It could probably be quantified to some level, but not with the current literature. One would need further analyses, which we have not performed here
White, Michael	No	Chapter 2	21	21	637	639	Any thoughts on when species 'extinct in wild' is reintroduced to historic range? IAS or not?	Thank you for the comment, this has been addressed in the scoping document
Li, Bo	No	Chapter 2	21	21	651	655	I the first sentence, please add "species" after the number.	Thank you, this has been addressed in the final draft.
Rebello, Alanna	No	Chapter 2	21	21	651	651	Add "a" or "the" before "database"	Thank you, this has been corrected in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	22	22	662	671	for proportions to be interpretable, information is needed on the expected proportions. 81% records found on islands is surprising because islands are only 5.3% (Box 2.7) of regions.	I do not think these two figures are incompatible, or even surprising. Even though they represent a small surface, 97% of islands are invaded by mammals, and mammals are not often invasive on mainland regions, which explains the 81-5.3 figure
Government of Mexico	Yes	Chapter 2	22	22	671	676	should be included because there is evidence of impacts caused by these species to native fauna and human health, such as disease transmission and in the following paragraph they mention the dog	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Rebello, Alanna	No	Chapter 2	22	22	674	674	"Lack from lists", instead: "are missing from lists"	Thank you, this has been addressed in the final draft.
Rebello, Alanna	No	Chapter 2	22	22	674	674	Needs English editing.	Thank you, this sentence has been revised in the final draft
White, Michael	No	Chapter 2	22	22	688	688	Delete final 's' from sheeps	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	23	23	698	698	Table 2.4: Change Canis lupus to Canis lupus familiaris in the table so it is consistent with the text above	Thank you, this has been addressed in the final draft.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	23	23	698	699	table 2.4 - please also include common names	Thank you, we have revised the table accordingly
Evans, Thomas	No	Chapter 2	23	23	720	720	Here you briefly discuss patterns in alien bird species richness worldwide. Alien birds are distributed across many small islands around the world; this would be an interesting point to add to this paragraph. Evans, T. (2021). Quantifying the global threat to native birds from predation by non-native birds on small islands. Conservation Biology, 35: 1268-1277. https://doi.org/10.1111/cobi.13697	Thank you for your comment. We added this statement and the reference to the revised section.
Pan, Xubin	No	Chapter 2	23	23	723	723	Delete "exten"?	Thank you for making this point. It does not seem to require changes to the text.
Li, Bo	No	Chapter 2	23	23	724	724	Change "were the key drivers" to "was the key driver" as colonisation pressure can only be one of the key drivers.	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	24	24	731	733	Need cite references here to support invasional meltdown.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Evans, Thomas	No	Chapter 2	24	24	747	751	If you want some text using recent studies, you could add a short comment to this paragraph to state that many of the reported impacts caused by alien birds affect native birds: Evans, T., Jeschke, J.M., Liu, C., Redding, D.W., Şekercioğlu, Ç.H. and Blackburn, T.M. (2021), What factors increase the vulnerability of native birds to the impacts of alien birds?. Ecography, 44: 727-739. https://doi.org/10.1111/ecog.05000 Using predation as an example, you could then state that alien birds have been recorded preying on native birds at many locations around the world: Evans, T. (2021). Quantifying the global threat to native birds from predation by non-native birds on small islands. Conservation Biology, 35: 1268-1277. https://doi.org/10.1111/cobi.13697	Thank you for your comment. We do not report on impacts, which are covered in chapter 4.
Evans, Thomas	No	Chapter 2	24	24	747	747	Perhaps remove the word 'Notoriously?' 'Problematic' seems a reasonable description.	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 2	24	24	747	747	You cite Brochier et al. (2010) here, but this is a seldom cited reference from a local journal. There are three recent, comprehensive global reviews of the impacts of alien birds. Evans et al. (2016) quantifies how severe their impacts are. The birds you list as having serious impacts are identified in these papers. Martin-Albarracín VL, Amico GC, Simberloff D, Nuñez MA (2015) Impact of Non-Native Birds on Native Ecosystems: A Global Analysis. PLOS ONE 10(11): e0143070. https://doi.org/10.1371/journal.pone.0143070 Jack Baker, Kerinne J. Harvey & Kris French (2014) Threats from introduced birds to native birds, Emu - Austral Ornithology, 114:1, 1-12, DOI: 10.1071/MU12122 Evans, T., Kumschick, S. and Blackburn, T.M. (2016), Application of the Environmental Impact Classification for Alien Taxa (EICAT) to a global assessment of alien bird impacts. Diversity Distrib., 22: 919-931. https://doi.org/10.1111/ddi.12464	Thank you for your comment. We have rephrased and added suggested refs.
Government of Mexico	Yes	Chapter 2	24	24	748	749	correct the species name should be <i>Oxyura jamaicensis</i>	Thank you, this has been corrected in the final draft.
Faulkner, Katelyn	No	Chapter 2	24	24	753	759	Table 2.5: Odd that <i>Columba livia</i> is the second (after <i>Acridotheres tristis</i>) most widespread invasive bird species in the world. Is it possible that it isn't being reported as it is so ubiquitous?	Thank you for making this point. This is possible indeed as it is only two regions below the myna
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	24	24	758	759	table 2.5 - please also include common names	Thank you for your comment. We would like to not add common names as the tables will become very large and difficult to read. In addition, common names widely vary across regions and no standard common names exist.
Li, Bo	No	Chapter 2	24	24	760	818	Fishes should come after amphibians; please put 2.2.1.3 Fishes section after 2.2.1.5. Amphibians section.	Thank you for your comment. The order of taxonomic groups mostly follows the order of "relevance" for humans rather than an evolutionary sequence. We would like to keep it as it is.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	24	24	774	776	while undoubtedly true that deliberate introductions of fish continue to occur, exchanges of water between basins should not be discounted here - cf lines 790-792.	We agree, and this is not discounted: a few lines further we wrote "Pathways of fish invasions vary and include inter-oceanic canals, ballast water..."

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Rebelo, Alanna	No	Chapter 2	25	26	760	819	I would like to see some literature here that hints at the knowledge gaps (from a Global South perspective in particular). During the round 1 revision I also mentioned that there has been much research done on alien fishes in South Africa (this is expanded in detail on pages 85-86). While I know you are focussing on regions and not particular countries, I think it would be good to cite some of the syntheses of research on alien fishes in South Africa, and then this can also be used to reflect on why these data are missing from global databases used here. Just one sentence could raise awareness that there is much data missing from these databases, but that the research isn't necessarily lacking. e.g. http://biodiversityadvisor.sanbi.org/planning-and-assessment/national-biodiversity-assessment-nba-2018/ ; http://www.wrc.org.za/wp-content/uploads/mdocs/2039-1-14.pdf ; https://www.saiab.ac.za/professor-olaf-weyl/programmes/other-alien-fish-projects.htm ; http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0075-64582015000100014 .	We have, as mentioned, already expended this part in the previous version. We cannot add all references on research on given countries, especially since here the links you provide are not all relevant: there is a link to an unpublished research project and to an opinion paper that is from South African researchers but not focused on South Africa. We have, however, added three new references on three reviews on alien fish that should at least in part respond to your point
Preisser, Evan	No	Chapter 2	25	25	766	766	suggest that saturation has not yet been reached	Thanks for this suggested change. We have included it in the new version.
Government of China	Yes	Chapter 2	25	25	767	769	The cited literature says "Freshwater fishery tradition in China goes as far back as the Zhou dynasty (3059 - 2269 ago), when special officers were in charge of fish capture and putting regulations in place to set fishing seasons and ban harmful fishing." The original text is intended to explain that the tradition of freshwater fishing management in China began in the Western Zhou Dynasty, and it has nothing to do with the introduction of freshwater fish species. Freshwater fishery does not equal to fish introductions outside their natural range. Therefore, this is not a valid citation for correct Chinese history of fish species introduction, and it should be deleted.	Thank you for spotting this error, which we corrected.
Preisser, Evan	No	Chapter 2	25	25	768	768	it is not	Thank you, this has been addressed in the final draft.
Estoup, Arnaud	No	Chapter 2	25	25	777	777	Please add "ALIEN or NON-NATIVE or INVASIVE or ALIEN INVASIVE" freshwater species	Thanks for this suggested change. We have included it in the new version.
Preisser, Evan	No	Chapter 2	25	25	780	780	factors	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	25	25	780	780	Add 's' to factor	Thank you, this has been addressed in the final draft.
Government of Mexico	Yes	Chapter 2	25	25	805	807	impacts on prey populations of herbivorous fishes ... Change by, populations of native species and local fisheries	Thanks for this suggested change. We have included it in the new version.
White, Michael	No	Chapter 2	25	25	805	808	Humans can eat lionfishes	Thank you for your comment, but we can see no connection between the highlighted text and the comment.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	26	26	817	818	table 2.6 - please also include common names	Thank you, we have revised the table accordingly
White, Michael	No	Chapter 2	26	26	824	824	Please figure out postscript descriptors for centuries. E.g. BC (before Christ), BCE (before common era); AD (Anno Domini); what is AC (After Christ?), CE (common era)	Thank you for your comment. We have now proof-read the chapters.
White, Michael	No	Chapter 2	27	27	849	849	Add 's' to reptile	Thank you, this has been addressed in the final draft.
Government of Mexico	Yes	Chapter 2	27	27	875	876	Update this reference for Cozumel, because a more recent study (2014 http://www.conabio.gob.mx/institucion/cgi-bin/datos2.cgi?Letras=LI&Numero=28) indicates that Boa constrictor records on the island have declined or at least more research needs to be done	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	27	27	883	883	Table 2.7: It can be assumed that the cell numbered 1 and containing data for Trachemys scripta elegans is not included in the cell numbered 2. Trachemys scripta, but it is confusing. It would be clearer to specify as a note which subspecies are included in the Trachemys scripta cell.	Thank you for spotting this inconsistencies, which we corrected.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	27	27	883	884	table 2.7 - please also include common names	Thank you, we have revised the table accordingly
Faulkner, Katelyn	No	Chapter 2	28	29	906	960	While there are amphibian invasions in Southern Africa, there have been few introductions from other regions, and most invasions are interestingly species that are native to somewhere in South Africa. See reference below: Measey J, Davies SJ, Vimercati G, Rebelo A, Schmidt W, Turner A (2017) Invasive amphibians in southern Africa: a review of invasion pathways. Bothalia: African Biodiversity and Conservation 47: a2117.	Thanks for this suggested change. We have included a couple of references in the new version.
Government of China	Yes	Chapter 2	28	28	915	918	"The American bullfrog has been the most successful frog invader in China and has established feral population in more than 10 provinces across China (Liu and Li 2009, Liu et al. 2012, Liu et al. 2015, Liu et al. 2016). In recent years, the greenhouse frog (Eleutherodactylus planirostris) has also been found in China, where the species was firstly recorded in Hong Kong, SAR of China at the year of 2000 (Lee et al. 2016), and then was found in Shenzhen in 2017 (Lin et al. 2017). Reference : Liu, X., and Y. M. Li. 2009. Aquaculture Enclosures Relate to the Establishment of Feral Populations of Introduced Species. PLoS ONE 4. Liu, X., M. E. McGarrity, and Y. Li. 2012. The influence of traditional Buddhist wildlife release on biological invasions. Conservation Letters 5:107-114. Liu, X., Y. Luo, J. X. Chen, Y. S. Guo, C. M. Bai, and Y. M. Li. 2015. Diet and Prey Selection of the Invasive American Bullfrog (Lithobates catesbeianus) in Southwestern China. Asian herpetological research 6:34-44. Liu, X., Y. Guo, Y. Luo, and Y. Li. 2016. Emergent Vegetation Coverage and Human Activities Influence Oviposition Microhabitat Selection by Invasive Bullfrogs (Lithobates catesbeianus) in Southwestern China. Journal of Herpetology 50:57-62. Lee, W. H., M. W.-N. Lau, A. Lau, D.-q. Rao, and Y.-H. Sung. 2016. Introduction of Eleutherodactylus planirostris (Amphibia, Anura, Eleutherodactylidae) to Hong Kong. Acta Herpetologica 11:85-89. Lin Shishim, Wang Jian, Lv Zhitong, Liang Peiying, Luo Lin, Wang Xin, Wang Yingyong. 2017. First Record of An Alien Invasive Species Eleutherodactylus planirostris in Mainland China, and Its Population Study. Sichuan Journal of Zoology, 36: 680-685. "	Thank you for your comment. We have added several of the references that you provided.
Preisser, Evan	No	Chapter 2	29	29	952	952	delete carnivorous - all toads are carnivorous	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	29	29	953	956	With regard to definition of IAS, note that "the African clawed frog is among the most commonly used laboratory animals" and is only considered an IAS because "many populations originating from laboratories have become invasive in regions with a Mediterranean climate."	Thank you for making this point. It does not seem to require changes to the text.
Government of Mexico	Yes	Chapter 2	29	29	957	957	correct the species name is Lithobates catesbeianus	Thank you, this has been corrected in the final draft.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	29	30	967	968	table 2.8 - please also include common names	Thank you, we have revised the table accordingly
Government of China	Yes	Chapter 2	30	30	30	998	"(e.g., the China Belt and Road project, Liu et al., 2019)" should be deleted. This paragraph aims to describe the trends of alien insect. But the cited paper (Liu et al., 2019) is a study on vertebrates and did not use any data on insect. In addition, it is only a simulation calculation, not factual evidence. In fact, since the Belt and Road (B&R) Initiative was proposed in 2013, China has signed 205 cooperation agreements with 171 countries and international organizations, and jointly launched more than 2,000 projects. The B&R initiative has opened up new space for world economic growth, created a new platform for international trade and investment, and expanded new practices for improving global economic governance. It is helpful to the common development of all countries in the world. China has made important contributions to preventing the risk of invasive alien species in the B&R Initiative. At the Third International Congress on Biological Invasions held in 2017, Chinese experts proposed to jointly carry out international biological control and pilot it in countries along the B&R. In addition, China has established an import-export inspection and quarantine system for invasive alien species and an introduction and approval system which effectively prevent invasive species. In the future, China will continue to earnestly fulfill the requirements of various international treaties, strengthen communication and cooperation with countries along the B&R, and jointly strengthen biological invasion risk prevention and control.	Thank you for your comment. There are many examples that large infrastructure projects can have large influences on the spread of alien species, and therefore consider this is as an important aspect. But we rephrased the sentence in a more general way and added additional references.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Li, Bo	No	Chapter 2	30	32	969	1073	Some insects that were introduced as biocontrol agents and then become pests are also need included in this part.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Guareschi, Simone	No	Chapter 2	30	30	970	998	Here or in the section Data gaps (page 1381). An important topic should be briefly mentioned (but I appreciate it is now discussed in line 4976): The paradox of the relative absence of invasive aquatic insects in freshwater. Please see Fenoglio et al. 2016, Biology Letters.	Thanks for your comment. The reference and the issue are already present/discussed in the draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	30	30	971	973	yet this is fewer than the factor of 4 or so we might expect. Are insects under reported, better controlled, or less likely to establish than other animal taxa?	We agree and have added this
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	30	30	986	989	These are important findings that should be included in Chapter 5 as well.	Thank you for making this point. It does not seem to require changes to the text.
Yang, Qiang	No	Chapter 2	30	30	995	996	I would not call the China Belt and Road project as a new factor, as it is essentially about trade.	Thanks for your comment. We have better rephrased this part.
Government of USA	Yes	Chapter 2	31	31	1038	1038	Suggest changing common name of <i>Ceratitis capitata</i> to Mediterranean fruit fly as it is not the only fruit fly of note.	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	31	31	1052	1053	Add second parenthesis after (<i>Agrilus planipennis</i> and (<i>Anoplophora glabripennis</i>	Thank you, this has been corrected in the final draft.
Government of USA	Yes	Chapter 2	32	32	1054	1054	The proposed new common name for <i>Lymantria dispar</i> in North America is Spongy moth.	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	32	32	1054	1054	gypsy moth	Thank you, this has been addressed in the final draft.
Estoup, Arnaud	No	Chapter 2	32	32	1055	1055	Add the following sentence just before "The Formosan termite...": The spotted-wing drosophila, <i>Drosophila suzukii</i> , a vinegar fly of Asian origin, has emerged as a devastating pest of small and stone fruits throughout North America, Europe and South America (Dos Santos et al. 2017 = https://doi.org/10.1371/journal.pone.0174318). --- Note that this invasive pest is indeed really problematic as it explains, to some extent, a regain of the use of pesticides in many countries ---.	Thank you for your comment. We added this sentence and reference as suggested.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	32	32	1059	1059	Add second parenthesis after (<i>Apis</i> , <i>Bombus</i> or <i>Megachile</i> ,	Thank you, this has been corrected in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	32	32	1061	1061	Add second parenthesis after (<i>Vespa</i> , <i>Vespula</i> , gall and parasitoid wasps, among others	Thank you, this has been corrected in the final draft.
Estoup, Arnaud	No	Chapter 2	32	32	1062	1062	Instead of "(<i>Apis mellifera scutellata</i>)" please write "(a hybrid of various European honey bee subspecies cross-breed with the East African honey bee <i>Apis mellifera scutellata</i>)"	Thanks for this suggested change. We have included it in the new version.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	32	32	1072	1072	1072-1072 table 2.9 - please also include common names	Thank you for your comment. We added common names to all tables.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	33	33	1105	1105	Table 2.10: Add alien range for <i>Dysdera crocata</i> . Alien to Australia, Spain and the United States (GISD http://www.iucngisd.org/gisd/species.php?sc=1465)	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	33	33	1105	1105	Table 2.10: Add alien range for <i>Loxoseles rufescens</i> . Introduced in most continents of the world (Native to the mediterranean basin) DOI: 10.1016/j.toxicol.2017.04.007	Thank you for your comment. We have added the contents where this species is alien to the table.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	34	34	1112	1113	1112-1113 table 2.11 - please also include common names	Thank you, we have revised the table accordingly
Agbere, Francis	No	Chapter 2	34	35	1116	1156	This is well summed up and creatively written. I also thought it would be rewarding to look at the gendered disaggregation of molluscs especially in the distribution density. This will help give a sense of the potential of establishing as an invasive specie as they transition in the gender based on age	Thank you for your comment. That information is beyond the scope of our chapter and we are declining to include it.
Government of China	Yes	Chapter 2	35	35	35	1152	The example is not supported by references, it is recommended to add or delete this part.	Thanks for this suggested change. We have included a couple of references in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	35	35	1133	1133	Add the genus to <i>Corbicula fluminea</i> as this is the first time the species is mentioned in the document	Thank you, this has been addressed in the final draft.
Jeschke, Jonathan	No	Chapter 2	35	35	1134	1134	The reference Strayer et al. (2019), which is cited here, is missing in the reference list. Perhaps this reference was meant: Strayer, D.L.; Adamovich, B.V.; Adrian, R.; Aldridge, D.C.; Balogh, C.; Burlakova, L.E.; Fried-Petersen, H.B.; G.-Tóth, L.; Hetherington, A.L.; Jones, T.S.; Karatayev, A.Y.; Madill, J.B.; Makarevich, O.A.; Marsden, J.E.; Martel, A.L.; Minchin, D.; Nalepa, T.F.; Noordhuis, R.; Robinson, T.J.; Rudstam, L.G.; Schwalb, A.N.; Smith, D.R.; Steinman, A.D.; Jeschke, J.M. 2019. Long-term population dynamics of dreissenid mussels (<i>Dreissena polymorpha</i> and <i>D. rostriformis</i>): a cross-system analysis. <i>Ecosphere</i> 10, e02701. https://doi.org/10.1002/ecs2.2701	Thank you for your comment. References have been revised in the final draft.
Preisser, Evan	No	Chapter 2	35	35	1135	1135	malacologists	Thank you, this has been addressed in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	35	35	1147	1154	Are the marine bivalves (oysters, mussels, clams) introduced for cultivation and harvesting to be considered as IAS? If so, would introduced crops and livestock also be IAS? There is no indication of harm from these marine bivalves. Definitions should be applied consistently.	There is no inconsistency here: crops generally have no documented impacts and only benefits, and livestock are considered invasive when they escape from agricultural practices. Here, marine bivalves are considered invasive when they have an impact
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	35	35	1152	1153	Remove the italics from the words in South Africa to habitats	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	35	35	1165	1167	Palestine?	Thanks for this suggested change. We have included it in the new version.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	36	36	1190	1191	1190-1191 table 2.12 - please also include common names	Thank you, we have revised the table accordingly
Preisser, Evan	No	Chapter 2	36	36	1195	1195	crustaceans were reported	Thank you, this has been addressed in the final draft.
Government of China	Yes	Chapter 2	37	37	1225	1228	Insufficient literature support. It is difficult to demonstrate the number of literature only from few literature cited so far, and it is recommended to supplement them.	Thank you for your comment. This is based on the assessment of knowledge by our experts and includes only a few references to back this up. A full review on this topic is beyond the scope of this assessment.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	38	38	1261	1262	1261-1262 table 2.13 - please also include common names	Thank you, we have revised the table accordingly
White, Michael	No	Chapter 2	38	38	1274	1277	I noticed in Equatorial Polynesia that large numbers of jellies arrived when marine plastic litter came from southeast (southern South America); fewer or none when currents were easterly or northeasterly	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Lieurance, Deah	No	Chapter 2	39	39	1296	1296	Why is Invasion in bold?	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Preisser, Evan	No	Chapter 2	39	39	1296	1296	remove bolding	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	39	39	1306	1306	have mostly been neglected	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Yang, Qiang	No	Chapter 2	39	39	1306	1330	duplicate usage of "ecosystem engineers" at L1306 and L1330	Thanks for this suggested change. We have included it in the new version.
Preisser, Evan	No	Chapter 2	39	39	1335	1336	that previously had an absent or impoverished earthworm fauna	Thanks for this suggested change. We have included it in the new version.
Li, Bo	No	Chapter 2	40	40	1338	1338	Change "ecological" to "ecologically".	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	40	40	1338	1338	ecologically	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	40	40	1338	1338	'Ecologically'	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	40	40	1342	1342	invasive, have	Thank you, this has been addressed in the final draft.
Yang, Qiang	No	Chapter 2	40	40	1359	1359	check if you have defined "invasional meltdown" in an early place	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Htar Maung, Molley	No	Chapter 2	40	40	1361	1361	Grammar error: Should be as "Earthworm also features...."	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	40	40	1361	1361	Change "Earthworm" to "Earthworms".	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	40	40	1361	1363	Good point, well done.	Thank you for your feedback.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	40	40	1365	1365	Substitute "The is a growing recognition of the important of" for "There" is a growing recognition of the importance....	Thank you, this has been addressed in the final draft.
Government of USA	Yes	Chapter 2	40	40	1365	1365	Change important to importance	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	40	40	1365	1365	"The is" should be "There is", and "nonnavitive" can be "non-native"	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	40	40	1367	1370	Landscaping can also be one of the drivers.	Thanks for this suggested change. We have included it in the new version.
White, Michael	No	Chapter 2	41	41	1398	1401	May be possible to bring inside Large Marine Ecosystem (LME) framework, as this includes ALL the world's coastlines	Thank you for your comment. This is section is about data and knowledge gaps and it did not become fully clear to us how the LME framework could help here. Please note that we indeed considered all coastlines worldwide, although not using the LME framework. For marine classification, our work is largely based on the Marine Ecoregions of the World (Spalding et al. 2007).
Luisa Nunes, Ana	No	Chapter 2	41	41	1413	1416	Please add Red List of threatened species to the sentence	Thanks for this suggested change. We have included it in the new version.
Lieurance, Deah	No	Chapter 2	41	41	1423	1426	I think an example here would be helpful	Thank you for your comment. The text has been revised for clarity.
Yang, Qiang	No	Chapter 2	41	41	1423	1425	the sentence reads a bit confusing for me	Thanks for this suggested change. We have included it in the new version.
Lieurance, Deah	No	Chapter 2	42	42	1428	1432	I don't see how this "for example" relates back to the problem being acute in regions with less developed economies	Thanks for this suggested change. We have included it in the new version.
Government of Netherlands (van Delft, Jeroen)	Yes	Chapter 2	43	43	1476	1481	This international review report includes a review of the use of eDNA cross-taxonomically with special attention for IAS, also invertebrates: Herder, J.E., A. Valentini, E. Bellemain, T. Dejean, J.J.C.W. van Delft, P.F. Thomsen and P. Taberlet, 2014. Environmental DNA - a review of the possible applications for the detection of (invasive) species. Stichting RAVON, Nijmegen. Report 2013-104. It is widely used and could be added in line 1480.	Thanks for this suggested change. We have included it in the new version.
Sagoff, Mark	No	Chapter 2	43	43	1476	1476	The Chapter states, "It is evident that more work remains to be done to address the current knowledge gaps." The Chapter describes many knowledge gaps, to be sure, but why do they need to be addressed? Why is it important to know which species are native and which alien? One cannot make the distinction by observation or experiment. In other words, the native-alien dichotomy presents a historical distinction without a biological difference. In the absence of historical knowledge it is impossible to tell which is which. Natural history is a wonderful topic, but naturalists have not seen a penny of funding in decades. If invasion biology by making a hobgoblin of non-native species attracts funding for the study of natural history, it is worth it.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
van Delft, Jeroen	No	Chapter 2	43	43	1476	1481	This international review report includes a review of the use of eDNA cross-taxonomically with special attention for IAS, also invertebrates: Herder, J.E., A. Valentini, E. Bellemain, T. Dejean, J.J.C.W. van Delft, P.F. Thomsen and P. Taberlet, 2014. Environmental DNA - a review of the possible applications for the detection of (invasive) species. Stichting RAVON, Nijmegen. Report 2013-104. It is widely used and could be added in line 1480.	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	45	48	1490	1622	Relevant to the definition of IAS, in the section on Trends and status of alien plants, no mention whatsoever is made of crop plants as invasive aliens, except in Box 2.2 (see next comment)	Thank you for comment. The definitions are provided in chapter one and in the glossary. Crop plants still under cultivation without "wild" populations are not considered as being alien species.
Government of Germany	Yes	Chapter 2	45	57	1490	1953	Proposal: Please consider to re-arrange the sequence of sub-sections within section "2.2. Global trends and status of invasions" starting with "Trends and status of alien plants", followed by "Trends and status of alien animals", and "Trends and status of alien microorganisms". Rationale: The abundance of alien plant species may form an important factor for other alien species (plants, animals, microorganisms) to introduce a region. Accordingly, the text states "The number of plant species introduced is particularly important because plant introductions (whether intentional or accidental) are a pathway for other invasive alien species introductions" (p. 45, ll. 1504-1505).	Thank you for your comment. We revised the chapter structure to some extent but would like to keep the main structure.
Golivets, Marina	No	Chapter 2	45	45	1491	1491	Change "introduced" to "alien" for consistency.	Thanks for this suggested change. We have included it in the new version.
Li, Bo	No	Chapter 2	45	45	1492	1492	Please add "in" before the IPBES.	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Turkington, Thomas)	Yes	Chapter 2	45	45	1494	1494	<p>"The importance of long-distance transport of IAS (plant pathogens, e.g. fungi) should be recognized more clearly. Certainly continent to continent spread is one aspect, but also long distance transport related to regional spread of IAS. E.g. the cereal rust "Puccinia pathway" in North America. Certainly cereal rusts are normal pathogen issues, but changes in virulence such as that observed for the stem rust race UG99 could be considered an IAS and if there is continental spread via long-distance wind transport or perhaps via humans (adherence of uredospores on clothing and transfer from one location to another) this could then be followed by rapid regional spread in Central, South and North America via wind parcels. Another aspects is smaller scale spread where an issue is introduced into an area and then establishes itself in the area, followed by step by step progress over shorter distances via wind spread, soil movement, or seed movement. Potential long-distance transport is not only a concern for cereal rusts, but also coffee rusts, and asian soybean rust. The following is from a Canadian perspective and relates to cereal rusts, but would have applicability to asian soybean rusts, etc. Source, dispersal and risk of cereal rusts</p> <p>In general, cereal rusts, especially for wheat and barley, will overwinter on cereals and grasses in the southern USA and northern Mexico, although stripe rust can also overwinter in the Pacific Northwest (PNW) and California (Chen 2005; Menzies and Gilbert 2003; Wiese 1987; Xi et al. 2015). Rust spores (also known as urediniospores) are blown northward by wind currents, affecting successive northerly winter and spring cereal crops (Agrios 1988; Chen 2005; Menzies and Gilbert 2003). In the Prairie region, rust spores will typically arrive in mid to late June. Several scientific reviews provide more detail on long distance transport of cereal rust fungi and other plant pathogens (Aylor 1990, 2003; Brown and Hovmöller 2002; Chen 2005; Eversmeyer and Kramer 2000; Nagarajan and Singh 1990).</p> <p>Spread of cereal rusts into Western Canada from locations in the USA will depend on the following factors:</p> <ul style="list-style-type: none"> ● Disease severity and pathotypes at the point of origin ● Release and turbulent transfer of spores into upper atmosphere air parcels ● Movement and direction of air parcels ● Spore survival during long distance transport ● Deposition of spores over at-risk locations in Western Canada ● Crop growth stage for at-risk locations ● Prevailing weather conditions for at-risk locations <p>Rust spore liberation from symptoms on infected cereal leaves is favoured by increased wind speeds and sudden wind gusts, while vertical movement into upper air parcels is favoured by convective wind currents resulting from surface heating and cooling during the 24 hour night/day cycle (Aylor 1990; Nagarajan and Singh 1990).</p>	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here. In addition, rust disseminated by wind cannot be considered as invasive under our definition of the term, and the potential human role here seems still speculative to be included.
Government of China	Yes	Chapter 2	45	46	1495	1537	<p>One of the reasons for the increase of invasive alien plants is due to the increasing number of introduced alien plant species. Another reason may be due to the increasing available information on invasive alien species. The causes for increased number of invasive alien species should be distinguished.</p>	Thank you for comment. Indeed, information is incomplete in nearly all cases, which is highlighted throughout the chapter, and particularly addressed in the gap sections.
Rebelo, Alanna	No	Chapter 2	45	45	1497	1497	English editing: "since centuries" -do authors mean: "for centuries"?	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	45	45	1498	1498	Change "exists" to "exist".	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	45	45	1513	1520	Great idea.	Thank you for your feedback.
Rebelo, Alanna	No	Chapter 2	45	45	1514	1520	Maybe this also has something to do with colonialism. Colonists took their plants with them. They wanted to see their home trees and flowers. Whereas the reverse trend has been limited mainly to botanical gardens.	Thank you for your comment. Yes, colonialism is one likely (and often mentioned) explanation. This has been written earlier in the chapter and doesn't need to be repeated here (where the point made is different)
Golivets, Marina	No	Chapter 2	45	45	1519	1519	Change "then" to "than".	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	45	45	1519	1519	than	Thank you, this has been addressed in the final draft.
Yang, Qiang	No	Chapter 2	45	45	1519	1519	replace "then" with "than"	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	45	45	1528	1529	the large numbers of established alien species constitute	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	46	46	1550	1553	On a quick scan of the citation (and there are several Pysek et al 2017 in the references), the paper seems to be about observed patterns without assessment of causes. Given the important of deliberate plant introductions, it seems logical that the largest number of known aliens would occur in the most populous regions of developed economies. The observed pattern of aliens does not, on its own, imply that invasibility of these systems is higher.	We agree with this comment and we have replaced "more easily invaded" by "more invaded"
Lembrechts, Jonas	No	Chapter 2	46	46	1555	1555	I feel personally that a map displaying these regional hotspots would facilitate interpretation, but perhaps this is out of scope here	Thank you for your comment. The calculation of relative hotspots (i.e., alien species numbers in relation to total species numbers) would require to gather information of native species, which is very time consuming and beyond the scope of this assessment. At least for plants, this has been done in the cited studies.
Golivets, Marina	No	Chapter 2	47	47	1565	1565	Change "then" to "than".	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	47	47	1566	1566	species than native	Thank you, this has been addressed in the final draft.
Pouteau, Robin	No	Chapter 2	47	47	1570	1570	Based on the cited data, I'm afraid you can 'only' talk about 'a greater vulnerability of islands to NATURALIZATION'	Thanks for this suggested change. We have included it in the new version.
Golivets, Marina	No	Chapter 2	47	47	1575	1575	Insert "all" before "climatic".	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	47	47	1575	1575	in all climatic zones	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 2	48	48	1590	1590	Leguminosae: on p. 47 line 1587 Fabaceae is mentioned. Chose either one, my preference would be Fabaceae.	Thank you, this has been addressed in the final draft.
Golivets, Marina	No	Chapter 2	48	48	1590	1590	Change "Leguminosae" to "Fabaceae".	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	48	48	1594	1594	What do you mean with 'not distributed randomly'? I don't feel like the next sentences really explain this concept	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Duistermaat, Leni	No	Chapter 2	48	48	1599	1601	The species concept in Cotoneaster and Oenothera is controversial, resulting in significantly different numbers of species depending on the smaller or wider species concept that is accepted.	Thank you for your comment. We follow the categorisation as provided in the cited literature.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	48	48	1609	1610	1609-1610 table 2.14 - please also include common names	Thank you, we have revised the table accordingly
Lembrechts, Jonas	No	Chapter 2	48	48	1611	1622	Some more effort to make numbers comparable in this paragraph might be good (e.g. putting them all-in percentage? As now I believe there is a different number of regions in the established vs invasive analysis	Thank you for the suggestion. However, we prefer to retain the numbers as they currently are
Li, Bo	No	Chapter 2	48	48	1611	1611	Change "11" to "10"?	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 2	48	48	1617	1617	GoNAF: GloNAF	Thank you, this has been addressed in the final draft.
Lieurance, Deah	No	Chapter 2	48	48	1617	1617	Should be GloNAF (missing 'L')	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of China	Yes	Chapter 2	49	49	1626	1627	Delete this sentence "The first introductions of alien aquatic plants date back to 1700s (e.g., China: Wang et al., 2016)". And the time and country for the first introductions of alien aquatic plants should be revised. According to the cited reference (Wang et al., 2016), Pistia stratiotes was introduced in 1700s. However, in the newly published Invasive Flora of China, it is pointed out that the earliest record of the Pistia stratiotes in China is the specimen collected in Kowloon, Hong Kong of China in 1913 (Anonymous 649, PE01436553. Link: https://www.cvh.ac.cn/spms/detail.php?id=ec6cab7e), not in the 1700s. Besides, in the cited literature (Wang et al., 2016), more than 80% of the 152 alien species were introduced at an unknown time, and according to existing records, the introduction of aquatic plants in China can be traced back to the 18th century, which does not mean that this is the first time that alien aquatic plant was introduced in the world. However, this literature seems to be used to show it is the first occurrence of the introduction of aquatic plants in the world. The description here is not rigorous.	Thank you, this has been corrected in the final draft.
Lembrechts, Jonas	No	Chapter 2	49	49	1626	1626	Here, and elsewhere: the 'first known and deliberate', or something like that? There could be earlier unreported or unknown introductions, in theory?	Thank you for noting this. We have now corrected it.
Hofstra, Gerrit	No	Chapter 2	49	49	1629	1630	Another factor is more and more effective research since 1980 but especially since 2008 (Environmental DNA)	Thanks for this suggested change. We have included it in the new version.
Lembrechts, Jonas	No	Chapter 2	49	49	1629	1629	though?	Thank you, 'though' was changed to 'through'
Golivets, Marina	No	Chapter 2	49	49	1636	1636	Add "aquatic" before "alien".	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 2	49	49	1641	1641	What is the source for the native status of Hydrocotyle ranunculoides in Africa and the Middle East? See Q-bank [https://q-bankplants.eu/] page Hydrocotyle ranunculoides - distribution: North America, Central America and South America: there are also EPPO - region records in southern Italy, Palestine and Caucasus (as H. natans Cirillo in the 19th century). This species has since been synonymized with H. ranunculoides, or referred to its var. natans (Cirillo, Urban). The present status of these forms are not clear, and there is no indication that they have ever been invasive. The European Garden Flora (Cullen, 1997) synonymizes H. ranunculoides with H. america L., implying that the species is distinct from the Mediterranean H. natans. Since H. ranunculoides also occurs in sub-Saharan Africa, more information is needed on the similarities or differences between New World and Old World populations.	Thank you for pointing this out. We have removed the sentence from the report.
Lembrechts, Jonas	No	Chapter 2	49	50	1645	1678	I feel like general statements are missing in the 'status' chapter for aquatic plants; which currently consists of specific examples only. If no such numbers exist, perhaps state this up front?	Thanks for the suggested change. We included a general opening statement on the global status of aquatic established alien plant species. The opening sentence reads: "Among the 13,168 established alien plant species worldwide reported in the GloNAF database, less than 1% of the species are aquatic (Pyšek et al. 2017). However, comprehensive assessments of aquatic alien plants globally are missing."
Duistermaat, Leni	No	Chapter 2	49	49	1646	1647	Crassula helmsii is also considered invasive in the Netherlands, included in 'Convenant waterplanten' [https://zoek.officielebekendmakingen.nl/stcrt-2010-11341.html] Bijlage 1, to protect native biodiversity, to prevent escapes of alien aquatic plants	Thanks for this suggested change. We have included it in the new version.
Golivets, Marina	No	Chapter 2	49	49	1647	1647	Consider moving "native to North America" to the beginning of the sentence for clarity.	Thank you, we have rephrased the sentence addressign your comment.
Odé, Baudewijn	No	Chapter 2	49	49	1648	1648	I would regard Elodea spp. as submerser, not as floating herbs	Thanks for this suggested change. We have included it in the new version.
Preisser, Evan	No	Chapter 2	49	49	1653	1653	major.	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 2	49	49	1655	1656	Myriophyllum heterophyllum is also established in the Netherlands: Duistermaat, Sparrius & Denters. Standaardlijst van de Nederlandse flora 2020. Gorteria 43: 109-156. https://natuurtijdschriften.nl/pub/1019223 .	Thanks for this suggested change. We have included it in the new version.
Duistermaat, Leni	No	Chapter 2	49	49	1656	1657	Myriophyllum aquaticum is established in the Netherlands (publication as for M. heterophyllum), and is included in Convenant waterplanten (publication as for Crassula helmsii)	Thanks for this suggested change. We have included it in the new version.
Hofstra, Gerrit	No	Chapter 2	49	49	1656	1658	M. aquaticum is incorporated on the European list of invasive species since 2016 so trade is forbidden	Thanks for this suggested change. We have included it in the new version.
Brundu, Giuseppe	No	Chapter 2	49	49	1660	1670	To supporto this paragraph, I would suggest citing also: Coetzee, J. A., Hill, M. P., Ruiz-Téllez, T., Starfinger, U., & Brunel, S. (2017). Monographs on invasive plants in Europe N° 2: Eichhornia crassipes (Mart.) Solms. Botany Letters, 164(4), 303-326. https://doi.org/10.1080/23818107.2017.1381041	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	49	49	1660	1660	In chapter 1 the scientific name Eichhornia crassipes was used, here Pontederia crassipes is used. Eichhornia is considered a synonym in Plants of the world online and a Basyonim in Tropicos. Adjust so the whole document uses the same valid name. In Mexico, the taxonomic experts consider Eichhornia crassipes as the valid name. Olvera, M. & Lot, A. 2013b. Pontederiaceae. Plantas acuáticas mexicanas una contribución a la Flora de México. Vol. I. Monocotiledóneas. pp: 307-319. En: Lot, A., Medina Lemos, R. & Chiang, F. (Eds.). Instituto de Biología, Universidad Nacional Autónoma de México	Thank you, this has been harmonized across the draft
Lieurance, Deah	No	Chapter 2	49	49	1660	1661	Not sure which authority you are using but Eichhornia crassipes is the scientific name I see just about everywhere (e.g. CABI, ITIS, USGS NAS). This old genus might confuse the readers	Thank you, this has been harmonized across the draft
Rebelo, Alanna	No	Chapter 2	49	49	1660	1660	Water hyacinth is also an issue in SA, see: https://www.inaturalist.org/observations?taxon_id=962637	We agree but cannot cite all invasive species of all countries. We have already mentioned that it has "invaded freshwater systems in over 50 countries on five continents..."
Li, Bo	No	Chapter 2	49	49	1662	1662	"in over 50 countries on five continents" can be changed to "in 62 countries, between the longitudes of 40°N and 40°S (Pan, Villamagna, et al., 2012)" Pan X, Villamagna, AM & Li B. 2012. Eichhornia crassipes Mart. [Solms-Laubach] (Water Hyacinth). In: Francis R (ed), A Handbook of Global Freshwater Invasive Species. Earthscan, London, pp. 47-56.	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	49	49	1665	1666	Water hyacinth is also a problem in Mexico. Suggest adding as follows: the south-eastern United States of America, Mexico, central and western Africa....	Thanks for this suggested change. We have included it in the new version.
Golivets, Marina	No	Chapter 2	49	49	1668	1668	Change "not" to "no".	Thank you, this has been addressed in the final draft.
Golivets, Marina	No	Chapter 2	50	50	1673	1673	Change "has since spread &" to "has since then spread and".	Thank you, this has been addressed in the final draft.
Golivets, Marina	No	Chapter 2	50	50	1676	1676	Change ", which" to ", where".	Thank you, this has been addressed in the final draft.
Golivets, Marina	No	Chapter 2	50	50	1681	1683	Capitalize phylum names and either provide common names here or scientific names in the following paragraphs.	Thank you, this has been harmonized across the draft. Please refer to Chapter 1 for more information on the nomenclature and style of species names
Preisser, Evan	No	Chapter 2	50	50	1693	1693	less disturbed sites	Thank you, 'intervened' was replaced by 'disturbed'
Golivets, Marina	No	Chapter 2	50	50	1695	1695	Change "Asian" to "Asia".	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	50	50	1695	1695	Substitute "such as the coast of the East Asian" for "such as the coast of East Asia"	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Li, Bo	No	Chapter 2	50	50	1699	1699	Change "were" to "was".	Thank you, 'were' was changed to 'was'
Lembrechts, Jonas	No	Chapter 2	50	50	1703	1703	Efforts-sentence lacks a verb	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Preisser, Evan	No	Chapter 2	50	50	1703	1703	are ongoing	Thank you, this has been addressed in the final draft.
Golivets, Marina	No	Chapter 2	51	51	1723	1723	Change "analyzes" to "analyses".	Thank you for your comment. We have corrected the typo (analysis)
Lieurance, Deah	No	Chapter 2	51	51	1730	1730	Santelices & Bernab?? ...finish this citation	Thank you, this has been corrected in the final draft.
Preisser, Evan	No	Chapter 2	51	51	1730	1730	??	Thank you, references have been revised in the final draft

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Preisser, Evan	No	Chapter 2	51	51	1741	1741	rugosities	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	51	51	1741	1741	Should this be <i>rugosities</i> ?	Thank you for your feedback.
Preisser, Evan	No	Chapter 2	51	51	1744	1744	Exotic macroalgal species can themselves serve as	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Government of USA	Yes	Chapter 2	51	51	1745	1745	insert the word 'as' between the word live and apiphytes	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Preisser, Evan	No	Chapter 2	51	51	1745	1745	live as	Thank you, this has been addressed in the final draft.
Government of Mexico	Yes	Chapter 2	51	51	1746	1747	correct species name is <i>Neosiphonia harveyi</i>	Thank you, we have edited the text accordingly
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	52	52	1764	1765	1764-1765 table 2.15 - please also include common names	Thank you, we have revised the table accordingly
Pan, Xubin	No	Chapter 2	52	52	1766	1766	The order of "Bryophytes" and "Algae"	Thank you for your comment. However, we prefer to keep the order as it currently stands.
Lembrechts, Jonas	No	Chapter 2	52	52	1780	1780	As hitchhikers on?	Thank you for spotting this error, which we corrected.
Preisser, Evan	No	Chapter 2	52	52	1786	1786	the highest	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 2	53	53	1797	1797	Knowledge gaps: Identification of alien species is hampered in taxa with a distribution over more than 1 continent, of which no global identification key is available, and especially when the origin of the alien plant is unknown (as is often the case). E.g. Cyperaceae, Hydrocotyle, Myriophyllum. Taxonomy of <i>Heracleum</i> is not clear.	Thank you for this comment. We have added a sentence as suggested
Lieurance, Deah	No	Chapter 2	54	54	1839	1939	Can abbreviate to GBIF after first mention And line 1841 and throughout the document)	Thank you, the text has been revised accordingly
Pan, Xubin	No	Chapter 2	55	55	1866	1911	Box 2.2: The order of "Figures 12-14"	Thank you for noting this inconsistency. We have now corrected it.
Golivets, Marina	No	Chapter 2	55	55	1870	1870	Box 2.2: Insert "being" before "the most".	Thank you, this has been addressed in the final draft.
Rebelo, Alanna	No	Chapter 2	55	55	1870	1870	Box 2.2: Some formatting errors here. "O" should be "of" and there shouldn't be a line break after "America"	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Golivets, Marina	No	Chapter 2	55	55	1871	1871	Box 2.2: Change "o" to "of".	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	55	55	1871	1871	Box 2.2: States of America... also, remove line break	Thank you, this has been addressed in the final draft.
Rebelo, Alanna	No	Chapter 2	55	55	1873	1873	Box 2.2: Australia and Spain: are these also invasive species?	Yes, as stated in the sentence "three main hotspots for invasive cacti"
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	55	55	1880	1894	All of a sudden, Box 2.2. mentions grasses as "introduced outside their native ranges for horticulture, soil stabilization, as food (forage) and fodder, or as raw materials". Are the food/forage/fodder species to be considered as IAS? It's important to have an explicit statement, one way or the other.	The reasons behind the introduction can be varied and numerous, and there is a priori no restriction. Food/forage/fodder can be considered invasive if they fulfill the criteria selected for invasive in this report
Lieurance, Deah	No	Chapter 2	55	55	1880	1881	Box2.5: Might also include biofuel or could write as biomass species	Thank you, we have revised the draft accordingly
Rebelo, Alanna	No	Chapter 2	55	55	1890	1890	Box 2.2: Ultimately it is their ability to compete, something that shorter grass species cannot do where there are taller guilds of plants present.	Thank you for making this point. It does not seem to require changes to the text.
Golivets, Marina	No	Chapter 2	55	55	1891	1893	Box 2.2: Provide the full name instead of the abbreviation TSG.	Thank you for noting this. We have now corrected it.
Government of USA	Yes	Chapter 2	55	55	1891	1891	Box 2.2: Define acronym TSG	Thank you for noting this. We have now corrected it.
Rebelo, Alanna	No	Chapter 2	55	55	1891	1891	Box 2.2: Give abbreviation in full on first use (TSGs)	Thank you for noting this. We have now corrected it.
Yang, Qiang	No	Chapter 2	55	55	1891	1893	Box 2.2: TSG not defined	Thank you for noting this. We have now corrected it.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	55	56	1896	1928	Same comment as above, for woody plants/shrubs used for "horticulture, forestry, food and agroforestry".	The reasons behind the introduction can be varied and numerous, and there is a priori no restriction. Horticulture, forestry, food and agroforestry can be considered invasive if they fulfill the criteria selected for invasive in this report
Rebelo, Alanna	No	Chapter 2	55	55	1896	1896	Box 2.2: I'm very happy to see woody plant species (i.e. trees) given this attention in a box, thank you for including this.	Thank you for making this point. It does not seem to require changes to the text.
Rebelo, Alanna	No	Chapter 2	55	55	1906	1906	Box 2.2: This sentence is confusing... Should this read: "only one..." instead of "all but one have their natural ranges confined..."	Thank you for noting this. We have now corrected it.
Rebelo, Alanna	No	Chapter 2	56	56	1912	1928	Box 2.2: Should the fact that many of these trees are fire-adapted be mentioned? It has contributed to their ability to establish and invade in South Africa, for example. If they were not fire adapted they would have disappeared after the first fire.	This box is already very long, and we cannot add new text at this stage except at the expense of other text, so we have chosen not to add this point
Golivets, Marina	No	Chapter 2	57	57	1939	1942	Figure 2.13: Remove italics for species names.	Thank you for spotting this error, which we corrected.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	57	57	1941	1942	Figure 2.13: 5 seems a small number given the preceding description. <i>Casuarina</i> occurs in more countries yet is not mentioned	yes, this must be a mistake. A quick look at ISSG and GBIF show many more countries. Need an expert check

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Turkington, Thomas)	Yes	Chapter 2	58	58	1961	1961	<p>"The importance of long-distance transport of IAS (plant pathogens, e.g. fungi) should be recognized more clearly. Certainly continent to continent spread is one aspect, but also long distance transport related to regional spread of IAS. E.g. the cereal rust ""Puccinia pathway"" in North America. Certainly cereal rusts are normal pathogen issues, but changes in virulence such as that observed for the stem rust race UG99 could be considered an IAS and if there is continental spread via long-distance wind transport or perhaps via humans (adherence of uredospores on clothing and transfer from one location to another) this could then be followed by rapid regional spread in Central, South and North America via wind parcels. Another aspects is smaller scale spread where an issue is introduced into an area and then establishes itself in the area, followed by step by step progress over shorter distances via wind spread, soil movement, or seed movement. Potential long-distance transport is not only a concern for cereal rusts, but also coffee rusts, and asian soybean rust. The following is from a Canadian perspective and relates to cereal rusts, but would have applicability to asian soybean rusts, etc. Source, dispersal and risk of cereal rusts</p> <p>In general, cereal rusts, especially for wheat and barley, will overwinter on cereals and grasses in the southern USA and northern Mexico, although stripe rust can also overwinter in the Pacific Northwest (PNW) and California (Chen 2005; Menzies and Gilbert 2003; Wiese 1987; Xi et al. 2015). Rust spores (also known as urediniospores) are blown northward by wind currents, affecting successive northerly winter and spring cereal crops (Agrios 1988; Chen 2005; Menzies and Gilbert 2003). In the Prairie region, rust spores will typically arrive in mid to late June. Several scientific reviews provide more detail on long distance transport of cereal rust fungi and other plant pathogens (Aylor 1990, 2003; Brown and Hovmöller 2002; Chen 2005; Eversmeyer and Kramer 2000; Nagarajan and Singh 1990).</p> <p>Spread of cereal rusts into Western Canada from locations in the USA will depend on the following factors:</p> <ul style="list-style-type: none"> • Disease severity and pathotypes at the point of origin • Release and turbulent transfer of spores into upper atmosphere air parcels • Movement and direction of air parcels • Spore survival during long distance transport • Deposition of spores over at-risk locations in Western Canada • Crop growth stage for at-risk locations • Prevailing weather conditions for at-risk locations <p>Rust spore liberation from symptoms on infected cereal leaves is favoured by increased wind speeds and sudden wind gusts, while vertical movement into upper air parcels is favoured by convective wind currents resulting from surface heating and cooling during the 24 hour night/day cycle (Aylor 1990; Nagarajan and Singh 1990). Burleigh et al. (1967) found that the aerial concentration of rust spores increased when disease levels were increased in wheat crops below the</p>	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here. In addition, rust dissemination by wind cannot be considered as invasive under our definition of the term, and the potential human role here seems still speculative to be included.
Singh, Baljinder	No	Chapter 2	58	61	1961	2074	<p>In this section, it would be important to note that with rising temperatures & more frequent extreme weather events, fungi are not only able to invade novel geographical areas, but some potentially pathogenic species are also beginning to evolve levels of thermotolerance that will allow them to breach the thermal barriers that have long protected mammals. Such thermotolerant fungi pose very significant threats to human health & well being. Nnadi NE, Carter DA (2021) Climate change and the emergence of fungal pathogens. PLoS Pathog 17(4): e1009503. https://doi.org/10.1371/journal.ppat.1009503</p>	Thank you for this point and associated reference. We have now added both
Pan, Xubin	No	Chapter 2	58	58	1963	1971	P59 L2013-2021	Thank you, the repetition sentence was removed.
Government of USA	Yes	Chapter 2	58	58	1976	1980	Additional information on important agricultural fungal pathogens could be added here such as Citrus Black Spot and Phytophthora ramorum.	<p>Thanks for this suggested change. We have added a sentence listing some important agricultural alien fungal pathogens and included four respective sources. We now mention sudden-oak death (Phytophthora ramorum; Thakur et al. 2019), citrus black spot (Phyllosticta citricarpa; Guarnaccia et al. 2019), soybean rust (Phakopsora pachyrhizi; Dean et al. 2012) or rice and wheat blast (Pyricularia oryzae; Fones et al. 2020)</p> <p>Thakur, W. H. van der Putten, M. M. P. Cobben, M. van Kleunen, S. Geisen (2019) Microbial invasions in terrestrial ecosystems. Nat. Rev. Microbiol. 17, 621–631</p> <p>Guarnaccia et al. (2019) Phyllosticta citricarpa and sister species of global importance to Citrus. Molecular Plant Pathology, 20, 1619-1635. https://doi.org/10.1111/mpp.12861</p> <p>Dean et al. (2012) The Top 10 fungal pathogens in molecular plant pathology. Molecular Plant Pathology, 13, 414-430. https://doi.org/10.1111/j.1364-3703.2011.00783.x</p> <p>Fones, et al., (2020) Threats to global food security from emerging fungal and oomycete crop pathogens. Nat. Food 1, 332–342</p>
White, Michael	No	Chapter 2	58	58	1976	1980	And in Great Britain (ash die-back)	We mean here Europe in the geographic sense, which includes Great-Britain
Government of Mexico	Yes	Chapter 2	59	59	2014	2021	Check paragraph is repeated in lines 1964-1971	Thanks for this suggested change. We have included it in the new version.
Li, Bo	No	Chapter 2	59	59	2018	2020	Lines 2018 to 2020 are the repetition of lines 1968 to 1970, and can be easily deleted.	Thanks for this suggested change. We have included it in the new version.
Preisser, Evan	No	Chapter 2	59	59	2021	2021	on all	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	59	59	2023	2023	Delete "fruiting"	Thank you, 'fruiting' was deleted.
Preisser, Evan	No	Chapter 2	60	60	2050	2050	fungi is	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	60	60	2054	2055	These species are alien, established, and have negative impacts. They meet the definition in Chapter 1 and the experts should provide that analysis and outcome, or justify why these species are excluded. In either case, the assessment should be clear as to how these species are handled for the purposes of the assessment.	Symbiots do not strictly meet the definition: they don't have an impact themselves, they allow an invasive. This being said, they were not excluded here, on the contrary the sentence says the "a case can be made that the unnoticed mutualist too is behaving invasively"
Government of Mexico	Yes	Chapter 2	61	61	2072	2073	correct the species name is Pseudogymnoascus destructans	Thank you for noting this. We have now corrected it.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	61	61	2081	2082	2081-2082 table 2.16 - please also include common names.	Thank you, we have revised the table accordingly

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Singh, Baljinder	No	Chapter 2	61	69	2083	2432	Human plastic pollution has created many opportunities, especially in marine environments, for organisms to travel far from their original zones. Some of these organisms include bacteria that can break down plastics. The continued evolution of plastic eating bacteria should be noted, because, even as we can exploit the special plastic-degrading enzymes possessed by such microbes to help tackle the global plastic pollution crisis, these microorganisms could also potentially create problems for our societies should these still-evolving bacteria find it possible to interact with, & digest the types of plastic that are vital to human infrastructure & society. *A bacterium that degrades and assimilates poly(ethylene terephthalate) SHOSUKE YOSHIDA et al., SCIENCE • 11 Mar 2016 • Vol 351, Issue 6278 • DOI: 10.1126/science.aad6359 *Toward Biorecycling: Isolation of a Soil Bacterium That Grows on a Polyurethane Oligomer and Monomer María José Cárdenas Espinosa et al. Front. Microbiol., 27 March 2020 https://doi.org/10.3389/fmicb.2020.00404 * Plastic-Degrading Potential across the Global Microbiome Correlates with Recent Pollution Microbial Ecology; Research Article; 26 October 2021 Jan Zrimec et al;	We thank you for this interesting point. However, since we are limited in the points we can add, we have not included this part, which is more speculative than most
Pan, Xubin	No	Chapter 2	63	63	2144	2144	Change "South America" to "North America"?	It seems indeed surprising, but the reference clearly states "Introductions are most commonly reported from Europe, South America, Australia and New Zealand; records from North America and especially Asia are rare."
Lembrechts, Jonas	No	Chapter 2	64	64	2189	2189	The link with the box - which deals with evolution - is not immediately apparent	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5 and strengthened links with the main text
Estoup, Arnaud	No	Chapter 2	65	66	2207	2262	Box 2.3 (1st box dealing with evolutionary aspects) is only cited a single time L2189 in the section « Data and knowledge gaps for fungi», hence confirming that this box brings not-much if nothing to chapter 2 and turns out to be rather even off topic for this chapter 2.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5 and strengthened links with the main text
Facon, Benoit	No	Chapter 2	65	69	2207	2423	I wonder about the positioning of the 3 boxes (Box 2.3, 2.4 and 2.5) in this chapter 2. They would seem to me to be better placed as a sub-section within chapter 3. In my point of view, evolution and contemporary adaptations must be viewed as potential drivers affecting the introduction, establishment and spread of invasive aliens. If this suggestion is accepted, I also propose to place box 2.3 after the boxes 2.4 and 2.5.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5 and strengthened links with the main text
Estoup, Arnaud	No	Chapter 2	65	65	2209	2209	Box 2.3 Write « Information about the evolutionary/phylogeographic history of alien species USING MOLECULAR MARKERS AND UP-TO-DATE STATISTICAL METHODS can have several...» instead of "Information about the evolutionary/phylogeographic history of alien species can have several"	Thank you, this has been addressed in the final draft.
Facon, Benoit	No	Chapter 2	65	65	2209	2215	Box 2.3: The reconstruction of invasion routes is required for defining and testing different hypotheses concerning the environmental and evolutionary factors responsible for biological invasions. See for instance Estoup & Guillemaud in Mol Ecol (2010)	Thank you for your helpful comment. Your point is interesting. However, we have significantly revised and shortened the evolution boxes and the topic is out of scope for our chapter.
Estoup, Arnaud	No	Chapter 2	65	65	2210	2210	Box 2.3 you might add the following reference after Chow et al. 2015) : Estoup & Guillemaud 2010 Mol Ecol https://doi.org/10.1111/j.1365-294X.2010.04773.x	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	65	65	2211	2212	Box 2.3: I think this would require ecological, rather than phylogenetic, knowledge.	They are not exclusive. Yet, this Box is about evolution/phylogeny, so it is relevant to mention the benefits of better knowledge in this matter
Estoup, Arnaud	No	Chapter 2	65	65	2212	2212	Box 2.3 you might again add the following reference after Chow et al. 2015) Estoup & Guillemaud 2010 Mol Ecol https://doi.org/10.1111/j.1365-294X.2010.04773.x	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Rius Viladomiu, Marc	No	Chapter 2	65	65	2214	2217	Box 2.3: The citations included here are relatively old (molecular tools are rapidly changing) and do not include studies using high resolution genomic tools to unravel source regions and introduction pathways. Some recent studies include: Hudson J, Bourne SD, Seebens H, Chapman MA, Rius M (2022) The reconstruction of invasion histories with genomic data in light of differing levels of anthropogenic transport. Philosophical Transactions of the Royal Society B 377: 20210023; Hudson J, Castilla JCC, Teske PR, Beheregaray LB, Haigh ID, McQuaid CD, Rius M (2021) Genomics-informed models reveal extensive stretches of coastline under threat by an ecologically dominant invasive species. Proceedings of the National Academy of Sciences 118: e2022169118	Thanks for this suggested change. We have included it in the new version.
Estoup, Arnaud	No	Chapter 2	65	65	2215	2215	Box 2.3 To strengthen this section and to include to a missing point you might add the following paragraph between "... (Chown et al., 2015)" and "Bulk screening...": "From an academic point of view, while it is widely recognized that biological invasions constitute a privileged natural experimental framework for the study of contemporary evolutionary phenomena, a good understanding of source regions and introduction pathways (i.e. routes of invasion/introduction) is essential. Knowledge of those routes makes it possible to precisely compare introduced populations to their original source population(s), and thus to determine whether the invaders have, for example, undergone an adaptive change that has favored them in their new living environment. This change may result from the selection of genetic variants that are rare in the original source population(s) but favored in the new environment. The reconstruction of routes of invasion/introduction is therefore crucial to define and test different hypotheses concerning the environmental and evolutionary factors underlying biological invasions and their success (Estoup & Guillemaud 2010; Keller & Taylor 2008 = DOI: 10.1111/j.1461-0248.2008.01188.x).	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Estoup, Arnaud	No	Chapter 2	65	65	2215	2215	Box 2.3 you might add the following reference after Chow et al. 2015): Collin et al. 2021 DOI: 10.1111/1755-0998.13413	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Rius Viladomiu, Marc	No	Chapter 2	65	65	2219	2219	What were the challenges back in 2015? Worth reading about the challenges now, see new issue on this topic here: https://onlinelibrary.wiley.com/doi/10.1111/j.1752-4571.2010.00119.x	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Lembrechts, Jonas	No	Chapter 2	65	65	2223	2237	Box 2.3: Cool, 'vaccines' for nature, love it :)	Thank you for your feedback.
Facon, Benoit	No	Chapter 2	65	66	2240	2262	Box 2.3: Concerning the importance of contemporary evolution in invasion processes and the existence of a genetic paradox of invasions, these references could be useful: Stockwell et al. TREE (2003), Facon et al. TREE (2006), Estoup et al. AREES (2016), Colautti & Lau Mol Ecol (2015)	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Li, Bo	No	Chapter 2	65	65	2240	2241	Box 2.3: "Adaptive evolution in alien species, at least in plants, has been proposed to be rather the rule than the exception (Hodgins et al., 2009)." In my opinion, this claim could not be supported strongly by the reference cited here, which was a theoretically modeling research. In addition, most case studies on adaptive evolution in alien species just reported the differences between native and introduced populations, which might result from sampling bias from native ranges. Genetic changes between the source and introduced populations are needed as sound evidence for adaptive evolution in alien species.	Thank you for your comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Estoup, Arnaud	No	Chapter 2	66	66	2250	2250	Box 2.3 You might add the reference Olazcuaga et al. 2020 MBE https://doi.org/10.1093/molbev/msaa098 after the reference McCartney et al. 2019	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Estoup, Arnaud	No	Chapter 2	66	66	2252	2252	Box 2.3 you might add the following reference Facon et al. 2006 TREE (doi: 10.1016/j.tree.2005.10.012) before the reference Moran & Alexander 2019.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Estoup, Arnaud	No	Chapter 2	66	66	2253	2253	Box 2.3 To strengthen this section and to include a missing point regarding key evolutionary scenarios that may occur for many invasive species/populations, you might add the following paragraph after "Pearman et al., 2008). scenario. Experimental studies (e.g. those carried out on the invasive ant <i>Wasmania auropunctata</i> ; Foucaud et al. 2010 doi:10.1111/j.1752-4571.2010.00119.x; Foucaud et al. 2013 = https://doi.org/10.1111/eva.12058) have highlighted the importance of eco-evolutionary processes taking place within the native range of invasive species, and the major role of man in these processes. More specifically, such studies underlined the importance of areas ecologically disturbed by human activity located in geographical proximity to areas of natural habitats both in the emergence of populations with high invasive potential because they are adapted to anthropized environments, and their accidental dispersal by man in more distant introduction zones also anthropized. This type of scenario potentially applies to many invasive species and it can explain accelerating rates of invasions. This generic scenario, named AIAl (Anthropogenically Induced Adaptation to Invade) was formalized and discussed in Hufbauer et al. 2012 Evo Appl doi: 10.1111/j.1752-4571.2011.00211.x . Documenting the AIAl scenario is not a trivial task and requires both ecological and genetic approaches.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Lembrechts, Jonas	No	Chapter 2	66	66	2253	2254	Box 2.3: Something feels off with this sentence	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Estoup, Arnaud	No	Chapter 2	66	67	2264	2338	Box 2.4 (2nd box dealing with evolutionary aspects) is only cited a single time L2196 in the section « Data and knowledge gaps for fungi», hence confirming that this box brings not-much if nothing to chapter 2 and turns out to be rather even off topic for this chapter 2.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Facon, Benoit	No	Chapter 2	66	67	2277	2299	Box 2.4: Concerning the stochastic processes, it could be informative to introduce the mechanism of purging of the deleterious alleles that cause inbreeding depression during the bottlenecks accompanying the invasions. See for instance Facon et al. in Curr Biol (2011), Schrieber & Lachmuth in Biol Rev (2017) or Eyer et al. in Mol ecol (2018)	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Li, Bo	No	Chapter 2	66	66	2277	2278	Box 2.4: "Evolution is defined as a change in allele frequencies within a population over time and can occur in response to selection (leading to genetic adaptation) and due to purely stochastic processes (genetic drift) (Keller & Taylor, 2008; van Ieuven, Bossdorf, et al., 2018). " This definition of evolution as allele frequency change is based on theory of population genetics. However, because the allele frequency always changes in natural populations, this definition does not work well here. For invasive species, evolution makes sense for functional traits and genetic loci frequency underlying them.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.6
Estoup, Arnaud	No	Chapter 2	66	66	2285	2285	Box 2.4 To strengthen and improve this section you might remove the following sentences "Observations of evolution during invasion initially presented researchers with a conundrum, because a newly introduced, and hence small, population is expected to contain low genetic diversity, limiting its ability to respond to selection (Sakai et al., 2001). However, even some populations that experience founder effects and genetic bottlenecks can evolve rapidly 2288 (Dlugosch & Parker, 2008), and low genetic variation can itself facilitate invasive behaviour. » and replace it by the following paragraph : «The genetic characterization of populations of alien invasive species has posed a dilemma referred to as the genetic paradox of invasion (Sax & Brown 2000 https://doi.org/10.1046/j.1365-2699.2000.00217.x). How can bottlenecked invasive populations, which generally have low genetic diversity and are therefore considered to have low evolutionary potential and/or low reproductive capacity, become invasive? Estoup et al. (2016 = DOI: 10.1146/annurev-ecolsys-121415-032116) have shown that although the notion of a genetic paradox of invasion is intuitive and possible in theory, this paradox is to a large extent overstated. Indeed, many invaders are characterized by similar or even greater genetic diversity than native populations, or are not faced with significant adaptation challenges in the invaded area (cf. "pre-adaptation"). Some invasive populations seem to meet all the conditions of a genetic paradox, but this paradox turns out to be false because the proxy used to characterize the genetic variation is inadequate. Specifically, the loss of diversity at a small set of neutral genetic markers does not reflect the decline in genetic variation of ecologically relevant traits. Genetic variation at neutral loci and ecologically relevant traits may even turn out to be low due to successful adaptation to new environmental conditions. In some invasions, however, the genetic paradox seems genuine. Nevertheless, in these cases, a wide range of evolutionary mechanisms may allow the invading population to overcome the various adverse consequences of low genetic variation and adapt to its new environment (Dlugosch & Parker, 2008; Estoup et al. 2016 = DOI: 10.1146/annurev-ecolsys-121415-032116).	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Li, Bo	No	Chapter 2	67	67	2295	2296	Box 2.4: Can add the following reference here: Shang, L., Li, L. F., Song, Z. P., Wang, Y., Yang, J., Wang, C. C., Qiu, S. Y., Huang, J. X., Nie, M., Wolfe, L. & Li B. 2019. High genetic diversity with weak phylogeographic structure of the invasive <i>Spartina alterniflora</i> (Poaceae) in China. <i>Frontiers in Plant Science</i> , 10 (11), 1467. https://doi.org/10.3389/fpls.2019.01467	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.6
Lembrechts, Jonas	No	Chapter 2	67	67	2318	2318	Box 2.4: Do we have a 'why' for why polyploid species do better?	Thank you for this suggested change. We have included a statement in the text that highlights potential reasons why polyploid species show higher invasiveness.
Estoup, Arnaud	No	Chapter 2	67	67	2324	2324	Box 2.4. A striking example of the point treated here is the case of <i>Wasmannia auropunctata</i> . I suggest to add the following sentence just after (Maiakovska et al., 2021): "Regarding the little fire ant <i>Wasmannia auropunctata</i> , a species which reproduce sexually within primary forests of South-America, the most parsimonious hypothesis is that worldwide introduced invasive populations stem from clonal populations which initially colonized human disturbed habitats within the native range of the species (Foucaud et al. 2010 doi:10.1111/j.1752-4571.2010.00119.x)	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.6 but did not have the space to include your nice example.
Sagoff, Mark	No	Chapter 2	67	67	2327	2327	Box 2.4: Phenotypic plasticity deserves more consideration. The same genotypes produce all kinds of different phenotypes in different circumstances. Native species can adapt to non-native ones by changing their behavior without benefit of any genetic change or selection. Phenotypic plasticity plays an enormously important role in invasion biology, and I should like to see more about it.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5. We agree that phenotypic plasticity deserves more attention but it is out of scope for our chapter.
Li, Bo	No	Chapter 2	67	67	2336	2337	Box 2.4: "While epigenetic variation has been associated with some successful invasions (Richards et al., 2012)." More references could be supplied here, for example, Shi W, Chen X, Gao L, Xu C-Y, Ou X, Bossdorf O, Yang J and Geng Y (2019) Transient Stability of Epigenetic Population Differentiation in a Clonal Invader. <i>Frontiers in Plant Science</i> 9:1851. Luo L, Kong X, Gao Z, Zheng Y, Yang Y, Li X, Yang D, Geng Y*, Yang Y*. (2020). Comparative transcriptome analysis reveals ecological adaption of cold tolerance in northward invasion of <i>Alternanthera philoxeroides</i> . <i>BMC Genomics</i> 21:532.	Thanks for this suggested change. We have included it in the new version.
Uludag, Ahmet	No	Chapter 2	67	67	2337	2338	I think epigenetics have more role in invasiveness and weediness. A book chapter will be published end of March, A chapter by Uludag et al in <i>Advances in integrated weed management</i> (Burlleigh Dodds Series in Agricultural Science, 113) edited by Dr Per Kudsk	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5. It has been reduced to a single box. Further additions are not feasible in the new format.
Estoup, Arnaud	No	Chapter 2	68	69	2340	2423	Box 2.5 (third box dealing with evolutionary aspects) is only cited a single time M2196 in the section « Data and knowledge gaps for fungi», hence confirming that this box brings not-much if nothing to chapter 2 and turns out to be rather even off topic for this chapter 2.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Estoup, Arnaud	No	Chapter 2	68	68	2365	2365	Box 2.5: You might add after (Colautti et al, 2009) the following sentence: The reconstruction of the routes of invasion/introduction (i.e. introduction pathways and source populations and regions) using molecular markers is therefore crucial to reliably compare introduced populations to their original native source population(s) and hence thoroughly test hypotheses regarding the environmental and evolutionary factors underlying biological invasions and their success (Estoup & Guillemaud 2010; Keller and Taylor 2008 = DOI: 10.1111/j.1461-0248.2008.01188.x).	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5. Unfortunately, cannot include this comment in the new draft which no longer includes epigenetics.
Facon, Benoit	No	Chapter 2	68	69	2367	2390	Box 2.5: Adaptations relevant to invasions are typically thought to occur either recently within the introduced range, as an evolutionary response to novel selection regimes. You may add here some words about a mechanism called "Anthropogenically induced adaptation to invade", according to which, recent adaptation within the native range, in particular adaptations to human-altered habitat, could also contribute to the rapid evolution of invasive populations (Hufbauer et al. in <i>Evol Appli</i> (2012). The combination of high evolutionary potential provided by high effective population size and strong novel selection imposed by human-altered habitats within the native range is likely to lead to rapid adaptation prior to introduction elsewhere, and simultaneously increased probability of introduction.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5. We think the points have been clarified.
Estoup, Arnaud	No	Chapter 2	68	68	2374	2374	Box 2.5 Add the reference Phillips & Shine, 2004 to the references Oduor, 2013; Vellend et al., 2007	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5
Government of Netherlands (van Delft, Jeroen)	Yes	Chapter 2	68	69	2414	2423	Box 2.5: In line 2420-2421 text can be expanded with "reptiles in Europe (Asztalos et al., 2021)" with this reference: Asztalos, M., Wielstra, B., Struijk, R.P.J.H., Ayaz, D. & Fritz, U 2021. Aliens in the Netherlands: local genetic pollution of barred grass snakes (Squamata: Serpentes: Natricidae) 57(1): 174–179. Salamandra.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5 and these references are no longer pertinent.
van Delft, Jeroen	No	Chapter 2	68	69	2414	2423	Box 2.5: In line 2420-2421 text can be expanded with "reptiles in Europe (Asztalos et al., 2021)" with this reference: Asztalos, M., Wielstra, B., Struijk, R.P.J.H., Ayaz, D. & Fritz, U 2021. Aliens in the Netherlands: local genetic pollution of barred grass snakes (Squamata: Serpentes: Natricidae) 57(1): 174–179. Salamandra. [link]	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5 and these references are no longer pertinent.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Netherlands (van Delft, Jeroen)	Yes	Chapter 2	68	69	2422	2423	Box 2.5: These lines can be expanded with "and can complicate the conservation of species" with this reference Riemsdijk, I. van, Struijk, R.P.J.H., Pel, E., Janssen, I. & Wielstra, B. 2020. Hybridisation complicates the conservation of Matrix snakes in the Netherlands. Salamandra 56(1): 78-82.	Thanks for this suggested change. We have added 'and can complicate the conservation of species (Riemsdijk et al., 2020).'
Preisser, Evan	No	Chapter 2	69	69	2387	2387	Box 2.5: there is	Thank you, this has been addressed in the final draft.
Sagoff, Mark	No	Chapter 2	69	69	2406	2407	Box 2.5: The text states, "Native herbivores have evolved to exploit the novel resources that alien plants can provide." All we know is that native herbivores exploit the novel resources that alien plants can provide. Whether they evolved to do so, just happen to do so, or do so through phenotypic plasticity is anyone's guess. Suppose a native herbivore used to exploiting wild raspberries comes across some succulent alien wild blackberries. I think that the herbivore would chow down on these without having to evolve to do so. Very little co-evolution has been documented; it has to be demonstrated by a history of reciprocal genetic exchange evidence of which is nearly impossible to establish.	Thank you for your helpful comment. Following this comments are others, we have now entirely reworked Boxes 2.3, 2.4 and 2.5 and that section was removed from the box.
van Delft, Jeroen	No	Chapter 2	69	69	2422	2423	Box 2.5: these lines can be expanded with "and can complicate the conservation of species" with this reference Riemsdijk, I. van, Struijk, R.P.J.H., Pel, E., Janssen, I. & Wielstra, B. 2020. Hybridisation complicates the conservation of Matrix snakes in the Netherlands. Salamandra 56(1): 78-82. [link]	Thanks for this suggested change. We have added 'and can complicate the conservation of species (Riemsdijk et al., 2020).'
Government of Germany	Yes	Chapter 2	70	70	2428	2430	Clarification required: The sentence "Within each region, information on trends, status and of alien species distributions and data and knowledge gaps is provided for plants, animals, fungi and microorganisms." seems to be erroneous and is hardly to understand. Please check.	Thank you for your comment. This sentences has been removed.
Lembrechts, Jonas	No	Chapter 2	70	70	2428	2428	Sentence doesn't flow too well yet	Thank you for your comment. This sentences has been removed.
Faulkner, Katelyn	No	Chapter 2	70	70	2435	2436	Can direct the reader to Figure 2.3, which shows the results for all groups together for each region	Thank you for your comment. Figure 2.3 was also added in addition to Figure 2.18
Faulkner, Katelyn	No	Chapter 2	70	70	2436	2438	The trend highlighted on these lines is not visible in Figure 2.18 for all taxonomic groups - only visible for birds	Thank you for your comment. We rephrased this paragraph.
Lembrechts, Jonas	No	Chapter 2	70	70	2458	2458	Table 2.17: I might have overlooked it, but I don't think it has been stressed strongly that the majority of aliens are vascular plants - the patterns in these tables are truly striking in that regard!	Thank you for this suggested change. We have included a statement in the text that highlights this circumstance.
Pan, Xubin	No	Chapter 2	71	71	2450	2454	The number is not same with the number in the Table 2.17	Thank you for pointing out these inconsistencies. We removed the numbers in the text and refer to those shown in the respective table.
Faulkner, Katelyn	No	Chapter 2	72	72	2475	2489	Box 2.6: How are the protected areas (those in the SCOPE study and revisited in the recent study by Shackleton et al. 2020) distributed across the four analysed continents? Did the trends over time vary across the continents? It would be good to know whether protected areas on all continents were considered or if there were geographical biases, and whether for protected areas on some continents the threat of invasions has increased, but for others it has remained stable. This box falls under the section "Trends and status of invasions by IPBES regions", so it would be good to discuss the findings in relation to the IPBES regions.	Thank you for comment. The protected areas are located on all continents and IPBES regions as shown in the figure. We could not analyse temporal trends as this information is missing for most areas.
Lembrechts, Jonas	No	Chapter 2	72	72	2483	2483	Box 2.6: has changed	Thank you, 'as changed' was replaced by 'has changed'
Preisser, Evan	No	Chapter 2	72	72	2492	2495	Box 2.6:confusing sentence	Thank you for this suggested change. We have revised this sentence.
Lembrechts, Jonas	No	Chapter 2	72	72	2494	2494	Box 2.6: 'to Foxcroft'	Thank you, 'Foxcroft' was changed to 'Foxcroft'
Lieurance, Deah	No	Chapter 2	72	72	2502	2502	Box 2.6: should Protection be capitalized?	Thank you for your comment. Yes. "Protected" should be capitalized, as it is in the book title (Foxcroft et al. 2013)
Preisser, Evan	No	Chapter 2	72	72	2502	2502	Box 2.6:Why is a particular book singled out for praise?	We have also cited other studies in this box, but the book was chosen as the main source of this knowledge box based on its suitability to this specific topic.
Preisser, Evan	No	Chapter 2	73	73	2530	2530	Box 2.6:highlighted	Thank you, 'highlights' was changed to 'highlighted'
Preisser, Evan	No	Chapter 2	73	73	2537	2537	Box 2.6:showed	Thank you, 'shows' was changed to 'showed'
Lembrechts, Jonas	No	Chapter 2	73	73	2543	2543	Box 2.6: Something feels off with this sentence	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	73	73	2543	2543	Box 2.6: "in terrestrial and inland waters protected areas" needs to be changed to "in protected areas of terrestrial and inland waters".	Thank you, "in terrestrial and inland waters protected areas" was changed to "in protected areas of terrestrial and inland waters".
Lembrechts, Jonas	No	Chapter 2	73	73	2551	2551	Box 2.6: Liu et al. (2020) also highlight that protected areas which are more recently inscribed, larger, suffering from greater human impacts and - surprisingly - with a higher protection status were more prone to having a higher 2553 richness of alien animals	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	73	73	2551	2553	Box 2.6:confusing sentence	Thank you, the sentence was rephrased.
Government of Mexico	Yes	Chapter 2	73	73	2559	2562	Box 2.6: Correct abbreviation should be UNESCO	Thank you for noting this. We have now corrected it.
Preisser, Evan	No	Chapter 2	74	74	2573	2573	Box 2.6: These include	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	74	74	2576	2577	Box 2.6: management. Many regions of the world (i.e., drop the praise of Foxcroft's work that's found throughout this section)	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	74	74	2600	2600	Box 2.6: "a recent assessment of alien" needs to be changed to "a recent assessment of aliens".	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	75	75	2612	2612	Figure 2.19: Is this terrestrial protected areas only? Worth highlighting in the main tekst these few hotspots?	Thank you for your comment. The maps shows indeed only terrestrial protected areas, which is now mentioned in the legend. We also included some information about the distribution of most invaded protected areas worldwide.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	75	75	2617	2625	Box 2.7: The high rate of invasions on islands is frequently attributed to vulnerability of the native systems combined with high rates of introduction. Does the database support an analysis of the number of alien species donated by islands? Such an analysis could support the expectation that island species are not very competent invaders...	This is interesting and we agree with your prediction; however, we do not have the resources for such an analysis at this stage.
Pouteau, Robin	No	Chapter 2	75	75	2621	2621	Box 2.7: Please replace '20% of the world's terrestrial biodiversity' with '20% of the world's terrestrial species'	Thank you, this has been addressed in the final draft.
Pouteau, Robin	No	Chapter 2	75	75	2623	2625	Box 2.7: think your definition of 'hotspots of biodiversity' i.e. areas of high species richness is confusing as it differs from the definition of 'biodiversity hotspots' identified by Conservation International (2005) = what you called 'hotspots of biodiversity loss'. Please reword. Moreover, perhaps you can mention that within the 35 biodiversity hotspots, 9 are composed exclusively of islands?	Thank you for this comment. We do have the same definition, but we agree that the phrasing was confusing and changed it
Lembrechts, Jonas	No	Chapter 2	75	75	2628	2628	Box 2.7: differences between the small island states and super-states are not explained, I believe	Thank you for this suggested change. We have included a statement in the text that highlights the major difference.
Pouteau, Robin	No	Chapter 2	75	75	2631	2631	Box 2.7: As remoteness promotes biological invasions (Moser et al. 2018), I would say 'small AND REMOTE tropical and sub-tropical islands'	Thank you, we have added 'and remote' in the sentence.
Lieurance, Deah	No	Chapter 2	75	75	2637	2637	Box 2.7: (almost three-quarters of threatened species, (Leclerc et al., 2018). Fix parentheses	Thank you for noting this. We have now corrected it.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sagoff, Mark	No	Chapter 2	76	76	2648	2650	Box 2.7: According to the text, "Coevolved native species and their biotic interactions thus confer greater ecosystem resistance to the establishment of new species, particularly when the introduced species does not find vacant niche space (or roles or services) to occupy (MacArthur, 1970). This speculation assumes that native species are co-evolved; but they may simply be naturalized species the arrival of which is unstained by the human taint. If coevolved native species and their biotic interactions confer greater ecosystem resistance to the establishment of new species, then one would infer that faraway Islands, where co-evolution may have occurred, would resist invasion. Yet we read that small tropical and sub-tropical islands have high numbers of invasive alien plants per unit of surface and this pattern holds across taxonomic groups. MacArthur had no way of knowing which species co-evolved; he is famous for his speculation that larger islands hold more biodiversity. What we see, however, is that tiny islands remote from everywhere, such as Ascension Island, harbor enormous alien species richness. Is alien species richness less valuable than native species richness? Why?	Thank you for these comments. There are several points raised here. First, there are several, non-exclusive hypotheses to explain higher invasibility on islands, especially remote ones, including vacant niches, lack of natural enemies and native naivety due to lack of coevolution. These have been tested and proved in a number of case studies, there is no point in trying to demonstrate them again here. That larger islands harbor more biodiversity is not a speculation, it is a well established fact in biogeography. It doesn't exclude the possibility that other factors also play a role, and indeed it is also the case of remoteness, explaining why remote, smaller islands also harbor high biodiversity levels. The two are not incompatible. Yet, smaller islands, even remote ones, are known for their high level of endemicity, not overall biodiversity, the two are linked but different. Regarding the comparison of alien species richness and native species richness from remote islands, we think there is no point in comparing. In addition, if the latter is at the expense of the former, and if in particular - as is the case for biological invasions - local species richness increases at the expense of global species richness, then there is indeed a biodiversity loss. We did not understand the claim of an alternative explanation to coevolution that was that "they may simply be naturalized species the arrival of which is unstained by the human taint" so we did not act upon this last point.
Pouteau, Robin	No	Chapter 2	77	77	2718	2720	Box 2.7: It seems to me that this statement only applies to anole lizards among Caribbean islands	Thank you for this comment, with which we agree. We have now added a reference and have made it clear that anoles in the Carribeans are only one example of study but that the statement is general and concerns many taxa
Preisser, Evan	No	Chapter 2	77	77	2721	2721	Box 2.7: explicitly define an acronym before using it	Thank you, we have edited the text accordingly
Lembrechts, Jonas	No	Chapter 2	79	79	2775	2775	Box 2.8: Letters of the sub-panels are missing (there are actually none throughout the chapter).	Thank you for pointing this out. We have made the corrections.
Government of Germany	Yes	Chapter 2	79	79	2788	2788	Proposal: Please replace "invasions" by "biological invasions" or "invasive alien species" in the heading of sub-chapter 2.3.1. Rationale: In order to avoid misunderstandings, scientific terms should be used in a consistent manner throughout the whole assessment. Please also make sure that used terms are introduced in the chapter's introduction.	Thank you, we have replaced 'invasions' by 'biological invasions'
Faulkner, Katelyn	No	Chapter 2	80	80	2793	2798	Please clarify that this section of text specifically refers to plants	Thank you, 'plant' was added to this sentence
Government of Germany	Yes	Chapter 2	80	80	2799	2799	Clarification required: Information given in this para refer to IAS trends in five African subregions the data of which are presented in Fig. 2.22. Please check if the statement reported here refers to the country "(Republic of) South Africa" or to the subregion "Southern Africa"?	Thank you for your comment, we have added 'the Republic of' to the sentence.
Faulkner, Katelyn	No	Chapter 2	80	80	2801	2807	Consider referring to Figure 2.22 more, only the results for plants shown in the figure are discussed in the text	Thank you. We have added this part to the text addressign your comment "A similarly steady increase in the cumulative numbers of alien species, as recorded for plants, can be observed for mammals over the last two centuries. Other animal groups (birds, fishes, insect and crustaceans) exhibit markedly accelerated increases in cumulative numbers in the second half of the 20th century (Figure 2.22)."
Government of Germany	Yes	Chapter 2	80	80	2802	2802	Clarification required: Fig. 2.22 presents information on IAS trends in African subregions. Please provide an overview of the countries belonging to the respective subregions (e.g. in the annex/ supplementary materials of this chapter).	Thank you for your comment. We have now included a reference to chapter 1 and an online source, where the IPBES regions and sub-regions are explained in detail, which reads as "A description of the IPBES regions and sub-regions including a spatial representation is provided in chapter 1 (1.6.4 and Fig. 1.14) and online (https://doi.org/10.5281/zenodo.5719431)."
Government of Germany	Yes	Chapter 2	80	80	2810	2810	Clarification required: Information given here refers to the IAS status in African subregions the data of which are presented in Tab. 2.18. Please check if the statement reported here refers to the country "(Republic of) South Africa" or to the subregion "Southern Africa"?	Thank you for your comment, we have added 'the Republic of' to the sentence.
Yang, Qiang	No	Chapter 2	80	81	2810	2855	it would be nice if mentioning the main continent donors of the established alien plants in Africa.	Thank you for your comment. We added this sentence to the end of the paragraph as well "Concerning the donor regions of naturalized plant species to Africa, the highest numbers were introduced from temperate Asia (19% of all introductions to individual countries), Europe (13.9%), tropical Asia (13.7%), Southern America (13.4%) and Northern America (10.9%). However, 21% of species that are naturalized in African countries were introduced from another country on that continent (van Kleunen et al. 2015)."
Lieurance, Deah	No	Chapter 2	81	81	2837	2837	"and" should not be italicized between scientific names (twice).	Thank you, we have edited the text accordingly
Lieurance, Deah	No	Chapter 2	81	81	2847	2847	I would pick a different word than 'alien' here. Consider non-native	Thank you for your comment. We have to stick to the agreed terminology of the report, which is 'alien' rather than 'non-native'.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	82	82	2867	2868	2867-2868 table 2.19 - please also include common names	Thank you, we have revised the table accordingly
Faulkner, Katelyn	No	Chapter 2	83	86	2910	3008	This section needs to be re-organised, it jumps back and forward between discussions of the different organism types, and consequently there is some repetition	Thank you for pointing this out. The section intentionally addresses taxonomic groups separately, which inevitably results in repetition. Note that we revised the whole chapter to avoid repetition as best as possible.
Faulkner, Katelyn	No	Chapter 2	83	83	2911	2911	What is meant by introductions are 'more restricted'? Fewer species introduced or species from fewer orders represented? Please clarify.	thank you for your comment, we meant that fewer species introduce to Africa, we have rephrased this in the final draft to "the introduction of alien mammals to Africa is surprisingly more restricted less than introduction to other continents, in light of Africa's colonial history"
Rebelo, Alanna	No	Chapter 2	84	84	2880	2880	"aesthetic" not "anesthetic"; "South African" not "south-African"	Thank you, we have edited the text accordingly
Faulkner, Katelyn	No	Chapter 2	84	84	2887	2888	I can understand that the Suez Canal would have led to an increase in fish introductions in North Africa, but the link between fish introductions and a strong socio-economic relationship with Europe isn't obvious. A strong socio-economic relationship would impact introductions of many different taxonomic groups, not just fish	Thank you for your comment. The sentence has been revised for clarity and to remove the ambiguity that there was a relationship.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Faulkner, Katelyn	No	Chapter 2	84	84	2904	2908	<p>The text on these lines states that freshwater animal introductions in South Africa plateaued after the 1950s. It is likely that this statement came from a book chapter I led in the 2020 book on biological invasions in South Africa (i.e. Faulkner et al. 2020). This statement only pertains to freshwater fish introductions for fishing purposes, not all freshwater animal introductions.</p> <p>Freshwater fish introductions for fishing in South Africa did plateau in about 1950, and there have been no new fish introduction for this purpose since the 1980s. While this could be due to legislation that regulates introductions (as mentioned on line 2908 of Chapter 2 of this IPBES assessment), it is far more likely that this is because alien sport fish are widely dispersed in South Africa and there simply isn't demand for new species for this purpose. See Box 2.1 in Faulkner et al. (2020).</p> <p>In terms of all freshwater fauna introductions to South Africa - there has been a general increase over time, with accidental introductions of invertebrates playing an increasing role. See Figure 6.8 of Weyl et al. (2020)</p> <p>Faulkner KT, Burness A, Byrne M, Kumschick S, Peters K, Robertson MP, Saccaggi DL, Weyl OLF, Williams VL (2020) South Africa's pathways of introduction and dispersal and how they have changed over time. In: van Wilgen BW, Measey GJ, Richardson DM, Wilson JR, Zengeya TA (Eds), Biological invasions in South Africa. Springer, Cham, Switzerland, 311–352. https://doi.org/10.1007/978-3-030-32394-3_12</p> <p>Weyl OLF, Ellender B, Wassermann R, Truter M, Dalu T, Zengeya TA, Smit NJ (2020) Alien freshwater fauna in South Africa. In: van Wilgen BW, Measey GJ, Richardson DM, Wilson JR, Zengeya TA (Eds), Biological invasions in South Africa. Springer, Cham, Switzerland, 153–183.</p>	Thank you for your comment. We rephrased this paragraph.
Faulkner, Katelyn	No	Chapter 2	84	84	2907	2908	<p>It states on this line that invertebrate introductions to South Africa have remained steady. This line requires clarity. Does it refer to all invertebrates (freshwater, marine, and terrestrial)? Or just one group?</p> <p>If all invertebrates are considered, then the number of introductions to South Africa have increased over time (see Faulkner et al. 2016). The number of freshwater invertebrates introduced has increased over time (see Weyl et al. 2020), as have the number of terrestrial invertebrates (see Janion-Scheepers and Griffiths 2020), and marine invertebrate introductions (Robinson et al. 2020).</p> <p>Faulkner KT, Robertson MP, Rouget M, Wilson JR (2016) Understanding and managing the introduction pathways of alien taxa: South Africa as a case study. <i>Biological Invasions</i> 18: 73–87.</p> <p>Weyl OLF, Ellender B, Wassermann R, Truter M, Dalu T, Zengeya TA, Smit NJ (2020) Alien freshwater fauna in South Africa. In: van Wilgen BW, Measey GJ, Richardson DM, Wilson JR, Zengeya TA (Eds), Biological invasions in South Africa. Springer, Cham, Switzerland, 153–183.</p> <p>Janion-Scheepers, Charlene Griffiths CL (2020) Alien terrestrial invertebrates in South Africa. In: van Wilgen BW, Measey J, Richardson DM, Wilson JR, Zengeya TA (Eds), Biological invasions in South Africa. Springer, Cham, Switzerland, 185–205.</p> <p>Robinson TB, Peters K, Brooker B (2020) Coastal invasions: the South African context. In: van Wilgen BW, Measey J, Richardson DM, Wilson JR, Zengeya TA (Eds), Biological invasions in South Africa. Springer, Cham, Switzerland, 229–247.</p>	Thank you for pointing this out. We have made the corrections.
Faulkner, Katelyn	No	Chapter 2	84	84	2921	2923	<p>The presence of these populations is not classified as 'extra-limital', rather their status is. Important to note that these types of invasions are discussed elsewhere in this chapter of the report but using different terminology: 'Intra-country' introductions on lines 788/790. Perhaps consider using standardised terminology for these introductions throughout the document.</p>	Thank you for your comment. We revised the sentence following the suggestion and renamed intra-country to within country.
Li, Bo	No	Chapter 2	84	84	2922	2922	I do not understand "as they are native to the geopolitical unit of South Africa".	thank you, we have revised the sentence "the presence of these species is often classified as "extralimital" instead of alien, as they are native to the geopolitical unit of South Africa"
Preisser, Evan	No	Chapter 2	84	84	2922	2922	native to	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	85	85	2934	2936	reduce the number of authors prior to the et al.	Thank you for your comment. References have been revised in the final draft.
Rebelo, Alanna	No	Chapter 2	85	85	2938	2938	And Mallard Ducks	I am not sure where exactly this is meant to be added, but since we are not aiming at exhaustivity, we can do without this additional example
Rebelo, Alanna	No	Chapter 2	85	85	2945	2947	<p>There is a lot known about herps in South Africa, including aliens, although very little in the rest of Africa. Please see this paper for a review: Alien reptiles and amphibians in South Africa: towards a pragmatic management strategy (http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0038-23532008000100005). There are countless entries on GBIF, where consultants also add their surveys and assessments, and also iNaturalist. There is also this website which pulls entries from various platforms and displays them, however does not indicate their alien status: https://www.facebook.com/HerpDistributionSA/.</p>	This reference was already cited in support of this sentence. Please do not that your comment is in full agreement with our sentence
Rebelo, Alanna	No	Chapter 2	85	85	2945	2945	What about amphibians? E.g. Raucous Toad?	To my knowledge, this southern African species is not invasive, but I may have missed info in my search. Likewise, alien invasive amphibians are not a major issue - relatively speaking - and we therefore devoted space to more pressing taxa
Faulkner, Katelyn	No	Chapter 2	85	85	2949	2950	<p>The presence of many marine alien fish in North Africa is likely to be due to the Suez Canal. In contrast, South Africa, which is relatively well studied has no recorded introduced marine fish species. See Robinson et al. (2020),</p> <p>Robinson TB, Peters K, Brooker B (2020) Coastal invasions: the South African context. In: van Wilgen BW, Measey J, Richardson DM, Wilson JR, Zengeya TA (Eds), Biological invasions in South Africa. Springer, Cham, Switzerland, 229–247.</p>	Thank you for your comment. We better specified this point and added the reference.
Faulkner, Katelyn	No	Chapter 2	85	85	2959	2966	Twice on these lines it mentions that 21 alien freshwater fish species have established in South Africa. Please remove the repetition	Thank you, the repetition sentence was removed.
Rebelo, Alanna	No	Chapter 2	85	85	2961	2961	"southern" has a small letter	Thank you, we have edited the text accordingly
Rebelo, Alanna	No	Chapter 2	85	85	2962	2962	fish species can be simplified to "fishes"	Thank you, we have edited the text accordingly
Faulkner, Katelyn	No	Chapter 2	85	85	2964	2966	<p>It might be worth noting here or elsewhere in this section that there are many 'extralimital' or 'within-country' introductions of fish and amphibians in South Africa. See Ellender et al. (2014) and Measey et al. (2017).</p> <p>Measey J, Davies SJ, Vimercati G, Rebelo A, Schmidt W, Turner A (2017) Invasive amphibians in southern Africa: a review of invasion pathways. <i>Bothalia: African Biodiversity and Conservation</i> 47: a2117.</p> <p>Ellender BR, Weyl OLF (2014) A review of current knowledge, risk and ecological impacts associated with non-native freshwater fish introductions in South Africa. <i>Aquatic Invasions</i> 9: 117–132.</p>	Thank you for your comment. The issue of fish has been already reported two lines above. The issue of amphibians has been added.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Faulkner, Katelyn	No	Chapter 2	86	86	2975	2978	Zengeya and Wilson (2021) which is cited twice on these lines should be dated 2020 - Zengeya and Wilson 2020	Thank you for your comment. References have been revised in the final draft.
Li, Bo	No	Chapter 2	87	87	3019	3019	"is" should be "are".	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	87	87	3025	3025	"control of alien species" should be "control of invasive species".	Thanks for this suggested change. We have included it in the new version.
Pouteau, Robin	No	Chapter 2	87	87	3038	3038	such as ferns and lianas' = unnecessarily restrictive. Please delete	Thank you, this has been addressed in the final draft.
Pouteau, Robin	No	Chapter 2	87	87	3059	3061	Please specify that this sentence refers to 'alien and invasive ANIMAL species'. For plants, see e.g. https://www.cbd.int/doc/world/cv/cv-nr-05-en.pdf and references therein	Thank you for your helpful comment and for the reference. We have now read the report and added a sentence about plants to complete our statement
Rebello, Alanna	No	Chapter 2	88	88	3065	3065	This statement is concerning: "there are still large gaps in scientific information to support this contention". I suggest the removal of the word "contention" as this is biased and casts the large amount of research demonstrating the negative impacts of invasive aliens into doubt (it essentially undermines the excellent African science, when actually the aim is not to do this, but to comment on the gaps). I'm certainly not aware that the negative impacts are much contested on the whole in the literature. Simply state: "there are still large gaps in scientific information".	We agree and we have corrected this as suggested
Government of Germany	Yes	Chapter 2	89	89	3106	3106	Clarification required: Fig. 2.23 presents information on IAS trends in American subregions. Please provide an overview of the countries belonging to the respective subregions (e.g. in the annex/ supplementary materials of this chapter).	Thank you for your comment. We have now included a reference to chapter 1 and an online source, where the IPBES regions and sub-regions are explained in detail, which reads as "A description of the IPBES regions and sub-regions including a spatial representation is provided in chapter 1 (1.6.4 and Fig. 1.14) and online (https://doi.org/10.5281/zenodo.5719431)."
Preisser, Evan	No	Chapter 2	89	89	3120	3120	5-year	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	89	89	3122	3122	increases similar to	Thank you, this has been addressed in the final draft.
Lieurance, Deah	No	Chapter 2	90	90	3129	3129	I am a bit surprised Florida is not mentioned here considering there are 1554 non-native and 3315 native plants in Florida plant atlas. The proportion of non-native taxa is pretty steep	Thank you for your comment, we have added this sentence "and also Florida belongs to the world regional hotspots with 1,473 naturalized alien plants" to clarify this.
Faulkner, Katelyn	No	Chapter 2	90	90	3133	3133	The figure cited here (Figure 2.22) shows data from Africa, not the Americas. Please correct the error	thank you, we changed the figure citation to Figure 2.23
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	90	90	3141	3141	The text states that there are 519 established alien species of plants in Mexico, it is not clear from the references where the number originates. The Invasive species information system has information on introduced species however there is no information on how many of them are established. The System includes 171 invasive alien species in the country and 729 alien species not yet classified as invasive. CONABIO, 2022. Sistema de Información sobre Especies Invasoras. https://www.biodiversidad.gob.mx/especies/Invasoras . Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Cd de México. México.	Thank you for your comment. The data were taken from GloNAF, where the CONABIO team kindly contributed information from Mexico. It is, however, likely that it does not exactly reflected the same number as provided by CONABIO due to slightly deviating data processing steps. We rephrased the sentence to clarify this point.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	90	90	3156	3156	Table 2.20: It would be useful to provide a reference and more details for the coverage of the geographical areas and the sources of the information. In the case of Mexico, part of the country falls under Mesoamerica and part under North America. In the National Invasive Species Information System for Mexico the information is not classified into mesoamerica and North America so it is confusing to see the information for the country divided into these to areas.	Thank you, please refer to chapter 1 for more information on the IPBES regions and subregions
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	91	92	3164	3165	3164-3165 table 2.21 - please also include common names	Thank you, we have revised the table accordingly
Lázaro-Lobo, Adrián	No	Chapter 2	91	91	3164	3164	Table 2.21: In this Table the authors include the species "Bubulcus ibis", but this species is thought to have arrived to America through natural dispersal mechanisms. Would it be an example of exotic species following the definition that the authors include in Chapter 1: "those whose presence in a region is attributable to human actions, intentional (i.e., directly) or unintentional (i.e., indirectly), that enable them to overcome biogeographical barriers"?	We thank you for your comment. There is not an obvious response, as there is no definitive proof that the species naturally colonised the Americas, and there are reputable databases that record the species as being introduced there (e.g., https://www.cabi.org/isc/datasheet/90783#toDistributionDatabaseTable). It has definitely been introduced to other locations including Hawaii, the Seychelles, the Chagos Archipelago, Rodrigues and Mauritius. Nevertheless as there is some uncertainty here. In this regard, we have opted to leave it as is currently.
Government of Argentina	Yes	Chapter 2	92	92	3195	3195	The jump in time between 1500 and the 2000 seems too big. Some connection of how introductions happened between this two very apart periods of time should be covered.	This is a good point. We have now added a couple of sentences for the period in between, while taking care not too extend this part too much, due to space limitations. A reference helps provide more information
Preisser, Evan	No	Chapter 2	93	93	3214	3214	increased by 160%	Thank you, this has been addressed in the final draft.
Government of Argentina	Yes	Chapter 2	93	93	3223	3224	The "Islas Malvinas" are wrongly named ("Falkland Islands"). We request the use of double nomenclature, in line with what is established in the editorial guidelines of the United Nations ST/CS/SER.A/42	Thank you for your comment, we have revised the draft accordingly
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	93	93	3228	3228	When the text identifies "farming" as a source of alien animal introductions, do they mean livestock?	Yes, it does. It includes, for example, the introduction of Bubalus bubalis and of Capra hircus in many new areas, where they have ecological impacts
Kalandarishvili, Alexandra	No	Chapter 2	93	93	3228	3234	Barbary sheep were introduced to the U.S in the 1900s. The species were kept on private lands and confined to zoos. In the mid 20th century individuals were released into the wild, and due to high reproductive ability and good adaptability, species experiences exponential increase in population numbers. To control the population and prevent threat to native species hunting permits were made available in 1963 to control the population. At the time of their introduction the negative consequences of AIS was not documented by research.	Thank you for your comment. Although this is correct, we have not the space to go into individual species details, and have therefore left the general description as is
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	93	93	3231	3231	The species Ammotragus lervia has been introduced in the north of Mexico but there are no reports of its establishment. The reference Texas Invasive Species Institute does not mention Mexico. Please adjust the text. Reference: Álvarez-Romero, J. y R. A. Medellín. 2005. Ammotragus lervia. Vertebrados superiores exóticos en México: diversidad, distribución y efectos potenciales. Instituto de Ecología, Universidad Nacional Autónoma de México. Bases de datos SNIB-CONABIO. Proyecto U020. México. D.F.	Thanks for this suggested change. We have included it in the new version.
Government of Mexico	Yes	Chapter 2	93	93	3231	3234	If possible change the example as currently the species that is being a problem is the invasion by Sus scrofa and it is affecting both countries, for more information https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/operational-activities/feral-swine/feral-swine-program .	Thanks for this suggested change. We have included it in the new version.
Preisser, Evan	No	Chapter 2	95	95	3293	3293	are unequally	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	95	95	3300	3300	have been published	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	95	95	3302	3302	Brazil has the	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	95	95	3310	3310	certainly has a	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	96	96	3324	3324	The Information System for Invasive Species in Mexico has 7 macrofungi registered. Change 10 to 7. CONABIO, 2022. Sistema de Información sobre especies Invasoras https://www.biodiversidad.gob.mx/especies/Invasoras . Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Cd de México. México.	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	96	96	3353	3354	Northamerica encompasses Canada, US and Mexico, Mesoamerica encompasses part of Mexico, so it is confusing to say that there is information for Northamerica but not for Mesoamerica. It should be specified which countries are included in which region.	Thank you, please refer to chapter 1 for more information on the IPBES regions and subregions
Pan, Xubin	No	Chapter 2	97	97	3380	3380	Delete "only"	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	97	97	3384	3384	Is French Guiana <i>Guyane</i> ?	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Preisser, Evan	No	Chapter 2	97	97	3389	3389	Venezuela	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	97	97	3395	3395	Change "gapbus" to "gaps"	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	97	97	3395	3395	gaps on	Thank you, this has been addressed in the final draft.
Government of Germany	Yes	Chapter 2	98	98	3413	3413	Clarification required: Fig. 2.24 presents information on IAS trends in subregions of Asia and the Pacific. Please provide an overview of the countries belonging to the respective subregions (e.g. in the annex/ supplementary materials of this chapter).	Thank you for your comment. We have now included a reference to chapter 1 and an online source, where the IPBES regions and sub-regions are explained in detail, which reads as "A description of the IPBES regions and sub-regions including a spatial representation is provided in chapter 1 (1.6.4 and Fig. 1.14) and online (https://doi.org/10.5281/zenodo.5719431)."
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	98	98	3430	3432	3430 - 3432 please also include common names in text	Thank you, we have revised the text accordingly.
Government of China	Yes	Chapter 2	99	99	3437	3438	It is recommended to delete this sentence since the source of the data is unknown and there is no literature support.	Thank you for your comment. We added the reference.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	100	101	3456	3457	3456-3457 table 2.23 - please also insert common names	Thank you, we have revised the table accordingly
Preisser, Evan	No	Chapter 2	101	101	3461	3461	For all animal groups except fishes considered in	Thank you, this has been addressed in the final draft.
Faulkner, Katelyn	No	Chapter 2	101	101	3481	3483	The animals that were restocked, were they re-stocked in their native range? If so there needs to be clarification as to why this is regarded as an introduction?	Thank you for your comment. We better specified this point
Government of China	Yes	Chapter 2	102	102	3493	3495	1. (Ma et al., 2003) did not mention that the first introduction of exotic freshwater species to Asia was more than 1,000 years ago; 2. The common carp (<i>Cyprinus carpio</i>) is one of the native species in China, and its widespread cultivation in China does not involve the issue of invasive alien species, so it is recommended to delete it. The cited article (Chen et al., 2017) describes the historical introduction, geographical distribution and biological characteristics of exotic plants in China, which has nothing to do with ballast water. The literature cited here is wrong, and the examples are unfounded. The description of China's coast should be deleted.	Thank you for your comment. We deleted the part on carp but not on coastal area (please see the reply at comment for line 3512-3513)
Government of China	Yes	Chapter 2	102	102	3512	3513	The cited article (Chen et al., 2017) describes the historical introduction, geographical distribution and biological characteristics of exotic plants in China, which has nothing to do with ballast water. The literature cited here is wrong, and the examples are unfounded. The description of China's coast should be deleted.	Thank you for your comment. However the reference was not correctly reported in the final list. Chen et al. 2017 is Chen Y, Sun C, Zhan A (2017) Biological invasions in aquatic ecosystems in China. Aquatic Ecosystem Health & Management 20 (4): 402–412.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 2	102	102	3529	3592	<i>Oryctolagus cuniculus</i> should be in italics	Thank you, this has been addressed in the final draft, following the recommendation of a different review comment
Preisser, Evan	No	Chapter 2	102	102	3529	3529	Should rabbit be capitalized? Also, italicize species names	Thank you, this has been addressed in the final draft.
Government of China	Yes	Chapter 2	102	103	3533	3542	"Compared with invasive alien plants and insects, the invasion status, ecological and economic damage of alien vertebrates in Asian countries are much less concerned except for the invasive American bullfrog (e.g., Li et al. 2011, Liu et al. 2015, Liu et al. 2018), the slider turtle (Shi et al. 2009), the invasive greenhouse frog (Lin et al. 2017, Lee et al. 2016), which needs more investigations in the future study. Reference : Li, Y., Z. Ke, Y. Wang, and T. Blackburn. 2011. Frog community responses to recent American bullfrog invasions. <i>Current Zoology</i> 57:83-92. Liu, X., Y. Luo, J. X. Chen, Y. S. Guo, C. M. Bai, and Y. M. Li. 2015. Diet and Prey Selection of the Invasive American Bullfrog (<i>Lithobates catesbeianus</i>) in Southwestern China. <i>Asian herpetological research</i> 6:34-44. Liu, X., S. Wang, Z. Ke, C. Cheng, Y. Wang, F. Zhang, F. Xu, X. Li, X. Gao, C. Jin, W. Zhu, S. Yan, and Y. Li. 2018. More invaders do not result in heavier impacts: The effects of non-native bullfrogs on native anurans are mitigated by high densities of non-native crayfish. <i>Journal of Animal Ecology</i> 87:850-862. Shi, H. T., S. P. Gong, W. Liang, M. L. Hong, L. R. Fu, and J. C. Wang. 2009. Control of the spread of alien slider turtles in China. <i>Bulletin of Biology</i> 44:1-3. Lin Shishim, Wang Jian, Lv Zhitong, Liang Peiying, Luo Lin, Wang Xin, Wang Yingyong. 2017. First Record of An Alien Invasive Species <i>Eleutherodactylus planirostris</i> in Mainland China, and Its Population Study. <i>Sichuan Journal of Zoology</i> , 36: 680-685. Lee WH, Lau MW-N, Lau A, Rao D-q, Sung Y-H. 2016 Jun. Introduction of <i>eleutherodactylus planirostris</i> (amphibia, anura, eleutherodactylidae) to hong kong. <i>Acta Herpetologica</i> 11(1):85-89. doi: 10.13128/Acta_Herpetol-16491. "Compared with invasive alien plants and insects, the invasion status, ecological and economic damage of alien vertebrates in Asian countries are much less concerned except for the invasive American bullfrog (e.g., Li et al. 2011, Liu et al. 2015, Liu et al. 2018), the slider turtle (Shi et al. 2009), the invasive greenhouse frog (Lin et al. 2017, Lee et al. 2016), which needs more investigations in the future study. Reference : Li, Y., Z. Ke, Y. Wang, and T. Blackburn. 2011. Frog community responses to recent American bullfrog invasions. <i>Current Zoology</i> 57:83-92. Liu, X., Y. Luo, J. X. Chen, Y. S. Guo, C. M. Bai, and Y. M. Li. 2015. Diet and Prey Selection of the Invasive American Bullfrog (<i>Lithobates catesbeianus</i>) in Southwestern China. <i>Asian herpetological research</i> 6:34-44. Liu, X., S. Wang, Z. Ke, C. Cheng, Y. Wang, F. Zhang, F. Xu, X. Li, X. Gao, C. Jin, W. Zhu, S. Yan, and Y. Li. 2018. More invaders do not result in heavier impacts: The effects of non-native bullfrogs on native anurans are mitigated by high densities of non-native crayfish. <i>Journal of Animal Ecology</i> 87:850-862. Shi, H. T., S. P. Gong, W. Liang, M. L. Hong, L. R. Fu, and J. C. Wang. 2009. Control of the spread of alien slider turtles in China. <i>Bulletin of Biology</i> 44:1-3. Lin Shishim, Wang Jian, Lv Zhitong, Liang Peiying, Luo Lin, Wang Xin, Wang Yingyong. 2017. First Record of An Alien Invasive Species <i>Eleutherodactylus planirostris</i> in Mainland China, and Its Population Study. <i>Sichuan Journal of Zoology</i> , 36: 680-685. Lee WH, Lau MW-N, Lau A, Rao D-q, Sung Y-H. 2016 Jun. Introduction of <i>eleutherodactylus planirostris</i> (amphibia, anura, eleutherodactylidae) to hong kong. <i>Acta Herpetologica</i> 11(1):85-89. doi: 10.13128/Acta_Herpetol-16491.	Thank you for your comment. We added the references
Pan, Xubin	No	Chapter 2	102	102	3536	3536	Central Asia is better not to be described in this part	Thank you for your comment. We deleted this part
Preisser, Evan	No	Chapter 2	103	103	3538	3539	italicize species names	Thank you, this has been addressed in the final draft.
Government of China	Yes	Chapter 2	103	103	3540	3542	Revise "Taiwan" to "Taiwan Province of China". Taiwan is a province of China, an inseparable part of China, cannot be listed independently with other countries such as Japan. This amendment shall also apply to the full text and the abstract of the report.	Thank you for your comment, we have revised the draft accordingly
Government of China	Yes	Chapter 2	103	103	3544	3548	1. The data come from different papers, and each of them is aimed at a specific country. It is not based on the data of all Asian countries, and it is not official or comprehensive statistical data. It cannot be used to rank numbers of introduced alien freshwater species and established freshwater fishes in Asian countries. 2. The citation of literature (Chen et al., 2017) is wrong. The conclusion of the number of introduced alien freshwater species in China is unfounded since the source of the number 383 is unknown. It is recommended to delete it.	Thank you for your comment. However the reference was not correctly reported in the final list. Chen et al. 2017 is Chen Y, Sun C, Zhan A (2017) Biological invasions in aquatic ecosystems in China. Aquatic Ecosystem Health & Management 20 (4): 402–412.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Liu, Chunlong	No	Chapter 2	103	103	3544	3546	Given <Xiong et al. 2015 Reviews in Fish Biology and Fisheries> reported a total of 439 alien freshwater fish species in China, I suggest this sentence to be changed to: "In Asia, the number of introduced alien freshwater fish species is highest for China (439) (Xiong et al. 2015), followed by Malaysia (203) (Saba et al., 2020) and the Philippines (159) (Casal et al., 2007)". The number of alien species is lower in Chen et al., 2017 than Xiong et al. 2015, which also include the unpublished data. In Chen et al., 2017, the number of introduced alien freshwater species in China is "429", with '383' alien freshwater animal species.	Thank you, we have revised the reference and the sentence as you suggested and added Xiong et al., 2015.
Government of China	Yes	Chapter 2	103	103	3552	3555	"Republic of China" should be revised to "China". The full name of China is the People's Republic of China rather than Republic of China. Please use "China" to keep consistency throughout the report.	Thank you for your comment, we have revised the draft accordingly
Li, Bo	No	Chapter 2	103	103	3555	3555	"north of Republic of China" is not correct, and must be changed to "north of China".	Thank you, this has been addressed in the final draft.
Liu, Chunlong	No	Chapter 2	103	103	3555	3555	"Republic of China" should be changed to "People's Republic of China" or "China".	Thank you for your comment, we have revised the draft accordingly
Pan, Xubin	No	Chapter 2	103	103	3555	3555	Change the "Republic of China" to "the People's Republic of China"	Thank you for your comment, we have revised the draft accordingly
Preisser, Evan	No	Chapter 2	104	104	3583	3583	Should harbor be capitalized?	Yes, it does.
Grossart, Hans-Peter	No	Chapter 2	104	104	3591	3613	Be careful for the fungi! Often there are determined by morphological features and not by molecular tools. In principle we hardly know anything about other microbes as even for fungi we don't have systematic global studies so far! There are several big initiatives such as FunAqua, Tree of Life or other global sequencing initiatives are underway! We can assume that with each invasive species a multitude of microorganisms are introduced. Als, balast water and other human activities transport huge numbers of microbes at a high frequency around the globe and almost nothing is known. I find this chapter a bit weak!!!	Thank you for your comment, with which we agree. We have added two sentences in this sense, but given that this is a part only about Asia and the comment holds for all regions, and given space limitations, we did not develop more this part. There is a specific part for knowledge and data gaps.
Li, Bo	No	Chapter 2	104	104	3593	3594	This sentence can be changed to: Data from China indicate that of the 27 invasive alien fungi recorded so far, only 2 new additions were reported after the year 2000 (Xu & Qiang, 2018). Reference: Xu, H. G. & Qiang, S. 2018. China's Invasive Alien Species (revised edition). Science Press, Beijing.	Thanks for this suggested change. We have included it in the new version.
Li, Bo	No	Chapter 2	104	104	3602	3602	This sentence can be changed to: Twenty-seven invasive alien fungal pathogens were recorded from China (Xu & Qiang, 2018), Reference: Xu, H. G. & Qiang, S. 2018. China's Invasive Alien Species (revised edition). Science Press, Beijing.	Thanks for this suggested change. We have included it in the new version.
Lieurance, Deah	No	Chapter 2	104	104	3616	3618	Invasive alien species is redundant and used twice in the same sentence...If it is invasive, then it is non-native. saying both is redundant	But 'invasive alien species' is an accepted term in our assessment
Pouteau, Robin	No	Chapter 2	104	105	3623	3626	Worth citing Javan rusa (Rusa timorensis), which also has dramatic impacts e.g. in New Caledonia	Thank you for this comment. Given that there are a massive number of examples of IAS on the islands of this region, many of which with impact equivalent or higher than this case, and given space limitations, we could not add this precise example, however relevant it is
Faulkner, Katelyn	No	Chapter 2	104	104	3655	3655	Hawaii is mentioned on this line, which falls into the section on Asia and the Pacific. However, Hawaii is also discussed under the section on the Americas. Perhaps remove the discussion of Hawaii in this section	Thank you for spotting this inconsistencies. The examples for Hawaii were moved to the Asia and the Pacific section.
Pouteau, Robin	No	Chapter 2	105	105	3636	3638	I find this section on the issue of invasive alien plants on Asia-Pacific islands quite short and relatively poorly illustrated. See e.g. Meyer (2014) https://www.publish.csiro.au/PC/PC140146 for a larger scale analysis.	We thank the reviewer for this comment. We agree that many more examples could be given in this part. However, since the report is already well over a thousand pages, and Asian and Pacific island invasions are also treated several times elsewhere in this chapter with different examples (under the focus on taxa, on islands, or in the box on islands), we did not expand more this part
Pan, Xubin	No	Chapter 2	105	105	3646	3646	"acclimatisation societies" or "Acclimatisation societies"	Thank you, "acclimatisation" will not be capitalized.
Government of China	Yes	Chapter 2	105	105	3657	3659	Revise "Hong Kong" to "Hong Kong, SAR of China", revise "mainland China" to "Chinese mainland".	Thank you for your comment. We have revised the text accordingly.
Government of China	Yes	Chapter 2	105	105	3658	3659	Delete. There is not any data that could support the results from the cited literature.	Thank you for your comment. This statement was based on a comprehensive new database on alien mammals recordings. We therefore believe that indeed there is data to support this conclusion.
Government of Germany	Yes	Chapter 2	107	107	3709	3709	Clarification required: Fig. 2.25 presents information on IAS trends in subregions of Europe and Central Asia. Please provide an overview of the countries belonging to the respective subregions (e.g. in the annex/ supplementary materials of this chapter).	Thank you for your comment. We have now included a reference to chapter 1 and an online source, where the IPBES regions and sub-regions are explained in detail, which reads as "A description of the IPBES regions and sub-regions including a spatial representation is provided in chapter 1 (1.6.4 and Fig. 1.14) and online (https://doi.org/10.5281/zenodo.5719431)."
Preisser, Evan	No	Chapter 2	107	107	3718	3718	; the Global	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	107	107	3723	3724	Only a few	Thank you, this has been addressed in the final draft.
Grossart, Hans-Peter	No	Chapter 2	109	110	3769	3776	Table 2.25: The knowledge on microorganisms is quite rudimental and that should be mentioned!	Thank you for your comment. We agree that there are severe knowledge gaps for microorganisms, which are discussed in the section "Data and knowledge gaps" of section 2.2.3 "Trends and status of alien microorganisms". We therefore prefer to not mention this in the legend, where we do not have space to indicate gaps for all groups and regions.
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	109	110	3775	3776	3775-3776 table 2.25 - please also insert common names	Thank you, we have revised the table accordingly
Kenward, Robert	No	Chapter 2	111	111	3793	3799	In view of the tendency for populist policy-makers with little commitment to biodiversity (or amelioration of climate-change) to be elected by rural voters, who themselves are often land managers, it is essential for IPBES science to be as balanced as possible on rural issues. With little time to review, my focus was therefore on checking for an accurate and balanced view of sustainable use activities which attract controversy. At 3793, it is accurate to describe Glis and Oryctolagus as "edible" species, not "game", because ancient introductions in Europe were to breed and eat them (i.e. farm them), not hunt them. Hunting was responsible for introductions of some ungulates (but by no means all). However, modern hunters are very aware of risk of alien introductions, against which most countries now have regulations, so 3797-9 should either read "Hunting has been an incentive for alien mammal introductions on both mainland and islands of Europe and Central Asia" (Carpio et al., 2017)" if Carpio et al. make that point, or even be omitted because why single out hunting?	Thank you for this comment. Game is mentioned for islands only here, not for mainland Europe, and nowhere is it claimed that hunting was responsible for all ungulate introductions. Hunting is not singled out: agriculture and stowaways are also mentioned in this paragraph. That introductions for hunting is now regulated does not negates the fact that many historical introductions were due to hunting. As it is currently, this part on mammal introductions in Europe is accurate and we have therefore not changed it

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Kalandarishvili, Alexandra	No	Chapter 2	111	111	3797	3799	The cited study does not make a statement that "Hunting has always been and continues to be a major pathway for alien mammals on both mainland and islands of Europe and Central Asia" nor can such a conclusion be drawn from the paper. Moreover, while numbers of species have been introduced outside their natural habitats for hunting purposes, today, hunting and trapping are among the most effective wildlife management tools that can help eradicate the AIS.	Thank you, it is true that the reference was inadequate and this has been corrected: it has now been removed and two new, correct references have been added. While it is true that hunting is a major management tool for invasive mammals, management is devoted to Chapter 4 and is not dealt with here. Highlighting that hunting has been responsible for many introductions is factual and should not be seen as an attack against this activity, nor does it need to be toned down by a management counter-argument here
Hofstra, Gerrit	No	Chapter 2	111	111	3816	3818	The main pathway for invasive aquatic animals in the Netherlands is the Danube Rhine canal with deliberate stocking second	Thank you for your comment. Although this is correct, we have not the space to go into individual country details, and have therefore left the general pattern, which does mention both these pathways for Europe
Kalandarishvili, Alexandra	No	Chapter 2	112	112	3841	3852	Muskrat, Raccoon dog and American mink were all introduced in Europe for the purpose of fur exploitation. Whether released in the wild or kept in confinements the primary aim of the introduction was fur production and not hunting. The grey squirrel was introduced in the UK for recreational observations in the 19th century. Due to their high adaptability the above mentioned species managed to establish a self-sustaining populations in the wild, therefore becoming invasive and threatening native species. Today, hunting is a tool that is actively used in the management of the invasive alien species, the effectiveness can be seen as a result of significantly reduced hunting bag of these species, indicating population declines.	Thank you for this comment. This is all correct but this part is already long and we cannot afford to go into too many details for most examples, so we have not added these information. Note that fur exploitation and grey squirrels topics are both covered, although concisely
Kenward, Robert	No	Chapter 2	112	112	3843	3845	For reasons given above, this statement probably needs correction to "This great reshuffling of mammal fauna was mainly driven by consumption ..." not "... by hunting...". There is need for great care with categorisation here because, of the four examples given (Sciurus carolinensis, Ondatra zibethicus, Nyctereutes procyonoides and Neovison vison), none are eaten to any great extent in Europe, though fur is used from the latter three. The grey squirrel (S. carolinensis) was not introduced in UK for fur but for recreational observation (called 'faunal enhancement' elsewhere in the assessment) in the 19th century; in Italy release post 1945 was of pets when US service personnel went home; S Africa for faunal enhancement. Even for ungulates in UK, Muntjac and Chinese Water Deer were introduced for faunal enhancement, not hunting, and probably Sika Deer too, though all are now hunted to try to keep numbers down.	Thank you for your comment. The categorisation refers to those categories provided in the original database, and we would like to keep this for consistency and transparency.
Preisser, Evan	No	Chapter 2	112	112	3848	3848	I don't think 'gray' should be capitalized	Thank you, this has been addressed in the final draft.
Faulkner, Katelyn	No	Chapter 2	112	112	3849	3849	An introduction to South Africa is mentioned on this line, but this section is on Europe and central Asia	Thank you for your comment. We deleted South Africa
Li, Bo	No	Chapter 2	112	112	3854	3865	Need to cite some references.	Thank you, we have added some references, noting that the text has been edited in the final version
Hofstra, Gerrit	No	Chapter 2	112	112	3860	3860	There is an European ban on import of wild birds, not on export	Thank you for your comment. We corrected this error as suggested.
Pan, Xubin	No	Chapter 2	112	112	3860	3860	"exports" or "imports"	Thank you for your comment. We corrected this error as suggested.
Grossart, Hans-Peter	No	Chapter 2	113	114	3890	3934	The knowledge on microorganisms is quite rudimental and could be improved!	Thank you for your comment: We tried our best to bet the sections as comprehensive as possible and would appreciate any suggestion of how to improve the content.
Faulkner, Katelyn	No	Chapter 2	113	113	3892	3894	The reference cited (Sikes et al. 2018) for this statement on introductions to Europe analyses data from New Zealand. Please cite a relevant reference	Thank you for spotting this. We replaced the reference.
Faulkner, Katelyn	No	Chapter 2	114	114	3941	3951	This section of text discusses introductions to European islands that are overseas territories. Please note that Marion Island is discussed in this section, but this is not a European overseas territory, it is a South African island. Please remove Marion Island from this section. A lot of work has been done on invasions on Marion Island, but this work should be discussed under the section on Africa.	Thank you for your comment. We deleted Marion Island
Government of Argentina	Yes	Chapter 2	114	114	3941	3941	"Islands belonging to the European countries include overseas territories in most oceans; in particular for the United Kingdom and France, also have many invaded islands in the southern Atlantic and in the Pacific. Therefore, invasions may be due to proximity of the continent (islands off the Atlantic and Channel Sea coasts) or to colonization of more remote islands (Falkland Islands or French Polynesia and New Caledonia, for example)." The use of double nomenclature is requested, in line with what is established in the editorial directive of the United Nations ST/CS/SER.A/42. In addition, the paragraph refers to the British overseas territories and mentions the Malvinas Islands, assigning said status to these territories. It is requested that, in accordance with editorial directive ST/CS/SER.A/42, on the Nomenclature of the Malvinas Islands incorporates the standard comment established in the administrative instruction ST/AI/189/Add.25/Rev.1 of January 20, 1997 through a note or footnote that says: "There is a dispute between A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands, the Falkland Islands (Malvinas)". It is also suggested that one more category be added to the paragraph: "disputed territories." The phrase should be added after "or to colonization of more remote islands...or disputed territories"	Thank you, we have revised the text accordingly.
Preisser, Evan	No	Chapter 2	115	115	3970	3970	linguistic	Thank you, this has been addressed in the final draft.
Faulkner, Katelyn	No	Chapter 2	116	158	3984	5751	It would be useful to include maps showing where the relevant IPBES units of analyses are found before each section	Thank you for your comment. We have now included a reference to chapter 1 and an online source, where the IPBES regions and sub-regions are explained in detail, which reads as "A description of the IPBES regions and sub-regions including a spatial representation is provided in chapter 1 (1.6.4 and Fig. 1.14) and online (https://doi.org/10.5281/zenodo.5719431)."
Preisser, Evan	No	Chapter 2	116	116	4001	4001	20% more recently	Thank you, this has been addressed in the final draft.
Grossart, Hans-Peter	No	Chapter 2	117	117	4010	4010	Figure 2.26: The curves for freshwater are a bit strange....	Thank you for your comment. The curves are based on available data at large scale, which are likely incomplete, but there is no way to change the curves other than adding more data, which are often lacking particularly for freshwater ecosystems.
Li, Bo	No	Chapter 2	118	137	4017	4851	Please add a Box to define the "Tropical and subtropical forests, Temperate and boreal forests, Mediterranean forests, woodlands and scrub, Arctic and mountain tundra, Tropical and subtropical grasslands, Temperate grasslands, Deserts and xeric shrublands, Cryosphere" of terrestrial units.	Thank you for your comment. The units of analysis used by IPBES are described in details elsewhere and briefly introduced in chapter 1 of this assessment. We included a link to those sources.
Rebelo, Alanna	No	Chapter 2	118	118	4018	4036	Box 2.9: What is missing here is the large body of research on South African mountain invasions. This box seems biased towards Europe. (e.g. https://www.sciencedirect.com/science/article/pii/S2352938520306236?via%3Dihub .)	Thank you for your comment. We tried to provide a global overview in this box with examples from all over the world. Due to the space restriction, it is not possible to provide more details on methodological aspects as those in the suggested reference.
Lembrechts, Jonas	No	Chapter 2	118	118	4034	4036	Box 2.9: The sentence with the reference to Pysek et al. feels disconnected from the tekst, as it is the same message as e.g. online 4027	Thank you for your comment. We removed that sentence.
Rebelo, Alanna	No	Chapter 2	118	118	4046	4048	"While there is no evidence yet that alien species in mountains have caused the local extinction of native species, they have a strong impact on multiple dimensions of biodiversity." There is extensive South African research on the negative impacts of alien invasions on biodiversity (see van Wilgen et al. 2020 and other works. This should be cited here.	We agree and we have added this reference

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Lembrechts, Jonas	No	Chapter 2	118	118	4069	4069	Box 2.9: Point of the last sentence isn't entirely clear to me. Perhaps worth referring to Petitpierre et al. 2016 when talking about future invasions in mountains? https://esajournals.onlinelibrary.wiley.com/doi/full/10.1890/14-1871	Thanks for this suggested change. We have adapted the final section of the box and now additionally refer to Petitpierre et al. (2016) and Alexander et al. (2016) Petitpierre et al. (2016) Will climate change increase the risk of plant invasions into mountains? Ecological Applications, 26, 530-544. 10.1890/14-1871 Alexander et al. (2016) Plant invasions into mountains and alpine ecosystems: current status and future challenges. Alpine Botany, 126, 89-103.
Faulkner, Katelyn	No	Chapter 2	119	119	4062	4062	Box 2.9: Recent work (Turner et al. 2021) has been published on the long-term transect discussed in the cited article Kalwij et al. 2015. Turner SC, Esler KJ, Kalwij JM (2021) Road verges facilitate exotic species expansion into undisturbed natural montane grasslands. Applied Vegetation Science: e12615. https://doi.org/10.1111/avsc.12615	Thank you for your comment. We added the reference
Faulkner, Katelyn	No	Chapter 2	119	119	4070	4070	From the figure (Figure 2.27) it seems that The Mountain Invasion Research Network does not monitor any mountains in Africa. Possibly worth pointing this gap out	Thank you for your comment. We added that suggested point
Preisser, Evan	No	Chapter 2	120	120	4093	4093	I don't think 'temperate' should be capitalized	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	120	120	4096	4096	establishment	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	120	120	4112	4112	island archipelago, the Galapagos,	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	120	120	4115	4115	"brown treesnake" or "brown tree snake" or "Brown Tree Snake"	Thank you, this has been harmonized across the draft
Preisser, Evan	No	Chapter 2	120	120	4115	4115	open-ended parentheses	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	120	120	4119	4119	plant	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	120	120	4122	4122	"fungi and diseases" is not accurate	Thank you for your comment. However, the authors in their paper used the term diseases because they reported diseases together with plants, invertebrates, etc. We have maintained the term
Preisser, Evan	No	Chapter 2	120	120	4124	4124	associated with the	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	120	120	4124	4124	Consider 'native' as a better word choice than endemic	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	121	121	4135	4135	forests and has	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	121	121	4140	4142	confusing sentence	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	121	121	4142	4142	The replacement of natural forests trees with exotic species,	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	121	121	4143	4143	disturbances, has	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	121	121	4144	4144	include plants like	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	121	121	4146	4146	"among many"?	Thank you, 'among many' was removed from the sentence.
Faulkner, Katelyn	No	Chapter 2	121	121	4147	4147	Which country is referred to here is unclear. The section is on Africa, which a continent. Which African country does this statement refer to?	Thank you for your comment. We rephrased that sentence to avoid confusion.
Preisser, Evan	No	Chapter 2	121	121	4147	4147	forests	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	121	121	4148	4148	Delete "still"	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	121	121	4150	4150	rapidly changing climatic conditions, are	Thank you for your comment. We changed it as suggested.
Preisser, Evan	No	Chapter 2	121	121	4155	4156	unit of analysis level?	Thank you for your comment. We rephrased that sentence to avoid confusion.
Preisser, Evan	No	Chapter 2	121	121	4168	4168	such as Herpestes	Thank you, this has been addressed in the final draft.
Faulkner, Katelyn	No	Chapter 2	121	121	4174	4174	Which region is referred to on this line. Please clarify	Thank you for your comment. The country (here China) is given in brackets in the following line.
Preisser, Evan	No	Chapter 2	121	121	4175	4175	(e.g., Xu et al	Thank you, this has been addressed in the final draft, but we think it is still useful to specify the location of this example (China)
Li, Bo	No	Chapter 2	122	122	4190	4191	In addition to fragmentation and road-building activities, afforestation is also one of principal drivers of the increase in forest plantinvasions.	Thank you for your comment. The aspect of afforestation as a driver of has now been included in the following sentence.
Government of Germany	Yes	Chapter 2	122	123	4218	4220	Proposal: Some information seems to be missing in this sentence. Please consider to add (in bold): "In European (deciduous) forests, 386 alien plan species (...)."	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 2	122	122	4219	4220	Impatiens parvifloramost commonly recorded alien plant species in forest understory: alien, but surely not invasiev!	Thank you for your comment. We fully agree and therefore refer to alien species rather than invasive alien species.
Preisser, Evan	No	Chapter 2	123	123	4219	4219	common,	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 2	123	123	4236	4239	Climate change definitely, as trees reach their saturation level for CO2 uptake	Thank you for your comment. Climate change is indeed mentioned.
Preisser, Evan	No	Chapter 2	123	123	4248	4248	open-ended parentheses	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	123	123	4251	4251	delete 'Yet'	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	123	123	4253	4253	case with	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	123	123	4258	4260	This sentence doesn't follow from the previous one	Thank you for your comment. We rephrased the sentence to make the transition from the preceding sentence clearer.
Rebello, Alanna	No	Chapter 2	123	123	4258	4260	This cannot be right. Mechanical clearing has certainly had some successes (e.g. the famous Working for Water programme, see various publications on this, including a book chapter in: http://www.paddywoodworth.com/our-once-and-future-planet.html). This programme has also had issues, but certainly successes too.	Thank you for your comment. We revised the sentence and removed the aspect related to management as this is covered by chapter 5.
Preisser, Evan	No	Chapter 2	124	124	4262	4262	referred to as	Thank you, this has been addressed in the final draft.
Rebello, Alanna	No	Chapter 2	124	124	4262	4262	Actually forestry is foremostly responsible for the impacts seen in the fynbos, especially in terms of the alien invasive trees with the largest footprints and impacts. Forestry should certainly be mentioned as well as agriculture. I'm sure this would be covered in van Wilgen et al. 2020 (Biological Invasions in South Africa)	Thank you for your comment. The sentence about fynbos does actually not address drivers. We would therefore prefer to leave the sentence as it is.
Preisser, Evan	No	Chapter 2	124	124	4275	4275	of the	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	124	124	4297	4297	In the	Thank you, this has been addressed in the final draft.
Rebello, Alanna	No	Chapter 2	124	124	4297	4297	"In Mediterranean basin" - what does this mean? In "the" Med basin? And where is this?	We agree and have added "the". The Mediterranean basin is the region of lands around the Mediterranean Sea that have mostly a Mediterranean climate, which supports characteristic Mediterranean forests, woodlands, and scrub vegetation.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Rebello, Alanna	No	Chapter 2	124	124	4297	4301	English editing is needed for this section. There are grammatical and content errors. "plants" were more resistant to invasion? Did authors mean "ecosystems" instead?	Thank you for your comment. We removed that sentence as it did not provide new information about the status of biological invasions in this unit of analysis.
Preisser, Evan	No	Chapter 2	125	125	4307	4307	spp., and Hakea	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	125	125	4308	4308	spp., and Agave	Thank you, this has been addressed in the final draft.
Faulkner, Katelyn	No	Chapter 2	125	125	4315	4315	Does 'the basin' refer to the Mediterranean basin. Please clarify	Thank you for your comment. We rephrased that sentence to avoid confusion.
Rebello, Alanna	No	Chapter 2	125	125	4327	4327	But see iNaturalist... This is changing with the rise of Citizen Science platforms being championed by key scientists.	We agree with this comment, but did not add a discussion on this aspect here, due to lack of space, and because it is addressed specifically elsewhere
Lembrechts, Jonas	No	Chapter 2	126	126	4357	4357	I'm missing a reference here or elsewhere in this paragraph to the excellent summary by Alexander et al. (2016) https://link.springer.com/article/10.1007/s00035-016-0172-8	Thanks for this suggested change. We have included it in the new version, together with the reference to Haider et al. (2022) suggested in comment 1387. Haider et al. (2021) Think globally, measure locally: The MIREN standardized protocol for monitoring plant species distributions along elevation gradients, Ecology & Evolution, 12, e8590. DOI: https://doi.org/10.1002/ecc3.8590
Lembrechts, Jonas	No	Chapter 2	126	126	4385	4385	Perhaps also worth referring to McDougall et al. (2018)? https://link.springer.com/article/10.1007/s10530-018-1787-z	Thanks for this suggested change. We have included it in the new version.
Preisser, Evan	No	Chapter 2	126	126	4391	4391	might well	Thank you for your comment. We replaced "as well" by "also" to avoid confusion.
Preisser, Evan	No	Chapter 2	126	126	4392	4392	when climatic conditions become too	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	127	127	4407	4408	Thus although invasive alien species have only recently begun to be considered a threat to	Thank you for your comment. We rephrased according to the suggestion.
Preisser, Evan	No	Chapter 2	128	128	4462	4467	Decide whether it's going to be 'C4' or 'C(4 subscript)' throughout the document ... I think C4 is appropriate	Thank you for your comment. Following the reviewer's suggestion, we changed to C4 grasses throughout the chapter.
Preisser, Evan	No	Chapter 2	128	128	4470	4470	elliottii	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 2	128	128	4479	4479	Pennisetum polystachion: currently accepted name is Cenchrus setosus	Thank you for pointing this out. We now use Cenchrus polystachios, which is the accepted name according to Catalogue of Life
Preisser, Evan	No	Chapter 2	129	129	4500	4500	should 'Great Plains' be capitalized?	Thank you for your comment. We are here referring to the North American region Great Plains, which is usually capitalised.
Preisser, Evan	No	Chapter 2	129	129	4501	4501	Starting here and throughout the rest of the manuscript, 'Pampas' is sometimes capitalized and sometimes not. Be consistent throughout.	Thank you for your comment. The term 'Pampas' is now capitalised throughout the chapter.
Pan, Xubin	No	Chapter 2	129	129	4504	4505	"Mongolia and China" is not Central Asia	Thank you for your comment. Central was deleted
Preisser, Evan	No	Chapter 2	129	129	4513	4513	remove author first initials	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	130	130	4560	4560	prairies that	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	131	131	4577	4577	insect should not be italicized	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	131	131	4581	4583	Pampas?	Thank you for your comment. The term 'Pampas' is now capitalised throughout the chapter.
Preisser, Evan	No	Chapter 2	131	131	4585	4585	the Pampas	Thank you for spotting this error, which we corrected.
Preisser, Evan	No	Chapter 2	131	131	4595	4595	highly continental??	Thank you for your comment. We removed the word "highly" to avoid confusion.
Preisser, Evan	No	Chapter 2	131	131	4598	4598	steppes, has	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	131	131	4599	4599	what does 'these' refer to?	Thank you for your comment. We rephrased to avoid confusion.
Preisser, Evan	No	Chapter 2	131	131	4602	4602	the extensive steppes	Thank you, this has been addressed in the final draft.
Government of Germany	Yes	Chapter 2	132	132	4618	4620	Proposal: A verb seems to be missing in this sentence. Please consider to add (in bold): "(...) especially as some countries [exhibit/show/have] slow economic growth".	Thank you for your comment. We rephrased that sentence to clarify the point.
Preisser, Evan	No	Chapter 2	132	132	4620	4620	I don't understand the last part of this sentence	Thank you for your comment. We rephrased that sentence to clarify the point.
Preisser, Evan	No	Chapter 2	132	132	4623	4624	awkward singular-plural agreement (invaders is) - please revise	Thank you for your comment. We rephrased that part.
Preisser, Evan	No	Chapter 2	132	132	4631	4631	climate, few alien plants are able to	Thank you for your comment. We rephrased it as suggested.
Government of China	Yes	Chapter 2	132	132	4643	4645	The literature support is insufficient. The reason for the increase in number can also be due to the increase in information caused by the in-depth investigation and research, not necessarily the increase in the number of invasive alien species itself.	Thank you for your comment. We added that changing recording intensities might affect this result.
Preisser, Evan	No	Chapter 2	133	133	4659	4660	but only have	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	133	133	4681	4681	It seems not finished for "Asian and South American deserts"	Thank you for your comment. We revised this sentence.
Preisser, Evan	No	Chapter 2	133	133	4681	4682	The second part of this sentence needs to be reworded... or what??	Thank you for your comment. We have revised the sentence accordingly.
Li, Bo	No	Chapter 2	134	134	4703	4703	"none or one are reported" should be "none or one is reported".	Thank you for your comment. We rephrased it accordingly.
Preisser, Evan	No	Chapter 2	134	134	4703	4705	confusing sentence - please reword	Thank you for your comment. We rephrased this sentence.
Pan, Xubin	No	Chapter 2	134	134	4721	4722	Arthropods is a kind of animals	Thank you for your comment. We better specified this part
Government of New Zealand (Perry, Joanne)	Yes	Chapter 2	134	134	4727	4727	4727 please insert Arctic and Antarctic in title - this is consistent with other chapters and more easily recognisable to non expert the cryosphere as a title	Thank you for your comment. We here refer to the IPBES unit of analysis with the name 'Cryosphere' and therefore would like to keep this term.
Li, Bo	No	Chapter 2	134	134	4731	4731	"don't" should be replaced by "do not"	Thank you for your comment. This was been done as suggested.
Preisser, Evan	No	Chapter 2	134	134	4731	4731	do not favor	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	134	134	4740	4740	associated with	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	135	135	4760	4760	open-ended parentheses	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	135	135	4769	4769	"of" should be deleted.	Thank you for your comment. This has been changed as suggested.
Preisser, Evan	No	Chapter 2	135	135	4774	4774	open-ended parentheses	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	135	135	4775	4775	experiments	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	135	135	4779	4779	for the	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	135	135	4786	4786	from the	Thank you, this has been addressed in the final draft.
Faulkner, Katelyn	No	Chapter 2	135	135	4958	4958	Changing shipping lanes are also expected to impact marine introductions in the Arctic. See Ware et al. (2014) Ware C, Berge J, Sundet JH, Kirkpatrick JB, Coutts ADM, Jelmert A, Olsen SM, Floerl O, Wisz MS, Alsos IG (2014) Climate change, non-indigenous species and shipping: assessing the risk of species introduction to a high-Arctic archipelago. Diversity and Distributions 20: 10–19. https://doi.org/10.1111/ddi.12117	Thank you for your comment. However, this section deals with freshwater habitats, not marine.
Preisser, Evan	No	Chapter 2	136	136	4800	4800	and on	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	136	136	4807	4807	future, with the	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Preisser, Evan	No	Chapter 2	136	136	4808	4809	shouldn't Seas be capitalized here?	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	136	136	4821	4821	"t" should be deleted.	Thank you for your comment. We deleted it.
Government of Australia	Yes	Chapter 2	137	137	4838	4850	Suggest delete block of duplicated text, starting 'However baseline biodiversity...' and ending '...Antarctic biota are rare (Hughes & Convey, 2012).'	Thanks for this suggested change. We have included it in the new version.
Pan, Xubin	No	Chapter 2	137	137	4838	4844	L4844-4850	Thank you for your comment. We deleted this part
Preisser, Evan	No	Chapter 2	137	137	4840	4850	Lines 4840-4843 are repeated in lines 4846-4850	Thanks for this suggested change. We have included it in the new version.
Preisser, Evan	No	Chapter 2	137	137	4841	4841	is generally dominated	Thank you for your comment. We added a comma.
Li, Bo	No	Chapter 2	137	137	4844	4850	Lines 4844 to 4850 must be deleted as "However, baseline biodiversity knowledge is poor and suitable taxonomic expertise is difficult to source, making it difficult to identify alien species, particularly invertebrates and aquatic species (Hughes & Convey, 2012)... " is the repetition of lines 4838 to 4844.	Thanks for this suggested change. We have included it in the new version.
Li, Bo	No	Chapter 2	137	137	4853	4853	Add a Box to define the different freshwater units.	Thank you, the units of analysis are defined in Chapter 1
Pan, Xubin	No	Chapter 2	137	137	4862	4862	Box 2.10: Figure 2.1 is not relevant here.	Thank you for spotting this error. We changed the link to Fig. 2.3
Government of Germany	Yes	Chapter 2	137	139	4895	4895	Proposal: Please replace "Natura 2020" by "Natura 2000"	Thank you for your comment. We changed it.
Rebello, Alanna	No	Chapter 2	138	138	4885	4885	See this report for South Africa: http://biodiversityadvisor.sanbi.org/planning-and-assessment/national-biodiversity-assessment-nba-2018/ . One of the reports is called: TECHNICAL REPORT Volume 2b: Inland Aquatic (Freshwater) Realm. Please refer to the section on alien species on page 116. There is also a section on: Spatial extent and abundance of invasives in South Africa. Copied here one short extract: "What are the top invaders of rivers and wetlands in South Africa? Of the 2 033 alien species recorded (or assumed to be present) outside of cultivation or captivity in South Africa, 191 are found in the aquatic biome (Appendix E). Of these, 65 are known to be invasive, nine are naturalised but not invasive, and 53 are present, but not naturalised (Table 4.6). For the remainder 64 species there is insufficient information to assign them to an introduction status category. Four of the alien species recorded as present in the country are currently listed in the Biodiversity Act regulations as prohibited (i.e. species assumed to be absent from South Africa and which may not be imported)."	We thank the reviewer for this very helpful report, which we have now used as a reference
Lieurance, Deah	No	Chapter 2	138	138	4887	4887	remove J.A. from citation	Thank you for notin this, we have revised the text accordingly
Preisser, Evan	No	Chapter 2	138	138	4897	4897	sites). Other studies	Thank you for your comment. We changed it.
Preisser, Evan	No	Chapter 2	138	138	4904	4904	is 'herptiles' common parlance?	Thank you for making this point. It does not seem to require changes to the text.
Faulkner, Katelyn	No	Chapter 2	138	138	4907	4908	Does this statement specifically refer to wetlands?	Thank you for your comment. The statement refers only to riparian habitats
Rebello, Alanna	No	Chapter 2	139	139	4890	4890	"lower" instead of "less"	Thank you for this suggested change, we have adopted it in the final version
Preisser, Evan	No	Chapter 2	139	139	4928	4928	was found	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	139	139	4931	4931	bogs were less	Thank you, this has been addressed in the final draft.
Rebello, Alanna	No	Chapter 2	139	139	4931	4931	where possible suggest to use IPPC and OIE definitions some of the definitions can be find https://assets.ippc.int/static/media/files/publication/en/2021/05/ISPM_05_2021_En_Glossary_2021-05-27_PostCPM-15_Fixed.pdf	Thank you we have proof-read the entire final draft.
Duistermaat, Leni	No	Chapter 2	139	139	4936	4936	Pennisetum clandestinum: currently accepted name is Cenchrus clandestinus	Thank you, this has been addressed in the final draft.
Rebello, Alanna	No	Chapter 2	139	139	4938	4944	Be careful here, this is very much taken from only one source: "natural and prescribed fires can favour biological invasions". Please see the other research from South Africa. This depends on the type of fire and the health of the peatland. If the peatland is healthy and not drained, fires pass over the top, and this should promote native vegetation. If the peatland has been drained, when fires pass through it results in peat fires, which kills the native peat vegetation, and could certainly create disturbance which would promote alien invasive plants. (e.g. see https://link.springer.com/article/10.1007/s11273-021-09853-1 ; https://journals.co.za/doi/pdf/10.10520/EJC-194fe9cf81 and http://www.wrc.org.za/wp-content/uploads/mdocs/2346-1-17.pdf)	We thank the reviewer for this comment. We agree that it can be context dependant, which is why we wrote "can favour"; we will insist by adding "in some cases".
Guareschi, Simone	No	Chapter 2	139	139	4951	4951	"in these areas" refer to Europe and America? It is not extremely clear	Thank you for your comment. We have better clarified it in the draft
Rebello, Alanna	No	Chapter 2	139	139	4951	4951	Perhaps add the word "mostly" before "missing"?	Done
Grossart, Hans-Peter	No	Chapter 2	139	143	4953	5080	I am afraid that this chapter is largely biased by the limited data availability and also awareness of small organisms. For example, the most balast water treatments don't sufficiently prevent the spread of microorganisms including fungi and bacteria, in particular since spores can well survive even harsh treatments.	We thank the reviewer for this comment. We agree that the available data are limited and those limitations likely bias our reporting. There is not much that we can do about that. However, we do report data gaps in order to make the lack of data transparent and to shine a light on regions, taxa, and units of analysis where more data are urgently needed.
Rebello, Alanna	No	Chapter 2	139	139	4953	4953	Likewise to enrich this section, please include information for this report for South Africa: http://biodiversityadvisor.sanbi.org/planning-and-assessment/national-biodiversity-assessment-nba-2018/ . One of the reports is called: TECHNICAL REPORT Volume 2b: Inland Aquatic (Freshwater) Realm. Please refer to the section on alien species on page 116.	We thank the reviewer for this very helpful report, which we have used as a reference
Faulkner, Katelyn	No	Chapter 2	141	141	5014	5016	The construction of inter-basin water transfer schemes has been in important pathway for freshwater fish introductions in South Africa. These have generally been fish that are native to somewhere in South Africa but introduced through these schemes to river basins where they are not native. See Box 12.2 in Faulkner et al. 2020 and Ellender and Weyl 2014 Faulkner KT, Burness A, Byrne M, Kumschick S, Peters K, Robertson MP, Saccaggi DL., Weyl OLF, Williams VL (2020b) South Africa's pathways of introduction and dispersal and how they have changed over time. In: van Wilgen BW, Measey GJ, Richardson DM, Wilson JR, Zengeya TA (Eds), Biological invasions in South Africa. Springer, Cham, Switzerland, 311–352. https://doi.org/10.1007/978-3-030-32394-3_12 Ellender BR, Weyl OLF (2014) A review of current knowledge, risk and ecological impacts associated with non-native freshwater fish introductions in South Africa. Aquatic Invasions 9: 117–132	Thank you for your comment. A reference has been added for South Africa
Faulkner, Katelyn	No	Chapter 2	141	141	5049	5051	Box 2.11: A recent publication on the impact of ballast water management on introductions to the Great Lakes: Ricciardi A, Macisaac HJ (2022) Vector control reduces the rate of species invasion in the world's largest freshwater ecosystem. Conservation Letters: e12866. https://doi.org/10.1111/conl.12866	Thank you for your comment. The reference has been added
Preisser, Evan	No	Chapter 2	141	141	5051	5051	Box 2.11: harmonized by?	Thank you. This has been changed and the term was removed.
Guareschi, Simone	No	Chapter 2	142	142	5063	5080	I think the recent studies that identified the impact of signal crayfish on invertebrate functional diversity (Mathers et al. 2020. Functional Ecology), the implications of invasive amphipods (Guareschi et al. 2021a Journal of Applied Ecology) and the consequences of different level bio-contamination (Guareschi et al. 2021b Ecological Applications) on river biodiversity and biomonitoring metrics can be useful examples of attempts to deal with relevant challenges/knowledge gap at the interface between applied ecology and invasion science. These are some of the very few examples based on invasive freshwater invertebrates and using long term datasets. At the same time I understand that these can also be useful or even more appropriate in Chapter 4 (line 1747). Overall, I think that the recent book chapters about IAS in freshwater may provide further details about management and new challenges in rivers: - Olden et al. 2021 Invasive Species in Streams and Rivers. Reference Module in Earth Systems and Environmental Sciences, Elsevier, https://doi.org/10.1016/B978-0-12-819166-8.00083-9 - Guareschi and Wood, 2021. Biological Invasions of River Ecosystems: A Flow of Implications, Challenges, and Research Opportunities. Reference Module in Earth Systems and Environmental Sciences, Elsevier, https://doi.org/10.1016/B978-0-12-821139-7.00147-1	Thank you for this comment. These are indeed very useful and current references. We agree with the reviewer that this is more appropriate for chapter 4 and we will pass that information on to that chapter.
Preisser, Evan	No	Chapter 2	142	142	5066	5066	monitor and an	Thank you, this has been addressed in the final draft.
Rebello, Alanna	No	Chapter 2	143	143	5076	5076	Perhaps it is worth qualifying: "with the exclusion of South Africa" here?	We think that singling out South Africa in this sentence would be cumbersome as other countries (such as Japan, for example), could be excluded as well. Putting a limit here is not possible. The sentence reads well as it is

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Li, Bo	No	Chapter 2	143	143	5082	5082	Add a Box to define the different marine units.	Thank you, the units of analysis are defined in Chapter 1
Rebelo, Alanna	No	Chapter 2	143	143	5082	5082	The Marine unit is not my area of expertise, therefore I have not commented on it, however there is likewise a huge amount of research on this in South Africa, and we have many marine protected areas. I presume that this assessment has included this wealth of literature and knowledge from South Africa. I also recommend the NBA as a starting point: http://biodiversityadvisor.sanbi.org/planning-and-assessment/national-biodiversity-assessment-nba-2018/	We thank the reviewer for this reference, which we have cited in the previous part
Li, Bo	No	Chapter 2	143	143	5105	5105	"is" should be replaced by "was".	Thank you. This has been changed.
Outinen, Okko	No	Chapter 2	143	143	5163	5173	In addition marine monitoring is lacking across EU Member States. Overall, 16 EU Member States reported to have NIS monitoring only in hotspot areas (e.g., ports), or not at all (Tsiamis et al. 2021). https://easin.jrc.ec.europa.eu/easin/Document/JRC124136_recommendations_on_marine_non_indigenous_species_eur_30640_en-1.pdf	Thank you for your comment. We revised the sentence and included the suggested reference.
Preisser, Evan	No	Chapter 2	144	144	5158	5158	Aichi target 9?	We thank the reviewer for this comment but it is written correctly in the chapter.
White, Michael	No	Chapter 2	145	145	5164	5164	We know so little about the deep sea, limited knowledge of resident spp let alone IAS	A. Castriota L, Corbeau C, Costa A, Cvitković I, Despalatović M, Dragičević B, Dulčić J, Fortić A, Francé J, Gittenberger A, Gizzi F, Gollasch S,
Li, Bo	No	Chapter 2	145	145	5169	5169	"are" should be replaced by "is".	Gruszka P, Hegarty M, Hema T, Jensen K, Josephides M, Kabuta S, Kerckhof F, Kovtun-Kante A, Krakau M, Kraśniewski W, Lackschewitz D,
Li, Bo	No	Chapter 2	145	145	5189	5189	Box 2.12: "exist" should be replaced by "existed".	Lehtiniemi M, Lieberum C, Linnamägi M, Lipej L, Livi S, Lundgreen K, Magliozzi C, Massé C, Mavrič B, Michailidis N, Moncheva S, Mozetič P,
Government of China	Yes	Chapter 2	145	145	5200	5203	Box 2.12: It is recommended to delete this sentence since there is no literature support. In addition, it is better to revise "the East China, South China, and Yellow Seas" to "the East China Sea, South China Sea, and Yellow Sea" to avoid misunderstanding.	Naddafi R, Ninčević Gladan Z, Ojaveer H, Olenin S, Orlando-Bonaca M, Ouerghi A, Parente M, Pavlova P, Peterlin M, Pitacco V, Png-Gonzalez
Preisser, Evan	No	Chapter 2	146	146	5213	5213	capitalization?	L. Rousou M, Sala-Pérez M, Serrano A, Skorupski J, Smolders S, Srebaliene G, Stehr PA, Stefanova K, Strake S, Tabarcea C, Todorova V,
Preisser, Evan	No	Chapter 2	146	146	5218	5218	that have	Trkov D, Tuaty-Guerra M, Vidjak O, Zenetos A, Žuljević A, Cardoso AC, Marine Strategy Framework Directive- Descriptor 2, Non-Indigenous
Preisser, Evan	No	Chapter 2	147	147	5257	5261	confusing sentence	Species, Delivering solid recommendations for setting threshold values for non-indigenous species pressure on European seas, EUR 30640
Preisser, Evan	No	Chapter 2	147	147	5263	5263	is 2009 really recently? Also, should be 'the Ionian'	EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-32257-3, doi:10.2760/035071, JRC124136
Rius Viladomiu, Marc	No	Chapter 2	147	147	5273	5280	Online databases like WRiMS are work in progress and are constantly being updated, so WRiMS is not just 'initial inventory'. The importance of WRiMS is that it is the first consolidated expert-edited world list of all introduced marine species. Citing the database is good as provides the most up-to-date information but a paper has recently been published presenting the database to the scientific community [Costello et al. (2021), Management of Biological Invasions 12(4): 792–811, https://doi.org/10.3391/mbi.2021.12.4.02]	EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-32257-3, doi:10.2760/035071, JRC124136.
Preisser, Evan	No	Chapter 2	147	147	5283	5283	but there are some	Thank you, this has been addressed in the final draft.
Rius Viladomiu, Marc	No	Chapter 2	147	148	5283	5303	It is not true that 'there is no global database', the WRiMS is the most comprehensive global database available and its content provide information on the sites where marine species can be found (e.g. https://www.marinespecies.org/introduced/aphia.php?p=taxdetails&id=103732#distributions). The occurrence data of each species are linked to OBIS (i.e. include the geographic coordinates of the species and not just based on countries) and are accessible upon request. Information about status of invasion is incomplete until a new study appears and provide more information on the distribution, genetics, etc. In addition, non-indigenous species are introduced into new sites all the time, changing the invasion history. WRiMS provides invasion data for broad regions of the world's oceans	Thank for your comment. We revised this section accordingly.
Preisser, Evan	No	Chapter 2	147	147	5289	5289	global (Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	147	147	5289	5289	global or Fishbase'...what? Records?	Thank you, this has been addressed in the final draft.
Grossart, Hans-Peter	No	Chapter 2	148	149	5305	5354	The deep sea chapter is also problematic due to the large knowledge gaps. I suggest to more clearly state what we don't know!	Thank you for this comment. We have tried to clarify this as a knowledge gap.
Preisser, Evan	No	Chapter 2	148	148	5316	5316	> 300 m	Thank you, we added 'm' after 300
White, Michael	No	Chapter 2	148	148	5320	5324	Seabed mining is going to be a big problem: bound to introduce IAS	Thank you for this comment. We will be sure to pass this on to the future dynamics or impacts chapters.
White, Michael	No	Chapter 2	149	149	5339	5341	And became about 15% saltier ~ osmotic issues for spp	Thank you for this important comment.
Li, Bo	No	Chapter 2	149	149	5345	5345	"of off" should be replaced by "o".	Thank for spotting this. We have corrected in thr final draft
Preisser, Evan	No	Chapter 2	149	149	5345	5345	of off?	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	149	149	5348	5349	by lithodid crabs from the Ross Sea that have crossed the Antarctic shelf	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	149	149	5374	5374	invasions.	Thank you, this has been addressed in the final draft.
Lieurance, Deah	No	Chapter 2	149	149	5377	5377	recommend changing 'between' to 'range'	Thank for spotting this. We have corrected in the final draft
Faulkner, Katelyn	No	Chapter 2	150	150	5388	6392	A useful reference on introductions to cities and their spread from cities into outlying areas: Padayachee AL, Irlich UM, Faulkner KT, Gaertner M, Procheş Ş, Wilson JRU, Rouget M (2017) How do invasive species travel to and through urban environments? Biological Invasions 19: 3557–3570.	Thank you for your comment. The reference has been added
Preisser, Evan	No	Chapter 2	150	150	5389	5389	and beyond were	Thank for spotting this. We have corrected in the final draft
Lembrechts, Jonas	No	Chapter 2	150	150	5399	5399	Lososová et al. Is not in the reference list? On a related note, Géron et al. 2021 (https://link.springer.com/article/10.1007/s10530-021-02469-9) showed that urban alien plants originate from warmer and drier native origins, versus rural alien plants from cooler and wetter (in oceanic Europe-	Thank you for this suggestion. We have chosen to include it in the section.
Lembrechts, Jonas	No	Chapter 2	150	150	5413	5413	these are'	Thank for spotting this. We have corrected it in the final draft
Preisser, Evan	No	Chapter 2	150	150	5420	5420	herptiles?	Thank you. This term is correct.
Uludag, Ahmet	No	Chapter 2	151	151	5433	5448	Ailanthus altissima, Robinia pseudoacacia and Erigeron spp are wide spread in urban areas I think there is a special need to fill gap. Tely are actually urban weeds.	Thank you, this is an excellent point and also very good examples. However, we are refraining from identifying particular species in the data and knowledge gaps sections as we cannot cover the full variation that exists globally.
Faulkner, Katelyn	No	Chapter 2	151	151	5438	5439	A useful reference: Padayachee AL, Irlich UM, Faulkner KT, Gaertner M, Procheş Ş, Wilson JRU, Rouget M (2017) How do invasive species travel to and through urban environments? Biological Invasions 19: 3557–3570.	Thank you for your comment. The reference has been added
Preisser, Evan	No	Chapter 2	151	151	5447	5447	on alien taxonomic groups other than plants	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 2	151	151	5448	5448	... ecoregions surrounding each city is needed. [delete: are]	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	151	151	5448	5448	is needed	Thank you, this has been addressed in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	151	151	5455	5457	What is the relevance of mentioning "first sites of new introduction 5455 of novel crops, genetically modified organism, biofuel crops, and novel genotypes of cultigens" and ornamental plants? Is the author suggesting these are IAS? Delete these references.	As explained above, some of these species, and especially their pathogens, weeds, or plant protection produced can be introduced as well and spread outside cultivated fields

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	152	152	5475	5482	None of these are trends. At best, they give information on status.	Thank you for your comment. The section has been rephrased and the original text moved to the Status section.
Martin, Jean-Louis	No	Chapter 2	152	152	5485	5500	See comment above about crop plants: Figure 1.1. What about crop species that are for many non native to the area were they are grown. As these are sometimes given as examples to minimize the issues related to non native species would a special comment mentioning that most crops species have been selected towards human needs and in the process for most of them have seen their potential to thrive without human help highly reduced making them very unlikely to become problematic invaders. I mention this here in case the question has not been dealt with. E.g. see Chapter 2 page 152 lines 5485 to 5500	Thank you for your comment. The terms used in this assessment are defined in the glossary. In general, crop species are not considered as being alien as long as they do not "escape" into the wild.
Uludag, Ahmet	No	Chapter 2	152	152	5485	5485	New Ipomoea and Amaranthus species in Turkey shows that changing agricultural practices changes weed problem in North America and these weeds of America become alien plants in the old world. Furthermore species such as solanum alaeagnifolium is increasing in arable areas as well and expanding in all habitats.	Thank you for these excellent suggestions. We will not add additional examples, however, as we already have many.
Government of Guinea Bissau	Yes	Chapter 2	152	159	5507	5819	The intensity of human intervention in these areas must be carried out with strict respect for their specific characteristics.	Thank you for your comment. Chapter 2 does not address interventions, which are covered in chapter 5 of this assessment.
Government of Guinea Bissau	Yes	Chapter 2	152	159	5507	5819	They are of strategic importance for the harmonious development of our countries and for this very reason human intervention in these ecosystems must be carried out with precautionary measures in order to further reduce the introduction of both fish and macroinvertebrates into the environment.	Thank you for your comment. Chapter 2 does not address interventions, which are covered in chapter 5 of this assessment.
Preisser, Evan	No	Chapter 2	152	152	5845	5845	in Eastern Europe	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	153	153	5522	5522	posing a relevant impact?	Thank you for your comment. We have revised this sentence.
Li, Bo	No	Chapter 2	153	153	5523	5524	After "and became invasive", a recent reference can be cited: Ju RT, Li X, Jiang JJ, Wu JH, Liu JG, Strong D & Li B. 2020. Emerging risks of non-native species escapes from aquaculture: call for policy improvements in China and other developing countries. Journal of Applied Ecology, 57: 85–90. doi: 10.1111/1365-2664.13521.	Thanks for this suggested change. We have included it in the new version.
Preisser, Evan	No	Chapter 2	153	153	5525	5525	it resulted those?	Thank for spotting this. We have corrected in the final draft
Government of China	Yes	Chapter 2	153	153	5531	5536	The common saying is Asian carp, in the text "Chinese carp" should be changed to "Asian carp" or directly use the species name.	Thank you, 'Chinese carp' has been changed to 'Asian carp' through the final draft
Preisser, Evan	No	Chapter 2	153	153	5531	5536	run-on sentence	Thank for spotting this. We have corrected in the final draft
Government of China	Yes	Chapter 2	153	153	5540	5543	The common saying is Asian carp, in the text "Chinese carp" should be changed to "Asian carp" or directly use the species name.	Thank you, 'Chinese carp' has been changed to 'Asian carp' through the final draft
Preisser, Evan	No	Chapter 2	153	153	5555	5555	thus increasing aquaculture-based introductions for	Thank you, this has been addressed in the final draft.
Lieurance, Deah	No	Chapter 2	154	154	5582	5584	This sentence doesn't make sense...Invasive seaweeds and it read the molluscs are an example Finally, since the 1970s many alien seaweeds have been unintentionally introduced through aquaculture, especially molluscs, while very few species were intentionally introduced for production, increasing slowly, since the 2000s	Thank for spotting this. We have corrected in the final draft
Li, Bo	No	Chapter 2	154	154	5590	5590	Ju, Li et al. (2020) can be cited before Silva et al., (2009).	Thanks for this suggested change. We have included it in the new version.
Government of China	Yes	Chapter 2	154	154	5594	5596	The previous content has reflected the overall situation of aquaculture in Asia and major aquaculture countries. There is no need to list the specific aquaculture categories in China separately.	Thank you for your comment. We removed this sentence.
Faulkner, Katelyn	No	Chapter 2	155	155	5614	5618	Information on freshwater parasites introduced to South Africa along with their hosts that were introduced for fishing, aquaculture etc is provided in Weyl et al. (2020). Weyl OLF, Ellender B, Wassermann R, Truter M, Dalu T, Zengeya TA, Smit NJ (2020) Alien freshwater fauna in South Africa. In: van Wilgen BW, Measey GJ, Richardson DM, Wilson JR, Zengeya TA (Eds), Biological invasions in South Africa. Springer, Cham, Switzerland, 153–183.	Thank you for the comment. We have added the example and the reference
Preisser, Evan	No	Chapter 2	155	155	5619	5619	up to now	Thank you, this has been addressed in the final draft.
Sagoff, Mark	No	Chapter 2	155	155	5619	5619	Typo" "know" should be "now."	Thank you, this has been addressed in the final draft.
Government of Guinea Bissau	Yes	Chapter 2	155	159	5635	5819	Coastal zones are generally fragile ecosystems but rich in biological diversity.	Thank you for this important comment.
Preisser, Evan	No	Chapter 2	156	156	5645	5645	protists to	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	156	156	5645	5645	There are also now fewer deliberate introductions of fishes and macroinvertebrates into the natural environment, likely because the potential negative impacts of such releases are now better understood	Thank you for your comment. We rephrased the sentence as suggested
Karayannis, Theofanis	No	Chapter 2	156	156	5652	5653	We had provided a similar comment in the review of the draft Post-2020 Global Biodiversity Framework, where a similar statement was included using the same reference. The referenced study does not take into account (and explicitly acknowledges this) the implementation of instruments already developed to prevent IAS introductions by shipping, including the Ballast Water Management Convention and the Biofouling Guidelines. Further, the authors of this study developed their own forecasts of shipping traffic to 2050, using various economic scenarios and limited historical traffic data. These estimates differ by an order of magnitude from the IMO's own estimates of shipping traffic increases to 2050 (based partly on the same economic scenarios), which we believe should be the primary source for such information as IMO is the competent UN body on shipping. Therefore, this sentence should: (a) be qualitative, rather than quantitative, in order to keep the main points while also reflecting the uncertainties as described above (this could be achieved by replacing the text "up to 20-fold" with wording such as "significantly"); and (b) make clear that the predicted increase in biological invasions from shipping in this reference reflects a 'no action' scenario that does not take into account existing instruments (this could be achieved by adding the text "without management of shipping-mediated vectors, thus underscoring the importance of existing instruments to prevent introductions via ballast water and biofouling" to the end of the sentence). In conclusion we propose to amend this sentence to "expectations of continued global shipping growth suggest the risk of biological invasions could increase significantly by 2050 without management of shipping-mediated vectors (Sardain et al., 2019), thus underscoring the importance of existing instruments to prevent introductions via ballast water and biofouling". We strongly believe this is a very fundamental point that should be made appropriately and not be missed.	Thank you for the comment, this has addressed in the final draft.
Preisser, Evan	No	Chapter 2	156	156	5659	5659	conditions that have led to dramatic increases in shipping activity are likely to	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	156	156	5660	5662	taxa. This is likely to reconfigure the	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	156	156	5680	5688	Suggest to add the following two citations:	See responses given for each citation, made in 2 different comments
Li, Bo	No	Chapter 2	157	157	5694	5698	Li, B., Liao, C.H., Zhang, X. D., Chen, H. L., Wang, Q., Chen, Z. Y., Gan, X. J., Wu, J. H., Zhao, B., Ma, Z. J., Cheng, X. L., Jiang, L. F., & Chen, J. K. 2009. Spartina alterniflora invasions in the Yangtze River estuary, China: An overview of current status and ecosystem effects. Ecological Engineering, 35 (4): 511-520. https://doi.org/10.1016/j.ecoleng.2008.05.013	Thank you for your comment. We added the suggested citation and a sentence, mentioning the mudflat conversion in China.
Government of China	Yes	Chapter 2	157	157	5696	5696	Delete, unofficial data. China has launched a census of invasive alien species in March 2021. It will take about three years to find out the number, distribution, and degree of damage of invasive alien species in China.	Thank you for the comment. To keep a balance of published material, we do not only rely on official data, which are often not available, but present also results from other reports and scientific papers.
Li, Bo	No	Chapter 2	157	157	5728	5728	Li, B., Ma, Z. J. Wu, J. H. & Ju, R. T.. 2021. Plant Invasion Ecology: the case of Spartina alterniflora in China. Higher Education Press, Beijing.	Thank you for your comment. We already added your other citation to show the effect of invasion by Spartina alterniflora as you suggested, and believe that this is now appropriately addressed.
Preisser, Evan	No	Chapter 2	157	157	5728	5728	resuming?	Thank for spotting this. We have corrected in the final draft
Preisser, Evan	No	Chapter 2	157	157	5730	5730	northern North	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	157	157	5731	5733	confusing sentence - please reword	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	157	157	5731	5731	has often been	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Preisser, Evan	No	Chapter 2	158	158	5739	5742	confusing sentence - please reword	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	158	158	5746	5751	run-on sentence	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	158	158	5747	5747	internet	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	158	158	5753	5753	Box 2.13: This is the subject of Chapter 4, and seems misplaced here.	Thank you for your comment. We have revised this box substantially to focus on trends and status of invasive alien species with impacts on good quality of life.
Lembrechts, Jonas	No	Chapter 2	158	158	5753	5753	Box 2.13: I'm not fully convinced about this box and its location here. I believe impact on quality of life is discussed in detail in other chapters. I can imagine that one would want to discuss 'data trends' in quality of life studies in this chapter, but even then results are often rather inconclusive here, as trends are hard to quantify. I haven't read the 'impact'-chapter in detail, but I would consider merging it in there	Thank you for your comment. We have revised this box substantially to focus on trends and status of invasive alien species with impacts on good quality of life.
Preisser, Evan	No	Chapter 2	158	158	5753	5753	good quality of life' is a bad way to say this... for one, it's unclear whose quality of life is being referenced. How about 'human well being'?	We appreciate your comment. However, Good Quality of Life is the terminology adopted by IPBES and to be consistent, we are using this term throughout.
Preisser, Evan	No	Chapter 2	158	158	5757	5757	They present an interdisciplinary perspective?	Thank for spotting this. We have corrected it in the final draft
Rebello, Alanna	No	Chapter 2	158	158	5757	5812	Box 2:13 in my opinion should be rethought. The English needs to be edited and the structure fixed. For example: "They present an interdisciplinary perspective", what is "they"? The invasive alien species? How can an organism, by virtue of being alien somewhere, "present" an interdisciplinary perspective? The English is poorly written, and the content doesn't make sense to me. It seems to be an attempt to suggest that alien species may not all have negative impacts, using indigenous communities as the justification, giving no evidence of where this has been documented. If the authors want to retain this box, then I suggest it is completely rewritten, and the necessary supporting evidence shown. For example, in lines 5810 to 5812, literature from South Africa is used. But it doesn't do the subtleties of the matter justice. From a cost-benefit perspective, the cost of these woody invasive alien trees in South Africa run to the billions of US dollars each year. We spend millions clearing them every year. Yes, there may be some benefits to some communities (though from an economic point of view building any business around these things is unfeasible), and maybe even in terms of protecting some indigenous forest from exploitation, however this cannot be presented without also mentioning the costs.	Thank you for your comment. We have revised this box substantially to focus on trends and status of invasive alien species with impacts on good quality of life.
Preisser, Evan	No	Chapter 2	158	158	5759	5760	by their effects that come?	Thank for spotting this. We have corrected in thr final draft
Lembrechts, Jonas	No	Chapter 2	158	158	5761	5761	Box 2.13: While this complexity...?	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	158	158	5761	5761	complexities	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	158	158	5770	5770	trends in	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	159	159	5779	5779	Don't start a sentence with an abbreviation	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	159	159	5780	5780	whose support services?	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	159	159	5786	5786	For the other taxa, very few species are reported? Also, this sentence doesn't follow from the previous one	Thank you for your comment. We have revised the box substantially to provide a more balanced view.
Lembrechts, Jonas	No	Chapter 2	159	159	5799	5803	Box 2.13: Not sure how these examples of single taxonomic units and single quality of life measurements support 'A wide range of good quality of life and taxonomic groups'	Thank you for your comment. We have revised the box substantially to provide a more balanced view.
Preisser, Evan	No	Chapter 2	159	159	5799	5800	A wide range of good quality of life and taxonomic groups is covered by almost studies??	Thank you for your comment. We rephased the sentence as suggested
Preisser, Evan	No	Chapter 2	159	159	5808	5813	very confusing sentence - please reword	Thank for spotting this. We have corrected it in the final draft
Faulkner, Katelyn	No	Chapter 2	160	168	5820	6116	In previous sections future trends are discussed, e.g. impact on future factors on introduction to the Arctic on line 4958. Perhaps it would be best if all discussions on future invasions etc were moved to this section.	Thank you for your comment. In principle, we agree with the reviewer, but in some specific cases we would like to have the discussion of future dynamics in the respective specific section.
Lembrechts, Jonas	No	Chapter 2	160	160	5820	5820	I feel like the narrative on future predictions is too descriptive. I think the main thing we want to see answered is: will numbers of new establishments accelerate or slow down? The information is in there, but I believe it should be highlighted better - and written perhaps a bit more boldly. Obviously, with all the necessary caveats as explained that it's hard to predict; but you show the graphs, so it can be discussed	Thank you for your comment. We added a few sentences about changes in rates of increase.
Li, Bo	No	Chapter 2	160	165	5820	6022	Please change the sequence "animals, plants, microorganisms" to "plants, animas, microorganisms" to keep similar sequence with other sections in Chapter 2.	Thank you for comment. We adjusted the sequence of taxonomic groups throughout the chapter to animals, plants, microorganisms.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	160	160	5821	5823	this sentence is not needed and could be removed without loss of information	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 2	160	160	5830	5831	Add "expert-based models" and delete "mechanistic models"	Thank you, this has been addressed in the final draft. We as well link to the model definitions in chapter 1.
Preisser, Evan	No	Chapter 2	160	160	5832	5832	(see chapter 1, section 1.5.9.3 for	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	160	160	5839	5839) and across	Thank you, this has been addressed in the final draft.
Luisa Nunes, Ana	No	Chapter 2	160	160	5840	5841	Should be 'as assessed by the IUCN ISSG'	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	160	160	5843	5851	Related to my previous comment, it's in this paragraph that I would like to see if these increases are faster or slower; that most numbrs will increase is perhaps rather obvious	Thank you for your comment. We added a few sentences about changes in rates of increase.
Preisser, Evan	No	Chapter 2	160	160	5847	5848	temperate Asia (...) and South America (Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	160	160	5848	5849	Globally, an average relative increase of	Thank you, this has been addressed in the final draft.
Lieurance, Deah	No	Chapter 2	161	162	5873	5879	table 2.26. The formatting of this table makes it hard to interpret,	Thank you for your comment. We agree that the high number of values makes the table difficult to read, but we prefer to keep this information for comprehensiveness.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	161	161	5876	5877	Figure 2.26: Species number entries in this table should be presumably (average \pm SD) - the use of only the plus sign is confusing. The SD for some of the fish and mammal estimates is larger than the mean, suggesting a distribution far from normal - it would be interesting to know what drives this high variability in estimates.	Thank you for spotting this error concerning the standard deviation, which is now corrected. The variation is calculated from stochastic simulations, and a high variation is mostly due to high variation in records, which in turn indicates either high uncertainty in the underlying data or the disability of the model to capture this variation appropriately. As this is a complex topic, we would like to refer to the cited literature instead of describing possible explanations.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	162	163	5882	5943	"invasion potential" is used only in section 2.5.1 - is it different from "invasion risk" used elsewhere? If retained, it needs a definition. This section is also confusing as to whether the level of risk is changing - it's clear that there is a pool of animal species that are potential invasives, but statements regarding "potential future invasion risk" (5922), for example, suggest that risk of invasion is also changing. It would be easier to follow the material if description focussed on results rather than what has been studied - moving the summary paragraph to the beginning of the section would help with this.	Yes, invasion potential is different from invasion risk, but these terms are basic and shouldn't need a definition. We do not believe that we should restructure this part as suggested
Lembrechts, Jonas	No	Chapter 2	162	162	5882	5882	A bit unusual to start the chapter on all animals with <i>Sus scrofa</i> , perhaps have an opening sentence on mammals to set the scene? Or on general patterns? Actually, the next sentence might do better as the first sentence.	Thank you for this suggestion. We have chosen to include it in the section by now starting it with the formerly second sentence. The sentence about <i>Sus scrofa</i> , <i>Urva auro-punctata</i> and <i>Procyon lotor</i> has been integrated a bit later in the section.
Preisser, Evan	No	Chapter 2	162	162	5882	5882	Among vertebrate taxa, the species	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	162	162	5882	5882	have a large potential of futre invasions worldwide' is awkward - please reword	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	162	162	5886	5887	how can a distribution suggest spreading potential?	Simply the current distribution is (much) smaller than the potential distribution
Preisser, Evan	No	Chapter 2	162	162	5889	5889	invasion	Thank you, this has been addressed in the final draft.
Estoup, Arnaud	No	Chapter 2	162	162	5893	5893	After Kriticos et al., 2017 please add " : Drosophila suzukii (Dos Santos et al. 2017) = https://doi.org/10.1371/journal.pone.0174318)." --- Note that this invasive agricultural pestinsect is indeed really problematic as it explains, to some extent, a regain of the use of pesticides in many countries ---.	Thank you for your comment. We added the example as suggested.
Preisser, Evan	No	Chapter 2	162	162	5894	5894	have also been identified for	Thank you, this has been addressed in the final draft.
Luisa Nunes, Ana	No	Chapter 2	162	162	5898	5898	Should be 'as assessed by the IUCN ISSG'	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	162	162	5899	5899	Perhaps add an explanation why there is a decreased potential?	Thank you for this suggestion. We have added an explanation.
Preisser, Evan	No	Chapter 2	162	162	5902	5902	species from taxonomic groups such as ants and termites	Thank you, this has been addressed in the final draft.
Karayannis, Theofanis	No	Chapter 2	163	163	5914	5915	The same comment in the previous row applies here too as this sentence makes the same (incorrect or at least incomplete) statement based on the same reference. This sentence should therefore also (a) become qualitative and (b) make clear that this is a 'no action' scenario. The proposed new wording is "with a projected significant increase in the global invasion risk without management of shipping-mediated vectors".	Thank you for your comment. We revised the sentence as suggested.
Rebello, Alanna	No	Chapter 2	163	163	5945	5945	The issue of future projections cannot be tackled without mention of anthropogenic climate change and C enrichment of the atmosphere, and how this will be promoting C3 over C4 pathways, driving tree invasions, both alien and native (e.g. bush encroachment). See the research of William Bond.	Climate change and global change are mentioned several times in this part. Due to space limitations, we cannot expand this part to develop more along the suggested lines
Pan, Xubin	No	Chapter 2	163	163	5946	5946	Change "pants" to "plants"	Thank you, this has been addressed in the final draft.
Pouteau, Robin	No	Chapter 2	164	164	5969	5970	Bellard et al. (2018) https://doi.org/10.1002/ecc3.4098 showed the opposite pattern (most studies report a decrease in overall potential future range sizes)	Thank you for your comment. We have revised the statement accordingly.
Lembrechts, Jonas	No	Chapter 2	164	164	5987	5987	Perhaps say 'alien vascular plant species richness', if this is not about the total richness (or is it?)	Thank you, this has been addressed in the final draft.
Estoup, Arnaud	No	Chapter 2	165	165	6025	6027	1) and 2) seem to express the same thing to me = "1) data availability of past and current distributions of species, 2) knowledge gaps of the past and current distribution of species"	Thank you for your comment. Knowledge and data are two different aspects as knowledge is generated from data, and both are lacking in this context.
Luisa Nunes, Ana	No	Chapter 2	165	165	6034	6034	Should be 'as assessed by the IUCN ISSG'	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	166	166	6063	6063	Please change "well studies" to "well studied".	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	166	166	6063	6063	to a few well-studied alien	Thank you, this has been addressed in the final draft.
Grossart, Hans-Peter	No	Chapter 2	166	166	6065	6065	Figure 2.30: The graph for the fungi is very problematic and far from being comprehensive...!	Thank you for your comment. These numbers originate from the largest review of existing literature on future projections ever. We are therefore confident that it shows a comprehensive overview of available literature.
Lieurance, Deah	No	Chapter 2	166	166	6065	6065	Figure 2.30, 2.31 These graphs should be remade in the same program as other figures in the chapter. Inlde x and y axis	The figures have been updated to fit the same style as similar figures in the chapter and to increase readability. We only include x-axis labels for the lower row in plots with multiple facets across multiple rows to avoid redundant text.
Preisser, Evan	No	Chapter 2	167	167	6073	6073	review of the	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	167	167	6076	6076	regions	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	167	167	6079	6079	Please change "studies group" to "studied group".	Thank you, this has been addressed in the final draft.
Pouteau, Robin	No	Chapter 2	167	167	6079	6079	Don't you mean 'vertebrates'?	Thank you for the comment. The statement is correct. Based on the literature review and the information provided in Box 1.13 in chapter 1 you can confirm this statement. The relevant section in the box reads: "Most of the papers focused on invasive alien plants (including bryophytes), with 40% observations (from a total of 858 observations), followed by invertebrates (30%), fishes (8%), mammals (7%), amphibians, birds and reptiles (3%) [...]"
Preisser, Evan	No	Chapter 2	167	167	6079	6079	predominantly studied group	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	167	167	6080	6080	are lacking	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	167	167	6086	6086	Perhaps shortly explain what a back-casting approach is?	Thank you for this suggestion. We have chosen to include it in the section and now include a short explanation of backcasting and an appropriate reference to Dreborg (1996) Dreborg K (1996) Essence of Backcasting. Futures, 28, 813-828. doi: 10.1016/S0016-3287(96)00044-4
Lembrechts, Jonas	No	Chapter 2	167	167	6087	6090	Several textual errors in these lines	Thank you, we have fixed those mistakes.
Preisser, Evan	No	Chapter 2	167	167	6088	6088	application has increased more rapidly	Thank you, this has been addressed in the final draft.
Preisser, Evan	No	Chapter 2	167	167	6090	6090	models that combine both	Thank you, this has been addressed in the final draft.
Li, Bo	No	Chapter 2	167	167	6094	6094	Please change "is" to "are".	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	169	171	6117	6117	currently, the conclusions focus only on what needs to be done to improve status and trends information. Normally I would expect to find a broad summary first: a few paragraphs that outline the main findings at a very high level (that is, alien species are everywhere and increasing, impacts are concentrated in certain places, and so on). Before explaining key information challenges, please explain why addressing them is necessary to improve outcomes (policy relevance requires an emphasis on improving outcomes, rather than improving knowledge) - this may require reference to other chapters. Lines 6150-6153 are a good start to this ("abiotic species" requires a copy-edit) - yet improved understanding is only a step on the path to improved environmental outcomes. Decision makers will have a good understanding of how costly it is to monitor, so it is important to clearly explain its value.	Due to space limitation, we cannot afford in this report to repeat information in a few paragraphs in the conclusion. Such summary is already present at the beginning. For the same reasons of lack of space in this already very large report, we have not explained why improving knowledge is important. This is written in other places
Government of China	Yes	Chapter 2	169	169	6118	6127	It is necessary to carry out nation-wide inventory of invasive alien species to obtain the baseline information, which is critical.	Thank you for your feedback. Please note that we highlight the need for more widespread and consistent monitoring throughout the assessment.
Li, Bo	No	Chapter 2	169	169	6119	6120	Can add "transportation" before "human disturbances"?	Thanks for this suggested change. We have included it in the new version.
Government of Argentina	Yes	Chapter 2	169	169	6125	6127	Given the recognition of data gaps and the lack of information from past periods, we do not understand how the conclusion that biological invasions are a global phenomenon can be reached. We recommend to delete this reference.	Thank you for your comment. We wanted to express that the transport of species by humans is a global phenomenon. We therefore prefer to leave this sentence. But please note that we have revised the whole section.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	169	169	6126	6127	All policy decisions are made on incomplete and biased data - this sentence should focus on the "so what?" element - given that data are never complete or truly representative, what are the risks here? Are data good enough to make good enough decisions?	Thank you for your comment. We have revised the whole section taking the comment into consideration.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	169	169	6129	6129	a subtitle such as "improving information sharing" would be more appropriate here - "collaboration" is too sweeping.	We think that on the contrary information sharing is too restrictive; we need to go beyond that and truly collaborate
Rebello, Alanna	No	Chapter 2	169	169	6130	6130	Comma needed after "equitable"	Thank you, this has been addressed in the final draft.
Rebello, Alanna	No	Chapter 2	169	169	6133	6133	Should citizen science also be mentioned here? (e.g. iNaturalist.org?) It is mentioned in this section: "Inclusive biodiversity monitoring" but could also be briefly stated here.	Since it is already mentioned in this part, and due to lack of space, we did not mention it again here

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Lembrechts, Jonas	No	Chapter 2	170	170	6174	6174	References to such standardization needed? For example Haider et al. (2022) for mountains: DOI: 10.22541/au.162219027.79625324/v1	<p>Thank you for this suggestion. We have chosen to include it in the section and now refer to 3 example references (De Pooter et al. 2015; Groom et al. 2017; Roy et al. 2017; Haider et al. 2022)</p> <p>De Pooter et al. (2017) Toward a new data standard for combined marine biological and environmental datasets - expanding OBIS beyond species occurrences. Biodiversity Data Journal, 5, e10989. https://dx.doi.org/10.3897/bdjournal.5.e10989</p> <p>Groom et al. (2017) Seven Recommendations to Make Your Invasive Alien Species Data More Useful. Frontiers in Applied Mathematics and Statistics. https://doi.org/10.3389/fams.2017.00013</p> <p>Roy et al. (2017) Developing a framework of minimum standards for the risk assessment of alien species. Journal of Applied Ecology, 55, 526-538. https://doi.org/10.1111/1365-2664.13025</p> <p>Haider et al. (2021) Think globally, measure locally: The MIREN standardized protocol for monitoring plant species distributions along elevation gradients. Ecology & Evolution, 12, e8590. DOI: https://doi.org/10.1002/ecc3.8590</p>
Lembrechts, Jonas	No	Chapter 2	170	170	6176	6176	This paragraph lacks references	Thank you for your comment. We have revised the whole section taking the comment into consideration.
Li, Bo	No	Chapter 2	170	170	6176	6189	Need cite some latest references in "technological advances".	Thank you, authors have cited the most relevant references. As the reviewer did not suggest additional newer references, we haven't made any changes.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 2	170	170	6179	6182	The last time I spoke with remote sensing experts they claimed that, contrary to the text, satellites cannot "distinguish individual plant species and measure plant traits". At the very least, a reference should be added.	Thank you for your comment. We have revised the whole section taking the comment into consideration.
Preisser, Evan	No	Chapter 2	170	170	6196	6196	measures, and synergies	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 2	170	170	6198	6198	Any references on the use of iNaturalist for invasive species? We used it here in Géron et al. 2021 (https://onlinelibrary.wiley.com/doi/full/10.1002/ecc3.7872), yet more for applications in science than for monitoring itself	<p>Thank you for this suggestion. We have chosen to include it in the section and now refer to 4 example references (Ballard et al. 2017a,b; McKinley et al. 2017; Aristeidou et al. 2021) that relate to citizen-science (esp. iNaturalist) and the engagement of the general public and associated learning. We did not include Géron et al. (2021) given its explicit focus on the application of citizen-science data to science rather than public engagement.</p> <p>Ballard et al. (2017a) Youth-focused citizen science: Examining the role of environmental science learning and agency for conservation. Biological Conservation, 208, 65-75. https://doi.org/10.1016/j.biocon.2016.05.024</p> <p>Ballard et al. (2017b) Contributions to conservation outcomes by natural history museum-led citizen science: Examining evidence and next steps. Biological Conservation, 208, 87-97. https://doi.org/10.1016/j.biocon.2016.08.040</p> <p>McKinley et al. (2017) Citizen science can improve conservation science, natural resource management, and environmental protection. Biological Conservation, 208, 15-28. https://doi.org/10.1016/j.biocon.2016.05.015</p> <p>Aristeidou et al. (2021) How Do Young Community and Citizen Science Volunteers Support Scientific Research on Biodiversity? The Case of iNaturalist. Diversity, 13, 318. https://doi.org/10.3390/d13070318</p>
White, Michael	No	Chapter 2	170	171	6201	6204	CoralWatch, Project NOAH, e-bird all good too	Thank you for your comment. We added the suggested examples in the revised version of the text.
Li, Bo	No	Chapter 2	171	171	6204	6206	Can change "community science" to "citizen science"?	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 2	171	171	6211	6213	This sentence is not well-supported and can be deleted.	We thank the reviewer for this comment, but we have chosen to keep it, as it adds value. As it uses the potential "may", we do not believe that we overstate the point
Hirsch, Tim	No	Chapter 2	223	223	8743	8745	Citation for Monteiro et al. (2020b) does not follow guidelines and should include a DOI in order for this reference to be attributed to IPBES in the GBIF citation tracking system. Correct citation is: Monteiro M, Reino L, Schertler A, Essl F, Ferreira M T, Figueira R, Capinha C (2020). Global database of alien macrofungi. Version 1.4. CIBIO (Research Center in Biodiversity and Genetic Resources) Portugal. Checklist dataset https://doi.org/10.15468/2qky1q accessed via GBIF.org on xxxx-xx-xx.	Thank you for your comment. We have updated the reference according to the journal article its referring to.
Jeschke, Jonathan	No	Chapter 2	229	229	9035	9035	Please remove "(October 2016)", as the month is not given for other references (plus October 2016 is not correct, as this paper was published in January 2017)	Thank you for your comment. We have updated the reference.
Jeschke, Jonathan	No	Chapter 2	234	234	9291	9295	All words in the title of this reference are currently written in upper case -> suggest to use the same format as for most other references	Thank you for your comment. We have updated the reference following the recommended citation of the source.
Jeschke, Jonathan	No	Chapter 2	236	237	9408	9409	There are some weird symbols in this reference -> please remove them	Thank you for your comment. We have updated the reference.
Jeschke, Jonathan	No	Chapter 2	240	240	9561	9561	Please remove "Scopus." (this is not part of this reference).	Thank you for your comment. We have updated the reference.
Jeschke, Jonathan	No	Chapter 2	250	250	10093	10096	Some special characters are incorrect in this reference, and the words in the title of this reference are currently written in upper case -> suggest to use the same format as for most other references	Thank you for your comment. We have updated the reference.
Akite, Perpetra	No	Chapter 3	0	0	0	0	Some statements in the document are left hanging with minimal clarity.	Thank you, we have revised the draft accordingly
Akite, Perpetra	No	Chapter 3	0	0	0	0	There are a number of citations where either both first and second author's names are cited or where two authors names are cited in references with multiple authors. Examples have been highlighted in some specific places. See line 3795 (page 97) for multiple example	Thank you, we have revised the references in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Estoup, Arnaud	No	Chapter 3	0	0	0	0	I found a number of redundancies (at the sentence if not paragraph level) in the chapter = same things mentioned several times. I understand that this is sometimes justified by the structure of the chapter and in a way somewhat « useful » to strengthen key take-home messages. However, at least through a last polishing step, a global effort could be done to remove some non-useful redundancies that makes the chapter sometimes a bit « lengthy and heavy » to read.	Thank you for your comment. While we are aware of redundancies and try to minimize them, we are also mindful that many readers may not read the entire report and may need reminders of critical aspects. We therefore attempt to balance these two need, and have taken a critical look at this aspect during final revisions.
Estoup, Arnaud	No	Chapter 3	0	0	0	0	In agreement with my point 17 (see above), please create in Chapter 3 a special section # 3.6 (section 3.6 becoming 3.7) entitled "Evolution as a driving force of biological invasion" preferentially using the following structure: 1/ The genetic basis of evolution during invasion (corresponding to the content of Box 2.4 from Chapter 2 + the modifications I proposed above in this box), then 2/ Evolution and adaptation observed during biological invasions (corresponding to the content of Box 2.5 from Chapter 2 + the modifications I proposed above in this box); and then 3/ sub-section 3/ Evolution during invasions: monitoring, management and future directions? (corresponding to the content of Box 2.3 from Chapter 2 + the modifications I proposed above in this box).	Thank you for your comment.
Estoup, Arnaud	No	Chapter 3	0	0	0	0	Please check that all references cited in the text are present in the reference list	Thank you, we have revised the references in the final draft.
Government of Argentina	Yes	Chapter 3	0	0	0	0	Throughout the chapter it is pointed out that the international trade of commodities represents the most important route by which invasive species are introduced. It should be noted that line 1127 states: International trade (whether legal or illegal) in commodities (eg, minerals, petrochemical products, agricultural commodities, machinery and electronics, plants, and wildlife) represent the most important route through which invasive alien species are introduced into a new region." It should be noted that the concept of "illegal trade" is not defined in CITES or the CBD. We request to review this references carefully in the light of these comments.	This point does not refer to CITES or the CBD, but to the cited literature on international trade as a driver of invasions, as specified and described in the text below. This text specifies different pathways, including illegal trade (see e.g., line 1157).
Government of Armenia (Aghasyan, Levon)	Yes	Chapter 3	0	0	0	0	The problem is occur across the chapters is a big difference between styles of visualizations. For example in Figure 3.7 taxonomic groups are shown as icons in case that in chapter 2 these groups are just text. Or in figure 3.13 map is black and white in case that all other maps of other chapters are colorful	Thank you, we have harmonized style where possible - but note that chapters are also stand-alone documents
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 3	0	0	0	0	Chapter 3 is essential to better understand the drivers of biological invasions and IAS spread. However, because the term "driver" is used both in the context of "drivers of biodiversity loss/change" and in the context of "drivers of IAS introductions and spread", it is harder to understand the conclusions of the chapter. Especially as some "indirect drivers of biodiversity loss" can be "indirect or direct drivers of IAS". If there is a way to make a clearer distinction between drivers of biodiversity loss and what are the factors that influence IAS introductions and spread the most, the chapter would be much easier to read. I understand this is not necessarily an easy task however, and appreciate the work undertaken.	The chapter focused on drivers of biodiversity change as drivers of biological invasions. We have revised the introduction to make sure this is made clear.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	0	0	0	0	Alien species are selected from the suite of introduced species by environmental conditions. The text should be careful not to suggest that alien species as a whole are better able to tolerate certain conditions such as pollution or warming climate - it is that the (presumably few) species able to tolerate such conditions can establish and persist while native species may not be able to tolerate changed conditions, creating niche space for aliens. For example, lines 2950-2951 is not warranted - it is that a hyper accumulator is able to exploit an empty niche and becomes invasive. Lines 4618-4619 are more fair. Every species is native somewhere.	Thankyou for this comment. The language is now moderated, and specific reference to "hyperaccumulators" deleted.
Government of Canada (Turkington, Thomas)	Yes	Chapter 3	0	0	0	0	"The importance of long-distance transport of IAS (plant pathogens, e.g. fungi) should be recognized more clearly. Certainly continent to continent spread is one aspect, but also long distance transport related to regional spread of IAS. E.g. the cereal rust "Puccinia pathway" in North America. Certainly cereal rusts are normal pathogen issues, but changes in virulence such as that observed for the stem rust race UG99 could be considered an IAS and if there is continental spread via long-distance wind transport or perhaps via humans (adherence of uredospores on clothing and transfer from one location to another) this could then be followed by rapid regional spread in Central, South and North America via wind parcels. Another aspects is smaller scale spread where an issue is introduced into an area and then establishes itself in the area, followed by step by step progress over shorter distances via wind spread, soil movement, or seed movement. Potential long-distance transport is not only a concern for cereal rusts, but also coffee rusts, and asian soybean rust. The following is from a Canadian perspective and relates to cereal rusts, but would have applicability to asian soybean rusts, etc. Source, dispersal and risk of cereal rusts In general, cereal rusts, especially for wheat and barley, will overwinter on cereals and grasses in the southern USA and northern Mexico, although stripe rust can also overwinter in the Pacific Northwest (PNW) and California (Chen 2005; Menzies and Gilbert 2003; Wiese 1987; Xi et al. 2015). Rust spores (also known as urediniospores) are blown northward by wind currents, affecting successive northerly winter and spring cereal crops (Agrios 1988; Chen 2005; Menzies and Gilbert 2003). In the Prairie region, rust spores will typically arrive in mid to late June. Several scientific reviews provide more detail on long distance transport of cereal rust fungi and other plant pathogens (Aylor 1990, 2003; Brown and Hovmöller 2002; Chen 2005; Eversmeyer and Kramer 2000; Nagarajan and Singh 1990). Spread of cereal rusts into Western Canada from locations in the USA will depend on the following factors: <ul style="list-style-type: none"> • Disease severity and pathotypes at the point of origin • Release and turbulent transfer of spores into upper atmosphere air parcels • Movement and direction of air parcels • Spore survival during long distance transport • Deposition of spores over at-risk locations in Western Canada • Crop growth stage for at-risk locations • Prevailing weather conditions for at-risk locations Rust spore liberation from symptoms on infected cereal leaves is favoured by increased wind speeds and sudden wind gusts, while vertical movement into upper air parcels is favoured by convective wind currents resulting from surface heating and cooling during the 24 hour night/day cycle (Aylor 1990; Nagarajan and Singh 1990). Burleigh et al. (1967) found that the aerial concentration of rust spores increased when disease levels were increased in wheat crops below the	Thankyou for this interesting comment. Some of this material is covered in section 3.7.4.3, dealing with climate change (extremes) impact on spread of alien species, including pathogens. Some of the provided material was incorporated there. A cross-reference is also made from section 3.3.4.5 Fire (which may increase wind and hence rust uptake).

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Turkington, Thomas)	Yes	Chapter 3	0	0	0	0	<p>There may be concerns related to the introduction of plant species into new regions/countries, where these plants species have new plant disease resistance genes or perhaps with the introduction of existing crops species (e.g. wheat) with enhanced plant disease resistance genes. The potential concern may be in relation to an impact on natural ecosystems and plant species and that these introduced species may result in selection pressure on existing pathogen populations for increased virulence on related plant species in these natural ecosystems. Overall, the main environmental impact of improved resistance including the use of new genes would be through decreased levels of the pathogen, selection. placed on pathogen populations, and economic and environmental benefits associated with reduced pesticide use. Shifts in virulence in pathogen populations may result from the deployment of resistance genes, which is not new and has been occurring routinely for some host-pathogen systems. over the past 50-100 years. These shifts are largely due to widespread and frequent (over time) cultivation of new disease resistant varieties by producers, which then places selection pressure on pathogen populations. Thus, virulence factors may evolve, which could enhance a plant pest. However, this is occurring in commercial fields as a consequence of variety use patterns by producers and its impact on pathogen populations. Although, deployment of resistance genes might result in transfer to wild relatives via cross pollination, the risk of this is likely limited as most current and historic shifts in pathogen populations are the result of crop variety use patterns by producers and not transfer to wild relatives (AyesuOffei 1971; Linde et al. 2016; Kilby and Robinson 2001; Shipton et al. 1974; Turkington et al. 2005; Zhan et al. 2007). The observed risk is mainly in terms of wild relatives and wild and tame grass host species being a reservoir of potentially more virulent cereal leaf spot pathotypes (Linde et al. 2016; Kilby and Robinson 2001; King et al. 2013). In addition, changes in cereal rust pathogen populations due to genetic recombination can occur when the rust pathogens are growing on their alternate hosts (Eversmeyer et al. 2000; Sinha and Chen 2021). Fortunately, historical initiatives such as the barberry eradication program have limited the risk associated with alternate hosts (Peterson 2013).</p> <p>A potential negative environmental impact may also result by release and cultivation of crop varieties without resistance genes, thus allowing the buildup of pathogen populations and a resulting greater reliance on pesticide use and its potential negative impact on non-target organisms and soil, water and air environments. These impacts may greatly eclipse any theoretical risk in terms of introduced plant disease resistance genes in relation to wild relative populations and the environment.</p> <p>References: Ayesu-Offei, E.N. 1971. Leaf scald of barley. Ph.D. Thesis, Department of Plant Pathology, Waite Agricultural Research Institute, University of Adelaide, South Australia, March 1971. 158 pp. Eversmeyer, M.G., and Kramer, C.L. 2000. Epidemiology of wheat leaf rust and stem rust in the central great plains of the USA. Annu. Rev. Phytopathol. 38: 491–513.</p>	Thankyou for this comment. Evolutionary aspects are not considered 'drivers' in the IPBES framework and hence also not in this report. Evolutionary aspect are treated under chapter 2.
Government of Germany	Yes	Chapter 3	0	0	0	0	<p>General comment: Congratulations to the authors for this well-structured, content-rich and informative chapter. The amount of knowledge gathered, supported by case studies and illustrations, is impressive. The adaptations of the original driver model from the IPBES Conceptual Frameworks is well understood. The last subchapter (Synthesis and Summary) could well be a bit more comprehensive (especially the part on assigning relative roles of indirect and direct drivers of biodiversity change on the transport, introduction, establishment and spread of invasive alien species) with a transition to the next chapter.</p>	The summary has been reviewed and edited
Government of USA	Yes	Chapter 3	0	0	0	0	<p>Through out the whole chapter (and other chapters) the majority of examples are from plants, mammals and birds. There are very few examples given for insects even though most animal invasions are insects and perhaps the greatest impacts are from insects</p>	Thank you, we have added some examples (see especially the Emerald ash borer in Chapter 4)
Odé, Baudewijn	No	Chapter 3	0	0	0	0	<p>I seem to miss the food forest (agroforestry) initiatives in this chapter. Those include the introduction of alien tree and shrub species with e.g. fruits or nuts and may or may not include cultivars that are suitable to the region. In The Netherlands a risk assessment has been performed for species involved in such new initiatives (Hoppenreijis, J.H.T., R. Beringen, F.P.L. Collas, D.D.M. Eeuwes, B. Odé, J.L.C.H. van Valkenburg & R.S.E.W. Leuven, 2019. Risicobeoordeling van voedselbossen als introductieroute voor invasieve plantensoorten. Radboud Universiteit, Nijmegen)</p>	Thankyou for this comment. Agroforestry (for multiple purposes) was mentioned in section 3.3.1.1, under the subheading "Forestry...". We have included the cited the suggested food forestry example.
Participants of ILK dialogue workshop (Florence Daguitan)	No	Chapter 3	0	0	0	0	<p>SPM A, B, Ch 3: From my region, Cordillera, Philippines, we have been exchanging crops and animals between villages. Only in 80s and 90s we came face to face with invasions, some of which were introduced by governments. This could be related to disturbance of ecosystems. We did not have experience of IAS prior to 70s, in spite of ongoing exchange of plants and animals. We also have epidemics of plant disease, and some scientists are saying it is due to soil deterioration.</p>	This aspect has now been included within the section on National Policies
Participants of ILK dialogue workshop (Guadalupe Yesenia Hernández Márquez)	No	Chapter 3	0	0	0	0	<p>Ch 3, SPM C, D: Threats to IPLC land and sea tenure should be highlighted as a driver of IAS all over the world.</p>	This aspect has now been included within the section on National Policies
Participants of ILK dialogue workshop (Lucy Mulenkei)	No	Chapter 3	0	0	0	0	<p>Ch 3, SPM B: Is livestock moving around in pastoralist areas a driver? Is this mentioned? In some communities you find that plants that are alien to the area are caused by livestock movement.</p>	Thank you for this comment, yes this is dealt with in Chapter 3 (land use)
Participants of ILK dialogue workshop (Lynn Jacobs)	No	Chapter 3	0	0	0	0	<p>SPM A, B, C, Ch 3, 6: Our indigenous community is located outside of city of Montreal, which a heavily urbanized area. The main drivers of IAS are the influences from urban environments around us. IAS are coming from wetlands we share with neighbours, and phragmites are filling our wetlands due to filling and clearing activities going on around our territories. So we have minimal control over that process, in spite of the government duty to consult. This shows how it is important to fulfill the duty to consult. This also shows again the importance of moving beyond the concept of "stakeholders", for indigenous peoples, as we are rights holders, so consultation on traditional territories is vital.</p>	Thank you for the comment. This aspect has been Included in urbanization.
Participants of ILK dialogue workshop (Maria Elena Regpala)	No	Chapter 3	0	0	0	0	<p>Ch 3, SPM A: In our area most of the IAS have been caused by government policy. Is this explored in the assessment?</p>	Thank you, chapter 3 also reflects these observations
Participants of ILK dialogue workshop (Te Tui Shortland)	No	Chapter 3	0	0	0	0	<p>Regarding drivers - Threats to IPLCs land and sea tenure is a major driver for invasives around the world. Acknowledgements of rights of IPLCs is disregarded in many areas where biodiversity loss happens, and invasives increase threatening IPLC guardianship of the world's hotspots. Some indigenous communities are at war protecting their territorial integrity in numerous regions of the world.</p>	This aspect has now been included within the section on National Policies
Volery, Lara	No	Chapter 3	0	0	0	0	<p>Although I understand the need to stay consistent throughout the IPBES report, I think keeping the distinction between direct and indirect drivers here is more confusing than helping. I do not understand the need to have the drivers being classified as either direct or indirect when each driver can have direct and/or indirect effects on different response variables. Keeping this distinction between direct/indirect drivers of biodiversity loss for addressing the drivers of invasive alien species, and structuring the whole chapter based on this distinction (which does not apply here anymore), does not really make sense to me. In my opinion, it would be less confusing to explain at the very beginning of this chapter that we are now looking at a different response variable (invasive alien species -and not biodiversity anymore), and that thus the drivers that used to be direct or indirect drivers of biodiversity loss might now be direct or indirect drivers of invasive alien species. Then, the chapter can be structured around direct/indirect drivers of invasive alien species. This would also spare some complicated explanations throughout the document on whether each driver is really direct/indirect for invasive alien species. For clarity, a summary figure/table could be added, showing the direct vs indirect drivers of biodiversity loss in a first panel and the direct vs indirect drivers of invasive alien species in a second panel.</p>	The IPBES IAS assessment should not be viewed in isolation from other IPBES assessments and thus a common structure is warranted which refers to a consistent terminology. By specially changing the terminology for the IAS assessment to drivers of invasions from drivers of biodiversity change there is a risk of confusion and a loss of comparability. Furthermore, there is something fundamentally different between the more societal indirect drivers and the more edaphic/biotic direct drivers. the introduction has been reviewed to make this more clear.
Volery, Lara	No	Chapter 3	0	0	0	0	<p>I find that addressing first the direct drivers and then the indirect drivers might make more sense than the contrary. Because the indirect drivers are the ones influencing the direct drivers, it would be nicer to have the direct drivers and their effects explained first, and then the drivers influencing the magnitude, direction or rate of change of these direct drivers.</p>	Thank you for your comment. We chose this structure to align with other IPBES assessments.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Volery, Lara	No	Chapter 3	0	0	0	0	The different stages of the invasion process are not consistent throughout the Chapter, which is confusing (e.g. l. 180, p.6: 'introduction, spread, abundance and dynamic', whereas in most places, they are 'transport, introduction, establishment and spread'). These different stages are introduced for the first time at l. 536-542 (p. 17), which is a bit late; It might be good to have them listed and explained in the introduction.	Thank you, this has been corrected in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	1	4	1	172	for greater impact, the length of the summary should be reduced by at least half. Examples should generally be included in the main text only, especially lists. The status and trends of particular drivers should be combined in a single point, and much greater emphasis should be put on the drivers rather than the state of knowledge. Where possible, limitations due to data availability should be addressed with confidence terms rather than explanatory sentences. Multipart sentences should be avoided so that confidence terms can be clearly associated with findings. For example, in this statement "North America (53%) and then Asia (13%) were associated with the highest documented costs, which is partly driven by cost data incompleteness for most regions of the world (well established)" it is unclear whether i) it is well established that NAM and Asia have the highest documented costs, or ii) it is well established that cost data are incomplete for most regions, or iii) it is well established that data incompleteness leads to documented costs being highest for NAM and Asia.	Thank you for this comment. We have edited the draft accordingly - as much as possible.
Kenward, Robert	No	Chapter 3	1	214	1	8664	Noting again that in view of the tendency for populist policy-makers with little commitment to biodiversity (or amelioration of climate-change) to be elected by rural voters, who themselves are often land managers, it is essential for IPBES science to be as balanced as possible on rural issues. With little time to review, my focus was therefore on checking for an accurate and balanced view of sustainable use activities which attract controversy. The treatment of hunting in conclusion 6 at Line 80 (and hence in the SPM) is proportionate. In general, too, the treatment of angling and hunting is appropriate and well researched, with plenty of innovative aspects to this chapter. On the whole, well done. The exception to this commendable effort is Box 3.2 at Lines 633-680, which singles out hunting for opprobrium. There is no doubt hunting has caused some introductions. However, much of what is cited as introduced for hunting is probably mainly for food: indeed, one of the main sources quoted, Hulme et al. (2008), used the combined category "food/game". Species cited include Phasianus colchicus and Alectoris chukar, which are not invasive as they are removed by natural predators and depend on continual releases. Alectoris rufa, Capra pyrenaica and Capra ibex are native European species, as is Anas platyrhynchos (the substantial problem from Anatidae in Europe has been Oxyura leucocephala as an escape from collections, now removed with much help from hunters. The only valid complaint in this box is Ovis canadensis, which could be equally easily removed if necessary. Perhaps the box title could be shortened to "The role of hunters" and a paragraph on their help removing alien species inserted at the end.	Thankyou for this thoughtful comment. Hunting as a management option for invasive alien species is indeed important, but is treated in chapter 5. Chapter 3 only deals with how different drivers might *facilitate* invasions.
Rojo, Iskra	No	Chapter 3	1	171	1	6213	Explore and describe positive and negaive actions from public policy around the world trying to manage all this drivers could be useful	Thankyou. This aspect is covered in chapter 5 and 6
Rojo, Iskra	No	Chapter 3	1	171	1	6213	I strongly belive tha economic (both) and socioculture drivers are direct drivers, and don't visualise them like that implies limited actions and solutions	Thankyou. We are restricted to follow the IPBES framework, but have attempted to explain it even more clearly.
Government of Argentina	Yes	Chapter 3	1	1	2	10	Given that in many occasions it is recognized that the rise in invasions initiated with colonization, we suggest to also reflect this here.	Thankyou. Colonialism is covered in the chapter (see eg section 3.2.2) but as the focus of the assessment is on current trends, we are not lifting this aspect forward in the executive summary.
Lembrechts, Jonas	No	Chapter 3	1	1	7	8	and/as well as	Thankyou. Editorial changes made.
Evans, Thomas	No	Chapter 3	1	1	10	10	Executive summary: I think the words 'spread of' are missing here?	Thankyou. Editorial changes made.
Lembrechts, Jonas	No	Chapter 3	1	1	10	10	establishment and invasive' reads grammatically incorrect	Thankyou. Editorial changes made.
Rojo, Iskra	No	Chapter 3	1	1	12	28	I think could be a better narrative with direct drivers firs	Thank you for this comment. However, we follow IPBES standards and present indirect drivers (the underlying societal causes) first.
Lembrechts, Jonas	No	Chapter 3	1	1	16	16	I assume the definition of indirect vs direct drivers is borrowed from earlier IPBES assessments? Is it possible that they are different for biodiversity loss than for alien species, though? Trade, for example, is seen as an indirect driver, but it could very well be a direct driver of alien species (as they are traded actively). I didn't read the rest of the chapter in detail yet, so this question might be obsolete, but for an 'innocent' reader of the executive summary, the distinction is not always clear. UPDATE: I now see that these issues are discussed below, but that doesn't remove the confusion with the distinction here in the executive summary (as readers of this summary will not necessary delve into the nitty-gritty below. UPDATE2: I now see you also fairly call them 'drivers of biodiversity loss', rather than of invasive species. Still, for someone less familiar with the IPBES-drivers it's confusing to look at drivers of biodiversity loss rather than at drivers of invasion itself. Complex issue :)	Thankyou for this comment, including updates. It helped us understand how the ES is being read. In response we have restructured the key messages to explicitly state the drivers scheme first, and then do the stages of invasion in a latter point.
Alexander, Jake	No	Chapter 3	1	1	19	28	This is a very long sentence - I sugges to move "are more influential..." [L27-28] to the beginning of the sentence, after "examined" on L20, and then starting a new sentence such as "These drivers include..."	Thankyou, the key finding has now been split to remove some of the complexity.
Lembrechts, Jonas	No	Chapter 3	1	1	23	23	Similarly to my previous comment, is mining more direct than trade, as a driver of invasion?	Thank you, we follow the IPBES categorization of indirect and direct drivers, impacting biological invasions
Alexander, Jake	No	Chapter 3	1	1	24	24	Should this be "changes to climate regimes" instead of "changes to weather"?	Thank you, we have changed it to "weather extremes"
Government of Germany	Yes	Chapter 3	1	1	24	26	Proposal: It is suggested to provide a short version of the explanation given at the end of p. 12 (L403-413) on why biodiversity loss is included as an explanatory variable and IAS functions as both key response and explanatory variable. A footnote might be useful in this case.	Thank you, we have added a paragraph to address this comment
Lembrechts, Jonas	No	Chapter 3	1	1	30	30	Is there a reason why here you talk about 'drivers of ecosystem change' rather than of 'biodiversity change', as under 2.?	Thank you for spotting this, we have corrected it in the final draft
Lembrechts, Jonas	No	Chapter 3	1	1	31	31	Could we say trade mostly influences early stages of invasion? - and make that distinction here in contrast to point 4? Or is it sufficiently affecting later establishment and spread as well?	Thank you, transport and introductions are indeed early stages of invasion
Maggs, Gwen	No	Chapter 3	1	1	36	36	I would edit the text to "as weed seeds in grain shipments"	Thank you, the edit has been made
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	2	2	45	59	I suggest that the key finding here should be the second sentence in this paragraph, that is, that direct introductions have been a major pathway and current practices continue to present high risk. This is the element of greatest policy relevance because deliberate introductions are those that are most amenable to control.	Thank you for this comment. The text is revised to provide clarity on this point.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	2	2	47	48	Does "Direct introductions of plants, animals, and microbial organisms for use in agriculture..." include crops and livestock. If not, this should be mentioned. If so, is this consistent with other Chapters?	Yes, it does, once they escape or are released into nature. The text is rephrased accordingly. Thank you.
Lembrechts, Jonas	No	Chapter 3	2	2	49	49	establishment	Thank you, this has been addressed in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	2	2	54	55	Do the authors mean to suggest that "replacement of native ecosystems with commercial monocultures" is more conducive to IAS than other agro-ecosystems? If so, it should be stated clearly, and references given. Otherwise replace "commercial monocultures" with "agro-ecosystems" and also give references.	Thank you, we have removed "commercial"
Duistermaat, Leni	No	Chapter 3	2	2	61	61	Many of the indirect and direct drivers ... [delete: of]	Thank you, the edit has been made
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	2	2	61	72	Sounds like a tautology.	Thank you, we have rephrased it to clarify
Maggs, Gwen	No	Chapter 3	2	2	61	62	The section title does not make sense, is there a word missing and it may need rewording "Many of the indirect and direct of drivers known to have significant negative impacts on biodiversity and nature's contribution to people (shoud this be changed to ecosystem services)?"	Thank you, we have rephrased it to clarify. In line with the IPBES conceptual framework, we use nature's contributions to people
Lembrechts, Jonas	No	Chapter 3	2	2	65	71	In the tekst here, order is reversed from the bold summary above; to me, this is a bit confusing juggling of the term 'drivers'	Thank you, we have rephrased it to clarify
Lembrechts, Jonas	No	Chapter 3	2	2	67	68	do you mean 'degradation of biological invasions'? As that's how I read this currently	Thank you, we have rephrased it to clarify
Government of Argentina	Yes	Chapter 3	2	2	79	79	"Despite a trend for developed countries to move away from deliberate introductions of alien species for uses in agriculture, aquaculture, forestry, horticulture, fishing, hunting, and ornamental purposes this is not so clear for developing nations" (line 79) It should be noted that such a statement is biased as it does not take into account the historical responsibility of developed countries in the introduction of invasive species, in particular through colonization. We request the deletion of this statement	Thank you, we have rephrased it to clarify

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	2	2	79	80	"a trend for developed countries to move away from deliberate introductions of alien species for uses in agriculture..." is either too much or not enough. What evidence is there? Should provide a reference(s) for this statement, which I have never seen before. On the contrary, many countries are looking to introduce new crops (e.g. for biofuels), often from other countries.	Thank you, we have rephrased it to clarify
Lembrechts, Jonas	No	Chapter 3	2	2	81	81	established but	Thank you, this has been addressed in the final draft.
Akite, Perpetra	No	Chapter 3	3	3	92	95	The statement about drivers interacting with direct or indirect driver needs to be revised because in current form, it reads like drivers are one factor and the indirect/direct drivers are another entity, which is not the case. For clarity it should read in the like " Given the complex interactions of drivers, capturing the relative....."	Thank you, we have rephrased it to clarify
Evans, Thomas	No	Chapter 3	3	3	97	97	Invasions (singular)?	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 3	3	3	117	117	Invasions (plural)?	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 3	3	3	127	127	Delete space	Thank you, we have corrected this in the final draft
Akite, Perpetra	No	Chapter 3	4	4	128	130	The texts on line 130 seem to be lacking some clarity. There are three aspects combined in the statement; the indigenous people's thought towards the policies, the policy roles (ie. improvement of livelihoods and environment, and the introductions of IAS.	Thank you. Rephrased.
Latombe, Guillaume	No	Chapter 3	4	4	137	152	This is especially true since the interactions between drivers mentioned in point 7 may also change for different countries. Maybe make the link with point 7 here.	Thank you, the structure of the executive summary has been edited and this point now follows the former point 7
Government of Germany	Yes	Chapter 3	4	4	143	144	Proposal: Please consider a reflected way of using the term "developed" in grouping countries. Furthermore, Europe is not a nation. Is reference made to the continent or the EU (= European Union)? This remains unclear here.	Thankyou for this comment. Following discussions around the agreed terminology for IPBES assessments is "developed", "developing", "least developed". We have gone through the chapter with the reviewers' comment in mind to ensure a balance usage of the terminology.
Evans, Thomas	No	Chapter 3	4	4	148	148	Delete 'of'	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 3	4	4	149	149	Ecosystems (plural)	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 3	4	4	154	154	Although drivers of biodiversity change are ... [insert space between change are]	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 3	4	4	154	154	Space needed	Thank you, we have corrected this in the final draft
Government of Germany	Yes	Chapter 3	4	4	154	162	Proposal: It is suggested to revise if para 8 and 12 can be pooled together as both address the interactions of drivers.	Thank you for this comment. We have revised the executive summary to remove the overlaps.
Latombe, Guillaume	No	Chapter 3	4	5	154	175	It is not clear how points 12 and 13 are different from each other and from point 7. Maybe combine them into a single point, or group them all together and emphasise what is specific to each point.	Thank you for this comment. We have revised the executive summary to remove the overlaps.
Martin, Jean-Louis	No	Chapter 3	4	4	154	154	typo replace "changeare" by "change are"	Thank you, we have corrected this in the final draft
Volery, Lara	No	Chapter 3	4	4	154	162	The point 12 of the Executive summary is very similar to the point 7 (l. 89-99) and sounds like a repetition. Maybe they could be merged?	Thank you for this comment. We have revised the executive summary to remove the overlaps.
Duistermaat, Leni	No	Chapter 3	4	4	161	161	... were climate change and ... [delete d after change]	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 3	4	4	161	161	climate change	Thank you, this has been addressed in the final draft.
Lembrechts, Jonas	No	Chapter 3	4	4	164	175	Paragraphs' point is not entirely clear, especially not how it differs from the earlier statements on interactions between drivers	Thank you for this comment. We have revised the executive summary to remove the overlaps.
Estoup, Arnaud	No	Chapter 3	5	5	175	175	Evolution should be mentioned in the executive summary...at different places (i.e. in different points of the present executive summary) or perhaps, for sake of simplification, as a given new point of the executive summary. If the points/request/advice that I mentioned to include Evolution in chapter 3 are accepted (cf. above points 42 and 43) THEN I AM READY AND WOULD BE HAPPY TO REDACT A NEW POINT OF THE EXECUTIVE SUMMARY SPECIFICALLY DEALING WITH EVOLUTION AS A DRIVER OF INVASION. JUST TELL ME.	Thank you for your comment. Evolution is addressed in Chapter 2.
Estoup, Arnaud	No	Chapter 3	6	13	176	565	It is worth stressing that Evolution is also a driving force of biological invasion. This should be mentioned somewhere – and probably at several places - in the introduction sections(s). A fortiori Evolution can be both a direct and an indirect driver of invasion (though I have to admit that the classification as direct and indirect drivers is not 100% clear to me!) that act on any steps and biotic/abiotic/social (fishing, hunting, transportation) features associated with invasion. If simplification is needed then, according to most table and figures I could see in this chapter, I would suggest to preferentially classify Evolution as a "direct driver". It might be also worth including Evolution as a driver (direct?) of invasion in Figures 3.1 and 3.4 as well as in Table 3.1. Optimally "Evolution" should be added within these figures and tables...but if this is too "difficult" to do then it should be at minima mentioned in the legends of these figures and Table that "Evolution is also a direct driving factor of invasion acting especially on virtually all direct drivers".	Evolution is a critical factor in invasions but is not an external driver such as climate change or trade. Rather it is an internal process and is a response to external drivers such as climate change or altered biotic interactions. Thus it is not included in our framework. See also comment 1858
Alaux, Christine	No	Chapter 3	6	7	177	241	Move all of Box 3.1 to line 241 at the end of chapter 3.1.1	Thank you for the suggestion. We moved the box to 3.1.1
Evans, Thomas	No	Chapter 3	6	6	182	182	Box 3.1: Synthesise(s)	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 3	6	6	184	184	Box 3.1: Change "knowledge and knowledge" to "knowledge and data"	Thank you, this has been addressed in the final draft.
Government of Germany	Yes	Chapter 3	6	6	185	190	Proposal: The adaptation of the drivers scheme for this assessment is an important piece of information. It is suggested to already provide it with para 2 of the executive summary in order to increase its understandability.	Thank you for your comment. The executive summary does not contain figures.
Sagoff, Mark	No	Chapter 3	6	6	191	192	Box 3.1: It appears that invasive species are both the cause and the effect of biodiversity change. "The synthesis focuses on attribution of cause-effect relationships between drivers of biodiversity change and invasive alien species..." IPBES recognizes invasive alien species as one of the principal drivers of biodiversity change and it recognizes -- and analyses in this chapter -- biodiversity change as one of the principal drivers of invasive alien species.	Thank you for your comment, please refer to chapter 1 to see how invasive alien species are both a driver and part of nature.
Evans, Thomas	No	Chapter 3	6	6	200	200	Box 3.1: summarise (singular)	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 3	6	6	206	206	Box 3.1: Compared to the last 30 years (delete in)	Thank you, this has been addressed in the final draft.
Government of China	Yes	Chapter 3	6	7	212	240	The direct and indirect drivers of biodiversity change may not be independent from each other, interactions among the drivers may exist and produce impacts on invasive alien species.	Yes, this is addressed in the interactions section
Evans, Thomas	No	Chapter 3	7	7	220	220	are dealt with	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 3	7	7	223	223	option(s)	Thank you, this has been addressed in the final draft.
Sagoff, Mark	No	Chapter 3	7	7	243	244	"The IPBES conceptual framework recognises invasive alien species as one of five primary anthropogenic 'direct drivers' of biodiversity change" Fair enough. But Chapter 3 studies the reverse -- biodiversity change as a direct driver of invasive alien species. An example may help. Suppose a new larval island appears as a result of an oceanic earthquake. Further suppose that a few forms of probably microbiotic life have evolved there. Here come the Europeans. They plant trees and other vegetation to nutify the larval deposits (adding fertilizer etc. as necessary) and over a few centuries a blooming, buzzing confusion of thousands or maybe hundreds of thousand species, all introduced, become established and naturalized and the Europeans leave, declaring the area a Heritage Site. Something of the sort happened with Ascension Island. Further suppose that the few native species survive in numbers not much different than before. Has there been any biodiversity change? If the concept "biodiversity" excludes introduced species, there has been little biodiversity change, if native species remain in stable abundance. If the concept "biodiversity" includes alien species, then there has been a lot of biodiversity change.	Thank you for your comment. The chapter looks at direct and indirect drivers of biodiversity change on invasive species, not simply biodiversity change. In one area it looks at how loss of biodiversity makes ecosystems more vulnerable to invasion. The Ascension Island example isn't relevant to our chapter.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	7	7	247	247	"Biodiversity and ecosystems" is incorrect, as biodiversity is inclusive - it should be "biodiversity" or "species and ecosystems"	Thank you for this comment. The terminology is from the IPBES conceptual framework
Evans, Thomas	No	Chapter 3	7	7	263	263	Drivers	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	7	7	280	282	Consideration of natural hazards is an important element, but at the same time, it creates a tension with the definition of IAS, which are introduced by people. If a species is transported from its native range by flood or hurricane, it is an IAS? Human influences may change the probability of such introductions - for example, rafting on plastic debris has received more attention following the 2011 tsunami in Japan. This may seem like semantic quibbling - similar control measures will be needed to reduce undesirable impacts in either case - but public perception of and values relating to species that "made it on their own" may be different.	Natural dispersal of native species is not dealt with here but the spread of alien species through natural means is addressed, this has been clarified.
van Kleunen, Mark	No	Chapter 3	8	8	266	266	Add citation to Bonnamour A, Gippet JMW & Bertelsmeier C (2021) Insect and plant invasions follow the waves of globalisation. Ecology Letters DOI: 10.1111/ele.13863	Thank you for this reference, an interesting study but it only supports rather than extends the other reference.
Evans, Thomas	No	Chapter 3	8	8	275	275	transport,	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	8	8	283	283	I don't understand this line '... as direct drivers' impacts?'	Thank you, the text have been edited to make clearer
Evans, Thomas	No	Chapter 3	8	8	284	284	Fig. 3.1 Earthquakes cause tsunamis but they aren't listed under natural drivers?	Omitted due to a lack of space but listed in following table
Volery, Lara	No	Chapter 3	8	8	284	285	Fig. 3.1: Climate change has an impact on Natural drivers: Should there be an arrow between these two boxes?	Yes, there are interactions but for the sake of clarity they have been left off the figure
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	8	8	285	285	Fig 3.1 should include an indication that IAS can be affected by IAS themselves. Options might include an arrow that loops from the IAS box back to itself, or listing IAS among the anthropogenic drivers. If the only natural drivers are natural hazards, these these should be labelled in the diagram as natural hazards, for consistency and clarity (or potentially as "natural hazard drivers" as in table 3.1). If there are other natural drivers, they need to be explained.	Yes, the terminology should be standardised and this has now been corrected
Latombe, Guillaume	No	Chapter 3	8	8	285	285	Figure 3.1: a few arrows are missing in this figure. Feedbacks are described in the legend, but it would be valuable to put them directly in the figure. Fore example, climate change will affect natural drivers by increasing fires and changing the frequency of cyclones and hurricanes. This will also convey the idea mentioned in points 7, 12 and 13. Also, IAS can change hazards, e.g. pine trees that change fire regimes and therefore generate an invasional meltdown (which is mentioned, but in the land use category on 1.2550). EDIT: ok, there is a full section dedicated to interactions between drivers. It would be useful to state here that only direct effects are indicated, and to refer to sections 3.1.5 and 3.4 for interactions and feedbacks.	Yes, there are interactions but for the sake of clarity they have been left off the figure
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	9	9	303	304	human population size is conspicuously missing from demographic drivers. It's not clear why density per se should be a driver. This is treated inconsistently in the text - line 434, for example, says increasing population is "linked to" rather than "is" an indirect driver, while line 449 and section 3.1.3.1 are more straightforward. Lines 2811-2816 is a good example of a mechanistic explanation.	Population density reflects the pressure per unit area which is a good measure of it pressure as a driver
Government of Germany	Yes	Chapter 3	9	9	309	309	Need for clarification: para 2. of the chapter's executive summary (p. 1 /l. 20) states: "seven broad categories of direct drivers". Here it's only six categories. We assume the confusion stems from whether or not to include either natural hazards or biodiversity loss (which is rather a result of the other drivers and termed as feedback mechanism subsequently) in the list. Please align the number of drivers which are included in the list of direct drivers throughout this chapter.	There are seven drivers, six are anthropogenic and the seventh is natural hazard
Evans, Thomas	No	Chapter 3	9	9	322	322	the authors	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	9	9	323	323	before drawing conclusions	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 3	9	9	328	328	Delete "coastal"	Thank you, we have corrected this in the final draft
Agbere, Francis	No	Chapter 3	9	10	331	351	I believe a critical issues to focus is cross-border smuggling beyond the legal trade system as an indirect driver of biodiversity change. This connects very closely to invasion of non-native species. What is find not readily captured is the lack of awareness or illiteracy for that matter also as an indirect driver. This presents a major socio-cultural issue that ought to be addressed in the analysis.	It is mentioned in the section on trade later in the chapter
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	9	9	333	333	shouldn't this be "invasive alien species"?	Thankyou for this comment, the text is amended accordingly.
Evans, Thomas	No	Chapter 3	10	10	339	339	The authors	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	10	10	340	340	drivers	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	10	10	341	341	indirect - the quotation mark needs to be changed	Thank you, we have corrected this in the final draft
Atchison, Jennifer	No	Chapter 3	10	10	344	351	Table 3.1: Poverty and socio-economic disadvantage or marginalisation are key indirect drivers that do not seem to be listed here. Reliance by people on IS in livelihood contexts is noted in a number of other chapters but not addressed or mentioned here. Its fundamentally important that this link between social and economic marginalisation of people and dependence or reliance on IS is noted and accounted for.	Thank you, we have now include Poverty and marginalisation in Table 3.1
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	10	11	344	350	Table 3.1. For better understanding, Direct drivers should be the first column, on the left. Indirect drivers should be in the middle. Likewise, in the text, direct drivers should be addressed before indirect drivers.	Thank you, we have kept the order to be consistent with other IPBES assessments structure
Latombe, Guillaume	No	Chapter 3	10	11	344	351	Table 3.1: Fire is under climate change, but wildfire is also under natural hazards. I think this is related to the interactions mentioned above. Also, putting the international crisis in the demographics category is strange. International crisis seem to generate changes in multiple categories. For example, in the section on international crisis on p. 26 1.879, it is specified that it also affects trade. Maybe mention that some factors can affect several categories, or treat them separately.	Thank you, we have edited the Table to read fire frequency and intensity
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	11	12	353	376	Given that "Breeding and genomic technologies" are specifically listed in Table 3.1 as indirect drivers of biodiversity change affecting IAS, there should be at least some text in Section 3.1.3.1 explaining how that occurs, especially because it is not intuitive.	Text has been added to make this point clear
Volery, Lara	No	Chapter 3	11	11	358	358	on decision making regarding invasive alien species management' (add 'management')?	Text edited
Government of Germany	Yes	Chapter 3	11	11	362	364	Need for clarification: If GDP/capita and thereby economic growth is such a significant driver, why is it not included in the list of economic drivers of table 3.1?	Because it is addressed in the section on trade
Latombe, Guillaume	No	Chapter 3	11	11	365	366	GDP is more correlated with Governance indicators than with Trade (see Latombe et al. on BioRxiv). GDP is therefore linked with multiple factors. The Latombe et al. manuscript is not published yet but has got a minor revision in Sustainability Science recently, and should therefore be published over the next few months. A preprint is available on BioRxiv at https://www.biorxiv.org/content/10.1101/2021.02.04.429788v1	Thank you for your comment, but authors did not find this reference relevant here
Volery, Lara	No	Chapter 3	12	12	381	384	This is also a valid point for biodiversity loss in general I think (the biodiversity loss is also feed-backing and leading to more biodiversity loss). I am wondering if it is confusing to only have this feedback addressed here but not elsewhere in the IPBES assessment.	Thank you, drivers impacting IAS are only addressed in Chapter 3. Chapter 2 also mentions how habitat loss may increase the invasibility
Sagoff, Mark	No	Chapter 3	12	12	382	382	The chapter invokes the concept "native biodiversity." Is there such a thing as non-native biodiversity? If the answer is "yes," one would note the empirical finding that for each native species lost (or drastically reduced in population size) on most islands, for example, many more non-native species have become naturalized and established. The "biodiversity change" would result in a gain not a loss of biodiversity. IPBES does occasionally refer to "alien species richness." What is the relation between alien species richness and biodiversity?	Thank you, this has been clarified in Chapter 1
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	12	12	385	386	"the specific use of alien crops and livestock" is cited as an example of "Land- or sea-use changes" as a direct driver. Is this consistent with the rest of the assessment? Should there not be some mention of the ecosystem service of providing food?	Yes, agricultural lands are a major form of land use change
Maggs, Gwen	No	Chapter 3	12	12	389	389	I would edit the text to "generally degrades habitats which can increase the vulnerability of native ecosystems to invasion"	Thank you, the edit has been made
Estoup, Arnaud	No	Chapter 3	12	12	394	394	Please change "Exploitation of abiotic resources" into "Exploitation of abiotic (e.g. mining) and biotic (deforestation, agricultural crop production,...) resources"	Thank you, the edit has been made
Estoup, Arnaud	No	Chapter 3	12	12	396	396	Please add the reference Hufbauer et al. 2012 Evo Appl doi: 10.1111/j.1752-4571.2011.00211.x (which provides an evolutionary perspective of some of the features mentioned in the sentence)	Thank you, but this reference was not felt appropriate here
Volery, Lara	No	Chapter 3	12	12	400	402	I do not understand the sentence 'Less well understood is [...]', I think it should be rephrased.	Sentence is fine
Geerts, Sjik	No	Chapter 3	12	12	403	407	Suggested citation to back up this statement: Le Roux et al 2020. (Le Roux J.J, Susanna Clusella-Trullas, Thabiso M. Mokoetjema, Mario Mairal, David M. Richardson, Lisa Skein, John R.U. Wilson, Olaf Weyl, Geerts, S. 2020. Biotic Interactions as Mediators of Biological Invasions: Insights from South Africa. In: van Wilgen B., Measey J., Richardson D., Wilson J., Zengeya T. (eds) Biological Invasions in South Africa. Invading Nature - Springer Series in Invasion Ecology, vol 14 pp 387-427. Springer, Cham)	Useful reference, perhaps best in the actual section on this topic but not here.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Volery, Lara	No	Chapter 3	12	12	403	403	Should the driver be 'invasive alien species' or simply 'alien species'? Do alien species need to be invasive to facilitate the establishment of invasive alien species?	We agree but have left it as it is to be consistent with the use of IAS as an IPBES driver
Volery, Lara	No	Chapter 3	12	13	410	415	This sentence could be combined with the sentence 1. 381-384 (p. 12) as it sounds very much like a repetition.	Thank you for your suggestion - the text has been changed substantially in the second order draft according to the comments.
Volery, Lara	No	Chapter 3	13	13	422	422	[...] 'facilitate the further introduction of alien species from their prior invasive range to new regions, [...]' (add 'from their prior invasive range' for clarity?)	Thank you, change made
Volery, Lara	No	Chapter 3	13	13	430	430	This section is mainly about increasing trends, but it would be nice to also have a brief sentence/paragraph about stable or decreasing trends (e.g. deliberate introductions are declining, as mentioned later).	Thank you for the comment. We have presented the global trends that could be quantified.
Outinen, Okko	No	Chapter 3	13	14	431	447	This paragraph and also Figure 3.2. While it is correct that these direct and indirect drivers must have accelerated the spread of IAS, it should be also mentioned that research/monitoring effort, taxonomic expertise and the number of scientific records have improved greatly in the late 20th/early 21st century. This has resulted in more IAS being detected and recorded. It has nothing to do with drivers of this change, but this point should be definitely mentioned/acknowledged.	Chapter 3 doesn't address the temporal trends in IAS, and the role of sampling, this is covered in Chapter 2
Evans, Thomas	No	Chapter 3	13	13	437	440	This paragraph is quite difficult to read. How about: An increasing proportion of the global population lives in urban areas. By 2015, the total area of urban settlements was 2.5 times larger than it was in 1970, accounting for 7.6% of the global land area and housing 3.5 billion people.	The paragraph attempts to deal with each driver separately and this accounts for the structure. We have split the opening sentence in two to make it more readable.
Government of Germany	Yes	Chapter 3	13	13	441	447	Proposal: It is suggested to use a more nuanced approach when presenting and discussing these drivers. Patterns of travel, economic growth, trade, (energy) production and consumption are unequally distributed in terms of global geographies which lead to different regional effects in terms of direct and indirect impacts on IAS. Using inequality as an economic category on its own might have provided interesting insights, too. For a more elaborate discussion of region-specific information on trade see e.g. Costello, Christopher; Springborn, Michael; McAusland, Carol; Solow, Andrew (2007): Unintended biological invasions: Does risk vary by trading partner? In Journal of Environmental Economics and Management 54 (3), pp. 262–276. DOI: 10.1016/j.jeem.2007.06.001	We simply present indicative trends of key drivers at a global scale. Having regionally specific figures would be nice but the issue here is on how these drivers impact IAS not the global variation in the drivers as such.
Evans, Thomas	No	Chapter 3	13	13	444	444	270% (maybe do a search using % as the search term, and close up gaps; in some cases there are no gaps, in others there are)	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	13	13	444	444	contribute	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	13	13	452	452	3	Thank you, we have corrected this in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	13	13	452	452	It should be noted that if "agricultural crop production has increased by about 300 % since 1970" this does not mean that the amount of land used in agriculture has grown by that extent. Yields per unit of land have also increased greatly during that time. Same comment for Page 50, lines 1896-1898.	Yes, we agree but agricultural land has generally increased
Evans, Thomas	No	Chapter 3	13	13	457	457	0.65	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 3	14	14	467	468	"°C" not "C"	Thank you, we have corrected this in the final draft
Akite, Perpetra	No	Chapter 3	14	14	468	468	Would it not be more meaningful if the number of decades were specified?	Edited next three decades
Evans, Thomas	No	Chapter 3	14	14	468	468	1.5C	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	14	14	469	469	Delete the	Thank you, we have corrected this in the final draft
Maggs, Gwen	No	Chapter 3	14	14	469	469	I would edit the text to "increasing fire risk and the a higher frequency of extreme events in many regions"	Thank you, we have revised the draft accordingly
Akite, Perpetra	No	Chapter 3	14	14	474	475	Remove the name of the second author from the citation	Thank you, this has been corrected in the final draft
van Kleunen, Mark	No	Chapter 3	14	14	481	481	In Figure 3.2, it would be good if all of the y-axes could start at zero (GDP, Tourism and Climate) and to use axes breaks if needed.	This isn't possible in many cases since the data are only available for relatively recent periods and thus the specific date when the value would have been 0 is unknown.
Government of Argentina	Yes	Chapter 3	14	14	494	494	The statement in line 494 "through a shift to more intensive agriculture which could lead to a direct effect on biodiversity loss and thus facilitate the introduction of invasive alien species" is highlighted. It is not clear that there is scientific evidence to establish such a relationship. There could be a sustainable intensification of agriculture, as stated in the IPBES GLOBAL ASSESSMENT, which can avoid biodiversity loss and therefore should avoid the introduction of invasive alien species. We request to review this sentence.	The text refers to an example of a possible interaction, it is a scenario. The wording specifically mentions can and could rather than has. In any case, the evidence that sustainable intensification is reducing the rate of land conversion to agriculture is not strong.
Volery, Lara	No	Chapter 3	15	15	487	492	I think the part starting with ', and a particular driver may act with a temporal delay [...] until 'to what extend a particular direct or indirect change is the main factor in shaping the introduction, establishment and spread of invasive alien species is challenging' is misplaced. The facts that it is difficult to quantify and assign impacts when drivers act with a time-lag and when they interact with other drivers is something that should come later. It is confusing to introduce this here, before the interactions between stressors are fully explained and introduced.	The introduction aims to give an overview of what is to come, the fact that alien species numbers lags some of the drivers is now commonly accepted
Pan, Xubin	No	Chapter 3	16	16	524	524	The order of "microbes, plants, invertebrates, vertebrates"	This is the order in the text
Volery, Lara	No	Chapter 3	16	16	526	527	Fig. 3.4: The example of hunters moving alien game or fishes to new areas and affecting the establishment stage is confusing, because it has a comparable effect to natural hazards (also redistributing alien fauna), which is shown to affect the transport stage.	Natural hazards can transport species to new regions while hunters often redistribute within a country
Evans, Thomas	No	Chapter 3	16	16	527	527	Figure 3.4. In the Economic Driver box, I think this should state: 'e.g., tourism and tourism infrastructure...'	Yes, this seems better wording thank you
Wong, Nicholas	No	Chapter 3	16	16	527	527	Figure 3.4: Direct and indirect drivers - It could possibly help to explain the concept more clearly especially regarding indirect economic drivers. International trade and travel is listed as an indirect driver, but this is missing that international and internet trade can directly introduce new invasive species. E.g. - AIS in ship ballast water could perhaps be illustrated with a second column beside indirect drivers- the direct mechanisms by which invasive species are introduced to new areas by the indirect drivers.	The aim of this figure is illustrative, making it more complex would defeat the object of the exercise
Volery, Lara	No	Chapter 3	17	17	541	541	It would be nice to have an example here of a case where the Transport of a species and its Introduction is not performed by the same 'agent'. Otherwise we are a bit left wondering why these two stages are not threatened together. In general, I find it hard to think of the Transport and Introduction stages separately and I did not find a good reason for keeping them separate. Maybe this could be explained better?	The figure gives the answer where transport is by ships but the actual introduction fails where there is good border biosecurity
Akite, Perpetra	No	Chapter 3	17	17	548	548	Remove first name initials from the citation K. F. McGregor et al., 2012	Thank you, we have revised the draft accordingly
van Kleunen, Mark	No	Chapter 3	17	17	558	560	It might also be good to point out that the lags between introduction and naturalization become shorter, and refer to Duncan RP (2021) Time lags and the invasion debt in plant naturalisations. Ecology Letters DOI: 10.1111/ele.13751	This is only for plants and may also suffer from censored observations given an apparent decline in lag phase.
Evans, Thomas	No	Chapter 3	17	17	559	559	Increases 'in' transport	Thank you, we have corrected this in the final draft
Maggs, Gwen	No	Chapter 3	17	17	559	559	I would edit the text to "consequences of recent increases in transport and travel are unlikely to"	Thank you, this has been addressed in the final draft.
Akite, Perpetra	No	Chapter 3	17	17	563	563	move the word see to inside the bracket in the citation, "see (Subbarao et al., 2015)"	Thank you, we have revised the draft accordingly
Atchison, Jennifer	No	Chapter 3	18	50	566	1875	Section 3.2 seems to omit description or analysis of human social and economic disparity or vulnerability (i.e. poverty, social and economic marginalisation) and its relationship to the introduction, spread or establishment of invasive species. This driver is discussed in Chapter 6. IS are noted in the literature as both a driver of poverty, and an outcome of it (indeed this is noted in box 3.13). The links between economic and social marginalisation of communities as indirect drivers of IS should be made apparent for example in the section on values to explain why people might value IS. Broad economic drivers are correlated and discussed in other sections - but the scale of economic analysis presented often omits the link for household or community scales of decision making with regard to IS. Addressing this issue would enable better connections to what is presented in Chapter 6. (see for example Shackleton, R.T., Shackleton, C.M. and Kull, C.A., 2019. The role of invasive alien species in shaping local livelihoods and human well-being: A review. Journal of environmental management, 229, pp.145-157.)	We now include more detail on economic disparity and human livelihoods in a section headed wealth, inequality and poverty.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Wong, Nicholas	No	Chapter 3	18	31	566	1122	Suggest to discuss the socio-cultural driver regarding how the poverty level of a region or country can be strongly linked to the establishment and flourishing of invasive species. E.g. In Madagascar, one of the poorest countries in the world, the Marbled crayfish (<i>Procambarus virginalis</i>) was introduced in rice fields and has thrived. It has become a highly desired protein source by many people, because it is now the cheapest protein that is available. Corresponding reference is by Andriantsoa et al, 2020 - Perceived socio-economic impacts of the marbled crayfish invasion in Madagascar in PLOS One https://doi.org/10.1371/journal.pone.0231773	Thankyou for this comment and useful example. It is included in the final version.
Volery, Lara	No	Chapter 3	18	18	569	571	I do not understand this sentence: why would the fact that invasive alien species directly impact biodiversity imply that indirect drivers of biodiversity change can directly affect invasive alien species?	Thankyou for this comment. Ther was a typo in the statement (direct driver, not change) and we have also included a reference to figure 3.1 which will hopefully remind readers of the IPBES drivers framework and how it is used in this assessment throughout.
Akite, Perpetra	No	Chapter 3	18	18	578	578	Remove the name of the second author from the citation (Shackleton, Richardson, et al., 2019; chapter 1)	Thank you, we have revised the draft accordingly
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	18	18	592	592	Figure 3.5: In the bottom arrow change aesthetic to aesthetic	Thank you, this has been addressed in the final draft.
Volery, Lara	No	Chapter 3	18	18	592	594	Fig. 3.5: Why are 'Perceived cultural, aesthetic, or practical value' considered as a driver of transport and not introduction? I think that in the case of deliberate introductions (like the ones adressed here), it should start at the introduction stage and not the transport stage (e.g. see Fig. 3.8, where the arrow shows both the Transport and Introduction stages at the same time).	Thank you for your comment. We think it is fine, as we order them, for example, or trade them, because they are attractive.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	18	18	593	593	Figure 3.5 All the examples currently in Fig 3.5 are intentional, which may lead to an impression that socio-cultural drivers do not lead to accidental introductions. Increasing tourism is highlighted as important in a number of places in the document, and could be included in the transport examples. Cultivation of alien ornamental species could be included in the introduction/establishment examples.	added 'tourism' instead of the second 'aesthetic'
Latombe, Guillaume	No	Chapter 3	18	18	593	593	Figure 3.5: The second arrow seems to point towards both transport and establishment, but only transport is mentioned in it. It seems an additional arrow explaining how socio-cultural values can affect land use change and therefore establishment could be added.	The second arrow points to both "Introduction " and" Establishment ". Also, added "escape of ornamental alien species".
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 3	19	19	596	599	It is unclear what those alien species refer to (e.g., domesticated animals?). In addition, are plants mentioned here agricultural crops? If so, as long as they do not spread beyond their range, they would not be considered invasive alien species.	No action
Akite, Perpetra	No	Chapter 3	19	19	602	602	Remove the name of the second author from the citation (Shackleton, Shackleton, et al., 2019).	Thank you, we have revised the draft accordingly
Evans, Thomas	No	Chapter 3	19	19	605	607	The line needs reviewing.	Revised in accordance with the comments
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 3	19	19	605	609	As mentioned earlier, including benefits of IAS should be done carefully. There may be instances where, in a specific location, mitigation efforts may provide some benefits, but generally, IAS are considered IAS when they have negative impacts.	We are talking about alien species, not IAS.
Maggs, Gwen	No	Chapter 3	19	19	606	607	Is there a word missing at the end of this sentence? "and the perceived costs of adverse impacts and subsequent"	Revised in accordance with the comments
White, Michael	No	Chapter 3	19	19	615	618	Lampedusa Italy has few trees so prickly pear is used in places as stock fences, and fresh fruit.	Revised in accordance with the comments
Akite, Perpetra	No	Chapter 3	19	19	627	627	Remove the name of the second author from the citation (Shackleton, Shackleton, et al., 2019).	Thank you, we have revised the draft accordingly
Evans, Thomas	No	Chapter 3	19	19	631	631	full stop needed	Thank you, we have corrected this in the final draft
Kalandarishvili, Alexandra	No	Chapter 3	19	20	633	645	Box 3.2: The knowledge that alien species have negative effects on native ecosystems came to light in the late 20th century. The understanding of the ecosystem functioning was radically different at the time of deliberate introduction of species. Common reason for species introduction was biodiversity enrichment, as it was believed that good quality ecosystems consisted of high species diversity. As new knowledge emerged that brought forward the harmful effects of species introduction, international regulations restricting invasive species and regulations on the transportation of wildlife to reduce risk of disease transmission has been called for by organizations such as the World Health Organization (WHO), the World Animal Health Organization (OIE) and the World Trade Organization (WTO). This contributed to overall reduction of introductions. While certain species have been introduced for hunting purposes, the majority of the furbearers were brought to Europe for fur production. Given in the lack of security or low levels of control, species escaped from the facilities into the wild and established self-sustaining populations. Hunting and trapping are among the most effective management tools that play a major role in AIS management. Eradication of coypu in the UK in the 1980s is one of the examples when hunting and trapping played a crucial role in eradicating an AIS.	Because the purpose of this Box is to introduce hunting as an example of social value, and because any further discussion would shift the focus, we will not adopt the proposal.
Rojo, Iskra	No	Chapter 3	19	20	633	680	Box 3.2 : Could be important describe how his actions are illegal or irregular in some countries, there are legal dispositions and some legal gaps or controversial legal interpretation	Thank you, but it is redundant to explain the legal issues, and since the Box is not about legal issues, but about social values, we will not adopt the proposal.
Dietz, Sabrina	No	Chapter 3	20	20	633	680	In general, Box 3.2 requires better clarification: Not all introduced species for hunting purposes are invasive nor even alien (e.g. Capra ibex: native to Europe and re-introduced for its biodiversity and conservation value after local extinction and is indeed a valued game species). The way this box is written currently tells the reader that every species introduced for hunting is an IAS. That is not correctly representing Carpio et al. (2017). The figures in Carpio et al. (2017) show all introduced species attributed to hunting however not all of them are invasive. It is essential to adequately report on the paper in order to avoid misinterpretation. The paper is correctly cited in line 2215 "Another European study by (Carpio et al. (2017) found stocking for hunting as a dominant source of introductions for mammals (24%) and birds (30%)." Further, it is important to note that current gamebird releasing practices are not introductions but restocking of existing populations.	Revised in accordance with the comments Comment, considering for appropriate representation
Maggs, Gwen	No	Chapter 3	20	20	640	640	A bracket missing "and that more than a half (56.1% of birds and 60.6% of mammals) introduced for hunting	Revised in accordance with the comments Comment No. 1577, considering for appropriate representation
Dietz, Sabrina	No	Chapter 3	20	20	641	643	Box 3.2: While there are intensive human efforts to create stable populations of game birds for hunting in some parts of Europe, their establishment as wild breeding populations is dependant suitable habitat and levels of continued management. It is perhaps not accurate to state "High rates of establishment are thought to be due to high reproductive rate". The later paper by Champagnon (Champagnon et al., 2015. doi.org/10.1111/ibi.12341, Robust estimation of survival and contribution of captive-bred Mallards <i>Anas platyrhynchos</i> to a wild population in a large-scale release programme), demonstrates low first-year survival of captive breed Mallards. This is true for other released game birds. Without intensive efforts released birds are not self-sustaining in the wild, at least at high densities.	Revised in accordance with the comments Comment, considering for the same author's new findings
Dietz, Sabrina	No	Chapter 3	20	20	646	649	Box 3.2: Both ibex species (<i>Capra pyrenaica</i> and <i>Capra ibex</i>) are native to Europe and have been re-introduced after local extinctions (Refoyo, P., Olmedo, C., Polo, I., Fandos, P., & Muñoz, B. (2015). Demographic trends of a reintroduced Iberian ibex <i>Capra pyrenaica victoriae</i> population in central Spain. <i>Mammalia</i> , 79(2), 139-145.; Brambilla, A., Von Hardenberg, A., Nelli, L. and Bassano, B. (2020). Distribution, status, and recent population dynamics of Alpine ibex <i>Capra ibex</i> in Europe. <i>Mam Rev</i> , 50: 267-277.). They can be therefore not considered as alien species. For the bighorn sheep, this reference to releases in Europe during the 20th Century appears to be anecdotal. There is no clear evidence of introductions or wild living populations in Europe. In fact, the IUCN global assessment from 2019 defines the distribution of bighorn sheep only in North America (https://www.iucnredlist.org/species/15735/22146699).	Revised in accordance with the comments Commen

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Kalandarishvili, Alexandra	No	Chapter 3	20	20	646	662	Box 3.2: It is important to avoid blanket statements. While the majority of the introduced species have negative impacts on native ecosystems, it is important to be reminded of certain positives and opportunities that the non-natives bring. In the UK, £2 billion is generated a year as a result of shooting. People spend £2.5 billion on goods and services providing considerable conservation benefits. Shooting supports close to 74,000 full-time jobs and brings significant income into rural areas especially in the low-seasons for tourism. Nearly £250 million a year is spent on conservation and habitat management which benefits a wide range of wildlife. Amounting to almost two million hectares of actively managed areas for conservation. It is important to evaluate the situation of AIS on a case by case basis. It is possible that an alien species provides more benefits than drawbacks. It is therefore necessary to conduct continuous research to compare advantages to disadvantages and manage species accordingly.	This chapter deals with drivers, not management. Also, Box is about social values, so we understand your opinion, but will not revise it here.
Maggs, Gwen	No	Chapter 3	20	20	646	649	Box 3.2: The reference for this sentence is at the start, should it be at the end of this for the previous sentence instead? (Delibes-Mateos, 2015) Trophy-valued ungulates such as ibex (<i>Capra pyrenaica</i> and <i>Capra 647 ibex</i>) and bighorn sheep (<i>Ovis canadensis</i>) have been introduced throughout Europe and generate 648 significant revenues, directly through licensing fees and indirectly through the provision of 649 hunting gear and services.	Revised correctly
van Kleunen, Mark	No	Chapter 3	20	20	646	646	Box 3.2: It is not clear to which sentence the reference Delibes-Mateos 2015 belongs.	Revise correctly
Maggs, Gwen	No	Chapter 3	20	20	659	659	I would edit the full stop to a comma in the value "300,000 in North America"	Thank you, we have revised the draft accordingly
Pan, Xubin	No	Chapter 3	20	20	659	659	Box 3.1: "300.000" or "300,000"?	Thank you, we follow the UN editorial manual (comma)
Dietz, Sabrina	No	Chapter 3	20	20	674	677	Box 3.2: Suggestion: Replace "In addition, a few game managers have been critical of the introduction from an ecological perspective (Delibes-Mateos, 2015) and it has been reported that as the knowledge and recognition of wild boar (<i>Sus scrofa</i>) increases, policies to restrict and prosecute the transport of wild boars are also supported in the United States (Grady et al., 2019)." by "In addition, a few game managers have been critical of the introduction from an ecological perspective (Delibes-Mateos, 2015), although interviewed hunters indicated that they favour the presence of wild game in biodiversity-rich landscapes instead of released individuals and are willing to pay at least 20 times more per wild partridge hunted than for a farm-reared bird (Delibes-Mateos, 2014). Further, it has been reported that as the knowledge and recognition of wild boar (<i>Sus scrofa</i>) increases, policies to restrict and prosecute the transport of wild boars are also supported in the United States (Grady et al., 2019)." Literature cited: Delibes-Mateos, M., Giergiczy, M., Caro, J., Viñuela, J., Riera, P., & Arroyo, B. (2014). Does hunters' willingness to pay match the best hunting options for biodiversity conservation? A choice experiment application for small-game hunting in Spain. <i>Biological Conservation</i> , 177, 36-42.	Revised in accordance with the comments Comment, considering for appropriate representation
Maggs, Gwen	No	Chapter 3	20	20	674	677	Box 3.2: The end of this sentence seems as though it is missing some detail "In addition, a few game managers have been critical of the introduction from an ecological perspective (Delibes-Mateos, 2015) and it has been reported that as the knowledge and recognition of wild boar (<i>Sus scrofa</i>) increases, policies to restrict and prosecute the transport of wild boars have increased, and are also supported in the United States (Grady et al., 2019).	Revised in accordance with the comments Comment, considering for appropriate representation
Dietz, Sabrina	No	Chapter 3	20	20	680	680	Box 3.2: To be added: To increase awareness toward IAS in the hunting community and to reduce the risk of hunters causing new accidental or intentional introductions of IAS, the Bern Convention, with the technical support of the IUCN SSC Invasive Species Specialist Group and FACE (Federation of Associations for Hunting and Conservation) developed the European Code of Conduct on Hunting and IAS (https://rm.coe.int/168063075c), which was adopted at the 33rd Standing Committee of the Bern Convention in December 2013. The present Code of Conduct aims to provide a set of voluntary principles for hunters and hunting managers to be adopted in order to improve sustainability of hunting, avoiding negative impacts caused by the introduction and spread of invasive alien species for hunting purposes, and to strengthen the contribution of hunters to the management and conservation of biodiversity.	Revised in accordance with the comments Comment
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	20	24	683	797	Human population numbers and population density have again been conflated here. Examples provided are all based on population size, not density (eg trade, land use change, and pollution do not increase if humans are confined to a smaller space. They do increase if the number of humans increases). Pysek et al 2010 and Dawson et al 2020 both use population density as a proxy for size and therefore do not provide a counterexample. There is a mechanistic explanation for population size effects, but none for density. Lines 785 and 786 should not assume causality without evidence of mechanism.	This section deals with population density so authors prefer to keep it as it is
Evans, Thomas	No	Chapter 3	21	21	687	687	aid is not an international crises	Thankyou for the comment. We added two commas to clarify that war is an exaple of an international crisis.
Evans, Thomas	No	Chapter 3	21	21	690	690	by' infleuencing (instead of 'through' influencing)	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	21	21	699	699	Figure 3.6. The term invasive alien species is used inconsistently. In some places it's written as alien invasive species.	Thank you, we have corrected this in the final draft
Akite, Perpetra	No	Chapter 3	21	21	706	706	The citation (United Nations et al., 2019) should only be (United Nations, 2019).	Thank you, we have revised the references in the final draft.
Akite, Perpetra	No	Chapter 3	21	21	710	710	The citation (United Nations et al., 2019) should only be (United Nations, 2019).	Thank you, we have revised the references in the final draft.
Maggs, Gwen	No	Chapter 3	22	22	714	714	I would edit the text to "Human population density is an important indirect driver acting across all the stages of invasion"	Thank you, we have corrected this in the final draft
Akite, Perpetra	No	Chapter 3	22	22	717	717	The citation (United Nations et al., 2019) should only be (United Nations, 2019).	Thank you, we have revised the references in the final draft.
Akite, Perpetra	No	Chapter 3	22	22	720	720	Coma after the author name in the citation (IPBES 2019)	Thank you, we have revised the draft accordingly
Akite, Perpetra	No	Chapter 3	22	22	721	721	Remove the author's first name from the citation (Clarke Murray et al., 2014)	Thank you for your comment. Clarke Murray is her full surname.
Akite, Perpetra	No	Chapter 3	22	22	724	724	Remove the name of the second author from the citation (Pyšek, Jarosik, et al., 2010)	Thank you, we have revised the draft accordingly
Evans, Thomas	No	Chapter 3	22	22	734	734	Space needed	Thank you, we have corrected this in the final draft
Sagoff, Mark	No	Chapter 3	22	22	745	746	"[A]lien species richness is positively associated with human population density." I found the discussion of this point to be informative and impressive. If biodiversity includes alien species richness, then biodiversity is positively associated with human population density. This is an important finding; it should be emphasized.	Thank you for your response. The comment refers to the impact of invasive species richness on overall species richness. This is not the focus of this chapter and the evidence presented in this section does not support this view. Thus we have not updated the manuscript.
Evans, Thomas	No	Chapter 3	22	22	752	753	for multiple taxa, birds...' This line isn't clear to me. Are birds and mammals the multiple taxa you are referring to?	Thank you, we have corrected this in the final draft
Maggs, Gwen	No	Chapter 3	22	22	755	755	You need to add in a full stop 'unicellular organisms) (Sandvik, et al. 2019). The number of visitors"	Thank you, we have corrected this in the final draft
van Kleunen, Mark	No	Chapter 3	22	22	755	756	The sentence is not clear. On what does the number of visitors have a significant effect?	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	22	22	757	757	delete ,	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	23	23	760	760	most influence? Strongest influence?	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	23	23	776	778	I don't understand this line	Thankyou for this comment, the text is now revised to clarify the message.
Evans, Thomas	No	Chapter 3	24	24	784	784	of linear mixed effects models	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	24	24	790	790	as a driver	Thank you, we have corrected this in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	24	24	805	808	The text appears to consider crops and livestock introduced by migrants as IAS, even if they are not harmful. Is this consistent with the rest of the assessment?	Thankyou, we have clarified that in order for these species to consitute invasions, they have to spread from containment and establish in natural habitats.
van Kleunen, Mark	No	Chapter 3	25	25	827	827	These references do not seem appropriate. Bertelsmeier did not use migration data, and Roques is not about ants, but about insects in general.	Thankyou for this comment. The linkages have now been clarified, specifically, wer point to how the first wave of global ant invasions in Beertelmeier concines with periods of high migration, and how the insect invasions in Europe increased after 1989 and with the expansion and closer integration of EU.
Maggs, Gwen	No	Chapter 3	25	25	855	855	The text needs to be edited "(Seebens et al., 2015). In a..."	Thank you, this has been addressed in the final draft.
Pan, Xubin	No	Chapter 3	25	25	855	855	Change "n a" to "In a"	Thank you, we have corrected this in the final draft
White, Michael	No	Chapter 3	25	25	858	861	Covid pandemic also displacing many people, trapped as borders shut	Thank you for this comment, unfortunately we have no references to back this up as a driver of invasions.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	26	26	898	898	Chapter 1 uses <i>Eichhornia crassipes</i> , Chapter 2 and 3 use <i>Pontederia crassipes</i> , please homogenize to valid name.	Thank you, we have harmonized the name across the chapters
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	26	26	901	902	There should at least be a reference for the provocative statement that "Biocontrol agents ... may themselves pose problems" and there should be balance by describing the beneficial effects of biocontrol agents with respect to IAS.	Thankyou for the comment. A reference is now provided. Impacts of biological invasions are dealt with in chapter 5.
Pan, Xubin	No	Chapter 3	27	27	930	934	Change "pests, diseases" and "pests and diseases" to "pests", the definition of pest, P35 L1261-1262	Thankyou for this comments. Both pests and diseases are removed, as we are focusing on IAS here
White, Michael	No	Chapter 3	27	27	938	940	Also heavy construction equipment does the same	Thankyou for this comment, the text is now revised to include the message.
Maggs, Gwen	No	Chapter 3	27	27	958	958	I would removed the common "The introduction of the Western corn rootworm"	Thank you, we have revised the draft accordingly
Duistermaat, Leni	No	Chapter 3	28	28	964	964	<i>Imperata cylindrica</i> (L.) Beauv: delete authors, I see no authors with other scientific names. If included it should be (L.) P.Beauv. in normal font (not italic).	Thank you, we have corrected this in the final draft
van Kleunen, Mark	No	Chapter 3	28	28	984	984	Bertelsmeier et al. 2017b = Bertelsmeier et al. 2017a.	Thank you, we have revised the references in the final draft.
White, Michael	No	Chapter 3	28	28	987	990	Not enough people to monitor the operations properly	Tjenyou for your comment, implemented.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	29	29	1018	1018	Correct Urbanisation to Urbanization, even though the reference is provided for a document titled "Urbanisation" this document is using US english and the line after this one says Urbanization, the terms should be even. https://dictionary.cambridge.org/us/dictionary/english/urbanize	Thank you, this has been corrected in the final draft
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	29	29	1033	1096	Change Urbanisation to Urbanization and urbanised to urbanized. US english has been used throughout all the chapters. https://dictionary.cambridge.org/us/dictionary/english/urbanize	Thank you, this has been corrected in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	30	30	1046	1067	This seems to combine a number of different drivers - cities provide a novel environment (through land use and disturbance regime change) which can be exploited by "pre-adapted" species, they are centers of trade, and they have large populations. Can the effect of urbanization be explained by these drivers or is there an additional urbanization effect?	We changed the sentence as suggested in comment 1626 to make clear that not all species are benefited by urbanisation. We agree with the reviewer, but since population and trade as a driver are discussed previously in the chapter (population 3.2.2.1, trade 3.2.3.1 & 3.2.3.2) they were referenced in the first paragraph and not discussed throughly in this section.
Government of USA	Yes	Chapter 3	30	30	1047	1049	The text currently reads as though all wildlife benefit from conversion of natural environments to cities. For accuracy, it should specify "certain" or "some" wildlife, to get at the point that it is talking about invasive spp. Suggest replacing these two sentences with "Conversion of natural environments to cities confronts certain wildlife with abundant novel opportunities, which are often exploited more efficiently by invasive alien species. Current ecological research suggests that urban environments are friendlier to some wildlife, in terms of climate and food abundance, instead of harsher (Griffin et al., 2017)."	Changed as suggested by the reviewer.
Sagoff, Mark	No	Chapter 3	30	30	1049	1050	"Current ecological research suggests that urban environments are friendlier to wildlife, in terms of climate and food abundance, instead of harsher." This important truth is well stated here. Many ecologists have recognized that suburban sprawl may be the ideal environment for a great deal of wildlife. The field of "reconciliation ecology" has developed to account for the presence in suburbs of far more wildlife than existed in the forests they replaced -- though much of that remains. See, for example, Rosenzweig, Michael (2003). "Reconciliation ecology and the future of species diversity". <i>Oryx</i> . 37 (2): 194–206. doi:10.1017/s0030605303000371. See also, Rosenzweig, Michael (2003). <i>Win-win Ecology, How the Earth's species can survive in the midst of human enterprise</i> . Oxford, UK: Oxford University Press. When plants and animals settle into human-dominated environments and thrive there, are they in their "natural" habitat. Does ecology include as habitat covered by its principles all the places, including cities and suburbs, in which wild populations often do very well?	Thankyou for this comment, which did not contain a suggested change or amendment to the text, so none was made.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	30	30	1050	1050	Friendlier to some wildlife, perhaps, but not all.	Changed as suggested in comment 1626 to read "to some wildlife".
van Kleunen, Mark	No	Chapter 3	30	30	1059	1059	Is it compared to 'native' or 'natural' habitat. I think the latter is meant.	Corrected
Sagoff, Mark	No	Chapter 3	31	31	1099	1101	The typographical error in these lines represents a Freudian slip because it shows the underlying confusion. Are the demographic changes drivers of 1) biodiversity or of 2) biodiversity change? If the former, they increase biodiversity, since alien species richness adds to or anyway overwhelms native species richness. If the demographic changes drive biodiversity change and if native species alone count as biodiversity, then these changes can only cause a loss in biodiversity. Which is it?	Corrected to biodiversity change
Pan, Xubin	No	Chapter 3	31	31	1100	1104	Change "of biodiversity of biodiversity" to "of biodiversity"	Thank you, we have corrected this in the final draft
Rojo, Iskra	No	Chapter 3	31	31	1104	1104	"of biodiversity" written twice	Thank you, we have revised the draft accordingly
van Kleunen, Mark	No	Chapter 3	31	31	1111	1111	Add citation to Seebens et al. (2015), which is already in reference list.	Lots of references show this point and not possible to list them all
Latombe, Guillaume	No	Chapter 3	32	32	1123	1123	Figure 3.8: the link between size of market and establishment is not clear. It is mentioned later on l. 1164-1166, but without explaining how the link is made. Intuitively, the link seems more appropriate for transport and introduction. Some details would be welcome	We will review this figure in the final draft
van Kleunen, Mark	No	Chapter 3	32	32	1123	1123	Figure 3.8: add 'horticulture' to 'pet trade' in lower arrow-box.	Thank you, this has been corrected in the final draft
Government of Germany	Yes	Chapter 3	32	32	1127	1133	Clarification is needed: It holds true that "few nations in the world are not linked to each other through trade." However, trade flows are not equally distributed between countries and regions. Also the nature of traded goods (raw commodities vs. manufactured goods) varies greatly between countries and regions being a reflection of a country's/ region's own position in the world economy (develop vs. developed countries or global south vs. global north). It might be interesting to know if these distinctions have an effect on transport, introduction and establishment of IAS which would require a more detailed consideration of trade flows.	This section has been rewritten to include a stronger focus on poverty related issues. There have been no studies about the more qualitative nature of trade and IAS and thus we do not discuss this here.
Ellers, Jacintha	No	Chapter 3	32	32	1146	1152	Could I suggest to refer here to Helmus et al (2014), who quantified the effect of trade on the number of alien species in their Nature paper. They calculated this relationship for exotic anoles in the Caribbean region, by correlating economic isolation of Caribbean banks (estimated from a global maritime shipping-traffic data set) and alien anole richness. To date this is one of the few studies actually describing the relationship between trade and alien species richness in a quantitative way instead of qualitatively. It would strengthen this paragraph to include this paper. (ref Helmus, M. R., Mahler, D. L., & Losos, J. B. (2014). Island biogeography of the Anthropocene. <i>Nature</i> , 513(7519), 543-546.)	Hulme 2021b is cited and this review covers most of the leading literature in this area
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	32	32	1146	1148	The text that states that "Alien species may themselves be ... a contaminant of a commodity (e.g., plant pathogens on a host plant, seeds trapped in wool fleeces, or insects in grain shipments)" would seem to indicate that these "host plants" or commodities themselves are not IAS. This approach needs to be taken consistently.	The commodities do not have to be IAS, they can be alien species in the region concerned but not necessarily invasive. Similarly, they could be cosmopolitan products such as wheat. This has been clarified with reference to Box 3.3. here.
Government of Netherlands (Ellers, Jacintha)	Yes	Chapter 3	32	32	1146	1152	Could I suggest to refer here to Helmus et al (2014), who quantified the effect of trade on the number of alien species in their Nature paper. They calculated this relationship for exotic anoles in the Caribbean region, by correlating economic isolation of Caribbean banks (estimated from a global maritime shipping-traffic data set) and alien anole richness. To date this is one of the few studies actually describing the relationship between trade and alien species richness in a quantitative way instead of qualitatively. It would strengthen this paragraph to include this paper. (ref Helmus, M. R., Mahler, D. L., & Losos, J. B. (2014). Island biogeography of the Anthropocene. <i>Nature</i> , 513(7519), 543-546.)	The authors implicate trade but do not prove it with quantitative relationships between imports and richness, they use shipping traffic as a measure of isolation.
Hofstra, Gerrit	No	Chapter 3	32	33	1152	1153	Regarding the list of 100 worst invasive species 52 are animals of which only 12 could arise from the pet trade	Almost 25% of invasive animal arise from the pet trade then, this seems quite high
Pan, Xubin	No	Chapter 3	34	34	1203	1203	Change "though" to "through"	Thank you, we have corrected this in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	34	35	1208	1250	Box 3.3: The comment addressing Page 32 seems to be contradicted by Box 3.3 which directly addresses a species intentionally introduced as a commodity for its beneficial effects. The approach on what is and what is not an IAS needs to be consistent with respect to commodities.	This has been clarified with reference to Box 3.3. here.
Maggs, Gwen	No	Chapter 3	34	34	1218	1218	I would edit the text "four out of 72 species were introduced for crop pollination"	Thank you, we have revised the draft accordingly

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Duistermaat, Leni	No	Chapter 3	34	34	1220	1220	Box 3.3: agriculture (reviewed in Aizen: delete (before Aizen	Thank you, we have revised the draft accordingly
Maggs, Gwen	No	Chapter 3	34	34	1225	1225	A full stop is needed "s relatively recent (Osterman et al., 2021)."	Thank you, we have revised the draft accordingly
Maggs, Gwen	No	Chapter 3	34	34	1229	1229	Box 3.3: I would suggest changing "eighties" to "the 1980s" to avoid any confusion regarding the century you're referring to	Thank you, we have revised the draft accordingly
Miwa, Koji	No	Chapter 3	35	36	1253	1298	In the section 3.2.3.2 Human international commerce and tourism, although it mentions the negative trends and impacts by tourism, it could also mention positive trends such as increased attention to sustainable tourism. The tourism sector aims to promote sustainable tourism more in the post-COVID 19 era (e.g., Galvani, A. et al., 2020; Orindaru, A. et al. 2021; Seyedabolghasemi, M.A., et al. 2022). According to the Sustainability Report by Booking.com (2021), more people are concerned about sustainability than pre-COVID-19 pandemic and 79% of travelers care if their accommodation has reputable third-party sustainability accreditation. If this section needs to focus on the negative aspect, perhaps this positive trend could be introduced somewhere else, where it fits better. Reference -Booking.com. 2021. Sustainable Travel Report. https://globalnews.booking.com/download/1037578/booking.com.sustainabletravelreport2021.pdf -Galvani, A. et al. 2020. COVID-19 is expanding global consciousness and the sustainability of travel and tourism, <i>Tourism Geographies</i> , 22:3, 567-576, DOI: 10.1080/14616688.2020.1760924 -Orindaru, A. et al. 2021. Tourism in a Post-COVID-19 Era: Sustainable Strategies for Industry's Recovery. <i>Sustainability</i> 2021,13, 6781. https://doi.org/10.3390/su13126781 -Seyedabolghasemi, M.A., et al. 2022. Residents' perceptions of Sustainable Tourism Destination Recovery: The Case of Northern Cyprus. <i>Land</i> 2022, 11, 94. https://doi.org/10.3390/land11010094	Thank you, we have revised the draft accordingly
Rojo, Iskra	No	Chapter 3	35	36	1253	1298	Here is important too legal discussion	Thank you, we are sorry we do not understand this comment
Duistermaat, Leni	No	Chapter 3	35	35	1280	1280	camping - literature reference: Verloove et al. 2020. Campsites as unexpected hotspots for the unintentional introduction and subsequent naturalization of alien plants in Belgium and the Netherlands. <i>Gorteria</i> 42: 66-107.	Nice, but we don't plan to reference every pathway here - there are many e.g. seeds on shoes, grass on golf courses etc.
Alexander, Jake	No	Chapter 3	36	36	1290	1292	Another recent reference documenting expansion of alien plants in the high Arctic is Bartlett et al. 2021: https://doi.org/10.1002/2688-8319.12056	Thank you, but this is quite a small survey 1.7km2
Rojo, Iskra	No	Chapter 3	36	36	1301	1306	Externalities was used before without definition	Thank you for your comment. It is defined in the first statement.
Sagoff, Mark	No	Chapter 3	36	36	1303	1304	"The global annual economic cost of these negative externalities is estimated in US 4.7 trillion." Fill in whatever number you like; it means nothing. It could be that a single invasive species is responsible for it all. The problem is to determine which invasive species are the culprits. If there are trillions of dollars at stake, let's get rid of purple loosestrife, a notorious invasive which is beautiful, much loved, and apparently harmless. It could take trillions of dollars to get rid of it. The social costs (as control costs) of this lovely addition to urban landscapes could be trillions. Maybe it would make more sense to battle a different invader. Which one? Ah, that is the question.	It makes sense to provide the estimated costs as information.
Sagoff, Mark	No	Chapter 3	36	36	1312	1314	"In addition, due to the characteristics of public goods, if left to the discretion of the market, invasive alien species will be undersupplied, which will add an incentive to 'free ride' and create market inefficiencies." What des this sentence mean? It is incomprehensible. The reference to the economic concept of externality is completely hopeless since it refers to anything someone doesn't like for any reason but is unable to affect through trade. The idea of social cost was debunked by Coase in 1960 and should be ignored. I suppose that alien species are undersupplied due to the characteristics of public goods. I just do not understand what this means.	The word "control" was missing. The meaning is not that there will be a shortage of alien species, but that the management of alien species will be insufficient. I rewrote it to make it easier to understand.
van Kleunen, Mark	No	Chapter 3	36	36	1325	1326	It might be good to use more recent data from Diagne C, Leroy B, Vaissiere A-C, Gozlan RE, Roiz D, Jaric I, Salles J-M, Bradshaw CJA & Courchamp F (2021) High and rising economic costs of biological invasions worldwide. <i>Nature</i> https://doi.org/10.1038/s41586-021-03405-6	Because the amount of damage itself is not the issue, we have modified it to describe the process of externality without using numbers.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	36	36	1329	1329	The statement that "very little investment has been made in pest management" is highly doubtful.	Reinterpreted the process of externality in a way that was not misleading.
Sagoff, Mark	No	Chapter 3	36	36	1329	1329	Since the crops are not native, they can be expected to bring their predators along with them. In the USA, I believe there are only three or four native crops -- blueberry, cranberry, Jerusalem artichoke, and some kind of squash. The statement, "very little investment has been made in pest management" is nonsense. Tell that to Bayer. Bt corn is pest management. Plant breeding is often for pest management. This paragraph ends on the next page with the weird statement, "In many cases, negative externalities promote the introduction of invasive alien species, but they are also suggested ways to prevent the introduction of alien species through internalization."	Reinterpreted the process of externality in a way that was not misleading.
Government of China	Yes	Chapter 3	37	37	1337	1340	"Taiwan's Shei-Pa National Park" should be revised to "Shei-Pa National Park of Taiwan Province of China." Taiwan is a province of China, therefore the country to which it belongs should follow.	Reinterpreted the process of externality in a way that was not misleading.
van Kleunen, Mark	No	Chapter 3	37	37	1353	1353	A 17 year old reference to 'recent years' is not appropriate. Refer to Diagne et al. (2021). See comment to line 1325-1326).	Reinterpreted the process of externality in a way that was not misleading.
Government of Germany	Yes	Chapter 3	39	39	1445	1572	Comment: Section 3.4.2.1 could also be classified under direct drivers especially if intentional releases of IAS are a direct consequence of research.	Thank you for your comment. Intentional release is actually involved in many various direct and indirect drivers.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	40	40	1450	1452	This sentence manages to be completely self-contradictory. If there is a "paucity of evidence" how can "evidence ... point to scientific research and related activities as important drivers"?	Thank you, we have modified the writing to make it clear that the paucity of evidence refers to specific stages
Maggs, Gwen	No	Chapter 3	40	40	1453	1454	I would edit the text "main mechanisms by which research facilitates transport and introduction of invasive alien species"	Thank you, we have modified the final draft following your suggestion while keeping the original idea that both transportation and introduction are the processes facilitated by research
Maggs, Gwen	No	Chapter 3	40	40	1459	1459	I would edit the text "important driver of transport, and introduction and release of invasive alien species	Thank you, we have corrected this in the final draft
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	40	40	1467	1467	Change fungu to fungus	Thank you, we have corrected this in the final draft
Duistermaat, Leni	No	Chapter 3	40	40	1470	1470	introduction of wild relatives of crops: This is likely to increase as 'de novo' domestication is upcoming quickly. E.g. Tian et al. 2021. Designing future crops: challenges and strategies for sustainable agriculture. <i>The Plant Journal</i> (2021) 105, 1165–1178. doi: 10.1111/tpj.15107	Thankyou for this comment. As we are reviewing the evidence for drivers of current invasions, we have limited scope for including materil on future invasions.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	40	41	1491	1515	Box 3.5: The observations and conclusions are expressed quite categorically given that there is a "paucity of evidence". The text should moderate its observations and conclusions accordingly.	The study in China is one of strongest pieces of evidence poiting to the role of botanic gardens in introducing IAS. Numerous studies now find a strong correlation between botanic gardens and IAS richness, thus the Box does not seem overly categorical.
van Kleunen, Mark	No	Chapter 3	41	41	1509	1511	Box 3.5: There is some other strong evidence for the role of botanical gardens. For example Feng et al. (2016) showed that planting frequency in European botanical gardens explained >50% of the variation in naturalization success of Chinese woody species in Europe. Feng Y, Maurel N, Wang Z, Ning L, Yu F-H & van Kleunen M (2016) Introduction history, climatic suitability, native range size, species traits and their interactions explain establishment of Chinese woody species in Europe. <i>Global Ecology and Biogeography</i> 25:1356-1366. (DOI: 10.1111/geb.12497)	The Box aims to reflect a regional case study not review the entire area. Given the limited number of examples from Asia, we prefer to focus on the China example rather than another European study.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	41	41	1514	1514	Box 3.5: the term botanical gardens is used here, the rest of the box uses botanic gardens. Please review so that it is even, both are accepted. https://www.oxfordlearnersdictionaries.com/us/definition/english/botanical-garden	Thank you, we have revised the draft accordingly
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	41	41	1515	1515	Box 3.5: It is important to add that botanic gardens have actively participated in the development of the Global Strategy for Plant Conservation and many national Plant Conservation Strategies, as in the case of Mexico, and are actively participating in communication activities regarding invasive species and working towards minimizing their impact in the introduction or dispersal of invasive species.	A sentence on this issue is now in the Box but despite participating in many conservation activities actions addressing IAS are rare.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Evans, Thomas	No	Chapter 3	41	41	1517	1517	Figure 3.10: The phrase used previously is botanic garden. Here for the photo caption it is botanical garden. Without wanting to offend, I'm not sure how useful a photo of a botanic garden is :)	Thank you, we have revised the text as suggested.
Pan, Xubin	No	Chapter 3	41	41	1517	1517	Figure 3.10: Where is the garden? Who took this photo?	Thank you, detailed are now included
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	42	42	1520	1524	would barnacles not sometimes also hitchhike on the feet and feathers of host birds? This seems likely to be an increase in the volume of transport, rather than an entirely new path.	Thank you for this observation. According to the quoted reference " External long-distance transport of aquatic invertebrates by birds has been reported for bivalves clipped onto birds' legs and for bryozoans attached to their plumage (Green and Figuerola 2005). This study is the first report of long-distance dispersal of barnacles by birds". According to the results all the barnacles were found over leg rings, therefore the mechanisms is novel for this taxonomic group.
Government of Canada (Ariey-Jougard, Rachel Tu-Van)	Yes	Chapter 3	42	42	1536	1547	I would be interested in seeing more sources confirming this information, and ideally more recent ones. I suspect that the situation has changed a lot regarding the release of IAS from labs.	Thankyou for this comment. We would also like to see more information, and while regulation of alien species release is increasing in many regions, the actual empirical evidence for accidental or intentional release from research or education is very scant.
Maggs, Gwen	No	Chapter 3	42	42	1536	1536	A common is required "Other research-related activities, such as teaching science at different education levels, are also"	Thanks for this suggested change. We have included it in the final draft.
Sagoff, Mark	No	Chapter 3	43	43	1566	1567	"Human-induced degradation of ecosystems occurs in nearly all types of land-uses and landscapes (sic) ..." Please correct the typo. What is meant by "degradation of ecosystems"? The IPBES glossary defines "degradation" in terms of degradation: Land degradation "Refers to the many processes that drive the decline or loss in biodiversity, ecosystem functions or their benefits to people and includes the degradation of all terrestrial ecosystems." The glossary often defines a term, such as "nature" in terms of itself, i.e., "the natural world." The question again arises whether an environment that is chock-a-block full of invasive species, each involved in all sorts of ecological interactions, is to that extent degraded. If invasions can cause a loss of biodiversity, can they also result in a gain? It is apparent that no general or characteristic biological properties distinguish the native from the alien; a biologist who did not know the history of the species would not know which is which. Poe and Latella (2018, p. 2532) have written that some philosophers "have questioned whether nonnative species and assemblages are objectively, ahistorically identifiable as different entities relative to native species and assemblages, once selection biases are taken into account." These authors (p. 2554) continue, "If a naïve conscious observer were to visit earth from another planet, could it distinguish 'natural' from nonnative assemblages of species? If the distinction of these systems is impossible using objective, ahistorical means, then the status of this distinction as a basis for judgement of sets of organisms may be questioned." Poe, S. and Latella, I.M., 2018. Empirical test of the native–nonnative distinction: Native and nonnative assemblages of Anolis lizards are similar in morphology and phylogeny. Functional ecology, 32(11), pp.2553-2561. A lack of historical information makes discrimination of invaded and uninvaded ecosystems impossible.	Thankyou for this comment. The IPBES IAS assessment is requested to use IPBES definitions and terms, and address the questions outlined in the scoping document. The issues raised here are beyond these bounds.
Hofstra, Gerrit	No	Chapter 3	44	44	1615	1616	In the Netherlands wholesalers of aquatic plants have voluntarily cooperated in the Waterplantenconvenant	Thank you for the information, we have revised it with the reference.
Rojo, Iskra	No	Chapter 3	44	44	1627	1627	Education, information, legislation and dialogue need it	Revised by adopting a part of the indication.
Asmervik, Ingvild Fonn	No	Chapter 3	44	47	1633	1746	Ref. last comment. It would be interesting to know more about how the breeding of native plant species for ornamental purposes could affect the native ecosystem if the bred species turns out to be invasive towards the ecosystem where it originated from.	Thank you for the comment. This is not in our scope.
Martin, Jean-Louis	No	Chapter 3	44	47	1633	1745	More on crops as potential threats and see if it is valid to contrast low risk associated to traditional crops versus increased risk in technology engineered new crops. See potential link with comment made for chapter 1 and copied hereafter: What about crop species that are for many non native to the area were they are grown. As these are sometimes given as examples to minimize the issues related to non native species would a special comment mentioning that most crops species have been selected towards human needs and in the process for most of them have seen their potential to thrive without human help highly reduced making them very unlikely to become problematic invaders. I mention this here in case the question has not been dealt with	Thank you for the comment. We added sentences to the text to highlight that evidence in general suggests that crop domestication do not increase invasion potential.
Asmervik, Ingvild Fonn	No	Chapter 3	45	45	1650	1651	What about breeding of native plant species for ornamental purposes? Are there any studies that have assessed the effects that this could have on native relatives?	Thank you for the comment. This is not in our scope.
Maggs, Gwen	No	Chapter 3	45	45	1676	1676	I would edit the text "There have also been also suggested editions that novel traits in genetically modified crops can favour"	Thank you, we have revised the draft accordingly
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	45	45	1681	1681	Add a Canadian reference: "Do escaped transgenes persist in nature? The case of an herbicide resistance transgene in a weedy Brassica rapa population." 29.oct.07, Molecular Ecology 2007 Oct 29; (advanced online pre-publication) Warwick SI, Légère A, Simard MJ, James T. http://www.blackwell-synergy.com/doi/abs/10.1111/j.1365-294X.2007.03567.x	Thank you for the suggestion, the reference was added to the text.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	45	45	1683	1687	This example taken from tomato breeding proves nothing and should not be used. If the invasive tomato pest moth is indeed a significant pest of tomatoes, breeders will establish a breeding program to capture the resistance already present in the "traditionally bred cultivars".	This solution suggested by the reviewer would indeed be a suitable breeder response! However, chapter 3 are just reporting on the problem, which we hope we now do in a balanced and clear manner.
Duistermaat, Leni	No	Chapter 3	45	45	1703	1703	<i>Leucaena leucocephala</i> subsp. <i>Glabrata</i> : <i>glabrata</i>	Thanks for this suggested change. We have included it in the final draft.
Duistermaat, Leni	No	Chapter 3	45	45	1705	1705	<i>Leucaena leucocephala</i> subsp. <i>Leucocephala</i> : <i>leucocephala</i>	Thanks for this suggested change. We have included it in the final draft.
Government of Mexico	Yes	Chapter 3	46	46	1703	1703	correct <i>Leucaena leucocephala</i> subsp. <i>Glabrata</i> must be <i>Leucaena leucocephala</i> subsp. <i>glabrata</i>	Thanks for this suggested change. We have included it in the final draft.
Government of Germany	Yes	Chapter 3	46	46	1729	1729	Proposal: The term "of the genome edition" might not be easily comprehensible. This part of the sentence could read "that newly developed techniques of genome editing".	Thank you. We have revised the text accordingly.
Rojo, Iskra	No	Chapter 3	47	50	1749	1875	perhaps good and bad practices could also be emphasized here, as part of the drivers or the response to them	Thank you, this is covered just after.
Evans, Thomas	No	Chapter 3	47	47	1756	1756	Fig. 3.11 The term non-native species is used here in the three red boxes - I guess it should be alien species to be consistent?	Thank you, this has been corrected in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	47	47	1756	1757	In Fig. 3.11, the statement about a the "lack of an international regulatory framework or bilateral or multilateral agreements" rather peremptorily fails to consider the implementation of the International Plant Protection Convention (IPPC) and the World Animal Health Organization (OIE).	Thank you for your comment. This chapter is about drivers of invasions, and hence this section focus on the role of organization in promoting them. The issue of managing and preventing biological invasions, and the eventual role of these organizations, is dealt with in Chapters 5 and 6 respectively. Now we made this distinction clear
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	48	48	1766	1781	This text should consider the influence of international organizations in preventing the introduction, spread and establishment of IAS.	Thank you for your comment. This chapter is about drivers of invasions, and hence this section focus on the role of organization in promoting them. The role of organizations in preventing biological invasions is dealt with in Chapter 6. Now we made this distinction clear
Rojo, Iskra	No	Chapter 3	48	48	1802	1814	With the experience of IPBES, a clear and consistent critique should be made of the current economic system and its effects on biodiversity, it as has been documented for years. And finally said in page 129	Thank you for your suggestion. The issue of the impact of this economic system on biodiversity is out of the scope of this chapter
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	48	49	1807	1809	This text should acknowledge that countries do indeed sometimes use animal and plant issues as non-tariff trade barriers (e.g. China/canola?)	Thank you for your comment. The use of animal and plant issues as non-tariff trade barriers is not the focus of this chapter and might be dealt with in chapter 6 focused on prevention of biological invasions
Maggs, Gwen	No	Chapter 3	49	49	1811	1811	I would edit the text "introduction and release of European bumble species in Chile"	Thank you for your comment. This example has been moved to the "trade section" in this chapter.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Asmervik, Ingvild Fonn	No	Chapter 3	49	49	1816	1829	Consider adding something about the carbon storage of natural habitats and how these will be affected by the invasion of fast growing trees that are likely to be cut at some point.	Thank you raising this interesting point, however the multiple consequences of the use of IAS as carbon storage on the ecosystem does not belong to this chapter on drivers, but to the chapter 4 (impacts)
Eckbo, Norith	No	Chapter 3	49	49	1816	1829	It can be emphasized more and give more information about how using invasive species as climate change mitigation efforts for sequestering carbon dioxide may result in lower ecosystem resilience to climate change in the long-run and bigger picture. It could be interesting and valuable to include more information about how planting for example sitka spruce to mitigate climate change may impact future scenarios of invasive species spread and both ecological and economical impact.	Thank you raising this interesting point, however the multiple consequences of the use of IAS as carbon storage on the ecosystem does not belong to this chapter on drivers, but to the chapter 4 (impacts)
Pan, Xubin	No	Chapter 3	49	49	1828	1828	"se section"?	Thank you, we have corrected this in the final draft
Latombe, Guillaume	No	Chapter 3	49	50	1831	1875	Some works on national capacities in terms of policy have shown the high heterogeneity of national policies across countries, and that countries more at risk of invasions are also often those lacking such policies. This seems important to mention here. Early, R., Bradley, B. A., Dukes, J. S., Lawler, J. J., Olden, J. D., Blumenthal, D. M., ... & Tatem, A. J. (2016). Global threats from invasive alien species in the twenty-first century and national response capacities. <i>Nature communications</i> , 7(1), 1-9. Turbelin, A. J., Malamud, B. D., & Francis, R. A. (2017). Mapping the global state of invasive alien species: patterns of invasion and policy responses. <i>Global Ecology and Biogeography</i> , 26(1), 78-92.	These papers do not deal with policies as drivers but point to the absence of policies being linked to more invasive species, this appears more closely linked to Chapter 6 than 3. We nevertheless mention them in our section on National Policies
Sandvik, Hanno	No	Chapter 3	49	49	1833	1837	National policies have not only "unintentionally" but also intentionally caused "an increase in the arrival or expansion 1833 of invaders". In many cases the arrival and expansion of these species were (and partly still are) actively encouraged by national authorities and were thus decidedly intended, even though the negative effects of these introductions may have been unintended.	Agreed, we hope to make this point more clear
Akite, Perpetra	No	Chapter 3	49	49	1844	1845	The first "limited" should be deleted and the statement reads "The effects in terms ofbeen limited".	Thank you, we have revised the draft accordingly
Duistermaat, Leni	No	Chapter 3	49	49	1844	1845	twice limited, delete the first: The effects in terms of control of ...	Thank you, we have revised the draft accordingly
Akite, Perpetra	No	Chapter 3	49	49	1848	1850	The whole statement is not clear. For clarity, the first statement should read (The introduction of two mosquito fish species (<i>Gambusia affinis</i> and <i>G. holbrooki</i>) in most temperate and tropical countries as biocontrol agents for mosquitoes started in the early 1990s and continues to date).	Agree, text edited accordingly
Evans, Thomas	No	Chapter 3	51	51	1887	1890	This line does not make sense to me?	Thankyou for the comment. As it was not fully clear what is unclear, and as this is just a short list of the content that comes below, the text is not amended.
Evans, Thomas	No	Chapter 3	51	51	1890	1890	first assess(es)	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	51	51	1891	1891	note(s)	Thank you, we have corrected this in the final draft
Government of China	Yes	Chapter 3	51	51	1898	1900	A recent study based on field survey and long-term GIS spatial analyses for established populations of the alien American bullfrog in China showed that the loss of suitable habitats had accelerated the rate of range expansion of the bullfrog (Wang et al. 2021). Reference : Wang, X., T. Yi, W. Li, C. Xu, S. Wang, Y. Wang, Y. Li, and X. Liu. Anthropogenic habitat loss accelerates the range expansion of a global invader. <i>Diversity and Distributions</i> 2021. DOI: 10.1111/ddi.13359	Thankyou for this nice example. It is included under the sub-section "3.3.1.5 Changes in landscape – seascape disturbance regimes (intensification and reduction)"
Evans, Thomas	No	Chapter 3	52	52	1926	1926	Fig. 3.12. Thirds red box - text needs revising.	Thank you, this has been corrected in the final draft
Government of Guinea Bissau	Yes	Chapter 3	52	54	1930	2028	As accompanying measures, capacity-building activities at various levels and the provision of appropriate equipment should be promoted, particularly in developing countries.	Thank you, this is unfortunately not the scope of this chapter
Government of Guinea Bissau	Yes	Chapter 3	52	54	1930	2028	Until countries are equipped with structures and control mechanisms at the national level and at the border, which allow strict control of clandestine introduction of animal and plant species into destination or transit countries, the fight against invasive species will not be successful.	Thank you, this is unfortunately not the scope of this chapter
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	52	52	1937	1941	Should specify that traits such as high reproductive rate, rapid growth etc do not mean "these traits are generally associated with high potential for establishment and spread of alien species". For example maize is highly reproductive but seeds are enveloped in the ear and rarely germinate unless managed by humans for next year's crop.	Thankyou for this response. This point is now clarified.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	52	52	1941	1941	The terms pest and weed are used in many cases almost as synonyms for invasive species, it would be good to add a line with these definitions to clarify the terms and their use	Thankyou for this comment. The entire chapter has been checked and amended for clarity. Invasive alien species are used when appropriate, but 'pests', 'pathogens', and 'weeds' are retained when this is necessary for the context, for example when the original source focuses on their pest/pathogen/weed status. In these cases, we have added a comment or bracket explaining their invasive alien species status when necessary.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	52	52	1942	1944	Text should note that "absence" of these crops and livestock would have negative impacts on food security, human livelihoods and the ecosystem function of providing food.	We don't understand the intent, so we don't revise it.
Pan, Xubin	No	Chapter 3	54	54	2006	2006	"off"?	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 3	54	54	2009	2009	"Scores"?	Thank you, we have corrected this in the final draft
Government of China	Yes	Chapter 3	55	55	2038	2039	This part talks about the release of marine organisms such as fish and shellfish in areas outside of their natural distribution. The <i>Penaeus chinensis</i> is a native species in the Yellow Sea, not an alien species. This example should be deleted.	The <i>Penaeus chinensis</i> is a native species in the Yellow Sea, but according to references, this species has been released both within and outside the natural distribution of this species in China, so this is regarded as an alien species issue. This is now specified in the text. Unfortunately, we do not have numbers on release inside vs outside the native area.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	56	57	2106	2140	Here as well it is not clear what is being considered as an IAS or not. Are plants introduced for pasture development to be considered as IAS, or only escapes from them, or only harmful escapes? This is not clear. We would not consider introduced pasture plants to be IAS and we would like to see that stated clearly.	Thankyou for this comment. We now clarify that "escapes" from pastures can be a source of invasions. And the point that pastures can also be vulnerable to invasions (by non-pasture species) is now lifted out as a separate paragraph at the end.
Duistermaat, Leni	No	Chapter 3	56	56	2122	2122	<i>Pennisetum ciliare</i> : currently accepted name is <i>Cenchrus ciliaris</i>	Thank you, we have revised the draft accordingly
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	57	58	2150	2184	Same comment as above, lines 2103-2140, for horticultural plants.	Thankyou - text amended to clarify that invasion happens when species spread beyond plantations.
van Kleunen, Mark	No	Chapter 3	57	57	2170	2172	In contrast, Omer et al. (2021) studying naturalization success of cultivated plants in Southern Africa found that woody cultivated species were not more likely to naturalized than expected, but that short-lived herbs were more likely to naturalized than expected. Omer A, Fristoe T, Yang Q, Maurel N, Weigelt P, Krefl H, Bleilevens J, Dawson W, Essl F, Pergl J, Pyšek P & van Kleunen M (2021) Characteristics of the naturalized flora of Southern Africa largely reflect the non-random introduction of alien species for cultivation. <i>Ecography</i> : 44:1812-1825. (DOI:10.1111/ecog.05669)	Thank you, the example is added to the text.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	58	58	2173	2173	Substitute cultivation for cultivation	Thankyou
Government of China	Yes	Chapter 3	58	58	2186	2191	This part describes that ornamental use is one of the main sources of aquatic plants. In this example, not all of the 55 aquatic plants in China were intentionally introduced for ornamental purposes, and not all of the 10 invasive plants were for ornamental purposes, and most of them were introduced as feed or for water body cleaning purposes. The example used here deviates from the meaning of the paragraph. It should be deleted or changed to a better example for ornamental purposes.	Thankyou for this comment. The section was on "Horticulture, agriculture, ornamental use, and nurseries" and the correct usages of the species is specified in the text. The example is retained, but now split between this section for agriculture and economic drivers for pets and ornamentals.
Government of Canada (Turkington, Thomas)	Yes	Chapter 3	58	58	2198	2202	In terms of Canada we are likely similar to the USA, but may even be higher. Many of the broad acre field crops species come from outside of North America and the original and subsequent introductions likely carried plant pathogens, weeds, and insect pest species.	Thank you for this comment. However, we do not have a readily available source that summarises this number of Canada, and as we have enough examples already we will unfortunately have to let this comment pass.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	58	58	2202	2202	Consider mentioning <i>Elaeis guineensis</i> which has been widely planted in the tropics and listed by GISD, although no impacts have been listed yet it is a good example for preventative measures http://www.iucngisd.org/gisd/species.php?sc=377	Thankyou for this comment. As we have enough examples for this section, the example will unfortunately not be included.
Latombe, Guillaume	No	Chapter 3	58	59	2204	2252	This section does not really seem to fit in the land use category. The information seems more related to lifestyle and economic aspects.	Thank you for this comment. Following your suggestion, we have moved this section to the section on trade.
Kalandarishvili, Alexandra	No	Chapter 3	58	59	2215	2238	Introduction of majority of the species took place before the knowledge of negative impacts of AIS would emerge. It is important to evaluate the situation of AIS on a case by case basis. It is possible that an alien species provides more benefits than drawbacks. It is therefore necessary to conduct continuous research to compare advantages to disadvantages and manage species accordingly. At the time of introduction of majority of the species, the negative consequences of introduction were not known. Hunters play a major role in regulating and managing invasive alien species around the world.	Thankyou for this comment. While the assessment fully acknowledges the positive impacts of some invasive alien species, our task in chapter 3 is to map the drivers of invasions. Impacts are dealt with in chapter 4, and holistic perspectives are given in chapter 6
Pan, Xubin	No	Chapter 3	59	54	2223	2223	Change "bar" to "but"	Thank you, we have corrected this in the final draft
Government of Canada (Arsenault, Andre)	Yes	Chapter 3	59	59	2255	2257	The following number seems exaggerated "90% of the remaining forests are within 1 km distance of artificial 2256 borders (IPBES, 2019a)."	Thank you for the comment. This is what the IPBES found.
Government of Canada (Arsenault, Andre)	Yes	Chapter 3	59	60	2262	2264	I would modify this statement because the degree of fragmentation is very important, so I have made a slight modification. Fragmentation can directly reduce effective population sizes of native biota, increasing their vulnerability to stochastic events and hence extinction risk, and reducing their reproduction potential and gene flow (Hanski, 1999; D. Saunders et al., 1991).	Thank you for this suggestion, we have accepted it.
van Kleunen, Mark	No	Chapter 3	61	61	2329	2335	Please consider deleting "invasive" from line 2330, 2331, 2332, 2334	Thank you for this suggestion. We have chosen not to change it in the assessment.
Government of Canada (Arsenault, Andre)	Yes	Chapter 3	63	63	2385	2385	Figure 3.13 shows data for the effects of corridors on both native and invasive alien species. However the text only treats the effect on invasive aliens. Either add something in text to address this or remove native species from the map.	Thank you for your comment, we have revised the Figure accordingly.
Wood, Christine	No	Chapter 3	64	64	2417	2423	This text implies that the species <i>Didemnum vexillum</i> and <i>Styela clava</i> do not spread from artificial habitats to natural habitats. Although this may have been the case for this specific case quoted, it is not applicable generally. There are numerous examples of <i>Didemnum vexillum</i> occurring on natural seabeds e.g. Cottier-Cook et al, 2019 and Valentine et al, 2009. Videos are available online to show its carpeting of seabeds in the UK and Norway. Many other references can be provided if required. Likewise <i>Styela clava</i> has spread all around the UK since its initial introduction, although predominantly found on artificial structures it also occurs on natural shores, e.g. Davis et al, 2007. Cottier-Cook, E. J., Minchin, D., Giesler, R., Graham, J., Mogg, A. O., Sayer, M. D., & Matejusova, I. (2019). Biosecurity implications of the highly invasive carpet sea-squirt <i>Didemnum vexillum</i> Kott, 2002 for a protected area of global significance. Management of biological invasions, 10(2), 311-323. Valentine, P. C., Carman, M. R., Dijkstra, J., & Blackwood, D. S. (2009). Larval recruitment of the invasive colonial ascidian <i>Didemnum vexillum</i> , seasonal water temperatures in New England coastal and offshore waters, and implications for spread of the species. Aquatic Invasions, 4(1), 153-168. Davis, M. H., Lützen, J., & Davis, M. E. (2007). The spread of <i>Styela clava</i> Herdman, 1882 (Tunicata, Ascidiacea) in European waters. Aquatic Invasions, 2(4), 378-390.	Thankyou for this important clarification. The text is now amended to take this point into account. As the original reference reported on a global literature review in addition to the field survey, the reference could support the amended statement and no additional case studies of invasions were needed. Note that impacts (which is the focus of many of the more recent papers the reviewer suggests) are dealt with in chapter 5.
Government of USA	Yes	Chapter 3	64	64	2419	2423	<i>Didemnum vexillum</i> has invaded many natural habitats. See https://www.sciencedirect.com/science/article/pii/S0025326X13006139	Thankyou for this important clarification. The text is now amended to take this point into account. As the original reference reported on a global literature review in addition to the field survey, the reference could support the amended statement and no additional case studies of invasions were needed.
Akite, Perpetra	No	Chapter 3	65	65	2487	2487	replace the word "that" with "than". Also for the statement "Importantly, time since disturbance is....". Do you mean time since last disturbance or which disturbance? This would make it clear because some disturbed areas can be under recovery and the time/ nature/magnitude of last disturbance is the one that is most critical. On line 2490, it should either be "increased livestock grazing" or "livestock overgrazing" as the two are synonymous.	Thank you for this comment. Implemented.
Akite, Perpetra	No	Chapter 3	66	66	2516	2526	There is a bit of mix up on the effect of land abandonment on invasion. The first statement indicates that there is decrease invasion with land abandonment but in lines 2519-2521, the effect reported is the opposite where there was instead an increase in invasion of plants for similar land-use system. The last statement on lines	Thankyou for this comment. There are indeed examples of increased invasion in response to both abandonment and intensification of agriculture. The text is now hopefully clarified.
van Kleunen, Mark	No	Chapter 3	66	66	2519	2521	It is not clear how this is an example of what is stated in the preceding sentence (lines 2516-2519).	Thankyou for pointing out this inconsistency. The text is now amended.
Government of Canada (Arsenault, Andre)	Yes	Chapter 3	67	67	2544	2544	Overgrazing was one of the most important factors of the spread of cheat grass.	amended.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	68	68	2590	2590	Even though the title of this section is Microbes, the text briefly mentions them and then talks about macroorganisms. Suggest changing the title to Microbes and macroorganisms	Thankyou. Amended.
Pan, Xubin	No	Chapter 3	68	68	2591	2604	The relevance between this paragraph and "Microbes"	Thank you for your comment. The chapter is amended.
Government of Germany	Yes	Chapter 3	68	68	2606	2614	Comment: We welcome the authors' efforts to provide a summary of subsection 3.3.1.5. and encourage the authors of the chapter to do likewise for the other subsections.	Thank you for this comment. We have harmonized the chapter, with the aim of keeping it as short as possible
Latombe, Guillaume	No	Chapter 3	70	71	2694	2725	Why is box 3.6 here, when it is first mentioned way earlier on p.62 1.2363?	Thank you for your comment. The box has been moved to where it is first mentioned.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	71	71	2710	2710	Figure 3.14: The number of species should be mapped as proportional to the area of the circle, rather than to its diameter.	The figure is reproduced from a published source, for consistency, we retain the scaling used in that source.
Evans, Thomas	No	Chapter 3	72	72	2737	2737	Fig. 3.15. Box two. "... act as 'a' pathway'. Box 3 - delete unwanted space between text.	Thank you, this has been corrected in the final draft
Volery, Lara	No	Chapter 3	72	72	2737	2739	Fig. 3.15: The text in the second arrow ('In addition to introductions of invasive alien species through transport') is unclear (although I see what is meant): I think that the first arrow 'Transport of harvested species and extracted resources can facilitate transport of invasive alien species' should show both the transport and introduction stages (because it concerns deliberate introductions, and thus involve both stages). The unclear bit in the second arrow could then be removed.	Thankyou for this comment. The figure is amended.
Latombe, Guillaume	No	Chapter 3	72	72	2738	2738	Figure 3.15: why are feedbacks only in this specific figure? Are they much more important than for other drivers? If they are so important here compared to elsewhere, they should be mentioned in the caption. However, feedbacks are only mentioned briefly on 1.2849 in this section. It seems they should be developed more here if they are indeed disproportionately important.	Thankyou for this comment. These figures are examples, not comprehensive summaries, of the impacts of different classes of drivers through the stages of invasion. We have included feedbacks when we find that they are relevant / illustrative in this and other figures (see for example figure 3.17).
Rojo, Iskra	No	Chapter 3	73	73	2771	2781	no more recent studies?	I haven't come up with any recent papers e.g. post 2018

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of China	Yes	Chapter 3	74	74	2821	2828	Deleted the case of South-to-North Water Transfer Project for the following reasons: 1. Water conservancy projects are an important strategy to solve water shortages for countries worldwide. For example, the Suez Canal (Gollasch 2006, Zhan et al., 2015), the California State Water Project, Garrison Diversion Project (North Dakota), Lake Texoma Water Transfer Project (Oklahoma-Texas), Santee-Cooper Diversion and Re-diversion projects (South Carolina) (Meador, 1992). In fact, South-to-North Water Diversion Project had helped ecological restoration of rivers and lakes along its eastern and middle routes. 2. Water diversion projects in countries worldwide all have the risk of leading to the potential alien species spread . The cited literature (Zhan et al., 2015) also pointed out that "Perhaps, the most notorious example of mass biological invasion unfolded followed opening of the Suez Canal, which allowed myriad species from the Red Sea to colonize the eastern Mediterranean Sea (Galil 2000; Gollasch 2006). Migration of species through the Suez Canal accounts for more species introductions in the eastern Mediterranean Sea (24.5 %) than ballast water (22.3 %) and hull fouling (16.5 %; Gollasch 2006)". Cases shown should take regional balance into account. 3. Liu et al. (2017) used Maxent modeling to predicted the distribution ranges of alien species, which is not a deterministic result that has been verified. It needs long-term monitoring to verify if alien species that break out in southern China can invade northern China due to large environment and climate difference. It is suggested to use examples of proven impacts on the spread of alien species. For example, water is supplied to both Los Angeles and San Diego from the lower Colorado River below Lake Mead, a system now colonized by biofouling quagga mussels (<i>Dreissena bugensis rostriformis</i>) (e.g. Hickey 2010). Or, the Chicago Area Waterway was constructed more than 100 years ago linking Lake Michigan and the Mississippi River. This conduit has permitted invasive species to move south from the Great Lakes, and may yet allow invasive silver carp (<i>Hypophthalmichthys molitrix</i>) and bighead carp (<i>Hypophthalmichthys nobilis</i>) to spread in the opposite direction (e.g. Jerde et al. 2013). 4. In this example, <i>Limnoperna fortunei</i> , <i>Taenioides cirratus</i> , and <i>Tridentiger bifasciatus</i> are all native species in China, and it is not highly related to the spread of invasive alien species. According to our unpublished data, in terms of both <i>Taenioides cirratus</i> and <i>Tridentiger bifasciatus</i> , only <i>T. bifasciatus</i> had spread in some parts of the east line, <i>T. cirratus</i> did not spread. References: Galil BS (2000) A sea under siege—alien species in the Mediterranean. <i>Biol Invasions</i> 2:177–186 Gollasch S (2006) Overview on introduced aquatic species in European navigational and adjacent waters. <i>Helgol Mar Res</i> 60:84–89 Meador MR (1992) Water transfer projects and the role of fisheries biologists. <i>Fisheries</i> 21: 18–23. Hickey V (2010) The quagga mussel crisis at Lake Mead national recreation area, Nevada (U.S.A.). <i>Conserv Biol</i> 24:931–937 Jerde CL, Chadderton WL, Mahon AR, Renshaw MA, Corush J, Budny ML, Mysorekar S, Lodge DM (2013) Detection of Asian carp DNA as part of a Great Lakes basin-wide surveillance program. <i>Can J Fish Aquat Sci</i> 70:522–526	Thankyou for this comment, critique, and additional examples. First, we acknowledge that many drivers (including hydrological projects) have benefits to people and livelihoods, indeed, economical benefits are the ultimate / indirect drivers behind many global environmental changes. However, weighing positive and negative impacts is not the mandate of Chapter 3, we are simply tasked with mapping the impact of drivers. Many of the additional examples that the reviewer cites are excellent suggestions, indeed, they are already mentioned elsewhere in the chapter. We therefore cross-reference for completeness in this part. When it comes to types of evidence, both empirical documentation and model-based studies are valid evidence for our report. However, we now lift the evidenced invasions forward, and cite the model-based study to infer that more invasions are likely to occur in the future. We are also removing specific reference to species of unclear native/non-native status.
Volery, Lara	No	Chapter 3	74	74	2849	2853	This sentence is unclear. I do not understand what is meant by feedback mechanisms (here and in the Fig. 3.15). Are not these feedback mechanisms between spread and establishment/spread in new areas always there (and if yes, are not they captured by the 'spread' stage in general)? I do not understand why they are addressed here for the first time (I suggest that they are either added in all figures showing the different invasion stages, or removed here).	Thankyou for this comment. The sentence is amended and a reference to section 3.5.1 that specifically deals with feedbacks is given.
Duistermaat, Leni	No	Chapter 3	74	74	2851	2851	... been observed for riparian ... [insert for]	Thank you, we have revised the draft accordingly
Duistermaat, Leni	No	Chapter 3	76	76	2915	2915	Phytophthora: Phytophthora	Thank you, we have corrected this in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	76	76	2934	2935	If "Post-mining areas are ... potential sites for the cultivation of biofuels", these cultures should not be considered IAS.	Thank you, we updated the text to indicate that known IAS could be cultivated on post mining landscapes and these could spread beyond the site of introduction.
Government of China	Yes	Chapter 3	76	76	2940	2941	Delete this sentence. The cited article (Hou et al., 2019) only studied 4 post-mining areas in Yunnan, China, and it does not represent all of post-mining areas in China. The conclusions and citations are inappropriate and not rigorous.	Thank you for your comment. The text has been updated to better reflect the example of invasive species occurring degraded mining areas in the Yunnan Province, China.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	77	77	2946	2961	If "the growth of natural vegetation is prevented by the barren and uncongenial conditions prevailing in contaminated sites", why should plants used for phytoremediation be labelled as IAS? These plants have a beneficial effect, whatever their origin.	Thank you for your comment. The text has been updated to reflect that known invasive species are usually introduced for the job remediating soils where other species with less invasive tendencies may also be used.
van Kleunen, Mark	No	Chapter 3	77	77	2969	2970	This statement requires a reference.	This is a summary paragraph. Now clarified in the text.
Evans, Thomas	No	Chapter 3	78	78	2986	2986	Fig. 3.16. Some lines of text end with a full stop - other lines of text do not. Best to check all of these figs.	Thank you, this has been corrected in the final draft
van Kleunen, Mark	No	Chapter 3	80	80	3066	3066	As the Netherlands is part of Europe, there is no border between them. Replace 'Europe' with 'Germany'.	Thankyou for pointing this out
van Kleunen, Mark	No	Chapter 3	80	80	3090	3091	Some of the metals listed are not heavy metals. Either delete the non-heavy metals or change 'heavy metals' to 'metals'.	Changed from "heavy metals" to "metals"
Pan, Xubin	No	Chapter 3	81	81	3119	3119	Change "five" to "six"	Thank you, we have corrected this in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	82	82	3155	3155	With regard to "Austrian [sic] coast rafting biota", Austria is land-locked. Did you mean Australia?	Thank you, this has been corrected in the final draft
Sandvik, Hanno	No	Chapter 3	82	82	3155	3155	Austria has no coast. Rech et al. (2016) refer to the Asturias region in Spain.	Thank you, we have corrected this in the final draft
van Kleunen, Mark	No	Chapter 3	82	82	3155	3155	Probably, the 'Australian' (not 'Austrian') coast is meant.	Thank you, we have corrected this in the final draft
White, Michael	No	Chapter 3	82	82	3155	3155	Do you mean Australian coast? Not Austria	Thank you, we have corrected this in the final draft
Government of China	Yes	Chapter 3	83	83	3211	3214	Delete this sentence. The citation is unreasonable. The cited article (Zhang et al., 2011) is "Industrial garbage reflection changes the leaf anatomical structure and photosynthetic capacity of an invasive alien species, <i>Iva xanthiifolia</i> ". It is a conference paper and only experimentally proved that light from reflected garbage effect on the photosynthetic capacity of <i>Iva xanthiifolia</i> , which is not representative.	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	84	84	3232	3232	<i>Felis catus</i> has been used as the latin name for the species throughout the document, here it is listed as <i>Felis silvestris catus</i> . Please change so that it is in accordance with the rest of the document.	Thanks for this suggested change. We have included it in the new version.
Sagoff, Mark	No	Chapter 3	84	84	3236	3237	This beautiful bird is considered a boon to farmers because it feeds on insect pests. In ancient Egyptian society, the Sacred Ibis was worshiped as the god Thoth and was supposed to preserve the country from plagues and serpents. The birds were often mummified and then buried with pharaohs. The Sacred Ibis is now extinct in Egypt but has a stable population in rubbish dumps near waterways in the United States and elsewhere. Extinct in its native range, the magnificent and beneficial bird is invasive elsewhere. Is it a threat to or a part of biodiversity?	Thankyou for this interesting comment, which is beyond the scope of Chapter 3. Our task is simply to summarise evidence for drivers responsible for invasions, not to judge whether invasions (or drivers) are inherently 'good' or 'bad'.
Alexander, Jake	No	Chapter 3	86	86	3349	3349	"assisted migration" is termed "assisted colonisation" in section 3.3.4.7. I think the choice of term is important - "migration" emphasises helping species to overcome dispersal barriers in order to reach new habitat (e.g. to track climate change), and is the term I am more familiar with; "colonisation" emphasises helping species to establish in a new location and has more negative connotations.	Thankyou. We now use "assisted colonization" throughout the text, except for one case where we explain the origin and connection between the terms.
Volery, Lara	No	Chapter 3	87	87	3355	3357	Fig. 3.17: I do not understand the feedback loop between spread and transport. Is this feedback loop between spread and transport/introduction not always present?	Thank you, we have clarified this point in the caption.
Evans, Thomas	No	Chapter 3	87	87	3356	3356	Fig. 3.17 First box ... 'alieu(n)'... externs?. Third box - 'settling' What does this mean?	Thank you for this comment, the figure and text is now amended.
Latombe, Guillaume	No	Chapter 3	87	87	3356	3356	Figure 3.17: as for Figure 3.15, the feedback between spread and transport seems underdeveloped.	Thankyou for this comment. These figures are examples, not comprehensive summaries, of the impacts of different classes of drivers through the stages of invasion. We have included feedbacks when we find that they are relevant / illustrative in this and other figures (see also figure 3.17).
Government of Germany	Yes	Chapter 3	87	87	3362	3365	Proposal: According to the IPCC AR6 WGI the GST by the end of the 21st century (2081-2100) is estimated to be between 1.4°C (best estimate for SSP1-1.9) and 4.4°C (best estimate for SSP5-8.5) relatively to the temperature of the period 1850-1900. The estimates in this para refer to the AR5. It is suggested to use the updated values and reference periods of the AR6.	Forecast temperatures have been updated

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Alexander, Jake	No	Chapter 3	87	87	3365	3366	Several studies show that climate change velocities are greater in high elevation environments: https://doi.org/10.1038/nclimate2563 , https://doi.org/10.1038/srep19219 , https://doi.org/10.1016/j.earsirev.2020.103349	Thank you for your comment. This has been rephrased to show ambiguity in the results...
Alexander, Jake	No	Chapter 3	87	87	3372	3372	Replace "northwards" with "polewards" or "polewards and upwards"	Thank you for this suggested change, we have adopted it in the final draft.
Government of Canada (Turkington, Thomas)	Yes	Chapter 3	87	87	3379	3382	This will likely be an area to watch for in Canada as winter temperatures increase we may see greater potential for local overwintering of IAS and/or pest species (e.g. insects and pathogens) that normally don't survive Canadian winter but are instead blown in from the USA and northern Mexico via long distance wind-mediated transport. See: G.J. Boland, M.S. Melzer, A. Hopkin, V. Higgins & A. Nassuth (2004) Climate change and plant diseases in Ontario, Canadian Journal of Plant Pathology, 26:3, 335-350, DOI: 10.1080/07060660409507151. Kliejunas, John T. 2011. A risk assessment of climate change and the impact of forest diseases on forest ecosystems in the Western United States and Canada. Gen. Tech. Rep. PSW-GTR-236. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 70 p. https://climatedata.ca/explore/sector/agriculture/ http://www.omafra.gov.on.ca/english/crops/field/news/croptalk/2020/ct-0620a4.htm This one is insect related: https://www.researchgate.net/publication/41622704_Insect_overwintering_in_a_climate_change	Thank you, we have added a new sentence given to pathogens with one new reference (Kliejunas 2011)
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	88	88	3417	3417	It might be worth mentioning that with climate change some native species are also becoming dominant in their environment and how this also may become a problem in the future.	Thank you, this is unfortunately not the scope of this chapter
White, Michael	No	Chapter 3	89	89	3434	3436	There is an impact on salinity too. Eastern Mediterranean increased 15% in recent years: high evaporation rates and very limited rainfall in Eastern basin.	Its nice point, but this topic of salinity would like to have separate section to which we could refer. There is no such section, but salinity is mentioned several times in the text... so in this case I would prefer to not include it here.
van Kleunen, Mark	No	Chapter 3	89	89	3446	3446	Is is not clear what 'economically invasive species' are.	Thank you, we have revised the draft accordingly
Government of Mexico	Yes	Chapter 3	89	89	3455	3455	put in italics the scientific name (<i>Solenopsis invicta</i>)	Thank you, we have revised the draft accordingly
Pan, Xubin	No	Chapter 3	89	89	3472	3472	Where is the Box 3.8?	Thank you for your comment. This was a wrongly referred Box, and the text is deleted.
van Kleunen, Mark	No	Chapter 3	91	91	3536	3538	This statement that C4 plants will have a greater advantage of increased CO2 contrasts with the general expectation that C3 plants should benefit more. See Poorter and Navas 2003). Poorter H & Navas M-L (2003) Plant growth and competition at elevated CO2: on winners, losers and functional groups. New Phytologist 157:175-198.	thanks, new sentence added to reflect this point
Alexander, Jake	No	Chapter 3	91	91	3537	3537	Would it be fair to write "can enable" and "potentially leading" in this sentence? I am not familiar with this literature so am not sure how strongly these connections can be drawn.	thanks, I added can. Potentially is added in the next sentence where we discuss the potential different observations.
Government of New Zealand (Perry, Joanne)	Yes	chapter 3	92	93	3566	3633	Chapter 3 3566 - 3633 The fire section should also include the risk of dispersal of IAS via fire induced updraft and smoke. The Myrtle Rust incursion into NZ is suspected to have been the result of extreme fire events which then dispersed spore across to New Zealand where the first sitings occurred on the west coast - also in previous years the invasive Bogong Moth was also intercepted in New Zealand and suspected to have made its way over on high altitude wind streams as a result of fire events occurring in Australia. occasional arrival of Bogong moths however occur at other timea as well..	Thankyou for this suggestion. but without unambiguous doementation we cannot reference anecdotal observations.
Duistermaat, Leni	No	Chapter 3	92	92	3588	3588	<i>Cenchrus ciliarius</i> L.: delete L.	Thank you, we have revised the draft accordingly
Duistermaat, Leni	No	Chapter 3	93	93	3622	3622	L. camara L.: Lantana camara (no author as in the rest of the document)	Thank you, we have revised the draft accordingly
Government of China	Yes	Chapter 3	94	94	3672	3675	Delete "China (W. Wang et al., 2015)". The main point of the paper cited in the report is that increased flooding may facilitate the successful invasion and expansion of <i>Phragmites australis</i> , thereby damaging native plant species in wetlands in China. It is only described as a possibility, there is no conclusive evidence, and flooding and sea level rise are different concepts.	Thank your for your comment. We have updated the text. The paper focuses on the role of sea level rise flooding coastal wetlands. The reference highlights that changes in sea level rise will facilitate the movement of invasive species as soil conditions are likely to be altered by increasing salinity resulting from rising sea levels. In this case the interaction between sea level rise and flooding of coastal areas by salt water are the main focus of this paper.
Alexander, Jake	No	Chapter 3	95	96	3700	3737	Related to the question of assisted colonisation, what is the status of species that cross administrative/ecological boundaries unassisted in response to climate change? Should these species be considered as IAS? Personally I don't believe they should, but this is a complex issue with lots at stake in terms of how we manage changing biodiversity in coming decades (e.g. see article by Wallingford et al. 2020 (https://doi.org/10.1038/s41558-020-0768-2) and the response by Urban 2020 (https://doi.org/10.1038/s41558-020-0770-8)). I know native range expanding species are somewhat beyond the scope of this report, but the topic feels like an elephant in the room and in my opinion needs to be discussed at least briefly (and I expect it is mentioned already in parts of the report that i have not read).	Thank you, we agree but recognize that this is not the scope of this assessment.
Alexander, Jake	No	Chapter 3	95	96	3700	3737	The topic of assisted colonisation is a very important one and it's great that it is included in this chapter. However, I question whether it should be listed as a driver of IAS on a par with climate change, sea level rise etc.; it is noted in 1.3712 that this driver might become important only in the future. I also worry that including assisted colonization prominently as a driver of invasion might stymie the uptake of a management strategy that, in combination with sound risk assessment, could become increasingly important to conserve vulnerable species as the climate changes. My impression reading this section is that My suggestion would be to integrate this part into section 3.3.5.2 on unintended consequences of management.	We think it is worthy of having this highlighted in a separate section
Pan, Xubin	No	Chapter 3	96	96	3752	3752	Change "Box 3.9" to "Figure 3.18"	Thank you, we have corrected this in the final draft
Jeschke, Jonathan	No	Chapter 3	97	97	3778	3778	Please fix the parentheses in this line.	Thank you, we have corrected this in the final draft
Alexander, Jake	No	Chapter 3	97	97	3780	3780	Also lines 3784 and 3787, I suggest to clarify here whether facilitation is meant here in a general sense (i.e. IAS being facilitated by any other species) or specifically in the sense of facilitation among alien species.	Thank you, we have corrected this in the final draft
Jeschke, Jonathan	No	Chapter 3	98	98	3815	3815	Please fix the parentheses in this line.	Thank you, we have corrected this in the final draft
Jeschke, Jonathan	No	Chapter 3	99	99	3853	3853	Please fix the parentheses in this line.	Thank you, we have corrected this in the final draft
Jeschke, Jonathan	No	Chapter 3	99	99	3865	3865	"Invertebrates" is currently written in upper case here.	Thank you, we have corrected this in the final draft
Alexander, Jake	No	Chapter 3	99	99	3873	3873	Maybe retitle this section as "Unintended consequences of management through biological control", since this section exclusively deals with biocontrol? But see my comment no. 8 about including assisted migration in this section.	Thank you for your comment. The title has been changed to reflect the content of the section. Assisted migration is a different topic though, and authors prefer to keep it separate.
Government of Canada (Mason, Peter)	Yes	Chapter 3	99	100	3874	3903	It is important to provide some context to this section. I recommend adding the statement "These examples are the result of decisions that were not based on good science or were the result of unintentional introductions" after the opening sentence to the paragraph, at line 3878. This would help to reduce the sensationalized implication that biological control is bad, which it is not when based on good science. See Chapter 5, page lines	Thank you for this point, the sentiment is now added (with a reference to chapter 5):
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	99	99	3877	3877	Please add that it was introduced to control NATIVE <i>Opuntia</i> in the Caribbean in tourist areas to avoid prickling. This in an example of a mistake made in managing local biodiversity for human benefit.	Thank you, done.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	99	99	3879	3879	After "where it threatens native <i>Opuntia</i> " please add the following: "and to the Yucatán peninsula where it was successfully eradicated. It has currently spread across the Southeastern United States to Texas where it can enter Mexico again and threaten the over 100 native <i>Opuntia</i> species, many of which are endemic. <i>Opuntia</i> also constitute an important part of the mexican diet and the economy. Reference: SENASICA, 2019. PALOMILLA DEL NOPAL. <i>Cactoblastis cactorum</i> . Aviso público del riesgo y situación actual.	Thank you, this additional material is incorporated.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Mason, Peter)	Yes	Chapter 3	99	99	3889	3889	There is a need here to explain why this 'classic case of biocontrol gone wrong' happened. It wasn't bad science, it was politics! After the statement ending "... (Shine, 2010).I recommend adding the statement, "This is an example where science was ignored and a political decision was made to introduce R. marina (Day et al. 2021)." Day MD, Cock MJW, Conant P, Cooke B, Furlong M, Paynter Q, Ramadan MM, Wright MG (2021) Biological control successes and failures: Oceania region. In Biological Control: Global Impacts, Challenges and Future Directions of Pest Management (Ed PG Mason) pp. 334-367. CSIRO Publishing, Clayton South.	Thankyou, this additional material is incorporated.
Government of Canada (Mason, Peter)	Yes	Chapter 3	100	100	3905	3907	The words "... being a less serious driver of invasive alien species than in the past." should be replaced by "... are no longer a driver of invasive alien species introductions." Compared to the horticulture, pet and hunting/fur trades biological control has contributed few invasive species.	We appreciate the sentiment and agree that this driver is currently less important than historically, but we do not have conclusive evidence of the complete absence of this driver at present, and therefore keep the relative language.
Government of Canada (Mason, Peter)	Yes	Chapter 3	100	100	3919	3919	see previous comment for lines 3905-3907	We appreciate the sentiment and agree that this driver is currently less important than historically, but we do not have conclusive evidence of the complete absence of this driver at present, and therefore keep the relative language.
Pan, Xubin	No	Chapter 3	101	101	3955	3955	Box 3.8: "non-native invasive"?	Thank you, we have replaced these by "alien"
van Kleunen, Mark	No	Chapter 3	103	103	4003	4003	Figure 3.20 in the upper arrow box: Should it be 'droughts' instead of 'draughts'?	Thank you, this has been corrected in the final draft
van Kleunen, Mark	No	Chapter 3	103	103	4024	4027	This sentence is not clear.	Thankyou for the comment, text is revised for clarity.
van Kleunen, Mark	No	Chapter 3	103	104	4027	4030	There is a reference a the beginning (Knevel et al.) and again at the end of the sentence (van Ruijven et al.). So, it is not clear which reference is the correct one.	Thankyou for the comment, text is revised for clarity.
Government of Ireland (Nelson, Brian)	Yes	Chapter 3	103	103	4041	4041	Misspelling of Helice tientsinensis	Thank you, we have corrected this in the final draft
van Kleunen, Mark	No	Chapter 3	104	104	4038	4040	This sentence is not clear.	Thankyou for the comment, text is revised for clarity.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	104	104	4053	4054	Separate the genus and epithet in Pterois volitans, remove brackets in Tutte et al.	Thank you, we have corrected this in the final draft
van Kleunen, Mark	No	Chapter 3	104	104	4056	4056	Less with regard to what?	Thankyou for the comment, text is revised for clarity.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	104	106	4063	4131	If IAS are defined as "organisms introduced directly or indirectly by people into places out of their natural range of distribution" as in the beginning of Chap.1, why is there any kind of section here on "natural direct drivers"? This section should be deleted and the topic should be treated in a sentence or two in the introduction to Section 3.3.	Thank you, natural drivers can facilitate the spread and introduction of species that are already invasive alien species (secondary spread).
Latombe, Guillaume	No	Chapter 3	105	105	4087	4087	Figure 3.21: Just a guess and not really backed up by specific literature, but couldn't/large scale events generate disturbance (e.g. a hurricane killing trees), which could in turn help alien species to establish?	Thank you for this comment. This is the general point we are getting at in the sub-chapter. Hopefully it's clearer now.
Pan, Xubin	No	Chapter 3	105	105	4087	4087	Figure 3.21: "secondary dispersal"?	Text clarified to explain secondary dispersal
Pan, Xubin	No	Chapter 3	106	106	4102	4102	"pf"?	Thank you, we have corrected this in the final draft
Government of Germany	Yes	Chapter 3	106	106	4114	4114	Proposal: Please reconsider in consultation with the task force on ILK if the term "new world" reflects a rather eurocentric world view.	Thank you, we have revised this in the new version
Evans, Thomas	No	Chapter 3	107	107	4138	4138	reverse (not reversed)	Thank you, we have changed it to "reversing"
Pan, Xubin	No	Chapter 3	107	107	4149	4155	The relationship between Figure 3.1 and Figure 3.22	Difference is in the size of the arrows, figure text revised accordingly
Sagoff, Mark	No	Chapter 3	107	107	4161	4161	What does the phrase "intact ecosystems" mean? Can novel ecosystems ever be "intact"? If "intact" implies unaffected by human beings or unsullied by invasive species, then it refers to the history not the biology of the ecosystem. Without historical knowledge it is impossible to tell which ecosystems are "intact" (not cursed by human corruption) and which are "degraded" (tainted by Europeans whose self-loathing may derive from views about the transgression of Adam and Eve.)	Thank you, we have changed it to natural ecosystems
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 3	107	107	4162	4164	remove as out of scope and prescriptive	Thank you, this has been deleted
Sagoff, Mark	No	Chapter 3	107	107	4162	4164	There is therefore considerable need for invasion scientists to reprioritise their research goals to quantify the role of direct and indirect drivers of biodiversity change on invasive alien species. I agree. Ecologists should study novel ecosystems and invasive species because this is where the action is. The text states that novel ecosystems can be more susceptible to invasive alien species than intact ecosystems. The term "intact" means not damaged or impaired. The Chapter assumes that novel ecosystems are damaged or impaired. Is there any evidence of this or are invaded (i.e., novel) systems per se "impaired"? A lack of historical knowledge makes it impossible to tell heirloom from upstart ecosystems. The Report has struggled to avoid overt normative judgments because these cannot be supported by empirical evidence. No empirical evidence available to biology could show, for example, that an environment is either intact or impaired. Someone might think that a beautiful and comfortable urban setting is more desirable than the forest it replaced. More pleasant, more intact. The Report should weed out all normative assumptions, for example, that native is better. Native may indeed be better (I believe it is) but not for reasons science can provide.	Thank you, we have edited the text.
Latombe, Guillaume	No	Chapter 3	110	110	4260	4260	Figure 3.23: The caption requires much more information to be able to understand these graphs.	Thank you for your comment. The figure caption has been updated.
van Kleunen, Mark	No	Chapter 3	110	110	4261	4261	Figure 3.23: A caption explaining the figure is missing.	Thank you for your comment. The figure caption has been updated.
Wong, Nicholas	No	Chapter 3	112	112	4307	4311	Suggest that it may help to state that Phragmites australis is present in all the Great Lakes, not just Huron and Michigan https://www.greatlakesphragmites.net/	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	113	113	4362	4362	delete ,	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	114	114	4408	4408	Table 3.2 Last row. Ecosystem(s) - this word should be plural.	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	114	114	4408	4408	Table 3.2. Overfishing example. Text on the cod example needs revising. The full name is Atlantic cod, and after opportunities insert the word 'for'	Thank you, we have deleted this table, as redundant with chapter 4
Evans, Thomas	No	Chapter 3	114	114	4408	4408	Table 3.2. Second box on overfishing. Use of the term non-native - should this be alien to be consistent with rest of document? Should the scientific name for salmon be included in the next box? You include scientific names for Atlantic cod but not salmon.	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	114	114	4408	4408	Table 3.2. The 'mining' row has no text in it?	Thank you, we have deleted this table, as redundant with chapter 4
Evans, Thomas	No	Chapter 3	115	115	4412	4412	the' invasion	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	115	115	4428	4428	cutting?	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	115	115	4433	4433	alien vine species	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	116	116	4461	4461	Suggested amendment: An example of this type of species is the North American Beaver (Castor Canadensis). This species was introduced... and it has since consumed	Thanks for this suggested change. We have included it in the new version.
Evans, Thomas	No	Chapter 3	116	116	4462	4462	lost the ability to provide refuge and food to native...	Thanks for this suggested change. We have included it in the new version.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Duistermaat, Leni	No	Chapter 3	116	117	4471	4471	Table 3: make italic the scientific names [Bromus rubens, Tamarix, Prosopis juliflora, Castor fiber, Castor canadensis]	Thank you, this has been addressed in the final draft.
Evans, Thomas	No	Chapter 3	116	116	4471	4471	Table 3.3. This table needs to be reviewed carefully for grammar and punctuation issues. I can see several e.g., words that should or shouldn't be plural; missing commas between words such as 'feral dogs foxes'.	Thank you for your comment. We improved the Table 3.3
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 3	116	116	4471	4471	Table 3.3, ensure latin names are in italics	Thank you, this has been addressed in the final draft.
Lázaro-Lobo, Adrián	No	Chapter 3	116	117	4471	4471	Table 3.3: Scientific names in this Table should be italicized.	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	118	118	4488	4488	Fig. 3.24. Could the text for CO2 be formatted?	Yes in final version
Lembrechts, Jonas	No	Chapter 3	121	121	4588	4591	Box 3.10: Sentence lacks some commas for good readability	Thank you. Amended.
van Kleunen, Mark	No	Chapter 3	121	121	4595	4595	Explain why the interaction is additive.	We added more information to make the additive effect clear.
van Kleunen, Mark	No	Chapter 3	122	122	4636	4638	Indicate what kind of organisms these are.	Common names were added.
van Kleunen, Mark	No	Chapter 3	122	122	4663	4664	A recent experimental study compared responses between less and more widely naturalized species in Germany and found that the widely naturalized ones took less advantage of artificial light at night than the less widely naturalized aliens. SpeiBer B, Liu Y & van Kleunen M (2021) Biomass responses of widely and less-widely naturalized alien plants to artificial light at night. Journal of Ecology 109(4):1819-1827. (DOI: 10.1111/1365-2745.13607)	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Duistermaat, Leni	No	Chapter 3	123	123	4668	4668	... did not change natives [delete d in changed]	Thank you, we have corrected this in the final draft
Sagoff, Mark	No	Chapter 3	123	123	4673	4674	Box 3.11: Comment on "well-published biological invasions of Lake Victoria by the Nile perch." It might be good to cite the movie Darwin's Nightmare, a 2004 Austrian-French-Belgian documentary film written and directed by Hubert Sauper, dealing with the environmental and social effects of the fishing industry around Lake Victoria in Tanzania. The movie explores the callous indifference of the IUCN to the plight of the people in its hysteria over the effects of the introduced perch on endemic cichlids.	Thankyou for this interesting suggestion. However, for the assessment, we'll stick ot more standard sources of scientific and ILK knowledge.
van Kleunen, Mark	No	Chapter 3	123	123	4688	4688	Box 3.11: Year is missing from the in-text citation.	Thank you, this has been resolved in the final draft
Rojo, Iskra	No	Chapter 3	124	124	4713	4715	Box 3.11: This is a strong generalization, there may be exceptions, if local practices are harmonious with the environment	Thank you, we have edited the box quite considerably in response to this comment
Evans, Thomas	No	Chapter 3	124	124	4715	4715	Box 3.11: Resource demands	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	125	125	4721	4721	about 105 or just 105?	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	125	125	4725	4730	I would avoid decribing these species as being in the top 100. This list is based on opinion alone so it is not that robust. See: Nentwig, W., Bacher, S., Kumschick, S. et al. More than "100 worst" alien species in Europe. Biol Invasions 20, 1611–1621 (2018). https://doi.org/10.1007/s10530-017-1651-6	We see the point, and have move the reference to the 100 worst list down and changed the language to reduce focus on this list.
van Kleunen, Mark	No	Chapter 3	125	125	4728	4728	The accepted name of Pontederia crassipes is Eichhornia crassipes, and this name is used elsewhere in this chapter.	Pontederia was recently recircumscribe to include Eichhornia species (Marco O. O. Pellegrini, Charles N. Horn, Rafael F. Almeida. 2018. Total evidence phylogeny of Pontederiaceae.
Duistermaat, Leni	No	Chapter 3	128	128	4828	4828	Prosopis juliflora [not iuliflora]	Thank you, we have corrected this in the final draft
Duistermaat, Leni	No	Chapter 3	128	128	4833	4833	... exacerbating Lantana camara ... [not L.]	Thank you, we have harmonized the use of abbreviations in the final draft
Duistermaat, Leni	No	Chapter 3	128	128	4839	4839	... Lantana camara [delete . after Lantana]	Thank you, we have corrected this in the final draft
Estoup, Arnaud	No	Chapter 3	130	130	4865	4865	In agreement with my points 17 and 44, please create a NEW special section # 3.6 (section 3.6 becoming 3.7) entitled "Evolution as a driving force of biological invasion" preferentially using the following structure: 1/ The genetic basis of evolution during invasion (corresponding to the content of Box 2.4 from Chapter 2 + the modifications I proposed above in this box), then 2/ Evolution and adaptation observed during biological invasions (corresponding to the content of Box 2.5 from Chapter 2 + the modifications I proposed above in this box); and then 3/ sub-section 3/ Evolution during invasions: monitoring, management and future directions? (corresponding to the content of Box 2.3 from Chapter 2 + the modifications I proposed above in this box). The present section 3.6 becomes section 3.7.	Thank you for this well described and thought-through suggestion. However, after considering it closely, we have reached the conclusion that this material would not fit our chapter. Chapter 3 summarizes the impact of drivers of biodiversity change (as defined in the IPBES framework) on biological invasions. As evolution is a process internal to the invasive species, it is not a driver of invasions in the IPBES terminology, but a response (that may certainly influence invasion success and impact).
Evans, Thomas	No	Chapter 3	130	130	4871	4871	Increased interdisciplinary what?	Thank you, it should be interdisciplinarity, text changed
Atchison, Jennifer	No	Chapter 3	131	131	4883	4883	Figure 3.27: One reason for the lack of studies on socio-cultural drivers in this analysis may be that the review sampling methodology only examines web of science. The majority of work addressing SC drivers may not be published in web of science indexed journals.	The analysis examined data from the Web of Science Core Collection of Citation Indexes (which includes science, social sciences, arts, and humanities citation indexes)
Evans, Thomas	No	Chapter 3	132	132	4920	4920	This suggests a room? Perhaps ' This suggests more synthesis and reviews are required to support...'	Text edited
Duistermaat, Leni	No	Chapter 3	133	133	4924	4924	Figure 3.29: legend in fig b: Terrestrial [not Terrestrial]	Thank you, this has been revised
Duistermaat, Leni	No	Chapter 3	133	133	4925	4925	Figure 3.29: legend in fig c: Vertebrate [not vertebrate]	Thank you, this has been revised
Evans, Thomas	No	Chapter 3	133	133	4926	4926	Fig. 3.29. Box b) speling of terrestrial. Box c) Caps for vertebrate; Microbe (singluar).	Thank you, this has been revised
van Kleunen, Mark	No	Chapter 3	135	135	4977	4977	Box 3.14: Which two drivers are meant. Only climate change is mentioned.	Thank you, we have edited the box accordingly
Estoup, Arnaud	No	Chapter 3	136	136	4995	4995	Please change "direct drivers of biodiversity change..." into "direct drivers of biodiversity change, including evolution,..."	Our chapter does not include evolution, as it is not a driver of biological invasions, according to the IPBES framework
Pan, Xubin	No	Chapter 3	138	138	5059	5059	Figure 3.31: Add "Indirect drivers" and "Direct drivers"	thank you for this suggestion. It is implemented in the final version.
Pan, Xubin	No	Chapter 3	139	140	5079	5086	P137 L5045-5046, L5053-5058	Thank you for this comment. The last paragraph summarizes the entire box, including the key finding of the preceding paragraph.
Akite, Perpetra	No	Chapter 3	140	140	5093	5094	Are plants not part of the terrestrial temperate ecosystems? Why the emphasis on plants in this statement?	Thank you, revised for clarity on the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 3	140	140	5101	5103	If "fewer than 5% of studies ... addressed more than one driver", how can the authors conclude that there are "potentially many interactions among drivers that are likely to lead to invasion scenarios"?	Because they are too hard to study e.g. climate change, fire and invasions. Separate studies have looked at climate change and fire, and fire and invasion, suggesting there is an interaction among all three but no studies have managed to be done.
Evans, Thomas	No	Chapter 3	140	140	5105	5105	Facilitate ecosystem degradation (delete 'the')	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	140	140	5106	5106	delete ,	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 3	140	140	5106	5106	Invasion(s) plural.	Thank you, we have corrected this in the final draft
Jeschke, Jonathan	No	Chapter 3	195	195	7788	7792	All words in the title of this reference are currently written in upper case -> suggest to use the same format as for most other references	Thank you, we have revised the references in the final draft.
Jeschke, Jonathan	No	Chapter 3	195	196	7819	7820	All letters in the journal title are written in upper case here.	Thank you, we have revised the references in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Alexander, Jake	No	Chapter 4	0	0	0	0	I greatly appreciate the systematic way in which the literature review underpinning this chapter has been conducted, and the presentation of data in a comparable way across regions and biomes. Nonetheless, I found it difficult to see which sources had been used as a basis for analysis (I understand that these might be detailed in the Impact Evidence Database, but this is under embargo until July 2023). Mountain regions, with which I am most familiar, were consistently recorded as having very few impacts, which is what I would expect. However, the species mentioned in the tables as having impacts were not always those I would have expected (e.g. Table 4.6, 4.14). I mention this since some publications of the Mountain Invasions Research Network (MIREN) provide examples of impacts of invasive plants in Mountain biomes, which might have been overlooked: McDougall et al. 2011 (http://dx.doi.org/10.1659/MRD-JOURNAL-D-11-00082.1), Alexander et al 2016 (http://dx.doi.org/10.1007/s00035-016-0172-8). MIREN has also conducted a large survey of stakeholder, indigenous and local knowledge about invasive species (all taxa) in mountains; the first paper summarizing these findings will be available on a preprint server within the coming weeks.	Thank you for this comment and the suggestion of additional references. Our systematic search was limited to primary observations or studies of impacts. We are sure to have included many of the original studies in mountain ecosystems, but we cannot guarantee that we have found all. However, this is not only restricted to mountain ecosystems, but similar criticism might apply to other environments as well. Therefore, it is difficult to justify to include at this point more impacts from specific ecosystems, as this might introduce an unwanted bias or imbalance with respect to other taxa, ecosystems or regions.
Evans, Thomas	No	Chapter 4	0	0	0	0	I am a contributing author. My name is listed as Tom Evans (Germany). Can you please change this to Thomas Evans (United Kingdom of Great Britain and Northern Ireland/Germany/France. Thank you.	Thank you, we have edited the draft accordingly
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 4	0	0	0	0	A simple note to mention that there are efforts underway in Canada via a federal-provincial-territorial committee (the Invasive Alien Species National Committee) to assess IAS-related expenses at the municipal level. Focusing on expenses was an easier way to get a sense of the economic impacts of IAS in a more cost-efficient way. Evaluating the full socio-economic impacts of all IAS would have been too costly of a task, especially if it was looking at all IAS. The report should be ready at the end of March 2022.	Thank you for bringing to our attention the report, which at the time of drafting was unavailable. We have included it
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	0	0	0	0	It is very appropriate that this Chapter emphasizes the limits of the state of our knowledge of impacts of IAS. I also strongly approve of the existence of a unit of analysis for Cultivated areas, the analysis of which gives very significant results.	Thank you for your feedback.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	0	0	0	0	Re-use of examples has the advantage of providing a wide range of information and telling a richer story for a particular case study, but it scatters information throughout the chapter and may lead to an impression that there are only a few examples. For example, Nile perch, mesquite, and dreissenid mussels are frequently mentioned, but chestnut blight, with a similarly devastating impact, is scarcely mentioned. N American Lumbricus invasion has ecosystem-wide impacts, but it is mentioned only once. Creating a section for a few high-profile case studies and consolidating the relevant information would reduce repetition in the text and create more compelling stories, while creating room for other examples elsewhere in the text. The marine section of 4.3.2 uses this kind of storytelling to good effect. It is one thing to tell policy-makers that there are cats outside, and quite a different thing to tell them that there is a cat problem outside.	Thanks for the suggestion. We tried to consolidate the narratives for the case studies throughout the chapter.
Government of China	Yes	Chapter 4	0	0	0	0	The ecological damage caused by many invasive alien marine species are still highly inadequate, and even the exact information on the provenance and invasive ranges of many alien species have not been identified yet (Molnar et al. 2008).	Thank you for your feedback.
Government of Germany	Yes	Chapter 4	0	0	0	0	General comment/need for clarification: While it is understood that the IAS assessment makes a strong effort to consider ILK as an element cutting across all chapters, why do only (sub)chapters 4.6-4.7 contain 'from indigenous and local knowledge' in their titles (see "Table of contents" (ToC)? This might be misleading to the reader, as one can conversely assume that (sub)chapters 4.1-4.5 do not contain ILK. Or how can the chapter structure as it reads in the current ToC be understood? These two chapter blocks separated out in the ToC could lead to an unintended dichotomy, even though the original intent could have been to highlight 'from indigenous and local knowledge'. Please consider reviewing accordingly/i.e. at least the referred wording of the headings of sections 4.6 and 4.7, while avoiding potential reinforcement of the dichotomy in question.	Thank you for your comment. Yes the intention was to highlight ILK, rather than present a dichotomy, as the remaining parts of the Chapter also include sources from ILK. The heading to section 4.6 has been revised.
Government of Germany	Yes	Chapter 4	0	0	0	0	General comment/Proposal: It is suggested to revise evidence while contextualizing the attribution of extinction to invasive alien species (IAS) by considering other drivers. This review can be done particularly when referring to quantitative evidence (e.g. numbers provided in figures and tables) throughout chapter 4. Rationale: There is hardly any critical reflection/contextualization regarding evidence provided on the impact of IAS which is, overall, currently attributed to IAS only. There is a lack of consideration of other drivers of extinction, e.g. sea and land use change and its compound effects (coupled with IAS), while land use change is just briefly mentioned on p.4, L.168-171 and p.161, L.4511 as driver of global change but not assessed at all.	Data on global extinctions (revised box "4.4") now explicitly mention the influence of other drivers, but this is from expert assessments, not from explicit studies of these interactions and relative contributions. There is also a box explicitly considering the interaction of drivers on impacts, but little is known, expect expert opinion, about their combined effects on extinctions. Data on local extinctions generally do not mention other drivers contributing to the observed extinction. This does not mean that other drivers do not play a role, but have been little investigated. Most studies only look at single drivers.
Government of Germany	Yes	Chapter 4	0	0	0	0	General comment: Commendable is also the boxes and figures which support with evidence - including ample quantitative evidence - the narrative on impacts of invasive alien species in chapter 4. While the data (including quantitative data) contained in most tables is valuable and useful, these could be condensed/integrated into a smaller amount of tables.	Thank you for this suggestion. It is unclear for us from the comment which tables should be condensed and which kept. We tried to condense some tables and hope this improved the reading.
Government of Germany	Yes	Chapter 4	0	0	0	0	General comment: The fact that the title and structure of chapter 4 is aligned to the IPBES Conceptual Framework (i.e. nature, nature's contributions to people, and good quality of life) is commendable.	Thank you for your feedback.
Government of USA	Yes	Chapter 4	0	0	0	0	Again, I compliment the authors on their impressive job of compiling information on impacts. However, I believe that the coverage of economic impacts is lacking. There is a brief summarization of information from the InvaCost database, but that work has been heavily criticized as including a lot of "double counting" and general lack of input from economists. There is quite a large literature on economic impacts of invasive species that is not covered here.	Thank you for this thoughtful response. We agree that almost all papers on the economic benefit/costs of invasive species are lacking and have many issues (this is coming from an economist). Unfortunately, very few global summaries and analyses exist. Additionally, even if the Invascost database suffers from some double-counting issues, the econ costs are still significantly underestimated. Invascost does, generally, include most economic cost categories (or impacts) in the analysis even if it's not described at a fine-scale here in this chapter. Unfortunately, we have to make tradeoffs about what we can cover here with limited space, and using insights from the Invascost literature was the most efficient way to cover global trends in a small box. It's also important to note that we included many economic impact papers in our own Chapter 4 impacts database, so these impacts are distributed between nature's contributions to people and good quality of life. Also, we have provide a paragraph in the introduction dedicated to the economic costs, as well as some brief discussion in the knowledge gap section.
Government of USA	Yes	Chapter 4	0	0	0	0	Appreciate the inclusion of statements about marine invasive species throughout the executive summary.	Thank you for your feedback.
Government of USA	Yes	Chapter 4	0	0	0	0	The compilation of data on impacts is impressive. However, in the material that summarizes this, again there are few examples given of impacts of insects. In particular, I think that the subject of impacts of insects and plant pathogens are not adequately summarized. There are many instances where invasions by insects and plant pathogens have triggered massive economic losses, societal collapse and human migration all as a result of impacts on agriculture. This information is not readily accessible from the invasion biology literature so the authors will need to search for this material through other publications.	Our literature search wasn't restricted to invasion biology literature (see DMR), including contributions from many specialist experts in entomology and plant pathology (see list of contributing authors) and thus consider the field adequately treated. Since no concrete changes to the report are suggested, we didn't take any further action.
Participants of ILK dialogue workshop (Florence Daguitan)	No	Chapter 4	0	0	0	0	Chapter 2, 4: Some IAS are helpful in some areas but can be considered harmful and invasive in other areas. Examples are 1) Lantana camara is being managed as fence or hedgerow and considered beneficial in Mountain Province, Philippines but considered invasive and render pastureland useless in the pasturelands of Kalinga, a neighbor province 2. Chromoleana odorata is a noxious weed but when considered as material for green manure and compost, this becomes beneficial	Thank you for your comment. Examples of these invasive alien plant species are included in the assessment, particularly section 4.6.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Participants of ILK dialogue workshop (Guadalupe Yesenia Hernández Márquez)	No	Chapter 4	0	0	0	0	Ch 4, SPM : On gendered impacts of IAS: In Mexico we have quite a few examples of IAS enhancing the impacts on gender, for example for women in many communities there are strategic resources and if they are damaged or removed due to IAS this causes more disparities and problems. Medicine plants in eucalyptus forests are an example, as eucalyptus eliminates all other plants, so small plants that are used as medicine plants are destroyed in the plantations, which means women lose access to these plants or they are forced to make greater efforts to find them. This is an example of how IAS can have a greater impact on women than men. Fuelwood and water are two other critical resources for women and when we lose them, is hard to find, or we invest more time to find it.	Thank you for your comment and excellent example. We have incorporated this example into the text in Chapter 4, section on Good Quality of Life, sub-section 4.5.1.
Participants of ILK dialogue workshop (Katie Kamelamela)	No	Chapter 4	0	0	0	0	Ch 4, SPM: On gendered impacts of IAS: In Hawai'i there is traditional dancing of hula, which is mostly by women, who go into the forest to collect the plants needed. But because of IAS, native species are being pushed up mountains or are being choked out by IAS, so open areas will be full of IAS, so there is more time needed to tend patches and less time to plant patches. In the ocean, women collect limpets, small shelled mollusks, seaweed and limu (a general Polynesian term for edible plants living underwater) which is a big part of diet for seasoning fish. These are traditional food sources mostly collected by women. IAS will take over habitats in intertidal areas so women have to go out in the dangerous wash and wave areas and reefs to gather.	Thank you for your comment and excellent example. We have incorporated this example into the text in Chapter 4, section on Good Quality of Life, sub-section 4.5.1.
Participants of ILK dialogue workshop (Lucy Mulenkei)	No	Chapter 4	0	0	0	0	Ch 4, SPM: On gendered impacts of IAS: Women have an eye to notice IAS, and also language about how to present issues in a traditional setting. Women in Africa who gather medicines also notice IAS that damage their medicinal plants and those that come in different seasons. They can be very good people to give information and to observe and monitor IAS in different areas. They are key actors and knowledge -holders when engaging communities around IAS.	Thank you for your comment. The information on the different impacts for gender has been captured in section 4.5.1 on impacts to Good Quality of Life.
Participants of ILK dialogue workshop (Lynn Jacobs)	No	Chapter 4	0	0	0	0	Ch 3, 4, 5, 6: Knowing that 80% of biodiversity is on lands of IPLCs and 44% of those lands are affected by IAS is daunting. Is it something that is going to be highlighted? The right issues are critical and within international processes they are often not highlighted enough. The lands around our community are being developed without proper consultation – the duty to consult is misunderstood by the Quebec Government. These impacted lands are then impacted by IAS. There is a feedback loop on our community as we lose access to traditional lands, they are impacted by IAS, and community lose capacity to perform traditional activities on those lands, which is a loop that keeps snowballing negatively, and this is a big driver for invasive alien species. There is a duty to consult on IPLC lands and this is a critical piece. All of these policy documents need to highlight this. But duty to consult and FPIC and its implementation by governments is critical to preventing the incredible damage taking place on IP lands and territories, whether in policy discussions or in drivers.	Thank you for your comment. In section 4.6 we have results that demonstrate access to traditional lands is a key concern for indigenous people and local communities. We have added further sentences following on from your comment and referring to the IPBES IAS ILK 3rd Dialogue workshop report that highlights the important issue of upholding the rights of indigenous people to maintain, use and control traditional lands, and how loss of access to these lands is considered a driver of IAS, which starts a negative feedback loop. We thank-you for this valuable addition to the assessment.
Participants of ILK dialogue workshop (Ransom Karmushu)	No	Chapter 4	0	0	0	0	Ch 2, 3, 4, 5, SPM A, B, C: Opuntia that is colonizing landscapes in Laikipia North is mainly disposed by human and elephants. The seeds are resistant to digestion and are dispersed by elephants. It is colonizing land, and gives big challenges and few advantages. It can be used to produce biogas, as is being done by one women's group, but very few people have that knowledge or use because there are not investments in this. Opuntia fruit juice and jam is used by other groups, but the community does not have the capacity for it. It can also be used for fodder, but still not capacity to really take advantage of this. Meanwhile, there are big disadvantages as Opuntia colonizes land and makes it less productive. Another IAS is acacia reficiens – its leaves are acidic and nothing can grow beneath it, no undergrowth or grass or other plants. This is also colonizing the arid areas.	Thank you for your comment. This example has been added to the section in Chapter 4 on Good Quality of Life, under the general patterns sub section 4.5.1 - impacts to different constituents of good quality of life.
Participants of ILK dialogue workshop (Thingreiphi Lungharwo)	No	Chapter 4	0	0	0	0	Ch 4, SPM: On gendered impacts of IAS: In my indigenous community in Nagaland, India, weeding is women's work. IAS affect women because weeds spread fast and this increases the workload and labour and time for women.	Thank you for your comment and excellent example. We have incorporated this example into the text in Chapter 4, section on Good Quality of Life, sub-section 4.5.1.
Rodriguez-Cabal, Mariano Alberto	No	Chapter 4	0	0	0	0	From my point of view Chapter four is missing a section dedicated at the indirect impacts of invasive alien species on community assembly, ecosystem processes and ecosystem services. The consequences of invasive alien species on biodiversity might significantly underestimate when focusing only on their direct impacts or on their impacts on single species. Communities are structured by direct and indirect interactions among species. In many cases, indirect interactions have disproportionate effects on other species and on ecosystem services and processes. Thus, if indirect effects are common then any disturbance such as the gains of invasive alien species can have cascading impacts on the rest of the community and on ecosystem services and processes. I have co-authored several papers on this topic that might be useful: Vitali, A., Sasal, Y., Vázquez, D. P., Miguel, M. F. & Rodríguez-Cabal, M. A. (2022) The disruption of a keystone interaction erodes pollination and seed dispersal networks. Ecology doi.org/10.1002/ecy.3547 Vitali, A., Vázquez, D. P., Miguel, M. F., §Sasal, Y. & §Rodriguez-Cabal, M. A. (2021). A keystone mutualism promotes resistance to invasion. Journal of Animal Ecology DOI: 10.1111/1365-2656.13597 Motta, L., Barrios-Garcia, M.N., Ballari, S.A. and Rodriguez-Cabal, M.A. (2020). Cross-ecosystem impacts of non-native ungulates on wetland communities. Biological Invasions 22: 3283-3291 Rodriguez-Cabal, M.A., Barrios-Garcia, M.N., Greyson-Gaito, C.J., Slinn, H.L., Tapella, M.P., Vitali, A., Crutsinger, G.M. (2019). Non-native ungulates indirectly impact foliar arthropods but not soil function. Biological Invasions 21: 3077-3084 Rodriguez-Cabal, M.A., Barrios-Garcia, M.N. Amico, G.C., Aizen, M.A. and Sanders, N.J. (2013). Node-by-node disassembly of a mutualistic network driven by species introductions. Proceedings of the National Academy of Sciences 110: 16503-16507. Rodriguez-Cabal, M.A., Stuble, K.L., Guénard, B., Dunn, R.R. and Sanders, N.J. (2012). Disruption of ant-seed dispersal mutualisms by the invasive Asian needle ant (Pachycondyla chinensis). Biological Invasions 14: 557-565. Rodriguez-Cabal, M.A., Stuble, K.L., Nunez, M.A. and Sanders, N.J. (2009). Quantitative analysis of the effects of the exotic Argentine ant on seed-dispersal mutualisms. Biology Letters 5: 499-502.	Thank you for this comment and for the suggested additional references. Generally, we included indirect impacts through the mechanism "indirect impacts" (see box 4.3) and to which we refer throughout the report.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	0	0	0	0	This chapter aims to improve knowledge on "How do people, including indigenous peoples and local communities, assess the magnitude of impacts of invasive alien species?" (I.195). To achieve this, it would be beneficial to further integrate the variation within people's opinions (e.g. farmers vs. local land managers vs. government officials) from one location to integrate the fine-scale user perspective. There was a survey sent out with this in mind by the MIREN team and there is a paper about to be pre-printed in this regard (https://www.mountaininvasions.org/post/global-survey-on-alien-invasive-species-impacts-and-management-in-mountains).	Thank you for your comment and suggested paper. We consulted the link and the upcoming paper will make an important contribution to the topic of how indigenous people and local communities assess the magnitude of impacts. Unfortunately we cannot include papers that are yet to be published. We already have some synthesis about the different perceptions of invasive alien species in Chapter 1, and also about different perceptions of impacts amongst and between indigenous peoples and local communities in the introduction of Chapter 4. We agree that finer scale data about people's livelihoods and social status and social groupings compared to perceptions of impact magnitude would be a welcome topic for further investigation following on from the assessment
Clements, David	No	Chapter 4	1	161	1	451	should consider using the new name of Fallopia japonica = Reynoutria japonica throughout	Thank you, we have revised the draft accordingly

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	1	4	1	171	The summary contains rather more detail that desirable as a summary. Such details are covered through the references to chapter sections, and only the emergent patterns should be reported here. Bolded statements should be short, simple sentences only. For example, lines 79-81 could be shortened to one sentence: "Human health impacts of invasive alien species vary from nuisance (allergies) to poisoning, disease and death." Lists are to be avoided where possible, and the section shortened to perhaps 2 pages.	Thanks for this suggested change. We have tried to respect this in the new version as far as possible.
Brooks, Thomas	No	Chapter 4	1	1	3	3	Add "species" and "ecosystems"	Thanks for this suggested change. We have included it in the new version.
Lang, Iris	No	Chapter 4	1	1	6	8	The sequence could be changed to improve logical links. First, the impacts on species : "competition, trophic interactions by predation and herbivory", then "physical and chemical changes of invaded ecosystems". And disease or parasite transmission could be added.	Mechanisms are listed in order of their frequency.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	1	2	8	53	There is an undue emphasis on what is reported. While evidence may be incomplete, it would be preferable to focus what we know about on the impacts themselves - what they are and where they occur. For example, large impacts in cold or dry areas would have likely attracted notice and study, so the small number of reported impacts is at least in part due to a small number of actual impacts. In bullet 4, the imbalance in positive and negative impacts that are reported should lead to different policy responses if it is due to reporting biases rather than to underlying biological patterns.	Thanks for the comment. It is true that the chapter focuses on reported impacts. It is difficult to discriminate the reporting bias from lack of impacts without speculating (i.e. pretending to know where the true impacts occur). We decided for this chapter to refrain from speculation and expert guessing and focus on reporting the data we collated.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	1	1	14	14	"established but incomplete" is surprising for a statement on number of reported impacts. Descriptions of the state of knowledge should be possible with factual statements. Placing a confidence statement here will lead to a tendency to interpret the statement as "Hardly any impacts occur...".	Thanks for the comment. We changed to a more confident statement.
Clements, David	No	Chapter 4	1	1	17	18	Would be good to at least briefly define "invasive" when providing this statistic, e.g., "with documented negative impacts" (seems to be how it is defined in section 4.2)	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	1	1	17	18	The "rule of tenths" that was used for a long time has been refuted by many publications. Suggest removing the phrase "about 10% of alien species are invasive but 17 their numbers are likely to be underestimated"	Thanks for the comment. We don't mention the tens rule, but these are the numbers we found from the database.
Lang, Iris	No	Chapter 4	1	1	17	18	The tens rule is controversial ? Jarić & Cvijanović, 2012. The Tens Rule in Invasion Biology: Measure of a True Impact or Our Lack of Knowledge and Understanding? Environmental Management 50(6). DOI: 10.1007/s00267-012-9951-1	Thanks for the comment. We don't mention the tens rule, but these are the numbers we found from the database.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	1	1	20	32	Replace "local extinctions" with "local extirpations" -- "local species extinctions" is a contradiction in terms, because "extinction" means that no individuals are living anywhere. This issue applies several times in the Chapter.	Thanks for the comment. We deliberately used the term "local extinctions" as it is used also in other official documents (e.g. IUCN EICAT Categories and Criteria) and the more specific term "extirpations", although correct, is not specifically known to all stakeholders.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	1	1	20	23	an example should not be included in the key message (bold text). It could be placed in a separate sentence.	Thanks for this suggested change. We have included it in the new version.
Robinson-Smythe, Tammy	No	Chapter 4	1	1	20	23	The wording is a clumsy - global extinction in Central America. Suggest changing wording to "...for example the chytrid fungus (Batrachochytrium dendrobatidis) led to global extinction of the Central American harlequin toads (Atelopus species)"	Thanks for the comment. The example was deleted in the revision.
Brooks, Thomas	No	Chapter 4	1	1	25	25	Important to add a sentence about relative prevalence of extinction risk driven by invasive alien species (as well as the text already in place on actual extinctions). Something like "Invasive alien species are also the fourth most prevalent driver of species extinction risk, as documented by threats to species assessed as threatened on the IUCN Red List of Threatened Species {4.3.1}" (Box 4.4 is particularly important here)	Thank you for the comment. We report that invasive alien species are a significant driver that directly or indirectly caused 60 per cent of documented global animal and plant extinctions. The relative importance to other drivers is debated and depends on the study methods (Bellard et al., 2022, Nature Communications 13, 2616). However, since evaluation of other drivers is not part of the present report, we don't think that this needs to be in the executive summary.
Robinson-Smythe, Tammy	No	Chapter 4	1	1	28	28	Delete "recorded as"	Thanks for this suggested change. We have included it in the new version.
Brooks, Thomas	No	Chapter 4	1	1	32	32	Add a sentence around here to document the increasing extinction risk driven by IAS. Something like "The Red List Index reveals ongoing increases in the prevalence of species extinction risk driven by invasive alien species {4.3.1}." Butchart (2008 Bird Conserv Internat) is the key reference.	Thank you for the comment. This increase in risk by invasive alien species has been documented for birds (based on changes in N=41 species) but is unknown for other taxa. We find that we have sufficiently documented the threat of invasive alien species already.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	1	2	39	45	Replace "local extinctions" with "local extirpations" -- "local species extinctions" is a contradiction in terms, because "extinction" means that no individuals are living anywhere.	Thanks for the comment. We deliberately used the term "local extinctions" as it is used also in other official documents (e.g. IUCN EICAT Categories and Criteria) and the more specific term "extirpations", although correct, is not specifically known to all stakeholders.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	2	2	55	58	Replace "local extinctions" with "local extirpations" -- "local species extinctions" is a contradiction in terms, because "extinction" means that no individuals are living anywhere.	Thanks for the comment. We deliberately used the term "local extinctions" as it is used also in other official documents (e.g. IUCN EICAT Categories and Criteria) and the more specific term "extirpations", although correct, is not specifically known to all stakeholders.
Clements, David	No	Chapter 4	2	2	59	59	formatting of right margin is off	Thank you, we have corrected this in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	2	3	63	133	Point 7 is a subset of point 5, on NCP. Point 6 is a subset of point 8, on good quality of life. There may be value in emphasizing economics and health, but linking them to the overarching elements may allow shortening of the summary.	Thank you for this suggestion. We have significantly altered the Executive Summary for easier reading.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	2	2	66	66	"The most common observed negative impact is a reduction of human food supply" - this depends on whether crops and livestock are considered to be IAS. If not, this approach needs to be consistent throughout the assessment. Either way, this must be made explicit.	Crops and livestock are not considered IAS neither in the summary nor through the text
Government of Canada (Arsenault, Andre)	Yes	Chapter 4	2	2	72	73	Are you sure you have data to back this up for the boreal forest. I find this surprising. Perhaps you meant temperate and boreal forests. In terrestrial systems, the most common taxa causing impacts are 72 plants in cultivated areas and in boreal forests (well established)	We have clarified "temperate and boreal forests"
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	2	2	73	73	should read "temperate and boreal forests"	We have clarified "temperate and boreal forests"
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	3	3	93	93	Change the common name from devil firefish to lionfish as it is more commonly known and it is the name that has been used in the rest of the chapters	There are two invasive "lionfish" species: Pterois miles (devil firefish) in the Mediterranean Sea, and Pterois volitans (Red lionfish) in the Caribbean & enviro. In each region the appropriate species is listed.
Government of Germany	Yes	Chapter 4	3	3	96	97	Need for clarification: Please clarify whether it should read billion or trillion. If the former is the case (as it is e.g. in the SPM L.6 and L.25), then kindly replace trillion with billion for the sake of accuracy.	We changed the figure of economic costs in the revised version and report these now consistently throughout the chapter
Robinson-Smythe, Tammy	No	Chapter 4	3	3	97	98	It not clear what is meant by " average global invasive alien species invasion costs " Does this mean the average cost per species?	Thank you for pointing out this confusion. We've edited the text to make it clear that we're referring to aggregate global invasive species costs: "In 2017 alone, documented aggregate global invasive alien species invasion costs were estimated to reach \$162.7 billion, exceeding the 2017 gross domestic..."
Clements, David	No	Chapter 4	3	3	126	126	cultivated should not be capitalized	Thank you, we have corrected this in the final draft
Clements, David	No	Chapter 4	3	3	127	127	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Robinson-Smythe, Tammy	No	Chapter 4	3	3	131	131	Delete "own"	Thank you for your comment. We have included this suggested change.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Heger, Tina	No	Chapter 4	4	4	135	137	"and they are often co-occurring" - it is unclear what "they" refers to - negative effects are often co-occurring with positive effects?	Thank you, this paragraph has been reworded and this comment is no longer relevant
Heger, Tina	No	Chapter 4	4	4	142	142	"as well negative impacts" - should read "as well as negative impacts"	Thank you, this paragraph has been reworded and this comment is no longer relevant
Robinson-Smythe, Tammy	No	Chapter 4	4	4	146	146	Replace "to access to assets" with "on access to assets"	Thank you, this paragraph has been reworded and this comment is no longer relevant
Clements, David	No	Chapter 4	4	4	150	150	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it..
Government of Mexico	Yes	Chapter 4	4	4	150	150	to include...the following generations	Thank you for your comment. We have included this suggested change.
Robinson-Smythe, Tammy	No	Chapter 4	4	4	153	153	Replace "taxomonical" with "taxonomic"	Thank you for your comment.Changed as suggested.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	4	4	155	155	more affected and impactful than what? Than currently known? Almost certainly.	this section was changed, so this good suggestion is not longer needed
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	4	4	163	163	"eastern and Northern" should possibly be "Eastern and Northern"	Thank you, we have corrected this in the final draft
Clements, David	No	Chapter 4	4	4	164	164	missing a period after }	Thank you, we have corrected this in the final draft
Clements, David	No	Chapter 4	4	4	165	165	I do not quite follow what "in our report" signifies - does it mean that if adequate translation was available the current chapter could be improved, or does it mean more generally scientific reports from Central Asia would be more complete - clarify	Thank you, the language has been edited for clarity and this specific point is discussed in the knowledge gaps section
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	4	4	167	168	in point 1, the number of reports from these areas are discussed, but here, in a point that discusses data gaps, there is a clear statement that there are few impacts.	this section was changed, so this good suggestion is not longer needed
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	4	4	168	171	this is policy prescriptive as phrased	this section was changed, so this good suggestion is not longer needed
Government of Germany	Yes	Chapter 4	5	5	195	195	Proposal: It is suggested to elaborate further on whether/how non-economic values are accounted for in the assessment of 'monetary costs' of the impacts of invasive alien species.	Thank you for your comment. Section 4.5 and 4.6 of the Chapter mostly focus on non-monetary costs of invasive alien species and these are included in the first and fifth guiding questions in this box which ask for impacts to good quality fo life and impacts as reported by indigenous people and local communities. We feel these are extensive sections that deal with non-monetary costs, and therefore we are inclined to leave the monetary costs guiding question as a stand-alone question, as it specifically relates to Box 4.12 in Chapter 4, which is also stand-alone and covers monetary costs separately.
Clements, David	No	Chapter 4	5	5	203	203	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it..
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	5	5	203	203	Box 4.1: As a key word suggest to add "invasive species positive and negative impacts" this information is very useful and not easy to find in literature, adding this key word could facilitate finding the information	Thank you, we have revised the draft accordingly
Robinson-Smythe, Tammy	No	Chapter 4	5	5	206	206	Replace "methodology to record" with "methodology used to record". Replace "analyse the invasive alien" with "analyse invasive alien"	Thank you, we have revised the draft accordingly
Clements, David	No	Chapter 4	5	5	208	208	Nature should not be capitalized	Thank you, we have corrected this in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	6	6	242	242	While the point being made here is an important one, the initial colonizers of Oceanic islands, for example, would have noticed the rapid extinction of island fauna, and would likely have been able to attribute this to invasives - although of course it is impossible to know if they would have seen this as a problem or just the way of the world. "Their impacts went largely unnoticed" could be rephrased to take into account Indigenous and local perspectives - cf lines 424-431.	The point raised is speculative, unsupported by contemporary sources. We have modified the draft to specify "written" sources.
Duistermaat, Leni	No	Chapter 4	6	6	246	247	Impact studies have been limited to 10% of recorded alien taxa (3516 of 39191 invasive alien species). Delete invasive here, because in line 657-659 it is mentioned that 3515 invasive alien species is 10% of all alien species according to GRIIS.	Thanks for this suggested change. We have included it in the final version.
Government of USA	Yes	Chapter 4	6	6	246	247	Source needed for the statement that "impact studies have been limited to 10% of recorded alien taxa". If well-supported and current, this is a critical metric. This appears to mean 10% of non-native species have been studied, NOT 10% of non-native species have impact - two VERY different conclusions.	Thanks for this suggested change. We have included it in the final version.
Clements, David	No	Chapter 4	6	6	247	247	"3516 of 39191 invasive alien species" - is there a literature source for these figures?	Thanks for this suggested change. We have included it in the final version.
Robinson-Smythe, Tammy	No	Chapter 4	6	6	248	248	Replace "already in" with "as casrly as"	Thanks for this suggested change. We have included it in the final version.
Clements, David	No	Chapter 4	6	7	256	261	I really like this sentence generally but still the wording could be streamlined (or broken into 2 sentences)	Thanks for this suggested change. We have included it in the final version.
Sagoff, Mark	No	Chapter 4	6	7	256	261	Well said. Many of these problems affect ecological science or research generally not just the study of invasive species.	Thank you for your feedback.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 4	7	7	263	286	Paragraph containing statements that seem to contradict each other	Thank you for your feedback. We edited this paragraph for consistency. However, it wasn't clear the statement(s) you were referring to, so we hope we've addressed your concern.
Sagoff, Mark	No	Chapter 4	7	7	268	269	The chapter states: "the literature is generally in agreement that their net economic effect is overwhelmingly negative." This is true. However this may reflect what those who publish and read this literature want to hear.	Thank you for this insight. We do discuss how the research in this area is incomplete towards the end of the paragraph, which should help address some of this concern. We updated this sentence to include "benefits" as also being underestimated. "Even though literature in this area has increased in recent years, research on the economic benefits and costs of invasive species is still in its infancy, and proposed netcost estimates are significantly incomplete and underestimated."
Busch, Michel	No	Chapter 4	7	7	270	290	For a farmer, it is difficult to say that wheat and maize are not invasive plants,brought in by humans, disrupting agricultural cycles, imposing fertilisers and pesticides, justifying the confiscation of groundwater, making it possible to feed huge quantities of domestic animals, and ,in total ,inducing the state of degradation of nature that we see.	Thank you for bringing this to our attention. Topics such as these are often underrepresented and reported in the economics literature. This is an important area for future research and we briefly discuss a similar topic in the knowledge gap section.
Clements, David	No	Chapter 4	7	7	270	271	better as: "Invasive alien species cause a wide array of economic damage, disrupting the production of goods and services."	Thank you for this suggestion. We updated the text as recommended.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	7	7	274	274	to keep the terminology consistent it might be better to use "nature's contributions to people" instead of ES here?	Thank you for this suggestion. We updated the text as recommended.
Geerts, Sjik	No	Chapter 4	7	7	276	277	Not so for plants at least. Indirect impacts yes. And yes, direct impacts on humans as well, but these are not frequently reported. I suggest remove 'frequently'	Thank you for this suggestion. We have removed the term 'frequently.'
Clements, David	No	Chapter 4	7	7	277	277	should be "damage" not "damages"	Thank you, this has been addressed in the final draft.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 4	7	7	277	280	Consider review following claim that calls into question the 2017 USD costs of \$1.7 trillion: "There are also costs associated with invasive alien species prevention and control efforts. Yet, research on the economic costs of invasive species is still in its infancy, and significantly incomplete and underestimated proposed cost estimates are significantly incomplete and underestimated".	Thank you for this feedback. In response, we changed the confidence wording text in the executive summary that references this # from "well established" to "established, but incomplete."

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of USA	Yes	Chapter 4	7	7	277	277	Another impact category to add to the list would be disruption of navigation (e.g., Cuban Bulrush: Mallison et al 2001, Bryson et al 2008; Nymphoides peltata: Darbyshire and Francis 2008; Ludwigia hexapetala: Grewell et al 2016; Alternanthera philoxeroides: Ashe and Driscoll 2013; Hydrilla verticillata: Ashe and Driscoll 2013 and many, many more) as well as increasing costs of transportation (e.g., Phragmites increasing road-right-of-way maintenance costs, hull maintenance, inspection stations, ballast treatment system costs, etc). Mallison, C.T., R. K. Stocker, and C. E. Cichra. 2001. Physical and vegetative characteristics of floating islands. Journal of Aquatic Plant Management 39:107-111. https://www.apms.org . Bryson, C.T., V.L. Maddox, and R. Carter. 2008. Spread of the Cuban club-rush (Oxycaryum cubense) in the southeastern United States. Invasive Plant Science and Management 1:326-329. http://www.bioone.org/doi/pdf/10.1614/IPSMS-08-083.1 . Darbyshire, S.J., and A. Francis. 2008. The biology of invasive alien plants in Canada. 10. Nymphoides peltata (S.G. Gmel.) Kuntze. Canadian Journal of Plant Science 88(4):811-829. https://doi.org/10.4141/CJPS07208 . Grewell, B.J., M.D. Netherland, and M.J. Skaer Thomason. 2016. Establishing research and management priorities for invasive water primroses (Ludwigia spp.). U.S. Army Corps of Engineers, Engineer Research and Development Center, Vicksburg, MS. https://apps.dtic.mil/sti/pdfs/AD1002917.pdf . Ashe, D., and T. Driscoll. 2013. B. A. Steinhagen Reservoir 2013 Fisheries Management Survey Report. Texas Parks and Wildlife Department, Inland Fisheries Division, Brookeland, Texas. https://tpwd.texas.gov/publications/pwdpubs/media/lake_survey/pwd_rp_t3200_1376_2013.pdf .	Thank you for this suggestion. We've added it to the text, including the references listed.
Geerts, Sjik	No	Chapter 4	7	7	279	280	Maybe worthwhile to add that we mostly calculate clearing costs. See for example van Wilgen and Wannenburgh 2016 Current Opinion in Environmental Sustainability Volume 19, 7-17 and Marais et al 2004 The clearing of invasive alien plants in South Africa : a preliminary assessment of costs and progress : working for water. South African Journal of Science Vol. 100, No. 1	Thank you for this suggestion. We've added it to the text.
Clements, David	No	Chapter 4	7	7	282	283	check order of citations	Thank you, this has been addressed in the final draft.
Clements, David	No	Chapter 4	7	7	286	286	better as: "assessed damage levels" vs. "damages"	Thank you for this suggestion. We updated the text as recommended.
Clements, David	No	Chapter 4	7	7	288	289	this gives a false impression that everyone in the public believes the same thing: better to say something like "many members of the public make assume that..."	Thanks for this suggested change. We have included it in the final version.
Pan, Xubin	No	Chapter 4	7	7	288	288	Delete "too"	Thank you, we have corrected this in the final draft
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	7	7	288	289	"the public has yet to shed the assumption that introductions by and large 'improve' on nature." - is there a good reference for this statement?	Thank you for your comment, references added.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	7	7	290	290	"... a limited number of introduced species are extremely valuable as crops and livestock". This is ambiguous. Are these crops and livestock being identified as IAS?	Thanks for this suggested change. We have included it in the final version.
Clements, David	No	Chapter 4	7	7	296	296	"listed"? - "listed" for what purpose? Is this missing a word or two?	Thanks for this suggested change. We have included it in the final version.
Clements, David	No	Chapter 4	7	7	298	298	I recommend adding the common names because these are very familiar to many - i.e. rainbow trout and brown trout	Thank you, this has been addressed in the final draft.
Sagoff, Mark	No	Chapter 4	8	8	314	315	"In fact, invasive alien species are pervasively defined in policy papers and legislation on the basis of their impacts." In that case, the statement that invasive species are harmful presents a tautology.	Thank you for your comment. We deleted the sentence.
Clements, David	No	Chapter 4	8	8	318	318	should it be "threaten biodiversity"?	Thanks for this suggested change. We have included it in the final version.
Robinson-Smythe, Tammy	No	Chapter 4	8	8	319	320	Sentence starting "In situ experimental" Its not clear what is meant in the first part of this sentence. Maybe words are missing?	Thanks for this suggested change. We have included it in the final version.
Schaffner, Urs	No	Chapter 4	8	8	319	324	When reading these sentences, one would expect that this chapter puts emphasis on spatially and temporally extensive experimental research and, following the argumentation, mainly consists of studies assessing economic and health impacts. However, if I understand correctly, most impacts included in the analysis in this chapter are impacts on nature. What kind of inclusion and exclusion criteria were used for compiling the data set analysed in this chapter? In the Methodology section (and the information available from the data management report), I could not find inclusion/exclusion criteria.	The reviewer is correct that we did not put emphasis on economic or human health impacts. Our goal was to understand their full impact (including, but not limited to, economic or human health impacts). Impacts on nature are a very large proportion of the impacts recorded, and they represent the number of studies on this topic in comparison to other topics. All in all, we did not have strict inclusion/exclusion criteria. Our goal was to capture a large representative fraction of all studies on impacts of invasive species.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	8	8	325	326	please include in glossary	Thank you, we have added this definition to the Glossary
Sagoff, Mark	No	Chapter 4	8	8	325	326	It seems obvious that introduced species will cause more change than native species in an ecosystem, especially biodiversity change. The question is whether the change is bad or good and who gets to make this normative judgment and on what grounds.	Thank you. Your point is considered in another section.
Government of USA	Yes	Chapter 4	9	9	344	346	something here is grammatically incorrect or redundant (or just unclear). Would this mean the same thing? "As invasive alien species impact directly and indirectly on nature's contributions to people, they may affect quality of life negatively or positively, highlighting human dependence on ecosystem functioning."	Thank you for your comment. We have now changed the text accordingly
Shin, Thant	No	Chapter 4	9	9	345	346	Can deleted unnecessary repeated/extra meaning "they may affect, negatively and/or positively good quality of life,"	Thank you for your comment. We have now changed the text accordingly
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	9	9	351	351	As an addition to this section consider adding that the information regarding positive impacts of an invasive species is essential in the design of a management plan for the species as any positive impacts may result in society opposing to the control or eradication of such species.	Thank you. Your comment was brought to the attention of Ch. 5.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	9	9	354	357	potentially add "Shackleton RT, Richardson DM, Shackleton CM, Bennett B, Crowley SL, Dehnen-Schmutz K, Estévez RA, Fischer A, Kueffer C, Kull CA, Marchante E, Novoa A, Potgieter LJ, Vaas J, Vaz AS, Larson BMH (2019b) Explaining people's perceptions of invasive alien species: A conceptual framework. Journal of Environmental Management 229: 10–26. https://doi.org/10.1016/j.jenvman.2018.04.045 " as reference?	thank you. added reference
Government of USA	Yes	Chapter 4	9	9	360	360	insert 'and' in the list ... and chestnut blight..	Thanks for this suggested change. We have included it in the final version.
Government of USA	Yes	Chapter 4	9	9	361	364	addition of a nonnative species WITHOUT extirpation/eradication does NOT result in loss of species richness (# of species present). I'd strike the portion of the sentence prior to the colon which seemed to be intended as a connector, but means the opposite of the intent. Or if a linker is wanted use "In addition to loss of species richness, other shifts in diversity are considered harmful to an environment as well..."	Invasive alien species-caused shifts in local diversity - whether by increase, decrease or replacement of native species - erode and damage the community, even when not causing extirpation (local extinction).
Government of USA	Yes	Chapter 4	9	9	361	368	here is the case of the successful eradication of Caulerpa in California that deserves to be highlighted as an example of success in the marine environment. See: https://www.waterboards.ca.gov/water_issues/programs/nps/docs/success/r9_eradication.pdf	Strands of the invasive alga Caulerpa taxifolia were identified in Huntington Harbour and Agua Hedionda lagoon (Anderson, 2005). Bleach introduced under PVC sheeting was used to eradicate the IAS. Though successful, it is not an 'example ... in the marine environment' - both sites are ENCLOSED, shallow, largely manmade sites, of poor environmental quality due to substantial urban runoff, effluents and persistent dredging. The eradication was NOT carried out in the marine environment, but in a polluted, manmade, nearly fully enclosed bodies of water.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	9	9	365	367	As currently written, the text suggests that increased richness is widely and wrongly seen as a benefit. This is oversimplified and contradicted by the following lines (367-370). It would be more correct to say that increasing richness has been seen as both a positive and a negative. The summary sentence may be better placed as the opening sentence of the paragraph.	Thank you, we have revised the draft accordingly

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sagoff, Mark	No	Chapter 4	9	9	371	372	"In this assessment, we define directions of impacts on nature as detrimental when a native species suffers disadvantage." When native species resist and extirpate an invader, this is called resilience and thought to be beneficial to the ecosystem. When invasive species similarly disadvantage native ones, this is deemed detrimental to the ecosystem. Without historical knowledge, however, it is impossible to differentiate native from alien species. Suppose an ecologist who did not know the history of an environment (however well versed he or she may be in ecological theory) observes that one species or group of species is disadvantaging another, say by extirpation. The ecologist would be unable to say whether these changes -- or "impacts" -- are beneficial or detrimental to the ecosystem. No biological research -- no property that can be determined by observation or experiment -- will tell the ecologist whether the change is advantageous or disadvantageous to the ecosystem. If the stronger species is alien -- that is tainted by the human stain -- the change is detrimental; if the species is native, the reverse is the case. That the change (one species disadvantaging another) is caused by an alien species is a sufficient condition to infer that the change is detrimental. Thus the text is correct in stating that "detrimental" is defined in terms of the historical pedigree not the biology of a species. Critics of invasion science argue that the definition is not based on biology; it is a stipulation not a testable hypothesis, and it goes beyond (ultra vires) the competence of science. Indeed, it is the penchant of scientists to go beyond their competence to urge their moral, spiritual, political, and cultural preferences which has engendered such popular mistrust of science.	Thank you for your comment. "without historical knowledge... it is impossible to differentiate native from alien species". But we DO have historical knowledge, and accumulated data on impacts of IAS on the host environment (& humans).
White, Michael	No	Chapter 4	9	10	371	395	Well explained	Thank you for your feedback.
Smith, Kevin	No	Chapter 4	9	9	373	373	for EICAT please write in full first 'IUCN Environmental and Socio-Economic Impact Classification for Alien Taxa' then just 'IUCN EICAT' thereafter.	Thank you, this has been revised accordingly
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	9	9	376	376	Introduction of increase/decrease seems unnecessary here. Changes in abiotic characteristics are and should be assessed using the same positive/negative considerations as biotic impacts. Difficulty in assessing directionality of abiotic impacts is not different from biotic - increased predation means decreased abundance, for example.	Thank you, we have revised the draft accordingly
Government of USA	Yes	Chapter 4	10	10	384	395	is specifying 'good quality of life' rather than simply 'quality of life' necessary? This assumes that the baseline condition is 'nature' providing a good quality of life. Especially given the explicit acknowledgement that the change can be positive or negative, presumably a poor quality of life could potentially be made better (or even worse).	This terminology (good quality of life) is consistent with the IPBES conceptual framework
Shin, Thant	No	Chapter 4	10	10	384	384	Grammar error: whether humans obtain benefit (or) humans are benefited"	Thank you, this has been addressed in the final draft.
Clements, David	No	Chapter 4	10	10	398	398	"on different nature's contributions to people" - there are grammatical issue with this phrase and it is hard to understand what is mean - re-word	Thank you, the sentence has been reworded
Government of USA	Yes	Chapter 4	10	10	403	403	are bidirectionality and multidirectionality alternative terms for the same thing (a species with both positive and negative impacts) or are those two different terms? If the latter, I'm missing something. If the former, pick one term and stick with it for simplicity.	Thank you, we have revised the draft accordingly
Clements, David	No	Chapter 4	10	10	410	410	black should not be capitalized	Thank you, this has been addressed in the final draft.
Clements, David	No	Chapter 4	11	12	423	477	capitalize Indigenous throughout	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Government of China	Yes	Chapter 4	11	11	450	451	Punctuation is missing. It should be: For indigenous people and local communities, an impact of invasive.....	Thank you, this has been deleted in the revised version
Clements, David	No	Chapter 4	11	11	458	458	I can see that the term "Early studies" is used here to signify that more in depth studies are now needed but it would be good to say more clearly what is meant by "early studies"	Thank you for your comment. This sentence has been changed to better clarify what was meant by "early studies", and a reference to one of the early studies has been included.
Clements, David	No	Chapter 4	12	12	465	471	run-on sentence - divide into two	Thank you for this suggested change. We have adopted it in the final version.
Geerts, Sjirk	No	Chapter 4	12	12	465	465	than' to 'that'	Thank you for this suggested change. We have adopted it in the final version.
Clements, David	No	Chapter 4	12	12	466	466	"before current people's living memory" better as "prior to the living memory of current peoples"	Thank you for this suggested change. We have adopted it in the final version.
Pan, Xubin	No	Chapter 4	13	13	483	483	Delete the "books chapters"	Thank you for this suggested change. We have adopted it in the final version.
Smith, Kevin	No	Chapter 4	13	13	487	487	I don't think you need to keep on writing 'International Union for Conservation of Nature (IUCN)' - maybe just do it once (line 487) and then just use 'IUCN'. For the Red List - please write the IUCN Red List of Threatened SpeciesTM for the first time, and then just 'IUCN Red List' thereafter;	We preferred to keep the full name for clarity
Pan, Xubin	No	Chapter 4	13	13	509	509	Change "native" to "invasive"?	we removed the word "native" since this is about the species anywhere.
Shin, Thant	No	Chapter 4	14	14	526	526	Punctuation error "fullstop is needed" where other facts are consistent	Thank you for this suggested change. We have adopted it in the final version.
Clements, David	No	Chapter 4	14	14	527	527	capitalize Indigenous	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Alaux, Christine	No	Chapter 4	14	15	530	595	Move sentence lines 530-533 to line 595 after Box 4-2 table	done
Pan, Xubin	No	Chapter 4	14	14	532	532	Where is "Box 4.5" (or "Box 4.4")?	Thank you, we have moved the boxes where appropriate
Brooks, Thomas	No	Chapter 4	14	16	535	595	Box 4.2 & Fig 4.1 are very important here	Thank you for your feedback.
White, Michael	No	Chapter 4	14	14	557	557	Box 4.2: Red List of Ecosystems has value too	We consider that is correct, but would add extra text that is not absolutely needed.
Pan, Xubin	No	Chapter 4	15	15	576	580	Box 4.2: L580-585	Thank you, we have revised the draft accordingly
Schaffner, Urs	No	Chapter 4	15	159	4443	4443	I find the section 4.7.2 quite superficial. A more thorough discussion could provide some guidance on how to deal with the many frequencies of negative and positive reports of impacts given in this chapter. As stated on L. 4486, an important challenge for many decision makers is how to deal with a set of negative and positive impacts. I suggest that this part of the chapter more thoroughly explores ways how to deal with the information provided in this chapter and discusses related aspects, such as the selection of indicators of impacts, or the analysis and interpretation of context dependency and trade-offs in impact studies. I am afraid that without assistance policy makers and many other stakeholders remain confused by the description of frequencies of positive and negative impacts of different IAS as provided in this chapter.	Thank you. We have now clarified elsewhere in the text about positive and negative impacts. We agree with the reviewer that this is a complex topic that requires more attention, but we consider that the text provided is enough for the section of this chapter.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	17	17	625	626	Box 4.3 "Transmission of disease": Would a disease-causing microbe (that is, the pathogen itself, rather than the vector) be included in "transmission of disease" or "parasitism"? An example IAS would be chestnut blight - it does not fall clearly into any of these categories.	no, a disease-causing species will not be here. This is about vectors. But we fully agree that diseases per se can also be invasive species. We do not think that adding the word "disease" to our list will necessary.
Clements, David	No	Chapter 4	17	17	646	646	not sure about the syntax for: types' (with the apostrophe)	We consider that this is correct
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	17	17	646	651	In Box 4.3, the definition of "Nature's contributions to people" is counter-intuitive. Why would "changes in nature's contributions to people ... not always directly translate into positive or negative changes for humans"? If "humans do not use the increase in nature's contributions to people" why should these be considered a contribution to people? This definition requires more explanation, or even rethinking.	the detailed explanation is a lot more detailed in the text we cite, there this term was first proposed. We have clarified this more in the new version
Government of USA	Yes	Chapter 4	17	17	657	657	I think this is the number above that I wanted a citation for. If from this study only, that needs to be clarified above. Also, clarify that 'impact' here includes both positive and negative impact, not just negative. Also clarify whether these are just reports of impact or also include studies that concluded no impact (impact was looked for/assessed, but NO impact found).	we clarified now that this for this study
Clements, David	No	Chapter 4	18	18	666	666	do not capitalize "temperate" or "Inland"	Thank you for this suggested change. We have adopted it in the final version.
Government of USA	Yes	Chapter 4	18	18	675	675	I'm pleasantly surprised you managed to find that many reports of impacts to native microbes!	Thank you for your feedback.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Clements, David	No	Chapter 4	18	18	677	678	in Table 4.1, do not capitalize "high mountain" or "grasslands"	Thank you for this suggested change. We have adopted it in the final version.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	18	28	681	973	General patterns do not emerge from this section. Table 4.2 demonstrates that data can be more clearly described in tables than in paragraphs. The text provides a great deal of information but lacks analysis, leading the reader to wonder "so what?"	Thank you for this comment and we are sorry that the way we summarise the existing evidence apparently does not fit your expectations. We have chosen not to act on your comment, as you have not provided any supporting evidence and no specific approach to solve it. In this report, we are describing existing knowledge, but we are not supposed to create new knowledge, e.g. by novel analyses. Also, other readers did not comment in similar directions, thus it might not be perceived as a general problem.
Asmervik, Ingvild Fonn	No	Chapter 4	19	72	680	2357	Consider describing the situation of <i>Picea sitchensis</i> in Norway, which is a species that is considered to have economic benefits and convenient ecosystem services (climate change mitigation), but at the same time is a serious threat to red listed species and nature types because of its invasiveness. It has colonized entire islands along the coast of Norway.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Government of USA	Yes	Chapter 4	19	19	691	693	Unless you have further data, I don't think you can conclude that the increase in impacts was more significant than the increase in research in terms of influencing these trends. Within my analyses of Great Lakes data, I see time lags between introduction of species and publication of study of impact that easily exceed 20-50 years. Case in point that you don't have any negative impacts reported until ~1930 (coincident with Elton's work) even though we have a history of invasion going back >200 years (documented non-native species for the Great Lakes region at least to the 1830s).	Thank you for your comment. The text does not suggest that one of the factors was more influencing the trends than the other, just that both were likely involved.
Clements, David	No	Chapter 4	19	19	702	702	omit "many"	Thanks for this suggested change, but we'd like to keep "many".
Duistermaat, Leni	No	Chapter 4	20	20	709	709	<i>Fallopia japonica</i> is referred to as <i>Reynoutria japonica</i> in Chapter 3. I prefer <i>Fallopia</i> , but whatever you chose, make it consistent throughout the report.	Thank you, we have harmonized the taxonomy across the assessment
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	20	20	712	728	This section is somewhat confusing, in part because it is not clear whether beneficial species can be invasive. Do all the species reported in the para lines 712-723 have both positive and negative impacts? If so, moving the sentences from lines 725-728 to the beginning of the preceding paragraph would be clearer. As currently written, there seem to be three categories (negative, positive, mixed) but the positive category contains mixed-impact species.	This assessment focuses on IAS, thus alien species causing negative impacts (chapter 1). Thus, all species with positive impacts also have negative impacts, but not necessarily at the same location. We try to clarify this in the description of Methods (chapter 4.2), and also mentioning this more specifically here.
Government of USA	Yes	Chapter 4	20	20	712	714	I'm surprised Dreissenids made the list for positive impact to nature, while top-down biocontrol species (salmonid control of alewife in the Great Lakes, fish stocked for mosquito control, etc) did not. You do note the positive impacts reported for round goby, but I assume that didn't make 'top ten'.	Thank you for your comment. The feedback is greatly appreciated by the chapter authors.
Clements, David	No	Chapter 4	20	20	725	725	avoid beginning a sentence with a numeral	Thank you, we have revised the draft accordingly
Government of USA	Yes	Chapter 4	20	20	725	728	I wonder to what extent these (bidirectional impact species) are the 'extensively studied' species or otherwise represent a time lag between study of negative impact and positive impact and/or perception of the relative importance of those two types of assessments (per figure 4.2 there is at least a 40 year timelag between the first studies reporting negative versus positive impact and positive impact account for only 12% of the total data. Bias against reporting 'negative results' (e.g., a study designed to document a negative impact found a positive one instead) may also be playing a role here.	This is true. However, we don't know the extent of biases and research lags, thus we refrain from speculating on this. Please note that the species mentioned here are among those that are most often reported causing negative impacts, but there are others that are less often studied.
Smith, Kevin	No	Chapter 4	20	20	730	730	It states "Some invasive alien species cause local extinctions of native populations." It would be good to tie this into the EICAT assessments, as any IAS impact that leads to population extinction would be classed either Massive or Major (depending on the irreversibility of the extinction) - these are the top two harmful categories of EICAT.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not specified how this should be connected to EICAT assessments and it does seem to be suggested elsewhere.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	20	20	739	743	If Red List data is the major source for this, microbes are only likely to be reported if they are disease-causing and pose a threat to another species. If this is the case, it is unfair to compare numbers to the other taxonomic groups.	Red List data is not the major source; these are summaries from the database gathered specifically for this report.
Government of USA	Yes	Chapter 4	20	20	739	743	Disease transmission in the marine realm has been studied for a much shorter period of time and is much more difficult to study, so this may not be a fair statement. I would avoid such a comparison, particularly given the rapid spread of SCTL from Florida to 19 other countries since 2014. (see comment above on SCTL)	Thank you for your comment. The feedback is greatly appreciated by the chapter authors. Please note that this is not meant as a comparison, and specifically the cause of SCTL is unclear and also if it's caused by an alien species.
Government of USA	Yes	Chapter 4	20	20	739	745	given how understudied the microbe group is (representing a tiny fraction of the total studies) it's actually quite impressive that there are so many examples of them leading to local extinction events. I suggest taking a look at this data relative to the proportion of studies done for each group -- what % of microbe studies reported local extinction versus what percent of vertebrate studies reported local extinction. Based on what was presented earlier, I suspect microbes are 'less frequently implicated' only insofar as they are understudied and that actually a high proportion of microbes that were studied revealed major-massive impact.	Thanks for the comment. This is addressed in the following paragraph and in table 4.2
Government of USA	Yes	Chapter 4	20	20	739	743	Was there any consideration of stony coral tissue loss disease as a new and terribly damaging microbe affecting marine habitats. First noted in Florida in 2014 it has now spread to 19 other countries with devastating impacts. The one thing that might preclude inclusion is the lack of a definitive causative agent at this time. https://www.agrra.org/coral-disease-outbreak/ provides a good summary and resources.	The causal agent of SCTL is unclear, and also if it is caused by an alien agent. Thus, it is not included in this report.
Clements, David	No	Chapter 4	20	20	742	742	missing parentheses around <i>Haplosporidium nelsoni</i>	Thank you, this has been corrected.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	20	20	743	745	This is unclear - how can extinction be of lower magnitude?	Thanks for the comment. We clarified the meaning.
Clements, David	No	Chapter 4	20	20	750	750	should be an "and" before "much fewer"	Thank you for this suggested change, this has been corrected in the final draft.
Government of China	Yes	Chapter 4	21	21	751	753	Given that the evaluations on alien species in marine realms are mainly based on the reports from shelf ecosystems and coastal areas, the conclusion suffers a strong bias to these two subregions, the conclusion should be more carefully stated.	Thanks for the comment. Changed as suggested.
Government of USA	Yes	Chapter 4	21	21	751	751	are reported to cause local extinctions (at least for the microbes which data suggests have a serious under-reporting/under-study issue, I would not say they 'cause fewer extinctions' so much as they 'aren't reported to cause as many extinctions')	Thanks for the comment. Changed as suggested.
Robinson-Smythe, Tammy	No	Chapter 4	21	21	755	755	Table 4.2: Capitalise the heading in the table	Thank you, we have corrected this in the final draft
Brooks, Thomas	No	Chapter 4	22	23	791	848	Box 4.4 is excellent. For Fig 4.3 though, the authors might be wise to relax the requirements with respect to scope and severity (or at least to check the impacts of doing so).	Thanks for the comment. Indeed, by using only a sub sample of the data for which IAS is considered as a significant driver of threat for the majority of the species ranges, we excluded a lot of species, and this might affect the result. We made this choice in order to be conservative and avoid to include species for which IAS is only a minor threat.
Smith, Kevin	No	Chapter 4	22	22	791	791	Box 4.4: Its great that the assessment uses the Red List data on Extinct species, but it would be great to see the assessment also provide similar analysis based on what the Red List shows to species that are 'Threatened with extinction' (i.e. CR / EN / VU) - there are currently over 6500 species threatened species that are coded as impacted by IAS on the RL.	Thanks for the comment. We understand it could be nice to compare the extinct records with the species that are currently threatened. However, this would be out of the scope of the box, which focus on the extinctions due to IAS. Following the suggestion, we have now added one sentence to illustrate that IAS is not the main driver of threatened species following Maxwell's statement (Maxwell et al., 2016) and also mentioned the number of species that are considered as critically endangered and possibly extinct by the IUCN Red List.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Smith, Kevin	No	Chapter 4	22	22	797	799	Box 4.4: I am not sure of the meaning of this sentence "Invasive alien species are categorized as a significant threat (i.e., causing significant decline to the majority of the species' ranges) in nearly 60% of cases." If by 'cases' you mean extinctions - is this not repeating the previous sentence "...[IAS] are a (co-)driver in 57% of all known extinctions"	Thanks for the comment. We agree that the sentence was a little bit confusing. We have now removed the repetitive part and modified the two sentences to improve clarity.
Smith, Kevin	No	Chapter 4	22	22	799	816	Box 4.4: If I understand what has been done correctly, by only using RL species where Scope and Severity is recorded - you will be excluding many species assessments from this dataset - note that threat scope and severity are NOT required to be recorded as part of the Red List assessment. You will be excluding a lot of data.	Thanks for the comment. Indeed, by using only a sub sample of the data for which IAS is considered as a significant driver of threat for the majority of the species ranges, we excluded a lot of species, and this might affect the result. We made this choice in order to be conservative and avoid to include species for which IAS is only a minor threat.
Brooks, Thomas	No	Chapter 4	22	22	803	803	Box 4.4: Add a sentence to document that the prevalence of extinction risk due to IAS is increasing, as documented by the Red List Index (impacts of IAS); citing Butchart (2008) Bird Conservation International. This is not only highly biologically important, but also politically so, given that the Red List Index is adopted by the UN as the official SDG indicator 15.5.1.	Thanks for the comment. Indeed, this is an important fact that we have now added in the box text.
Clements, David	No	Chapter 4	23	23	820	821	common names should not be italicized	Thank you. This has been corrected in the final draft
Smith, Kevin	No	Chapter 4	23	23	823	823	Box 4.4: Im not sure what 'significantly caused by IAS' means ? Does this mean where IAS was the only threat, or where IAS were recorded with scope >50% and severity > significant decline?	Thanks for the comment. Significantly caused by IAS" means indeed that IAS are categorized as a significant threat (i.e., causing significant decline to the majority of the species' range), we have now used the same terminology as defined in the text to avoid any confusion
Smith, Kevin	No	Chapter 4	23	23	827	827	Box 4.4: 'Global extinction hotspots...' - maybe add '...where IAS are a know threat'	Thanks for your suggestion, we have now added "extinction hotspots where IAS are a main threat".
Government of USA	Yes	Chapter 4	23	23	838	839	Box 4.4: "endanger freshwater fish invasive alien species" - something wrong or a word missing here -- the invasive fish aren't the ones endangered. I had to read this whole sentence multiple times to parse what was meant - try splitting into a couple of sentences.	Thanks for the comment. We are sorry for the mistake, the sentence was added during the editing process and it is now removed.
Smith, Kevin	No	Chapter 4	23	23	843	847	Box 4.4: IUCN don't say that the Red List is the most comprehensive list of extinct species, what it is is the 'worlds most comprehensive information source on the global conservation status of species (i.e. the risk of extinction)'. It is very hard to say if a species is definitely extinct (to be assigned EX there is a very rigorous process to go through) - therefore IUCN state that the RL underestimates the true level of extinction (note that there are 387 species listed on the RL that are 'CR possibly extinct' that have IAS recorded as a threat - these are not mentioned at all). In addition, the attribution of factors driving extinctions (i.e. recording threats) relies upon published literature (incl. peer review) in addition to expert opinion, so please remove this phrase and especially the term 'thus is invalidated'.	Thanks for your suggestion, we have now modified the sentence. We also added information about the documented CR possibly extinct due to IAS, note that the number is 327 species as we only considered plants and animals. Finally, the sentence 'it is thus invalidated' was not in the original draft of the box and has been added during the editing process, this has now been modified to "thus is subject to uncertainty".
Brooks, Thomas	No	Chapter 4	23	23	845	846	Box 4.4: Change "observation and expert opinion and thus is invalidated" to "evidence, and thus subject to data gaps". The text is not correct as written: extensive guidance is provided on documenting not just the presence of a threat (following Salafsky et al. 2008 Conserv Biol; https://www.iucnredlist.org/resources/threat-classification-scheme) but also documenting their scope, severity, and timing (https://www.iucnredlist.org/resources/rules-of-procedure). See also Mair et al. (2021 Nature Ecol Evol).	Many thanks for the additional ref. We added the IUCN and Salafsky's publications. Note that the Mair et al 2021 offers a very interesting approach but is not relevant to be cited here.
Clements, David	No	Chapter 4	23	23	846	846	"thus is invalidated" is too strong a statement and could be misinterpreted. The causes of extinctions are not validated by scientific research, but the observations in combination with expert opinion are still "valid" sources of information. An alternative wording could be "thus has not been validated by in depth scientific research."	Thanks for the comment. We agree that the "invalidated term" is wrong and should not be used here. In fact, the draft of the box did not include this term, which was added later during the editing process. We will be extra careful that the edits does not change the meaning of the sentence in the future. The sentence now reads it is thus subject to uncertainty.
Government of USA	Yes	Chapter 4	23	23	846	846	Box 4.4: invalidated does not mean 'not validated'. I don't think you would devote this entire box if you thought the list and method was truly invalid (proven wrong).	Thanks for the comment. We agree that this term should have not been used and it is now replaced by the original version of the sentence "it should be emphasized that the attribution of factors driving extinctions' relies on evidence upon published literature (incl. peer review) in addition to expert opinion and thus subject to data gaps observation and to some level of uncertainty"
Sandvik, Hanno	No	Chapter 4	23	23	846	846	Figure 4.5: It is not correct that the attribution of factors has been "invalidated" (i.e. proven wrong), it just has not been validated (i.e. corroborated).	Thanks for the comment. We agree that this term should have not been used and it is now replaced by the original version of the sentence "it should be emphasized that the attribution of factors driving extinctions' relies on evidence upon published literature (incl. peer review) in addition to expert opinion and thus subject to data gaps observation and to some level of uncertainty"
Brooks, Thomas	No	Chapter 4	24	24	849	852	Fig 4.5 is useful, but clarify whether this just relates to extinctions driven by IAS, or whether it relates to all extinctions. My impression is the latter. Also, add citation following https://www.iucnredlist.org/about/citationinfo	Thanks for the comment. The data considered extinctions where IAS are cited as a threat, this is now clarified in the legend. We have now added the IUCN citation to the data.
Wong, Nicholas	No	Chapter 4	24	24	849	852	Figure 4.5. Cannot quite tell from the legend or the figure text if the bars for extinct species and extinct in the wild separate bars? Or combined as a single annual value?	Thanks for the comment. The data of EX and EW are combined as specified in the legend.
Robinson-Smythe, Tammy	No	Chapter 4	24	24	850	850	Figure 4.5: Suggested change to figure legend: Barplot of the number of species extinct or extinct in the wild since 1500, with date of last observation indicated.	Thank you, we modified the legend text as suggested.
Smith, Kevin	No	Chapter 4	24	24	855	855	Change 'density' to 'size'? The rest of the section presents information on population declines. Also maybe good to explicitly draw parallels with the IUCN EICAT category of Moderate - which is a category assigned to IAS impacts where they lead to declines in population sizes in at least one native taxon (but do not lead to local extinction). Same for where you mention 'decline in performance' (which = Minor impact category)	Thanks for the comment. Changed as suggested. We explain the relation to EICAT in the Methods section (4.2).
Government of USA	Yes	Chapter 4	24	24	874	875	Box 4.5: sentence fragment "But also, because the skills and resources required to study multiple drivers may not be available in all regions of the world or because of disciplinary boundaries."	Thanks for the comment. Changed as suggested.
Government of USA	Yes	Chapter 4	25	25	893	893	Box 4.5: blamed FOR the rapid decline...	Thank you for this suggested change. We have adopted it in the final version.
Government of USA	Yes	Chapter 4	25	25	900	900	Box 4.5: unless you have direct evidence that most/all invasive aquatic plants thrive in polluted habitats, preface this with many or some or use the phrase 'may thrive'. At least for the Great Lakes region, we have some aquatic plants that are wreaking havoc in otherwise pristine lakes/wetlands.	Thanks for the comment. Changed as suggested.
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	25	25	908	908	Box 4.5: there appears to be a reference error.in relation to Innes et al it should read 2010	Thank you, we have corrected this in the final draft

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of USA	Yes	Chapter 4	25	25	908	909	Box 4.5: Hunting can also be a vector for introduction of 'hitchhiking' invasive species -- duck hunters are suspected to be a vector for European frogbit in Michigan/Ontario (Catling and Dore 1982). Many other aquatic plants and invertebrates are documented to move as hitchhikers on boats. ... not sure if you want to use this broader context here or were trying to keep the whole paragraph to just cases with extinctions. Catling, P. M., & Dore, W. G. (1982). STATUS AND IDENTIFICATION OF HYDROCHARIS MORSUS-RANAE AND LIMNOBIUM SPONGIA (HYDROCHARITACEAE) IN NORTHEASTERN NORTH AMERICA. Rhodora, 84(840), 523-545. http://www.jstor.org/stable/23314457	Thanks for the comment. Chapter 4 is about impacts, and the suggested example would fit better in chapter 3 (drivers).
White, Michael	No	Chapter 4	25	25	912	918	Box 4.5: I call this the cascade effect. Look at Planetary Boundaries and global tipping points too.	Thanks for the comment. However, we decided not to include this as the evidence for invasive alien species impacts in planetary boundaries and global tipping points is speculative.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	29	29	1020	1020	Box 4.6: unless these were human-mediated, the word "introductions" should perhaps be replaced by "species immigrations," which aligns more closely with terminology used in island biogeographical theory	Thank you for your comment. We have now changed the text accordingly
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	30	30	1029	1030	"Athens (1997, 2008) considers the Pacific rat is the underlying cause of lowland forest collapse." - should be "as"?	Thank you for your comment. "is" is correct.
Robinson-Smythe, Tammy	No	Chapter 4	30	30	1037	1037	Box 4.5: Add "and" after "rodents"	Thank you for your comment. We have now changed the text accordingly
Robinson-Smythe, Tammy	No	Chapter 4	31	31	1066	1066	Box 4.6: Add "are" after "Hawaii, "	Thank you for your comment. We have now changed the text accordingly
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	31	31	1110	1116	If the opening sentence of this para were deleted, the paragraph would provide a clear summary of the overall pattern. Putting the percentages in a table would provide several advantages: readers could be reminded what the mechanisms are, subtotals for direct and indirect mechanisms would allow easy comparison, and use of two columns would allow comparison of all impacts vs local extinctions.	Thanks for the comment. We moved the opening sentence. Adding another table would increase the length of the chapter and we refrained from this.
Government of Germany	Yes	Chapter 4	32	32	1100	1100	Proposal: We suggest to add: The EU shows in a guidance document how invasive species regulation and the protection of the Natura 2000 protected area system can interact (Scalera et al. 2020). Riccardo Scalera, Wolfgang Rabitsch, Evelyn Underwood (2020) FAQs on how the Invasive Alien Species Regulation interacts with the EU Nature Directives. European Commission, Brussels. https://ec.europa.eu/environment/nature/natura2000/management/docs/FAQ_IAS.pdf	Thanks for the comment. Chapter 4 is about impacts, and the suggested example would fit better in chapter 5 (management).
Tassin, Jacques	No	Chapter 4	32	32	1102	1129	All the given examples of mechanisms are from animals, but no example is provided for plants. That would be necessary to complete.	Thanks for the comment, but this is not true. Invasive alien plants cause impacts through competition, hybridisation and other mechanisms, which are included here, but do not belong to the most frequently reported impacts. See also table 4.3 for plant examples, please.
Robinson-Smythe, Tammy	No	Chapter 4	32	32	1113	1113	Should "e.g." not be "i.e."?	Thanks for the comment. Changed as suggested.
Robinson-Smythe, Tammy	No	Chapter 4	32	32	1119	1119	Replace "Invasive alien species causing most frequently extinctions through hybridisation" with "The invasive alien species that are most commonly responsible for extinctions through hybridisation"	Thanks for the comment. Changed as suggested.
Robinson-Smythe, Tammy	No	Chapter 4	32	32	1121	1122	Replace "Invasive alien species causing most frequently extinctions through predation" with "Invasive species most frequently causing extinctions through predation"	Thanks for the comment. Changed as suggested.
Robinson-Smythe, Tammy	No	Chapter 4	32	32	1125	1125	Add "have" after "(Paralithodes camtschaticus)"	Thanks for the comment. Changed as suggested.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	33	33	1131	1131	Figure 4.11: this figure is confusing - it's very hard to extract an overall message. The only really clear result I see is not a very interesting one: ecosystem mechanisms tend to affect ecosystem properties.	Thanks for the comment. We agree that the figure is complex as it contains a lot of information, thus we'd like to keep it.
Wong, Nicholas	No	Chapter 4	33	34	1148	1151	Table 4.3. Suggest that the "Predation mechanism" should include freshwater - E.g. Nile perch (Lates niloticus) causing 200+ extinctions in Lake Victoria, Africa, as mentioned on page 51 line 1675. CAN WE ADD ANOTHER SPECIES- SMALL MOUTH BASS, GOLDFISH	Thanks for the comment. We added the Nile perch as example.
Robinson-Smythe, Tammy	No	Chapter 4	33	33	1149	1149	Table 4.3: Add "have" after "species which"	Thanks for the comment. Changed as suggested.
Robinson-Smythe, Tammy	No	Chapter 4	34	34	1162	1162	Delete "e.g.,"	Thanks for the comment. Changed as suggested.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	34	35	1165	1173	this is a really interesting finding.	Thank you for your feedback.
Robinson-Smythe, Tammy	No	Chapter 4	34	35	1165	1170	This is a very long sentence, making it difficult to follow. I suggest ending the sentence in line 1169 with the word "vertebrates". The next sentence can start "However this pattern does not hold for invasive alien microbes"	Thanks for the comment. Changed as suggested.
Robinson-Smythe, Tammy	No	Chapter 4	36	36	1192	1192	Table 4.4: Should the first column of this table not have the heading "Native taxa"	Thanks for the comment. Changed as suggested.
Pan, Xubin	No	Chapter 4	37	37	1223	1237	Box 4.7: P36-37 L1210-1223	Thanks for the comment. We removed the duplicated text.
Government of Canada (Mason, Peter)	Yes	Chapter 4	38	36	1269	1317	Box 4.7: The discussion about how cane toad may influence evolution of native predators is appropriate and well placed. However, this discussion does not suggest that cane toads have a positive impact on native biodiversity (see comment page 50, lines 1622-1626).	Thanks for the comment. Since this box considers evolutionary aspects of impacts, we do not find it necessary to refer to positive impacts here.
Robinson-Smythe, Tammy	No	Chapter 4	38	39	1269	1317	Box 4.7: This section on Cane toads is very interesting but much of the information is repeated - lines 1272-1249 deal with consumption of Cane toads by native predators, then the whole concept is reintroduced in lines 1294-1317. These two parts can be consolidated.	Thanks for the comment. We removed the duplicated text.
Sagoff, Mark	No	Chapter 4	38	39	1269	1293	Box 4.7: A good deal of material is repeated here -- a typographical mistake.	Thanks for the comment. We removed the duplicated text.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	38	38	1269	1317	Box 4.7: The whole paragraph is repeated identically! From line 1293 "Invasive... it is a word for word repetition of the above."	Thanks for the comment. We removed the duplicated text.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	38	38	1293	1371	Box 4.7: Delete because duplicates lines 1269 to 1293.	Thanks for the comment. We removed the duplicated text.
Clements, David	No	Chapter 4	39	39	1286	1325	some of the material (e.g., on evolution of gape size) appears to be repeated several times within Box 4.7 - edit carefully; Box 4.7 seems very long in general so may benefit from some editing	Thanks for the comment. We removed the duplicated text.
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	39	39	1293	1317	Box 4.7: 1293-1317 text starting Invasive alien species may have (Phillips and Shine, 2004). Has been inserted twice.	Thanks for the comment. We removed the duplicated text.
Pan, Xubin	No	Chapter 4	39	39	1294	1318	Box 4.7: P38-39 L1269-1294	Thanks for the comment. We removed the duplicated text.
White, Michael	No	Chapter 4	39	39	1296	1296	Box 4.7: Some text is repeated in this box: snakes and cane toads	Thanks for the comment. We removed the duplicated text.
Robinson-Smythe, Tammy	No	Chapter 4	40	40	1348	1348	Box 4.7: Replace "marine coasts" with "the coast" - a coast is marine by its very nature.	Thanks for the comment. Changed as suggested.
Clements, David	No	Chapter 4	40	40	1359	1359	mallard should not be capitalized	Thank you for this suggested change. We have adopted it in the final version.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	41	41	1382	1393	Box 4.7: The whole paragraph is repeated identically! From line 1390 "Rapid evolution in native species." it is repetition of the above.	Thanks for the comment. We removed the duplicated text.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	41	41	1389	1396	Box 4.7: Delete because duplicates lines 1382 to 1389.	Thanks for the comment. We removed the duplicated text.
Pan, Xubin	No	Chapter 4	41	41	1389	1396	Box 4.7: P41 L1382-1389	Thanks for the comment. We removed the duplicated text.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sagoff, Mark	No	Chapter 4	42	42	1407	1408	Box 4.7: "The evolutionary responses of native species to invasive alien species likely ramify throughout entire communities and ecosystems..." At some point, it is impossible to tell how much of ecosystem activity can be attributed to native vs. alien species. It's too much of a scramble. And there are a lot of cryptogenic species to buffuddle any attempt to say what is native and what alien in environments that have mixed them up for centuries. The question must arise -- why bother? Since the native/alien distinction does not depend on biology but pedigree -- absent historical knowledge it is impossible to say which is which -- why is this distinction, which lacks a biological difference, of interest to science? I understand that if one makes the initial assumption that humanity is not part of nature, perhaps because of Adam's transgression in Eden, then the distinction is important because alien species carry the taint of human corruption. For anyone interested, I have argued that the idea that nature is innocent and good while culture is corrupt and detrimental is not bad science. It is bad theology. See Sagoff, Mark (2015), "A Theology for Ecomodernism." Breakthrough Journal, No. 5 (Summer). https://thebreakthrough.org/journal/issue-5/a-theology-for-ecomodernism	Thanks for the comment. This is a philosophical question and the author is certainly entitled to his views, but as the author is well aware, quite many people find it logically consistent and useful to discriminate native and alien species. The present IPBES report is based on this distinction and the according definitions are given in the scoping document and in chapter 1.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	42	42	1411	1413	Box 4.7: delete	Thanks for the comment. Changed as suggested.
Clements, David	No	Chapter 4	42	42	1432	1432	should be "The highest numbers..."	Thanks for this suggested change. We have included it in the new version.
Clements, David	No	Chapter 4	43	43	1457	1457	gorse should not be capitalized	Thanks for this suggested change. We have included it in the new version.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	43	43	1458	1458	"worst" - potentially "most impactful" / "associated with most negative impacts ?	Thanks for this suggested change. We have included it in the new version.
Clements, David	No	Chapter 4	43	43	1462	1464	in Table 4.5, do not capitalize "high mountain" or "grasslands"	Thanks for this suggested change. We have included it in the new version.
Clements, David	No	Chapter 4	44	44	1480	1480	should be "alters"	Thanks for this suggested change. We have included it in the new version.
Clements, David	No	Chapter 4	44	44	1499	1499	should be "invasive plants"	Thanks for this suggested change. We have included it in the new version.
Schaffner, Urs	No	Chapter 4	45	45	1513	1513	Correct reference: Shiferaw, H., Schaffner, U., Bewket, W., Alamirew, T., Zeleke, G., Teketay, D. and Eckert, S., 2019. Modelling the current fractional cover of an invasive alien plant and drivers of its invasion in a dryland ecosystem. Scientific Reports, 9(1), pp.1-12.	Thank you, we have revised the citations as appropriate
Government of Germany	Yes	Chapter 4	45	45	1525	1528	Proposal: Please provide a brief explanation (e.g. in a footnote, as seen to fit) on what is meant with 'social costs' and 'social benefit'.	Thanks for pointing this out. We have changed the wording and this new version of the sentence will clear things up without needing to add to a glossary.
Schaffner, Urs	No	Chapter 4	45	45	1536	1547	One of the most important impact of prosopis is missing here, i.e. the high water consumption and ist implications on groundwater level (not just access to water); respective references should be added.	Thank you for pointing this out. We have added this and included a reference (Shiferaw, H., Alamirew, T., Dzikiti, S., Bewket, W., Zeleke, G., & Schaffner, U. (2021). Water use of Prosopis juliflora and its impacts on catchment water budget and rural livelihoods in Afar Region, Ethiopia. Scientific reports, 11(1), 1-14.).
Schaffner, Urs	No	Chapter 4	45	45	1548	1550	This needs to be formulated more carefully; people have to adapt to mesquite in highly invaded areas because they may not be able anymore to rear livestock or do subsistence farming; thus, the use of wood from prosopis may not increase financial capital but help buffering the losses due to reduction in income from traditional land use (e.g. Linders et al. Ecosystem Services 2020).	Thank you for your comment. We have now changed the wording of the sentence, added the new reference. We also added a further sentence to explain that the sustainability of these livelihood adaptations is context dependent, including examples from India and Africa.
Robinson-Smythe, Tammy	No	Chapter 4	47	47	1575	1575	Add "group" after "second"	Thanks for this suggested change. We have included it in the new version.
Clements, David	No	Chapter 4	48	49	1607	1608	some spacing issues in the first column of Table 4.6	Thank you, we have corrected this in the final draft
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	48	48	1607	1607	Table 4.6: In the title instead of (top 10 by #records) specify (top 10 by #records of impacts) to clarify that they are records of impacts not records of presence	Thanks for this suggested change. We have included it in the new version.
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	48	50	1608	1609	1608-1609 table 4.6 - please also include common names.	Thank you, this has been addressed in the final draft.
Clements, David	No	Chapter 4	50	50	1615	1615	Fallopia japonica needs to be in italics	Thank you, all scientific names have been italicized in the final draft
Duistermaat, Leni	No	Chapter 4	50	50	1615	1615	... japonica showed higher abundances ... [insert showed]	Thanks for this suggested change. We have included it in the new version.
Duistermaat, Leni	No	Chapter 4	50	50	1615	1615	Fallopia japonica italic, or use common name Japanese knotweed	Thank you, all scientific names have been italicized in the final draft
Robinson-Smythe, Tammy	No	Chapter 4	50	50	1617	1617	Delete "the species"	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Mason, Peter)	Yes	Chapter 4	50	50	1620	1622	This paragraph describes positive impacts of IAS on nature in terrestrial habitats. The statement "Some invasive invertebrates are used as a biological control agent of pests that affect crops; for example, Acerophagus malinus (Malausa et al. 2016) and Aceratoneuromyia indica (Ovruski et al 2016)." notes the positive impacts of two classical biocontrol agents but does not state what those impacts are. A statement of the positive impacts is required.	Thank you for your comment. We have removed these examples in this section.
Government of Canada (Mason, Peter)	Yes	Chapter 4	50	50	1622	1626	The choice of cane toad as an example of an IAS vertebrate having a positive impact of is shocking. The negative impacts of cane toad far outweigh any 'benefits' of this introduction. Another example should be found. In any case the statement should be deleted.	Thank you for this suggestion. We have removed this example in this section.
Government of Mexico	Yes	Chapter 4	52	52	1689	1689	Figure 4.17: It is necessary to include photo credits	Thank you, yes and this has been addressed,
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	52	52	1693	1693	Figure 4.17: Would be beneficial to add common names to figure legend.	Thank you, this has been addressed in the final draft.
Robinson-Smythe, Tammy	No	Chapter 4	52	52	1696	1704	This is a very long sentence and is difficult to follow. I Breaking the sentence after "(Vaughn, 2018)". The next part can then start "this can be seen when invasive molluscs..."	thank you, we have now changed the text accordingly
Guareschi, Simone	No	Chapter 4	53	53	1706	1706	In order to help the reader, I think it is important to specify where cited species are (geographically) considered IAS.	thank you, we have now changed the text accordingly
Guareschi, Simone	No	Chapter 4	53	53	1715	1715	When mentioning Pacifastacus leniusculus it may be worth it to stress that the implications of signal crayfish on invertebrate functional diversity in UK rivers has been recently discussed (Mathers et al. 2020. Functional Ecology)	thank you for your comment, we cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here. However, the paper is already included in the impact database we have collated for IPBES Chapter 4.
Clements, David	No	Chapter 4	53	53	1725	1725	do not capitalize grass	thank you, we have now changed the text accordingly
Robinson-Smythe, Tammy	No	Chapter 4	53	53	1731	1731	Replace "Also raising concerns about the magnitude of its " Another species of concern regarding"	thank you, we have now changed the text accordingly
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	53	53	1736	1746	watermilfoil is a high-impact invasive in North America and seems to be missing from discussion here. Introductory material here: https://www.dfo-mpo.gc.ca/species-especes/profiles-profil/eurasianwatermilfoil-myrriophylleeni-eng.html , https://www.ontario.ca/page/eurasian-water-milfoil , https://www.invasivespeciesinfo.gov/aquatic/plants/eurasian-watermilfoil	thank you, we have now changed the text accordingly
Clements, David	No	Chapter 4	53	53	1744	1744	better "causes changes in physiochemical properties" vs. "determines changes of the physiochemical properties"	thank you, we have now changed the text accordingly
Clements, David	No	Chapter 4	54	54	1745	1745	should be "altering" not "alters"	thank you, we have now changed the text accordingly
Guareschi, Simone	No	Chapter 4	54	54	1747	1747	If appropriate, please consider mentioning here the implications of invasive amphipods (Guareschi et al. 2021a Journal of Applied Ecology) and the consequences of different levels of bio-contamination (IAS richness) (Guareschi et al. 2021b Ecological Applications) on river biodiversity and biomonitoring metrics. Overall (chapter 4 entire), I think that the recent book chapters about IAS in freshwater systems may provide further details about management and new challenges in rivers: - Olden et al. 2021 Invasive Species in Streams and Rivers. Reference Module in Earth Systems and Environmental Sciences, Elsevier, https://doi.org/10.1016/B978-0-12-819166-8.00083-9 - Guareschi and Wood, 2021. Biological Invasions of River Ecosystems: A Flow of Implications, Challenges, and Research Opportunities. Reference Module in Earth Systems and Environmental Sciences, Elsevier, https://doi.org/10.1016/B978-0-12-821139-7.00147-1	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here. Furthermore, the management of biological invasions is the focus of another chapter of the IPBES IAS assessment.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Guareschi, Simone	No	Chapter 4	54	54	1763	1778	I suggest unifying this part with the previous part about crustacean in line 1705.	Thank you for this suggested change. Although we used crayfish as an example, the emphasis of the paragraph is on types of impacts that can be perceived as positive and negative, depending on the context. As the suggested change does not change the meaning, it is a matter of style and we will not adopt it.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	55	55	1803	1803	Box 4.9: "contributes" should be "contribute"	Thank you, we have corrected this in the final draft
Guareschi, Simone	No	Chapter 4	55	55	1805	1805	Figure 4.18: To be consistent the scientific name of the species should be provided in the legend. Lates niloticus	thank you, we have now changed the text accordingly
Clements, David	No	Chapter 4	56	56	1817	1818	do not capitalize brown and rainbow	Thank you, we have revised the draft accordingly
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	56	56	1828	1828	Table 4.8: In the column number of records please specify number of records of impacts to clarify that these are not occurrence records	thank you, we have now changed the text accordingly
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	56	56	1828	1829	1828-1829 table 4.8 - please also include common names	Thank you, this has been addressed in the final draft.
Robinson-Smythe, Tammy	No	Chapter 4	56	56	1833	1834	To me the definition of shelf ecosystems excludes the intertidal zone, yet examples included in the text, and in fact Box 4.10, include the intertidal. Maybe the definition should be amended to "from the intertidal zone to the shelf break" I now see from the key in Fig 4.33 that intertidal is in fact included. I definitely think that needs to be made clearer in this definition	Thank you. According to the IPBES definition, shelf ecosystems include the intertidal zone (refer to Chapter 1, supplementary materials 1.2).
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	57	57	1839	1840	1839-1840 table 4.9 - please also include common names	Thank you, this has been addressed in the final draft.
Alaux, Christine	No	Chapter 4	59	60	1924	1931	Move the sentence line 1924 to the line 1931	Thank you, we have corrected this in the final draft
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	60	60	1930	1930	Figure 4.21: Would be beneficial to add common names to figure legend.	Thank you, this has been addressed in the final draft.
Alaux, Christine	No	Chapter 4	60	65	1932	2134	Just before the name of the species mentioned, insert a small photograph of this species. And do this for each of the species indicated. This will break the monotony of the text and provide visual recognition information for the species in question.	Thank you for your comment. We cannot add the requested photographs due to space restrictions.
Robinson-Smythe, Tammy	No	Chapter 4	60	61	1943	1958	While I agree with the info provided here, I do wonder if it would be helpful to include that these worisome impacts are not seen in South Africa (Howard BR, Barrios-O'Neill D, Alexander ME, Dick JTA, Therriault TW, Robinson TB, Côté IM (2018) Functional responses of a cosmopolitan invader demonstrate intraspecific variability in consumer resource dynamics. Peer J 6:e5634 DOI: 10.7717/peerj.5634). It highlights how context dependant impacts can be in marine systems. However, if the point here is simply to detail negative impacts then the text is fine as is.	Thank you. We have only provided a few examples and cannot, unfortunately, cite lack of impacts, for the sake of space
Clements, David	No	Chapter 4	61	61	1991	1991	no period after Caulerpa	Thank you, all typos have been corrected in the final draft.
Robinson-Smythe, Tammy	No	Chapter 4	61	61	1991	1991	Replace "Caulerpa." with "C."	Thank you, abbreviations and acronyms have been harmonized across the draft
Clements, David	No	Chapter 4	62	62	1999	1999	cladercon should not be in italics	Thank you, this has been addressed in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	62	63	2029	2035	Eucheuma denticulatum appears to be included as an example of an IAS only for the corollary effects of its cultivation, which are similar to any crop. Is every crop going to be considered an IAS? If not, delete this reference.	Thank you. The cited investigations have shown impacts on the coastal environment in the vicinity of farms, comparing biota in seagrass beds, with and without seaweed farms.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	63	63	2049	2057	Kappaphycus alvarezii appears to be included as an example of an IAS only for the corollary effects of its cultivation, which are similar to any crop, and in spite of reported beneficial effects. Is every crop going to be considered an IAS? If not, delete this reference.	Thank you. The cited investigations have shown impacts on the coastal environment in the vicinity of farms, comparing biota in seagrass beds, with and without seaweed farms.
Clements, David	No	Chapter 4	63	63	2056	2056	should read "holothurians and reef fish"	Thank you, we have edited the draft accordingly
Robinson-Smythe, Tammy	No	Chapter 4	64	64	2087	2091	This is not correct. Only in one instance was a sand bank invaded (after which the mussels died out). The invasion is focused on rocky shores. I suggest the following text replace what is currently in the report: "An ecosystem engineer, it dominates wave exposed rocky shores in South Africa, increasing invertebrate density and species richness, and changing community composition (references as you have them, but remove Robinson & Griffiths 2002 as this details the anomolous sandy invasion).	Thank you. The sentence will be rephrased but the ref will not be removed: "a comparative study between invaded areas and areas clear of invasion was conducted. ... The biomass supported in invaded areas (53 262 g/m2), was significantly greater than that in clear areas (1133 g/m2). ... Invertebrate densities supported in invaded (6780.1 individuals/m2) and clear areas (835 individuals/m2) were also significantly different These figures indicate a replacement of the naturally-occurring sandbank communities by those more typical of rocky shores."
Robinson-Smythe, Tammy	No	Chapter 4	64	64	2091	2095	This sentence is not factually correct (1) native mussels have never been commercially valuable and (2) this wording suggests loss of natives when some were displaced but others increased in abundance (though are now smaller in size). I suggest replacing the current wording with "It has altered native systems by replacing open rocky habitat with complex mussel beds, displacing the native mussel Choromytilus meridionalis and native limpet Scutellastra argenvillei, but increasing the abundance of the mussel Aulacomya atra and the limpet Scutellastra granularis that now occur within the Mytilus beds (references as you have them). Note that two of the species names that were used are old and incorrect. I have added the new names: Aulacomya ater must be Aulacomya atra and Patella granularis must be Scutellastra granularis.	Thank you for your comment. We have completely revised the whole section and considered your comment
Clements, David	No	Chapter 4	64	64	2097	2097	do not capitalize black oystercatcher	Thank you, we have edited the draft accordingly
Clements, David	No	Chapter 4	64	64	2099	2099	do not capitalize bay mussel	Thank you, we have edited the draft accordingly
Robinson-Smythe, Tammy	No	Chapter 4	65	65	2120	2125	(1) Alucomya has not been displaced to the subtidal, it occurs within mixed beds of Mytilus galloprovincialis and Semimytilus. (2) Aulacomya ater should be Aulacomya atra. (3) this invasion is integrally related to Mytilus gappoprovincialis and this should be indicated. I suggest changing the wording for this species as follows: Semimytilus patagonicus (Hanley, 1843), a mytilis mussel native to the Pacific coast of South America has spread to the west coast of South Africa (de Greef et al., 2013; Ma et al. 2020). Together with Mytilus galloprovincialis it has invaded wave-exposed rocky shores where it has altered community structure (Sadchatheeswaran et al., 2015; Skein et al. 2018).	Thank you for your comment. We have completely revised the whole section and considered your comment
Robinson-Smythe, Tammy	No	Chapter 4	65	65	2120	2120	This mussels name has recently been changed to Semimytilus patagonicus (as per World registry of Marine Species).	Thanks for this suggested change. We have included it in the final version.
Robinson-Smythe, Tammy	No	Chapter 4	65	65	2127	2127	Add "of these species" after "tenth"	Thank you, the text has been revised accordingly.
Robinson-Smythe, Tammy	No	Chapter 4	65	65	2142	2142	Add "oP" after "13%"	amended - thank you
Clements, David	No	Chapter 4	66	66	2160	2160	do not italicize and	Thank you, we have edited the draft accordingly
Robinson-Smythe, Tammy	No	Chapter 4	66	66	2160	2160	I would delete Semimytilus from here - there is no evidence that it threatens commercially valuable species.	Thanks for this suggested change. We have included it in the final version.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	66	66	2162	2165	For policy relevance, it is important to state why more knowledge is needed, particularly as we cannot wait for it. We know enough now to know that new introductions/establishments should be avoided, and research is being conducted to support management of economically valuable species. Why, then, should a fisheries minister invest in additional research rather than acting on the informaiton we have now? Calling for research is policy prescriptive, whereas an explanation of the value of additional research informs options.	Thank you for your comment. We have revised the paragraph and considered your comment.
Government of USA	Yes	Chapter 4	66	66	2162	2165	Strongly support this statement. Recommend capturing this more clearly in the executive summary.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	66	66	2169	2169	Please specify if the "positive impacts" refer to positive impacts on native biodiversity, or also other impacts such as social and economic.	As these are in the chapter on "Impact to nature" they refer to positive impacts on native biodiversity. Please also refer to the definitions of positive impacts in ch. 4.1.3

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	66	67	2195	2238	Table 4.11: Would be good with additional row in each table that indicates that Ecosystem impacts, Impacts on individuals, Population declines, Local extinction, all are negative impacts in contrast to the positive impacts in column 6.	Thank you for this comment, we have revised the table accordingly
Sagoff, Mark	No	Chapter 4	67	67	2205	2213	The brief treatment of the zebra mussel is useful and fair. Not demonizing.	Thank you for your feedback.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	68	68	2220	2220	<i>Linepithema humile</i> in italics	Thank you, this has been addressed in the final draft.
Robinson-Smythe, Tammy	No	Chapter 4	68	68	2220	2220	Italisise the species name <i>Linepithema humile</i>	Thank you, we have corrected this in the final draft
Robinson-Smythe, Tammy	No	Chapter 4	68	68	2225	2226	Italisise the species name <i>Rosa rugosa</i>	Thank you, we have corrected this in the final draft
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	68	68	2226	2226	<i>Rosa rugosa</i> in italics	Thank you, this has been addressed in the final draft.
Clements, David	No	Chapter 4	69	69	2266	2266	do not captilize eastern quolls	Thank you, we have edited the draft accordingly
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	70	70	2272	2272	Figure 4.22: Would be beneficial to add common names to figure legend.	Thank you, this has been addressed in the final draft.
Clements, David	No	Chapter 4	70	70	2281	2281	do not captilize common diving petrel	Thank you, we have edited the draft accordingly
Government of Argentina	Yes	Chapter 4	71	71	2319	2319	The Malvinas Islands are incorrectly referred to as "Falkland Islands". The use of double nomenclature is requested, in line with what is established in the editorial directive of the United Nations ST/CS/SER.A/42	Thank you, this has been revised accordingly
Government of Argentina	Yes	Chapter 4	71	71	2320	2345	The South Georgia Islands are incorrectly referred to as "South Georgia". Suggested incorporation in English text as "South Georgias"	The text refers correctly to south Georgia island (singular).
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	72	72	2339	2339	Suggest adding the following text: Mexico has one of the most successful programs for island eradication of invasive species with a restored island area of over 51,000 ha resulting in the protection of over 200 nesting marine bird populations, some of which have returned to nest in these areas after having abandoned them due to invasive species predation. Ref: Conservación de islas 2022. https://www.islas.org.mx/conservacion-biodiversidad#gsc.tab=0	Thank you for your comment. The box highlights impacts solely on subantarctic Islands, and cannot cite examples from islands off Mexico.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	72	72	2340	2340	It would be interesting to add an example of one of these cases in which recovery of a native species was tempered when the removal of the exotic one increased the population of it's natural predator. If possible please add.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions
Wong, Nicholas	No	Chapter 4	73	73	2360	2363	There are instances where both "invasive alien species" and "alien invasive species" are used in the same paragraph. Suggest to revise entire documents for consistency.	Thank you, we have revised the draft accordingly
Tassin, Jacques	No	Chapter 4	73	73	2367	2368	There is an obious strong bias as negative impacts are far more studies thant positive ones. That is why this sentence does not make sense.	We have changed the response to "There are also 421 invasive alien species that can cause positive impacts"
Clements, David	No	Chapter 4	73	73	2369	2369	better as "for impacts on the regulation of ocean acidification"	Done
Robinson-Smythe, Tammy	No	Chapter 4	73	73	2377	2377	Box 4.12: Add "of" after "lack"	in this sentence "lack" is a verb and not a noun. Therefore "of" is not necessary
Sagoff, Mark	No	Chapter 4	73	73	2383	2384	Box 4.12: The text asserts that the crude extrapolations of Pimentel (2001) were "much criticized by ecologists and economists alike." This is nonsense. Hoffman and Broadhurst (2016), the reference given, support or cite Pimentel favorably except in relation to some Australian data. This paper cites Pimentel about 20 times, mostly with approval, except that Pimentel included pathogens which Hoffman and Broadhurst do not. The write (p. 12) "For both Pimentel et al. (2001) and here, many of the data used, are based on conservative minimums, and the calculations made are based on conservative assumptions especially for environmental costs, and therefore the actual costs are likely to be greater." This is agreement not criticism. Ecologists have cited the Pimentel estimates as authorities thousands of times. One never heard a disparaging word. I quote from an article of mine. "According to Google Scholar, Pimentel et al. (2000) has been cited by 3675 scholarly articles. Pimentel (2005) has been cited in 4234 articles, of which 1810 were published after 2015; 726 use the \$120 billion number. Approximately 350 articles published in Biological Invasions cite Pimentel et al. as an authority. Of these, 15 use the figure \$120 billion. Nine refer \$137 billion, and most use phrases such as 'tremendous environmental damages and economic costs.'" Sagoff, M., 2020. Fact and value in invasion biology. <i>Conservation Biology</i> , 34(3), pp.581-588. I continue, "Of the nearly 10,000 articles that cite the Pimentel et al. estimates, I found only 1 that questions them. Kareiva et al. (2017) called them a mix of data leaps and expert guesses and contended that in some cases there was no way to get from one number to the next. "The absence of serious efforts to improve on Pimentel's cost estimate is revealing—it suggests a willingness to accept the science so long as it roughly aligns with what conservationists want to hear" (Kareiva P, Marvier M, Silliman B, editors. 2017. <i>Effective conservation science: data not dogma</i> . Oxford University Press, Oxford, United Kingdom) p. 5. If the IPBES cannot find among the thousands of scientific papers that cite the Pimentel et al. estimates a single article other than Kareiva's that questions them, it cannot contend that the crude estimates were much criticized by ecologists. The false statement that the Pimentel extrapolations were "much criticized by ecologists and economists alike" should be better supported or removed. The literature -- the IPBES report is largely an argument from the authority of "the literature" -- may refer overwhelmingly to the negative effects of invasive species because this is what conservationists want to hear. In view of the near-universal acceptance and celebration of the Pimentel et al. estimates, the literature may reflect rather than support what conservationists and ecologists already believe or assume.	First comment: our claim that Pimentel's work has been much criticized is not nonsensical. Here are a few references. It is true that Hoffman & Broadhurst agreed that results are conservative and underestimated in both studies, it doesn't however imply that the methods of Pimentel were agreed upon. If the space limitation of Chapter 4 allows, these citations can be inserted. TP Holmes. The Year in Ecology and Conservation Biology, 2009: Ann. N.Y. Acad. Sci. 1162: 18–38 (2009). doi: 10.1111/j.1749-6632.2009.04446.x Lamb W. 2013. Commentary on economic valuations of biodiversity. <i>Ecological Economics</i> (89):170-173 Goldstein, L. D. 17 Reasons the Economic Impact of the Domestic Cat as a Non-Native Species in the U.S. Does Not Cost \$17 Billion, < www.straypetadvocacy.org/PDF/17reasons.pdf > (2011). Hoagland, P. & Jin, D. Science and economics in the management of an invasive species. <i>BioScience</i> 56, 931-935, doi:10.1641/0006-3568(2006)56[931:saetim]2.0.co;2 (2006) Holmes, T. P., Aukema, J. E., Von Holle, B., Liebhold, A. & Sills, E. Economic impacts of invasive species in forests. <i>Ann N Y Acad Sci</i> 1162, 18-38, doi:10.1111/j.1749-6632.2009.04446.x (2009). Bradshaw C, Leroy B, Bellard C, Roiz D, Albert C, Fournier A, Barbet-Massin M, Salles J-M, Simard F & Courchamp F. 2016. Massive yet grossly underestimated global costs of invasive insects. <i>Nature Communications</i> . doi:10.1038/ncomms12986. Sagoff, M. (2009) Environmental harm: political not biological. <i>Journal of Agricultural and Environmental Ethics</i> 22: 81–88 Of special interest, the last reference which spends two pages criticizing Pimentel's studies, and concludes " The Pimentel et al. study (2000, updated2005), however, should be treated with incredulity and not (as it usually is) with deference." (Sagoff, 2009). Second comment: Pimentel has been indeed cited an impressive number of times. This is solely due to the fact that it has been for years the only global estimation of economic costs of biological invasions and therefore the only way to cite global costs. Pimentel was indeed an authority, because it was the only one to
Robinson-Smythe, Tammy	No	Chapter 4	73	73	2394	2395	Box 4.12:Delete "United States dollar (USD)" and add "USD" after "billion"	Thank you, we have followed the UN editorial manual's guidelines.
Government of Germany	Yes	Chapter 4	75	75	2438	2440	Proposal: Please change color of upper left quadrant of Figure 4.24, so as to increase contrast between font and background colors and facilitate reading.	We thank the reviewer for this helpful suggestion. We have followed it.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	76	76	2461	2461	In Figure 4.25 it could be beneficial to address the 10 most costly taxa by their common names (lower right inlet) to facilitate understanding of layman audience and spread of the figure. Eg. "Insects"...	Thank you, as common names are not international, but English, we prefer to order species by their scientific names
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	77	77	2485	2487	The MIREN survey paper that is scheduled to come out soon provides detailed insights into differing perceptions of IAS by stakeholder groups across IPBES regions and IAS organism groups. It might strengthen the argumentation by providing some general patters. E.g. Farmers/local knowledge holders report more positive impacts, government officials more negative impacts on ncp's. - (https://www.mountaininvasions.org/post/global-survey-on-alien-invasive-species-impacts-and-management-in-mountains)	We decided not to add the reference to this link because the full results are still not fully available when the IPBES database on impacts was analysed.
Government of Germany	Yes	Chapter 4	77	77	2492	2495	Proposal: It is suggested to label the axes of Figure 4.26, so the graphical part of the figure (e.g. if copied without its title) can be understood by itself.	Thank you, we have revised the figure accordingly
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	78	78	2513	2530	2513-2530 remove double up - starts The top ten species -- to end of para is a repeat of above	The duplication was removed
Pan, Xubin	No	Chapter 4	78	78	2513	2530	P77-78 L2497-2513	The duplication was removed
Sagoff, Mark	No	Chapter 4	78	78	2513	2530	Repeats word-for-word previous passage.	The duplication was removed
Clements, David	No	Chapter 4	78	78	2515	2515	better as "The water hyacinth, <i>Pontederia crassipes</i> , and many other aquatic plants"	Done
Robinson-Smythe, Tammy	No	Chapter 4	78	78	2515	2515	Add "with" after "as". Replaces "have" with "has"	Done as suggested.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Schaffner, Urs	No	Chapter 4	78	78	2532	2533	Legend must be revised; the table is based on records of negative and positive impacts. It is quite likely that in some cases all records refer to the same kind of impact.	Changed to "Top ten invasive alien species with most records causing..."
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	78	79	2533	2534	2533-2534 table 4.13 - please also include common names in both tables	Thank you, this has been addressed in the final draft.
Schaffner, Urs	No	Chapter 4	79	80	2542	2543	The whole paragraph should be rewritten; there is no evidence from the references provided that all negative effects of prosopis are offset by the positive impacts (why potential?), and it contradicts other statements in this chapter (e.g. L. 1536). Pods ca be used as supplementary fodder, but the amount of fodder for cattle lost due to prosopis invasion is far higher than that provided by pods, and pods alone should not be fed; clearly, people are adapting to prosopis invasion, but most socio-economic studies provide evidence that rural people would like to reduce local prosopis cover and stop its invasion process, and there is no evidence that this can be achieved by collecting firewood and pods only.	Changed to "These negative impacts of Prosopis juliflora on nature's contributions to people are not offset by some positive impacts: the wood is an important source of fuelwood (Dayal, 2007; Duenn et al., 2017); the stems are used for fencing (Bartlett et al., 2018; Duenn et al., 2017); it can improve soil quality via biochar (Bartlett et al., 2018); and there are reports of people adapting to the use of plant parts for medicinal purposes (Duenn et al., 2017)."
Clements, David	No	Chapter 4	80	80	2546	2546	first letter of Prosopis needs to be italicized	Thank you, we have revised the draft accordingly
Clements, David	No	Chapter 4	80	80	2565	2565	missing a space after the period	This is fixed in the final draft
Pan, Xubin	No	Chapter 4	80	80	2565	2567	P80 L2562-2565	The duplication was removed
Clements, David	No	Chapter 4	81	81	2574	2574	"the 80' promoted research" ???	The start of the paragraph has been changed to: "The SCOPE international programme on biological invasions indicated the need for research, monitoring and management of the impacts of invasive alien species in protected areas."
Clements, David	No	Chapter 4	81	81	2576	2576	"have been conducted in such." ???	The start of the paragraph has been changed to: "The SCOPE international programme on biological invasions indicated the need for research, monitoring and management of the impacts of invasive alien species in protected areas."
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	81	81	2577	2580	Repeated sentence.	The duplication was removed
Clements, David	No	Chapter 4	81	81	2578	2580	sentence is duplicated (same as previous sentence)	The duplication was removed
Pan, Xubin	No	Chapter 4	81	81	2578	2580	P81 L2576-2578	The duplication was removed
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	81	90	2591	2746	It could be useful to add which terrestrial realms have been extensively covered in the academic literature in this context and which have been treated less extensively, to prohibit that the arising patterns are a function of research activities.	Thank you for your comment. This point is addressed at the bottom of the first paragraph of this section (and is also addressed in the Methods, section 4.2, Table 4.1).
Sagoff, Mark	No	Chapter 4	82	82	2623	2623	Why are "food and feed" included among nature's contribution to people? All crops everywhere with few exceptions are alien species thoroughly altered by conventional breeding and biotechnology. We are talking industrial agriculture -- not hunting-and-gathering -- here: the future is the farmerless farm in which driverless tractors responding to GPS signals and software attuned to soil, weather, and market conditions, traverse tracts of millions of hectares of cropland in which every living thing which is not crop has been extirpated. Agriculture is a far less "natural" activity than architecture because architects like to build houses that "fit" into the environment, while Cargill, ADM, Bayer, and other megafirms build the environment to fit their crops. I believe that commodity agriculture will soon be vertically integrated on an industrial information-science basis and that nature, except maybe weather, will have nothing to do with it. Robots are picking strawberries. I understand that since all the crops are alien, their pests may follow them: that much is natural. Genetic engineering -- Bt crops are the obvious example -- is likely to take care of this, especially with new gene-editing technologies. If one contrasts "nature" with "artifice," one cannot imagine a less natural and more technology-based industry than agriculture.	Thank you for your comment. The IPBES definition of Nature's Contributions to People, as detailed in the IPBES conceptual framework, includes food and feed from managed systems as a co-produced benefit from nature, involving both ecosystem processes and anthropogenic interventions.
Pan, Xubin	No	Chapter 4	83	83	2637	2637	Figure 4.28: Delete the figure title	Thank you for your comment. Figure title has been deleted.
Pan, Xubin	No	Chapter 4	84	84	2661	2661	Figure 4.29: Delete the figure title	Thank you for your comment. Figure title has been deleted.
Sagoff, Mark	No	Chapter 4	85	85	2674	2674	The chapter speaks of 4-6% of maize losses. Maize, like other commodity crops, has been produced in vast surplus since World War II and has always relied on price supports. In the United States, 40% of the crop is burned after being converted to ethanol and mixed with gasoline to fuel cars. This is a government requirement to soak up some of the surplus. Since there is no scarcity of maize but a gargantuan glut, it is hard to know what "losses" mean. Does it mean that maize is 4-6% more expensive per bushel? Now maize prices are so low it's hardly worth planting. Suppose the invasive species problem were fixed -- does that mean we would produce more maize? Who would buy it? I understand that small holder farmers and their families often cannot operate their farms without government subsidies. According to a BBC report, the government of India after a year of intense farmer protests finally caved in to demands that subsidies and price supports for their crops continue despite the high cost to the government. "The farmers were protesting against the government's introduction of three laws that loosened rules around sale, pricing and storage of farm produce - rules which have protected them from the free market for decades. Farm unions said these laws would leave farmers vulnerable to big companies and destroy their livelihoods." The problem is that small holder farmers must sell their crop -- but to whom. To each other? They have to supply urban markets where there is demand. But large-scale industrial and virtually farmerless operations, which are increasing in India, glut urban markets with agricultural commodities at prices with which small-holder farmers cannot possibly compete in a free market. This would be just as true in the absence of invasive pest species. The industrialization, vertical integration, and automation of agriculture drives out small landowners. This has nothing to do with invasive species.	Thank you for your comment. The example of fall army worm and its impact on maize production is merely indicative of the magnitude of the impact one invasive crop pest can have on a single crop. Cumulative losses caused by invasive pests across all crops are estimated to be sizeable (e.g., by Pimentel et al. 2001; Bradshaw et al. 2016).
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	85	85	2679	2681	These two sentences appear somewhat contradictory.	Thank you for your comment. This has been reworded for greater clarity.
Clements, David	No	Chapter 4	85	85	2682	2684	needs to be re-worded - "Another exception" needs to be written more in terms of how it was explained in the previous paragraph; the sentence beginning with "These are fungi" also does not quite make sense	Thank you for your comment. This has been reworded for greater clarity.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	87	87	2744	2746	Table 4.14: Could be useful to repeat the header line of the table on each sheet for better orientation.	Thank you, this has been addressed in the final draft.
Duistermaat, Leni	No	Chapter 4	87	89	2745	2746	Table 4.14, Reynoutria bohemica: Fallopia bohemica	Thank you, we use the GBIF backbone taxonomy
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	87	87	2745	2745	Table 4.14: Please format table so that the title row with the names of the columns remains throughout the 3 pages of the table and it is easier to follow	Thank you, this has been addressed in the final draft.
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	87	90	2745	2746	2745-2746 table 4.14 - please also include common names	Thank you. This has been corrected in the final draft
Clements, David	No	Chapter 4	94	94	2806	2806	omit semicolon	Thank you, the text has been revised accordingly.
Sagoff, Mark	No	Chapter 4	94	94	2809	2809	I would think that aquaculture areas are not "natural" unlike some in inland surface waters/waterbodies, Where does nature stop and culture begin? One does not think of aquaculture as representing nature's contribution to people. Rather it represents, as almost everything useful does, people's intervention in and transformation of nature.	Thank you for your comment. The IPBES definition of Nature's Contributions to People, as detailed in the IPBES conceptual framework, includes food and feed from managed systems as a co-produced benefit from nature.
Clements, David	No	Chapter 4	94	94	2821	2821	capitalize Martinez-Cillero	Thank you, the text has been revised accordingly.
Guareschi, Simone	No	Chapter 4	94	94	2821	2821	There are currently 6 parentheses in this line of text. Author surname should be in capital letter.	Thank you, the text has been revised accordingly.
Clements, David	No	Chapter 4	95	95	2838	2838	omit semicolon	Thank you, the text has been revised accordingly.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	95	96	2847	2848	2847-2848 table 4.15 - please also include common names	Thank you. This has been corrected in the final draft
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	95	96	2847	2848	Table 4.15: Could be useful to repeat the header line of the table on each sheet for better orientation.	Thank you, we have revised the draft accordingly
Robinson-Smythe, Tammy	No	Chapter 4	97	97	2862	2863	If the incorrect notion that the invasive mussel <i>Mytilus galloprovincialis</i> negatively affected commercially important native mussels has been captured in these numbers then this needs to be corrected. Native mussels have never been sold as food in South Africa, while they are collected on a recreational basis the service in terms of food has not been affected as the alien mussels are now harvested in their place	not applicable, error
Government of USA	Yes	Chapter 4	97	97	2870	2873	Figure 4.32: Regulation of hazards and extreme events may not be fully assessed - recent work has documented the benefit of shallow coral reefs in attenuating wave impacts on tropical coastlines (Storlazzi, C. D., Reguero, B. G., Cole, A. D., Lowe, E., Shope, J. B., Gibbs, A. E., ... & Beck, M. W. (2019). Rigorously valuing the role of US coral reefs in coastal hazard risk reduction. Open-File Report-US Geological Survey, (2019-1027). This may be a growing concern for Stony Coral Tissue Loss Disease and the rapid loss of corals in the affected areas. However, smothering of native species by invasive algae may also contribute - such as the impacts of invasive algae in Hawai'i - ex. Maunaloa Bay and loss of coral from <i>Kappaphycus</i> and <i>Eucheuma</i> algae. Other algae may have similar impacts in other ecosystems.	Thank you for this suggestion. We have chosen not to include regulation of hazards and extreme events in this context, as there is insufficient evidence directly linking coral loss due to invasive algae with a reduction in regulation of hazards and extreme events.
Robinson-Smythe, Tammy	No	Chapter 4	99	99	2908	2911	In South Africa, the whole mussel mariculture industry is based on farming the invasive mussel <i>Mytilus galloprovincialis</i> and the oyster industry farms the invasive oyster <i>Crassostrea gigas</i> (Olivier et al 2013 Food Sec. 5:251-267 DOI 10.1007/s12571-013-0244-1. Should that have been captured here? Maybe it belongs in the economic section?	not applicable, error
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	99	100	2939	2940	2939-2940 table 4.16 - please also include common names	Thank you. This has been corrected in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	101	101	2965	2968	The statement that "agronomic studies of crop losses often do not distinguish the status of impacting species" is highly doubtful. It is not true that "studies on impacts of weeds are rarely conducted for individual weed species".	Thank you for the comment. We have deleted this sentence, changed the wording of the following sentence and moved it to the end of the paragraph. We now make it clear that in cases where the whole weed flora in crops is assessed, it is not possible to extract data on impacts of individual alien weeds. However, we do have such records in our database, but we think they are underrepresented. We also added an example (Pimentel et al. 2005) to illustrate how this problem has been addressed in the case of the US weed flora.
Sagoff, Mark	No	Chapter 4	101	101	2968	2968	It is suggestive that the economic and agronomic literature does not distinguish between native and invasive species. Only environmental scientists bother with the distinction. Why is that -- especially when there is no general or characteristic biological difference between them? My guess is that environmental scientists believe in the nature-culture divide which separates native from alien, while others think that everything that exists or can exist is natural, the opposite of the natural being the supernatural. I think the IPBES report struggles with the problem of keeping the line clear between the natural and the artificial, for example, when it includes among nature's contributions those of industrial aquaculture and agriculture. If native and alien are equally natural -- neither being supernatural -- why is there a scientific basis to distinguish between them? If economists or agronomists don't care about the distinction, why do environmental scientists?	Thank you for your comment. See reply to comment above how we have clarified this argument. The text in question is currently on page 129 of the report.
Geerts, Sjirk	No	Chapter 4	102	102	2982	2986	Words missing in the first part of this sentence. In fact, sentence too cumbersome and meaning therefore not very clear.	Thanks, this has been rephrased
Geerts, Sjirk	No	Chapter 4	102	102	2992	2992	Not clear whether the 'which' refers to Africa or North America and Europe.	Thanks, this has been rephrased
Geerts, Sjirk	No	Chapter 4	103	103	3019	3019	Should read "...Central Asia (38) and Asia-Pacific (26)."	Thanks, this has been rephrased
Geerts, Sjirk	No	Chapter 4	104	104	3033	3033	Table 4.18. Am surprised there are no examples of positive impacts to people by plants in terms of pollination anywhere in the world. In South Africa for example, alien <i>Eucalyptus</i> has become a critical food source for important bee pollinators during the summer nectar dearth (see for example Hirsch et al 2020. <i>Eucalyptus camaldulensis</i> in South Africa – past, present, future. Transactions of the Royal Society of South Africa, 75(1): 1-22	There are records of positive impacts of plants for pollination in our database and included in table 4.18 for the Americas (5) and Europe/Central Asia (11). Unfortunately, our search strategy must have missed the Hirsch et al. reference, therefore this record for Africa is missing. We cannot amend the database retrospectively. However, we have added a sentence in section 4.4.2 to include this issue including the reference.
Geerts, Sjirk	No	Chapter 4	104	104	3033	3033	Table 4.18. Only 6 alien invasive plant species indicated as medicinal value in Africa. There are a few papers that could be considered to correct this number. Maema, L. P., M. J. Potgieter, and A. Samie. "Ethnobotanical survey of invasive alien plant species used in the treatment of sexually transmitted infections in Waterberg district, South Africa." <i>South African Journal of Botany</i> 122 (2019): 391-400. Maema, L.P., Potgieter, M. and Mahlo, S.M., 2016. Invasive alien plant species used for the treatment of various diseases in Limpopo Province, South Africa. <i>African Journal of Traditional, Complementary and Alternative Medicines</i> , 13(4), pp.223-231.	Thank you for your comment. We cannot add additional references to our database at this point and are aware that there are gaps. Some of the species mentioned in these papers are included in our database for Africa however.
Robinson-Smythe, Tammy	No	Chapter 4	105	105	3070	3070	Replace "was abandoned" with "that was then abandoned"	Thank you for this suggested change. We have adopted it in the final version.
Robinson-Smythe, Tammy	No	Chapter 4	105	105	3073	3073	Replace "woman" with "them"	Thank you for this suggested change. We have retained the word women in the final text to maintain clarity about the gender that is being discussed
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	106	107	3086	3134	Given the current context, it seems essential to include Covid-19 here.	Thanks for the comment. The extent to which covid is included in the report is explained in chapter 1.
Government of China	Yes	Chapter 4	107	107	3120	3124	Box 4.13: China attaches great importance to the relationship between food security and the management of invasive alien species (IAS), and ensures food security through the prevention and control of invasive agricultural pests. China has formulated the Seed Law and the Agriculture Law and other relevant legislation, established the management system for the introduction of crop and tree varieties, and introduced forest varieties that do not have natural distribution in China after experiments. At the same time, China has established the monitoring mechanism and rapid extermination mechanism for animal and plant diseases and pests to prevent and control the threat posed by foreign pests to food security. China promulgated the Biosecurity Law in 2020, which calls for strengthening the prevention and response to IAS. In particular, it calls for the competent department of agricultural and rural affairs, together with other relevant departments under the State Council, to formulate lists and regulations for IAS. Besides, Nanjing, Shanghai and other Chinese cities have issued local regulations on agricultural pest control, providing for the monitoring and emergency management of foreign pests. In accordance with the requirements of the Biosecurity Law, China is currently studying and formulating a comprehensive legislation on the control of IAS, in which agricultural production and food security are important elements. This piece of legislation will help further strengthen the control of agricultural pests and ensure food security.	Thank you for your additional information about the strategies employed by the Government of China to manage agricultural pests and food security. This is valuable information but at present we have a word limit for the assessment and consider that this detail would not currently fit in the section of the text describing impacts to human health.
Government of Germany	Yes	Chapter 4	108	108	3150	3156	Proposal: Please increase font size and consider refining graphic design, particularly for Figure 4.37.	Thank you for your comment. The graphic has been updated.
Clements, David	No	Chapter 4	108	108	3156	3156	should be "Globally, there is a subset..."	Thank you for this suggested change. We have adopted it in the final version.
Clements, David	No	Chapter 4	108	108	3169	3170	avoid capitalizing common names except when proper nouns are involved	Thank you, this has been revised accordingly
Clements, David	No	Chapter 4	109	109	3175	3175	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Clements, David	No	Chapter 4	110	110	3204	3206	avoid capitalizing common names except when proper nouns are involved	Thank you, the text has been revised accordingly.
Clements, David	No	Chapter 4	110	110	3228	3230	avoid capitalizing common names except when proper nouns are involved	Thank you, the text has been revised accordingly.
Clements, David	No	Chapter 4	111	111	3234	3234	better as "The introduced range of <i>W. auropunctata</i> ..."	Thank you, the text has been revised accordingly.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of China	Yes	Chapter 4	111	111	3237	3238	Delete "Taiwan", or revise "Taiwan" to "Taiwan Province of China". Taiwan is a province of China, it cannot be listed with other countries independently.	Thank you, the text has been revised accordingly.
Liu, Chunlong	No	Chapter 4	111	111	3238	3238	According to "United Nations General Assembly Resolution 2758", Taiwan is part of China. "China, Taiwan" should be changed to (1) "mainland China, Taiwan", or (2) "China".	Thank you, the text has been revised accordingly.
Pan, Xubin	No	Chapter 4	111	111	3238	3238	Delete "Taiwan"	Thank you, the text has been revised accordingly.
Schaffner, Urs	No	Chapter 4	111	111	3242	3242	The fact that <i>Ailanthus altissima</i> shows up in this list as the second plant overall and the first woody plant in terms of frequency of negative impacts reported for constituents of well-being and that the frequency is 13 raises serious concerns regarding data collection. There is no problem to find more than 13 reports of negative impacts on constituents of well-being for other plant species, such as <i>Prosopis juliflora</i> . It would be really good to clarify inclusion/exclusion criteria for the data set presented in this chapter.	Thank you for your comment. This Table was intended to show those species that affected more than one category of constituents of well-being, rather than the most number of reports (which was the subject of a different table). Therefore the top species were species that impacted 3 constituents of well-being, then 2 constituents and so on. However, we agree with your comments that this was confusing for the reader also having the frequency of reports in the same table. We have considered your comment and now modified the table to highlight the multiple types of constituents that are impacted.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	111	111	3249	3249	Shouldn't the reference to Table 4.22 actually be to Table 4.21?	Thank you for this suggested change. We have adopted it in the final version.
Clements, David	No	Chapter 4	111	111	3251	3253	avoid capitalizing common names except when proper nouns are involved	Thank you, the text has been revised accordingly.
Duistermaat, Leni	No	Chapter 4	111	111	3251	3251	Black Locust Tree elsewhere in document referred to as: black locust; chose one or the other and make it consistent	Thank you, this has been harmonized in the final draft
Clements, David	No	Chapter 4	112	112	3262	3263	avoid capitalizing common names except when proper nouns are involved	Thank you, the text has been revised accordingly.
Clements, David	No	Chapter 4	112	112	3269	3273	avoid capitalizing common names except when proper nouns are involved	Thank you, the text has been revised accordingly.
Schaffner, Urs	No	Chapter 4	112	112	3275	3275	Legend must be revised; the table is based on records of positive impacts. It is quite likely that in some cases all records refer to the same kind of impact.	Thank you for your comment. We have revised the table legend.
Schaffner, Urs	No	Chapter 4	113	113	3291	3291	There is no question that rural people often adapt to a changing environment and also start making use of invasive species. But whether this increases the resilience of a social-ecological system is a different question. People also adapt to climate change, but this does not mean that the social-ecological systems remains stable with increasing climate change.	We have inserted this to the paragraph "it is important to note that some of these people do not necessary adapt to a species and its positive impact but they do because they may not have had a choice, and their preferred option may still be the native species; as the adaptation does not necessarily increase the resilience of their social-ecological system (See section 4.6)".
Pan, Xubin	No	Chapter 4	113	113	3310	3312	P45 L1545-1547	The repeated sentences have been deleted as they appear in Box 4.8
Duistermaat, Leni	No	Chapter 4	113	113	3314	3314	... , for example buffle ... [delete . after example]	Thank you, the text has been revised accordingly.
Clements, David	No	Chapter 4	114	114	3322	3322	better as "represented negative impact."	Phrase modified as suggested
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	114	115	3340	3376	The whole paragraph is repeated identically! From line 3358 "In our literature analysis..." it is repetition of the above.	Thank you, this has been removed.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	115	115	3352	3388	A lot of duplicated text in this long paragraph.	Thank you, this has been removed.
Pan, Xubin	No	Chapter 4	115	115	3358	3376	P114-115 L3340-3358	Thank you, this has been removed.
Clements, David	No	Chapter 4	115	115	3365	3365	should be "D'Antonio"	Thank you, this is revised in the final report.
Clements, David	No	Chapter 4	115	115	3366	3366	should be "is also vulnerable"	Thank you, the text has been revised accordingly.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	116	116	3402	3416	This text appears to duplicate the text in Page 115, line 3389 to Page 116, line 3402.	Thank you, this has been removed.
Pan, Xubin	No	Chapter 4	116	116	3402	3416	P115-116 L3389-3402	Thank you, this has been removed.
Sagoff, Mark	No	Chapter 4	121	121	3437	3437	Table 4.27: I am not sure it is a good idea to include disease organisms, which may be endemic to human beings, in the study. Where are they native? Where alien? Why could that possibly make a difference? Why does it matter where Dengue is native? Is it less of a problem because it is native there -- does it cause less suffering? Also, I doubt that a virus is a living thing or organism. It's more like a tiny machine. How can it be a species?	Thank you for your comment. The scoping document of IAS assessment defines IAS as "animals, plants or other organisms introduced directly or indirectly by people into places out of their natural range", and that covers "disease" organisms. Any IAS could be problematic in their native range too, in this report, however, we evaluate their impacts outside of native range. Virus are classified based on International Code of Virus Classification and Nomenclature, and thus, there are virus "species".
Clements, David	No	Chapter 4	121	121	3448	3448	should be "Solenopsis invicta"	Thank you, the text has been revised accordingly.
Duistermaat, Leni	No	Chapter 4	121	121	3448	3448	... , Solenopsis invicta, ... [not Invicta]	Thank you, the text has been revised accordingly.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	122	122	3470	3470	"The all too common ragweed (<i>Ambrosia artemisiifolia</i>)..." maybe better: "The common ragweed (<i>Ambrosia artemisiifolia</i>)..."	Thank you changed as suggested by the reviewer
Clements, David	No	Chapter 4	122	122	3471	3471	"wider" is quite vague - could just say "has spread throughout the globe"	Thank you changed as suggested by the reviewer
Clements, David	No	Chapter 4	122	122	3477	3477	should be "elicits"	Thank you, the text has been revised accordingly.
Clements, David	No	Chapter 4	122	122	3478	3478	should be "Giant hogweed" (no "The")	Thank you, the text has been revised accordingly.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	122	122	3478	3479	giant hogweed now found in N. America as well.	Thank you for this comment. The cited article contains no documentation of health impacts in N America.
Clements, David	No	Chapter 4	123	123	3491	3491	it would be good to get a better photo for giant hogweed, e.g., in flower	Thank you, but there already is a photo of plants
Clements, David	No	Chapter 4	123	123	3494	3497	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	123	123	3509	3509	"A common thread here is access to land and carrying out normal activities..." maybe better "A common thread here is access to land and carrying out traditional activities as normal"	Thank you for this suggested change. We have adopted it in the final version.
Government of China	Yes	Chapter 4	124	124	3547	3547	Box 4.14: There is no such expression as "Old China", it is suggested to change it to "the trans-Pacific trade"	Thank you the comment has been addressed and changed as suggested
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	125	125	3567	3570	Box 4.14: This is the authoritative global assessment on IAS: rather than reporting the opinion of "some scientists," the assessment should determine whether Covid meets the definition used in the report (I believe it does) and apply the result. If an exception is to be made for infectious human diseases, it needs to be made clear when IAS are defined and to be applied consistently throughout - dengue, for example, is included as an IAS elsewhere. A principled decision will also need to be taken for diseases that affect both wild animals and humans - as Covid does. Are Covid impacts included as impacts reported in this chapter?	Thanks for the comment. The extent to which covid is included in the report is explained in chapter 1.
Clements, David	No	Chapter 4	125	125	3570	3570	no capital letter A at the end of Vila	Thank you, this has been revised
Lázaro-Lobo, Adrián	No	Chapter 4	125	125	3570	3570	Box 4.14: Change "VilA" for "Vila"	Thank you, this has been revised
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	125	126	3575	3632	Box 4.15: The structure and information flow in this text box could be improved. If I understand it correctly, all the studies have been conducted with the Ngukurr community, but they are not named before the last paragraph. Giving more context with regards to the place names would be beneficial, e.g. "In south east Arnhem Land" is that the landscape that the Ngukurr live in? Is it still the same landscape as mentioned in the paragraph above?	Thank you for your comment. An additional sentence has been added to the Box regarding the location and communities involved in the research.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Clements, David	No	Chapter 4	125	125	3583	3601	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Government of Germany	Yes	Chapter 4	125	125	3601	3606	Need for clarification: Please clarify whether in L.3601 it is "an indigenous and local knowledge holder" or rather 'an indigenous knowledge holder'. Kindly note that in L. 3605 it is referred to "indigenous ecological knowledge".	Thank you for your comment. The knowledge holder is an indigenous knowledge holder and this edit has been made.
Clements, David	No	Chapter 4	125	125	3604	3604	better as: "This was attributed to human depopulation of the countryside and invasion by feral ungulates"	Thank you for your comment. In Australia, the term Country is now generally accepted as meaning indigenous people's traditional lands and waters (see Rose 1995). The term evokes cultural connections and responsibilities to these areas, as well as the connections between humans, their Dreaming stories, the health of the environment and health of people. But given this is a global audience, the term has been changed to 'traditional lands and waters'.
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	125	125	3606	3606	Box 4.15: Should be a period after "2021"	Thank you, we have corrected this in the final draft
Clements, David	No	Chapter 4	126	126	3612	3620	check citation format	Thank you, this has been revised
Clements, David	No	Chapter 4	127	127	37	3673	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it..
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	127	128	3643	3671	It could be useful to add which terrestrial realms have been extensively covered in the academic literature in this context and which have been treated less extensively, to prohibit that the arising patterns are a function of research activities.	Thank you for this comment. Unfortunately, because the information contained in this section is based on our database (documented occurrences of impacts in the literature), the patterns that arise are a function of research activities. We wrote the first sentence in this section to clear up the confusion: "As exhibited within the IPBES chapter 4 impact database, invasive alien species-induced changes to the components that make up good quality of life vary significantly depending by unit of analysis and realm." We also recognize this challenge in Section 4.7.2 Challenges for future studies of impacts (based on gaps of knowledge).
Clements, David	No	Chapter 4	128	128	3657	3657	avoid beginning a sentence with a numeral	Thanks for this suggested change. We have avoided beginning sentences with numbers throughout this section.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	128	128	3673	3673	Table 4.28: use of colour-coding in this table is very effective and could be applied elsewhere	Thank you for this comment. We have considered this comment but only applied it where appropriate
Pan, Xubin	No	Chapter 4	132	132	3705	3705	"red fire ant" or "red imported fire ant"?	Thanks for this correction. We have included it in the final version.
Government of Germany	Yes	Chapter 4	132	134	3723	3776	Proposal: Box 4.16: It is suggested to elaborate critically and transparently on the question of attribution to invasive alien species (IAS) only, including in this case of the fall armyworm invasion. Are there not any other variables negatively affecting crop yields during the timeframe of the impact assessment on the fall armyworm invasion, e.g. extended severe drought periods coupled with/in addition to the negative IAS impacts featured in Box 4.16?	Thank you for your comment. We agree that some of the estimates listed in this section fail to account for confounding factors for agriculture losses. Part of this concern is addressed by the sentence "It should be mentioned that most of the yield loss estimates were based on farmers' perceptions, which may have been overestimated (Baudron et al., 2019)." We also included an additional sentence to bring more insight to this topic: "Although even when controlling for potential confounding factors in a regression framework, reported fall armyworm-induced yield losses are nearly 12% (Baudron et al. 2019; Kassie et al., 2020)."
Sagoff, Mark	No	Chapter 4	133	133	3747	3747	Table 4:30: The fall armyworm does elude Bt crops unlike many other pests. But genetic engineering is preparing answers. See, for example, https://allianceforscience.cornell.edu/blog/2022/02/gm-versions-of-fall-armyworm-can-effectively-control-the-insect-pest-study-confirms/ Vertically integrated, massively scaled, technology-driven, genetically engineered, farmerless agriculture is the future. Thebioengineers at the Archer-Daniels-Midland Company use the motto: "Unlocking Nature. Enriching Life." These are the folks that slice, dice, and splice genes to assure the contributions of Nature to People. They are the ones to whom to turn -- not ecologists or economists -- to defeat crop pests.	Thank you for allowing us to consider this comment. We've forwarded this suggestion to more appropriate chapters, Chapters 5 and 6 (management chapters).
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 4	133	133	3751	3751	Box 4.16: Add the latin name after fall armyworm (Spodoptera frugiperda)	Thank you, this has been revised
Government of China	Yes	Chapter 4	133	133	3755	3756	Box 4.16: Delete this sentence since there is no literature support.	Thank you for pointing out our error. We have correctly cited this sentence now: Yang, X., Wyckhuys, K. A., Jia, X., Nie, F., & Wu, K. (2021). Fall armyworm invasion heightens pesticide expenditure among Chinese smallholder farmers. <i>Journal of Environmental Management</i> , 282, 111949.
Clements, David	No	Chapter 4	135	135	3788	3789	sentence is somewhat odd - more explanation of the observed trend would help	Thank you for your comment. Upon reviewing this section, we decided to delete this sentence because it didn't significantly add any insight even once we clarified the trend.
Clements, David	No	Chapter 4	135	135	3789	3789	do not capitalize inland	Thank you, we have corrected this in the final draft
Clements, David	No	Chapter 4	135	135	3811	3811	do not capitalize cultivated	Thank you, we have corrected this in the final draft
Clements, David	No	Chapter 4	136	136	3853	3853	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	138	138	3905	3906	More explanation of the observations for microbes would be useful. Are invasive microbes even identified, beyond agents affecting human health? Is it because they are so mobile, because they are so small, or because they are not well identified taxonomically? Is there even methodology to identify positive or negative impacts of microbes on native species?	Thank you for this suggestion. Indeed, microbes can have impacts beyond health, like fungi (food), input into beer, used for biological control, etc. Unfortunately, we're unable to adequately address this question because of some knowledge gaps related to microbes. We discuss this in more detail in section 4.7.2. We made sure to delete the sentence in question and have also rewritten another sentence to accommodate this concern "Aside from microbes that do not have any documented positive impacts (see section 4.7.2 on knowledge gaps)..."
Clements, David	No	Chapter 4	139	139	3928	3928	not clear what the phrase "the Americas document [42] impacts and the Asia-Pacific region [27] impacts" means - is there something missing?	Thank you for your comment. We rewrote this sentence for clarity in the final version.
Clements, David	No	Chapter 4	142	142	3989	3989	avoid beginning a sentence with a numeral	Thanks for this suggested change. We have included it in the final version.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Wedegärtner, Ronja Elisabeth Magdalene	No	Chapter 4	144	156	4013	4377	In chapter 4.6 a discussion of different perceptions of different social groups within indigenous or local communities would strengthen the storyline by highlighting that where impacts are seemingly contradictory this can be the result of different approaches to livelihood and different values within local/indigenous communities. See the upcoming paper https://www.mountaininvasions.org/post/global-survey-on-alien-invasive-species-impacts-and-management-in-mountains .	Thank you for your comment and suggested paper. We consulted the link and the upcoming paper will make an important contribution to the topic of livelihoods and regions affecting how different groups of people perceive impacts. Unfortunately we cannot include papers that are yet to be published. We already have some synthesis about the different perceptions of invasive alien species in Chapter 1, and also about different perceptions of impacts amongst and between indigenous peoples and local communities in the introduction of Chapter 4.
Clements, David	No	Chapter 4	144	156	4017	4364	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Government of New Zealand (Perry, Joanne)	Yes	chapter 4	144	146	4033	4093	4033--4093 a useful additional case study that showcases the impact of pigs in vector pathogens, while also being of cultural use for indigenous species is that of pigs as vectors for kauri dieback disease in NZ. Kauri is a taonga species for Māori I New Zealand, while wild pigs are also an important food source. The national management plans outlines how agencies will work with local iwi to manage both invasives. it can be found at https://www.mpi.govt.nz/biosecurity/long-term-biosecurity-management-programmes/kauri-dieback-disease-control/	Thank you for your comment. We have added further sentences in section 4.5.1 (subheading 'top IAS causing negative impacts to good quality of life') to highlight Kauri dieback as a key concern for Maori and maintaining cultural and spiritual relationships, and that further collaboration is required here between Maori and contemporary knowledge sources, in line with the great reference you provided.
Government of Germany	Yes	Chapter 4	145	146	4069	4072	Proposal: It is suggested to increase the sample, so the percentages for given types of impacts provided in Table 4.33 are based on a larger number of reports? Rationale: In the table, there are many impacts with extremely small shares of the small total number of reports - i.e. 2% (percentage of total) that is based on 1 report (absolut number) - which does not allow for meaningful descriptive statistics and associated interpretations/findings/messages.	Thank you for your comment. The sample size for the literature review of impacts of invasive alien species as reported by indigenous peoples and local communities is stated at the start of section 4.6, being 131 papers reviewed, and 79 papers containing information directly from indigenous peoples and local communities that was used as data for the tables. We considered this quite a large sample size considering the paucity of published data in this field, especially considering were only including data that was directly from indigenous peoples and local communities (quotes, interviews, interview data) rather than interpretation from authors. We have chosen to keep the tables as they are, whereby we are still reporting categories with a lower number of reports, as we feel it is important to highlight the full range of topics that were reported by indigenous peoples and local communities. This gives the reader a qualitative understanding of themes and issues in addition to the quantitative reporting. We acknowledge that reporting the categories with smaller number of reports may look odd, but we have chosen to keep them in for the reasons above. We attempted to combine them into an 'other' category, but for some tables, this would have not left many themes remaining.
Government of Germany	Yes	Chapter 4	146	146	4085	4093	Proposal: It is suggested to further include excerpts of interviews with indigenous peoples and local communities captured in the assessed peer-reviewed literature. This would substantiate section 4.6 - whose title contains "[...] from indigenous peoples and local knowledge" while having a rather small number of reports - with qualitative evidence and perceptions of impacts by indigenous peoples and local communities themselves.	Thank you for your comment. We have provided 5 quotations from the reviewed sources to highlight important findings in section 4.6.1. Due to word limits for the assessment, we feel we cannot include further quotations, and have opted for an synthesis of the interview material in each source to form the basis of section 4.6.1.
Clements, David	No	Chapter 4	149	149	4167	4167	do not capitalize perch or common	Thanks, this has been corrected in the revised version
Geerts, Sjirk	No	Chapter 4	149	149	4182	4182	change to "...that they have replaced"	Thank you for your comment. We have included this suggested edit.
Schaffner, Urs	No	Chapter 4	149	149	4184	4184	see comment on L.3275	Thank you for your comment. We have modified the table legend.
Robinson-Smythe, Tammy	No	Chapter 4	150	150	4209	4209	Table 4.35: It might be helpful to make the heading of the final column "% of total reports" - It took me a while to work that out	Thank you for your comment. We have modified the table column headings in line with your suggestions.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	150	150	4210	4210	Table 4.35: delete "Negative" from top row (title) because both negative and positive impacts are described in the Table.	Thank you for your comment. We have modified the table column headings in line with your suggestions.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 4	151	151	4225	4225	Table 4.36: delete "Negative" from top row (title) because both negative and positive impacts are described in the Table.	Thank you for your comment. We have modified the table column headings in line with your suggestions.
Clements, David	No	Chapter 4	155	155	4325	4325	not sure why (plant) is needed below Elodea on the table	Thank you for your comment. We have made this suggested edit.
Clements, David	No	Chapter 4	155	155	4333	4333	do not capitalize red king crab	Thank you, we have corrected this in the final draft
Clements, David	No	Chapter 4	156	156	4361	4361	do not capitalize emerald ash borer or black ash	Thank you, we have corrected this in the final draft
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 4	157	161	4378	4511	This section could look not only at models and scenarios for impact or how to evaluate impacts, but also at trends in impacts. This could help those involved in IAS prevention and management adapt their practices based on that knowledge.	Thank you, we have added the following: "Moreover, impact assessment schemes (Bacher et al., 2018; IUCN Species Survival Commission (SSC), 2020) and databases, such as InvaCost for the economic costs of for invasive alien species on a global scale impacts (Diagne, Leroy, et al., 2020), are available. Indeed, a recent study using InvaCost showed rising economic costs of invasive alien species both in damage and management (Diagne, Leroy, et al., 2020, 2021). Although there is no such database nor study for the impacts of IAS on native species or native ecosystem, it is most likely that those impacts are also increasing since the number of IAS establishments is still increasing globally (Seebens et al., 2017)."
Government of China	Yes	Chapter 4	157	157	4378	4511	It is difficult to accurately calculated the economic loss caused by biological invasions and the cost of preventing and removing them. It is suggested that continued research to made in developing methods for estimation to improve the accuracy.	We agree and we hope that this now more clear in the new version of the box on costs
Clements, David	No	Chapter 4	157	157	4384	4384	Indigenous should be capitalized	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Clements, David	No	Chapter 4	158	158	4424	4424	"bias" not "biased"	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 4	160	160	4456	4461	P160 L4452-4456	Thank you, we deleted the repeated text.
Clements, David	No	Chapter 4	160	160	4465	4465	check citation format	Thank you, this has been corrected in the final version
Robinson-Smythe, Tammy	No	Chapter 4	161	161	4502	4502	Replace "invasion" with "invasions"	Thank you. This has been corrected in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 4	161	161	4509	4511	in order to achieve what?	Thank you. We clarified this in the final version.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Germany	Yes	Chapter 4	161	161	4509	4511	Need for clarification and proposal: The distinction of invasive alien species and invasive species is only made at the last sentence of this chapter (4) and not explained - it is suggested to do so rather at the beginning of the assessment and/or in a glossary, while considering potential implications throughout the assessment.	chapter one devoted a large part of it to define some key terms. We have made definitions more clear in this new version. We hope now all is clearer
May Donnellan Barracough, Alicia D	No	Chapter 4	169	169	4467	4469	Throughout the chapter there are several mentions of lack of studies or references of impacts of IAS on mountain areas. I would like to refer to a recent study which is in review, analyzing perceptions of IAS impacts in mountain areas, where they find very different perception of impacts across regions, with consistently negative impacts on biodiversity but variable impacts on Ecosystem Services - please find reference here https://www.mountaininvasions.org/post/global-survey-on-alien-invasive-species-impacts-and-management-in-mountains	Thanks, we were unable to find the peer review publication. This looks like a project in progress that is not ideal a citation of this type of report
Brooks, Thomas	No	Chapter 4	183	183	5464	5464	Add correct citation for the IUCN Red List (at Page 183, Line 5464) following https://www.iucnredlist.org/about/citationinfo .	Thank you. This has been corrected in the final draft
Smith, Kevin	No	Chapter 4	183	183	5465	5467	The correct reference for EICAT standard is "IUCN (2020). IUCN EICAT Categories and Criteria. The Environmental Impact Classification for Alien Taxa First edition. Gland, Switzerland and Cambridge, UK: IUCN. X + Xpp." The citations to it also need changing to "IUCN, 2020" from "IUCN Species Survival Commission (SSC), 2020"	Thank you. This has been corrected in the final draft
Bharat, Alka	No	Chapter 5	0	0	0	0	Add sub-head for broad classification of uncertainty based on politico-Governance system	Thank you for your comment. This is beyond the scope of Chapter 5. Please refer to Chapter 6 for more information on uncertainty
Bharat, Alka	No	Chapter 5	0	0	0	0	Add sub-head of 5.1.3 to cover broad classification of countries	Thank you for your comment. This has already been addressed in other Chapters.
Bharat, Alka	No	Chapter 5	0	0	0	0	Add sub-heads for broad classification of governance system	Thank you for your comment. Governance classification is addressed in Chapter 6, not 5.
Day, Michael	No	Chapter 5	0	0	0	0	While generally thorough, some sections are difficult to read. Overly long, multi-topic sentences. Consider shortening sentences by breaking them up and simplifying. If you want people to read and adopt, then make it easier to read. There are a large number of cases of poor sentence structure and spelling mistakes. Spell checker would have picked up the vast majority. Strongly suggest someone goes through the whole document thoroughly. I only mentioned a few below where I had gone through various sections more thoroughly than others. Headings are mixed, some in sentence case, others with multiple words capitalized. Adequate punctuation is missing throughout. Some sections have very little punctuation, which can impact on the meaning of the sentence. It would be better if all figures were formatted similarly. Fonts and size of text varies considerably between figures. Species names should have authority, Order and family, or just authority and family if a plant. Use abbreviations after first defining them e.g. USA. Citations in the text seem to be formatted inconsistently.	Thank you for your comment. We have completely revised the whole chapter and considered your comment.
Eschen, René	No	Chapter 5	0	0	0	0	The report would benefit of a section addressing conflict species, i.e. species that provide significant (perceived) benefits and that as a result cannot be managed effectively. I know that it has been stated somewhere, but utilisation is not effective management. This should be stated very clearly, as many international donor agencies continue promoting utilisation of IAS and IAS are time and again mentioned as a useful resource. Calling utilisation by indigenous people "species led management" is misleading; often it is just using a resource once it is present without the explicit aim of managing a species. Utilisation is not only proposed and practiced in poor countries; recently utilisation of Gorse (Ulex sp.) was proposed as management method of the species in Scotland (https://www.abdn.ac.uk/rowett/news/15687/).	Thank you, this has been addressed in the final draft.
Fabre, Sophie	No	Chapter 5	0	0	0	0	The interest of data fusion to detect and characterise invasive species and help to choice of actions for management could be emphasized. Many categories of fused data are of interest: (1) Multimodal RS data fusion gives access to further vegetation traits or improve their assessment : Passive optical data give information on the biochemical and biophysical vegetation traits. The temporal dimension provides the phenology and development stages. Active optical data are interesting to characterize vegetation structure in the vertical and horizontal dimensions. (2) Multiscale data fusion : data collected with in-field device (e.g. spectroradiometer, terrestrial lidar...) provide information at local scale and can be used to specify methodology applied at larger scale on satellite acquisitions. (3) RS data fusionned with complementary data on environment development (soil granulometry, exposition, relief...) can provide more accurate information.	Thank you for your comment. This is out of scope for Chapter 5, but we transferred this comment to the Data lead for Chapter 6.
Fabre, Sophie	No	Chapter 5	0	0	0	0	This chapter is very interesting and well-written, emphasizing on the key role of RS in invasive species detection and characterization (spatio-temporal scale, terrestrial to satellite devices). A review of mapping and monitoring methods (classification, data fusion, change detection...) with relevant review articles could have achieved to complete this chapter.	Thank you for your comment. This is out of scope for Chapter 5, but we transferred this comment to the Data lead for Chapter 6.
Gallardo, Belinda	No	Chapter 5	0	0	0	0	Generally, there is a lot of overlap among sections which makes the chapter repetitive and difficult to follow. I would suggest contents (definitions, examples and strategies) by major stages of the invasion continuum.	Thank you for your comment. The structure of the Chapter as it stands results from a long process of consultation through the Zero Order Draft and the First Order Draft, and we selected and were supported by reviewers down our structure which captures both the basic components of the Invasion Curve (i.e., Prevention through establishment, spread and widespread) integrated with the three basic management approaches (pathways, species and sites). Any structure of such a complex subject will lead to some levels of repetition, but on the advice of our Review Editors we believe we have the balance right
Gallardo, Belinda	No	Chapter 5	0	0	0	0	Summary is quite vague in comparison with other Chapters that seem to be more clearly evidence-based.	Thank you for the comment. This section has been revised and improved.
Gallardo, Belinda	No	Chapter 5	0	0	0	0	Tables and Figures need clear captions to be properly understood. Some are incredibly useful and synthetic, but others too vague to be informative. I have indicated those that I find less useful below.	Thank you for your comment. Noted so we will address this comment on a case by case basis based on the more detailed comments from the reviewer.
Gallardo, Belinda	No	Chapter 5	0	0	0	0	There are lots of typos in the document that could be easily fix with a corrector. I've highlighted some below. As a non-native speaker myself I am sure I missed others.	Thank you for your feedback. We have edited the typos in the final draft.
Gallardo, Belinda	No	Chapter 5	0	0	0	0	Include a Methods sections. The clarity of the Chapter would increase with a short Methods section at the begining clarifying the criteria to select topics for discussion and make clear what can and cannot be expected from this chapter. It is unclear if the selection of topics (management strategies, new technologies) is based on a literature review (then with which keywords?), expert consultation (then which experts? online discussion, workshop?), or just the personal opinion of the participants (and that is fine too, you're all experts in the field!). Some sections seem to be supported by clear reviews of the data available (e.g. IDK, biocontrol) but others make strong statements that are not clearly based on an analysis of successes and failures. It is not until the very end of the Chapter that it is made clear that this is not an exhaustive review. But if it is not (as one would initially expect) then how where contents decided?	Thank you, we have added links to data management reports where appropriate.
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 5	0	0	0	0	As indicated in the glossary at the beginning of the chapter, the meaning of IAS managemnt is two-fold. This important information should maybe be reflected within the beginning of the chapter itself, and a distinction to help ensure that those who read the document know about which kind of management we are talking about would be important as well. On another note, I would like to share some effort by an NGO within Canada, the Invasive Species Centre, that is trying to collate risk assessments undertaken in Canada. https://www.invasivespeciescentre.ca/invasive-species/what-is-at-risk/invasive-species-risk-assessment/	Thank you for your comment. A short paragraph has been added to Section 1 after the opening table clarifying the definition used for IAS management with a reference to the Glossary entry. The link is now considered under 5.2.2.1 The ISC activity has now been added to Section 2

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	0	0	0	0	This chapter contains a lot of useful information, but it is difficult to navigate as information does not always appear under the section heading that one might expect. While mechanical, consideration of the logical flow of the chapter and revision of subheading titles for greater alignment with the text would improve the overall usability of the document.	Thank you for the comment. No specific cases provided for us to adjust. The Review Editors have told us the Chapter structure and content flows well and where they have suggested some adjustments these have been made.
Government of Germany	Yes	Chapter 5	0	0	0	0	General comment: Please consider inserting SDG (15) and its target 15.8 which refers to IAS, and please expand on the fact that target 15.8 states: "by 2020 introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems, and control or eradicate the priority species." By IPBES decision, this assessment should respond directly to Aichi Biodiversity Target 9 (Annex III to decision IPBES-4/1), which states: "By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated and measures are in place to manage pathways to prevent their introduction and establishment." We therefore recommend the analyses of the recently launched CBD GBO-5 report (2020, https://www.cbd.int/gbo/) that provides an in depth analyses of what progress has been achieved so far under Target 9. In order to maintain continuity in this process we warmly encourage the authors to analyse IAS-related aspects in ongoing CBD processes that should lead to further goals/targets under the planned 'post-2020 global biodiversity framework'. For this, kindly also analyse working documents that will be released in preparation of CBD COP-15, and the decision/s taken at COP-15 in 2022 on new/continued IAS targets.	Thank you for your comment. The international convention aspects of this assessment are covered in Chapter 6 and not part of the scope of Chapter 5
Government of Germany	Yes	Chapter 5	0	0	0	0	Proposal: It is suggested to expand the title of this chapter to "Management: Lessons learned - challenges and opportunities". Rationale: This would make this chapter sound more forward-looking by indicating that desirable outcomes will be promoted.	Thank you for this suggested change. We have included it in the new version.
Government of Germany	Yes	Chapter 5	0	0	0	0	General comment: This chapter provides a very comprehensive summary of available management approaches and gives useful examples for relevant management issues. We fully agree with the message of this chapter that there are many and in principle potentially useful management techniques available. Thank you very much for all the work collecting evidence and summarizing the state of knowledge in a holistic manner. However, we think that the chapter could address the following issues in even more detail: a) previous chapters have shown that there are substantial impacts of IAS on other species. In 44% of all extinctions, IAS have been identified as major driver. Has management so far been ineffective in reducing this dramatic extinction rate- although so many useful techniques are available- and why? The authors address barriers and impediments to implementation of management in this chapter, but we still think that there is a bit of an imbalance in the relatively positive picture of management in this chapter vs. its overall limited success in reducing IAS impact on species extinction in the past b) IAS may provide net benefits to some groups of society and net costs and predominantly negative impacts to other groups- and the severity of impacts may change over time as ecosystems reorganize- This may cause fundamental challenges for management which we feel are insufficiently visible in this chapter- in particular in its summary and conclusions sections. Please strengthen these issues in these sections.	Thank you for your comment. We have tried to correct the imbalances in the final draft and have also strengthened the content on conflicts and differences in perspectives as a challenge for managing invasive alien species
Government of Germany	Yes	Chapter 5	0	0	0	0	Proposal: The table of contents of chapter 5 looks a bit unsorted. Please ensure that there is a clear outline, that headings and subheadings build effectively on each other. The table of content should already give a meaningful impression of the contents of this chapter	Thank you, we have clarified some titles in the final draft.
Government of USA	Yes	Chapter 5	0	0	0	0	Coverage here of biosecurity is incomplete in its description	Thank you for your comment. The definition of Biosecurity as adopted in this assessment has been compiled under the Assessment Glossary and not under this particular chapter.
Government of USA	Yes	Chapter 5	0	0	0	0	In general, biosecurity risk analysis is not adequately covered here. The descriptions here are missing key components such as the role of climatic niche models in risk analysis	Thank you for your comment. It was not the aim or intention of Ch5 on IAS management to write a comprehensive treatise on risk analysis in that context, so it is not surprising that this reviewer thought we failed in that task. We believe we have covered this area to sufficient depth that it will be useful to policymakers active in the area of this assessment even if specialists in this field will remain disappointed. The role of climate niche models is beyond the level of detail we were able to address.
Government of USA	Yes	Chapter 5	0	0	0	0	One of the things that the authors did not adequately cover in this section is the role of international agreements and conventions in biosecurity. This is a huge subject so it is a major oversight	Thank you for your comment. Chapter 5 does cover international agreements and conventions in Biosecurity in the context of them informing/governing direct management approaches. A full review of these conventions is outside the scope of Chapter 5 and is more comprehensively addressed in Chapter 6.
Government of USA	Yes	Chapter 5	0	0	0	0	There are several key parts of any national biosecurity program that are inexplicably not mentioned at all here. These include border inspection, phytosanitary treatments and post-entry quarantine. Not mentioning here greatly detracts from the usefulness of this summary.	Thank you for this comment. We believe that some aspects raised here have already been covered, but have followed the suggestion and have strengthened these points in the final draft.
Marchante, Elizabete	No	Chapter 5	0	0	0	0	My impression is that the chapter is quite successful in reviewing the various approaches, programs, and tools for preventing and managing invasive alien species and their impacts in varied spatio-temporal contexts, but falls somewhat short of expectations in terms of assessing their comparative efficacy, so that professionals and decision-makers can make informed choices... but I fully understand that the available information does not allow this analysis to be carried out easily and objectively.	Thank you for the comment. As the reviewer states, "the available information does not allow [a complete] analysis to be carried out easily and objectively", as much as we would have liked to have been able to do this. Hopefully the Chapter provides pointers (e.g. the knowledge gaps in Section 6) to ensure improvements will come in the future
Participants of ILK dialogue workshop (Faith Nataya)	No	Chapter 5	0	0	0	0	Ch 5, 6, SPM C, D: Different IPLCs have different experiences, which need to be documented to show how they encountered different species and encourage them and give support. There is also a recommendation to have a system for IPLC themselves on how to manage IAS so they know what is going on in their communities about this and what best practices for IPLCs are.	Thanks for this comment. The chapter provides many examples of different management practices by different IPLCs. Also, the assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Participants of ILK dialogue workshop (Faith Nataya)	No	Chapter 5	0	0	0	0	Ch 5, 6, SPM C, D: Indigenous peoples often only know species in local languages, so researchers (preferably indigenous researchers) need to find ways to bring these community names and scientific knowledge together, working to document knowledge in local language, and with pictures so these can be linked to scientist names, so community knowledge of IAS can be shared with science. IPLC researchers are needed for this task, and there should be capacity building so they can work on this and manage the data. Also, communities should think about biocultural protocols and other management systems so they know what knowledge to share and how, and how they want to approach FPIC.	Thank you for your comment. This is already addressed in section 5.3.
Participants of ILK dialogue workshop (Florence Daguitan)	No	Chapter 5	0	0	0	0	Chapter 3, 4, 5: A direct driver of IAS is introduction of new plants and animals. IPLCs can enrich their community processes and protocols to include the prevention of entry or proliferation of IAS. Like in one village in the late 1990's, an irrigation project from the government has a mandatory seed dispersal. The people requested one woman to plant these seeds far away from the farm site for observation	Thank you for your comment. Considerations on the risk of new species introduction associated with management are already presented in Section 5.4, in association with biological control. This section is not specific to the IPLC situation in particular, but it covers general situations, including common situations faced by IPLCs.
Participants of ILK dialogue workshop (Florence Daguitan)	No	Chapter 5	0	0	0	0	Some collective actions or synchronized activities of indigenous peoples' can be harnessed for effective management of IAS. For example, in the Philippines, during rice transplanting, people will start from the higher elevation going to the lower elevation to plant within a given time. All were consciously removing the golden apple snail significantly decreasing the population of golden apple snail, hence damage is insignificant. By the time the snails multiply the rice plants have grown and can no longer be of interest to the snail. Also, in mid-80s, the Pidlisian people of Sagada, Mtn Province, experienced the invasion of rats / rat infestation in their farmlands damaging more than 50% of the expected yield. The elders analyzed the situation and they said that expansion of rotational agricultural lands in the forest reached a level that created imbalance of forests and ricelands. They then declared some forestlands to be off limits to rotational farming. "we had to restore the habitats of the forests in the forests to restore the productivity of our ricelands"	Thank you very much for the comment. We already have many examples, and due to the word limit we can't add more examples.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Participants of ILK dialogue workshop (Guadalupe Yesenia Hernández Márquez)	No	Chapter 5	0	0	0	0	Ch 5, 6, SPM B, C, D: It's so important the issue of displacement of indigenous peoples from their lands and the impact of this problem related with invasive alien species. It is related with governance too.	Thank you for this suggestion. We have chosen to include it in the section 5.2
Participants of ILK dialogue workshop (Katie Kamelamela)	No	Chapter 5	0	0	0	0	Ch 5,6, SPM B, C, D: In relation to the removal of indigenous peoples from lands, this causes a forced need to adapt to a new area, to a new climate, and you are divorced from the ecological knowledge you have built up. And then IAS are added on top of that – it's a complexity we talk about in Hawai'i. It motivates peoples' engagement to remove IAS, for example with pigs being removed from a conservation unit, or removal of IAS to make way for a housing development so that people can use those resources.	Thank you for your comment.Relevant statements were changed throughout the chapter.
Participants of ILK dialogue workshop (Katie Kamelamela)	No	Chapter 5	0	0	0	0	I appreciate the team effort to capture very nuanced information. Looking at the perspectives and worldviews shows the complexity of the conversation around invasive species in IPLC communities. On the discussion on motivations for management by IPLCs management, often it is all of these issues/motivations at once, they are not separated. Also, communities learn from each other. For example relating to Prosopis in Hawai'i – Communities in South Africa have some traditions and communities in Hawai'i have been learning from this.	Thank you, we have revised this content in the final draft, with this comment in mind.
Participants of ILK dialogue workshop (Lucy Mulenkei)	No	Chapter 5	0	0	0	0	Ch 5, 6, SPM C and D: Lucy: In Africa and Kenya in particular, in some remote areas, even when an IAS is discovered or the community notices them, they do not connect them with government, and they do not try to catalyze engagement and documentation by researchers. There are gaps because there are areas where communities live, and no research or government representatives from the ministry of agriculture or environment go there. How can we connect these groups and show that policy issues are there. We need to reach communities to give them the information. Make sure that IPLCs are engaged and involved in the process. Another challenges for working with IPLCs around IAS is for local people to know scientific names of IAS plants. Without this it can be hard to discuss them in the communities. There needs to be support for indigenous peoples on IAS that have been a problem. It would be good to see where governments and researchers have been key players together with IPLCs. Positive examples would be good to see in the assessment.	Thank you very much for your comment. We already have a few positive examples of collaboration among governments, NGO and IPLCs in Section 5.3. We have also acknowledged the importance of decision making integrating IPLCs and ILK in Section 5.2.
Participants of ILK dialogue workshop (Lynn Jacobs)	No	Chapter 5	0	0	0	0	Ch 5, 6, SPM B, C, D: Sometimes adaptation is not a choice in Indigenous territories. If the control/management options will have impacts on other aspects of the natural world that are considered to be worse than learning to live with the species and dealing with the impacts. So IPLCs make the least worst choice, which is to adapt. This is linked to the spiritual dilemma of managing the invasive species using chemicals and affecting our other relations in the natural world.	Thank you for your comment. Relevant statements were changed throughout the chapter.
Participants of ILK dialogue workshop (Lynn Jacobs)	No	Chapter 5	0	0	0	0	Spirituality is the core for IPLCs, and a review should highlight spirituality as the background to all rationality for protecting these lands.	Thank you, this has been addressed in the second order draft of the SPM
Participants of ILK dialogue workshop (Lynn Jacobs)	No	Chapter 5	0	0	0	0	There is a moral dilemma for IPLCs: management and best practices for IAS often involve chemicals, which goes again the spiritual/moral connection that IPLCs have with the land. We are facing that, especially with phragmites now, as putting chemicals in wetlands is considered best practice. We do not know how to move forward with this. We want to protect biodiversity, but without putting chemicals in the habitats.	Thank you, this is a very interesting perspective and case study. We have strengthened content on IPLCs managing invasive alien species, and also invite you to read chapter 1 for more information.
Participants of ILK dialogue workshop (Ndiaga Sall)	No	Chapter 5	0	0	0	0	SPM C, D, Ch 5, 6: Experience from north of Senegal; There is a river which supplies drinking water, and typha now covers 19-14% of the lake. This is an example of successful integration of local communities by researchers and government. Local communities of Senegal and Mauritania were impacted, and they started to create management strategies, and then researchers and governments joined them, so this is a very good example of co-producing and co-managing solutions at the local levels and across borders.	Thank you for your comment. Future options and governance are out of the scope of Chapter 5 and will be dealt with in Chapter 6.
Participants of ILK dialogue workshop (Te Tui Shortland)	No	Chapter 5	0	0	0	0	Ch 5, SPM B, C, D: The assessment says many IPLCs faced with IAS will adapt. It is important to highlight that a lot of the time IPLCs adapt because they do not have any other options. They are not legally or financially supported to look after their territories, they have to have day jobs which takes up time and energy, so they adapt because they have to. We do adapt well, we try to compare it to our ancient wisdoms in regards to relatives and kinships relations. But when we ask questions of IPLCs about adaptation, many of them might have chosen eradication if they had the options and resources.	Thank you for your comment. Relevant statements were changed throughout the chapter.
Participants of ILK dialogue workshop (Te Tui Shortland)	No	Chapter 5	0	0	0	0	Ch 5, SPM C22: I agree with the ethical issues and the need for safeguards around genetic engineering, and it is good that this is considered in chapter 5. With climate change and biodiversity loss there is a whole industry pushing for new technology. There needs to be a framework in place for considering new technologies, and indigenous peoples have to have a meaningful role within that. For example: in New Zealand, indigenous peoples had to go to the High Court to have a say regarding genetic engineering as Big Agriculture were determined that only the EPA would have a say. Without safeguards in place, this issue may continue around the world.	Thank you for this suggestion. This discussion is included in section 5.4 under Genetic-control approaches
Participants of ILK dialogue workshop (Te Tui Shortland)	No	Chapter 5	0	0	0	0	It seems that the assessment is suggesting that from the literature review for management, only a small percentage of IPLC management of IAS is related to/motivated by spirituality. However, For IPLCs, spirituality underpins everything (as does food). However, often IPLCs do not report spirituality in studies. It therefore needs to be made clearer that results here are based on what was reported in studies, and is not reflective of IPLC priorities in reality.	Thank you, we have added links to data management reports where appropriate.
Robertson, Peter	No	Chapter 5	0	0	0	0	Title - why is this 'Management: lessons learned', the breadth of the work is wider than that	Thank you for the comment. The title is modified based on comment 2369.
White, Michael	No	Chapter 5	0	0	0	0	I think Ch 5 is pretty good, well done	Thank you for your feedback.
Day, Michael	No	Chapter 5	1	5	0	0	Overall, I found the Executive Summary difficult to read and understand. I had to read it numerous times to get the full gist of what is being said. Some sentences are overly complex with multiple subjects. Simplify points.	Thank you for the comment. This section has been revised and improved.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	1	5	1	181	The summary captures the major findings of the chapter, but also contains many details which obscure high-level messages. To align more closely with policy needs, ordering could be reconsidered, perhaps reflecting the conclusions section. I would say the first point is that the impacts of IAS can be avoided or minimized with appropriate management. Points 1, 2 and 5 are really the same point (although the non-bold part of point 1 does not seem to be related) - they all say that knowledge and tools for management are available, and could be condensed into a second point. Elements such as "Choosing the best available option is critical for management success" are not helpful to policymakers - partly because it is self-evident that the best option would be the best, but also because it suggests that if the best option isn't available, it's not worth trying. Items 7 and 8 are robust conclusions and should be placed ahead of needs (second half of point 1, as well as 3, 9, 12); needs should be combined into a single point at the end to address how to improve our ability to manage the issue. Points 6 and 10 are related and should be placed adjacent to one another.	We have removed a lot of the detail (by 500 words) and reordered the KMs to better reflect their importance. The clarity of the different key messages has been improved to the focus of each is clear and the overlaps are removed without the logical order being disrupted
Marchante, Elizabete	No	Chapter 5	1	1	1	21	Someone who reads the first 2 points of the executive summary gets the impression that the knowledge to manage the IAS is great and almost everything is available to do it everywhere... but this is not the case in all countries, not in Europe where 15 MS were notified by the EC to show the results of the implementation of Regulation No. 1143/2014, not in the field where IAS continue to enter and spread, nor with predictions that the number of IAS will continue to increase despite of all strategies, scenarios, etc. Other points show this variability (and point 10 says it all), but perhaps less generalization can be made in these early texts?	Thanks for this suggested change. We have included it in the new version.
Evans, Thomas	No	Chapter 5	1	1	2	21	Both point 1 and point 2 of this summary provide long lists of phrases and terms. I don't find these points easy to digest to be honest. Point 3 is easier to read by comparison.	Edited back
Robertson, Peter	No	Chapter 5	1	1	2	8	I would suggest a statement in the summary to say that current management is not dealing with the scale of the problem, all major targets have been missed and most impacts remain unmanaged.	Thank you, this is related to Aichi targets which sits under Ch6
Government of Germany	Yes	Chapter 5	1	1	9	11	Proposal: It is suggested to include the term "natural substances" in this definition of Biological Control as it was done in the IEEP_Report: https://www.iobc-wprs.org/index_news_IEEP_Report_2021.html (here link to https://dicogroecologie.fr/en/encyclopedia/biocontrol/ ; Stenberg et al 2021 (https://link.springer.com/article/10.1007/s10340-021-01354-7 ; https://link.springer.com/article/10.1007/s10340-021-01386-z)	Refs added and definition modified
Government of Germany	Yes	Chapter 5	1	1	10	21	Comment: Are there any shortcomings or knowledge gaps around the available decisions support tools for IAS? If so, please add them here.	High level key knowledge gaps have been added
Evans, Thomas	No	Chapter 5	1	1	11	13	This sentence doesn't make sense as written?	Thanks for this comment. We have re-worked the paragraph
Sathyapala, Shiroma	No	Chapter 5	1	1	14	14	sustainability instead of repeatability	Thank you four your suggestion. After discussion among the authors, it is repeatability and not sustainability that is at stake here. We have therefore decided to leave the sentence as is.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sathyapala, Shiroma	No	Chapter 5	1	1	16	16	add "semi quantitative" as many countries are using semi quantitative support tools	Thanks for this comment. We think that is not necessary to add semi-quantitative to this sentence
Robertson, Peter	No	Chapter 5	1	1	20	20	multi-criteria methods are an analytical approach, not a process in themselves - risk assessment and risk management often rely on this analytical approach	This level of detail has been removed
Day, Michael	No	Chapter 5	1	1	23	34	Is there any reference to determining what gaps there are and how to address them?	Section 5.6.2.1 lists the gaps. The chapter does not address how to fill these gaps as this was not part of the brief
Sathyapala, Shiroma	No	Chapter 5	1	1	25	25	preventive Instead of precautionary	Thanks for this comment. These two words are different concepts and we think in this case precautionary is the correct one
Robinson-Smythe, Tammy	No	Chapter 5	1	1	30	30	Replace "support all jurisdictions in" with "supports all jurisdictions at"	Thank you for your comments, the entire paragraph was re-written.
Gallardo, Belinda	No	Chapter 5	1	1	42	42	"Site-based approaches ..." species-led approaches are discussed in the previous sentence	Thank you for your comments, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	1	2	42	52	the sentence is long and unclear needs to be simplified	Thank you for your comments, the paragraph was corrected
Robertson, Peter	No	Chapter 5	1	1	43	43	multiple invasive alien species', this seems overly optimistic, I'm not aware of many examples of successful multi-species management	Thanks for this suggested change. We have included it in the new version.
Robertson, Peter	No	Chapter 5	1	1	46	46	reference to restoration of marine habitats seems too specific and out of place, why select just this one shortcoming here.	Thank you for your comments, the paragraph was corrected
Robertson, Peter	No	Chapter 5	1	1	47	52	This seems very optimistic, most species and impacts are unmanaged, current levels of management are not slowing the increasing rate of impacts, many species (marine and most freshwater species, most widespread species) are effectively unmanageable once prevention has failed.	Thank you for your comments, the paragraph was corrected
Robertson, Peter	No	Chapter 5	2	2	36	78	Points 4 and 5 overlap, both describing similar lists of actions, many of which are not management in themselves. I would suggest restructuring to separately discuss methods to help decision making (eg risk analysis), how to collect the data that these need (surveillance) and then the actual forms of active management that can be applied (eg prevention, eradication).	The clarity of the different key messages has been improved so the focus of each is clear and the overlaps are removed without the logical order being disrupted. Some of the confusing detail has been removed
Day, Michael	No	Chapter 5	2	2	46	47	Site restoration is not available following marine pest invasions? On the contrary, there has been much work done on creating substrates to encourage colonization, following disturbance.	Thank you for your comment. We are aware about resotartion programs in marine ecosystems but they are no related to marine invasions and as part of management programs after invasions
Sathyapala, Shiroma	No	Chapter 5	2	2	48	48	effective tried and tested Is this referring to effective and tested ? Needs revision	Thank you for your comments, the paragraph was corrected
Government of Canada (Bourchier, Rob)	Yes	Chapter 5	2	2	49	49	Definition of adaptive management should be included in key terms and definitions for this chapter starting on page 6. It would be clearer in this summary statement to change text to : ...adative management- i.e. learning as you go and strong stakeholder engagement...	Thank you for your comment. The definition of adaptive management was added to the assessment glossary.
Government of Germany	Yes	Chapter 5	2	2	54	78	Proposal: "Chosing the best available option is critical for management success". Unfortunately, there are no further hints that guide choosing the best available option in this para. Please give some more hints as this statement is part of the bold messages, which should be further explained and backed up in the unbold text.	Thank you for your comment. This related to decision support which is a process not an output and we don't have the space to expand this here but the guide is Section 5.2
Robertson, Peter	No	Chapter 5	2	3	54	95	sections 5 and 6 both discuss stakeholder and local community involvement, these would be better focused in one bullet point.	Thank you for your comment. Text has been edited to remove repetition.
Robinson-Smythe, Tammy	No	Chapter 5	2	2	61	61	Its not clear what a 'volatile' technology is	Thank you for your comment, the paragraph was re-written
Government of Canada (Bourchier, Rob)	Yes	Chapter 5	2	2	68	68	It is not clear what is meant in summary statement 5 by term "lethal technologies". Many things are lethal methods of control , chemical , mechanical etc. . Some additional context needs to be added , "eradication programs" may be clearer term to what is being referred to here. A definition should be included in key terms and definitions for this chapter starting on page 6.	Thank you for your comment. This sentence has been removed.
Robertson, Peter	No	Chapter 5	2	2	68	69	reference to 'should only' is very strong, while good advice I would think that 'may consider' would be more appropriate	Thank you for your comment, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	2	2	68	68	The term "Lethal technologies" is not clear here . Suggest Lethal technologies for management of large animals / vertebrates	Thank you for your comments, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	2	2	68	69	In general for many IAS control methods enviornmental impact assessments are conducted and only occasionally community-led ethical assessment are included. Suggest to include both	Thank you for your comments, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	2	2	69	72	is this is about conducting research on untested technologies or implementation of untested technologies ? or both?	Thank you for your comments, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	2	2	74	74	introductions instead of incursions ?	Thank you for your comments, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	2	2	76	76	the terms control and management are used in the document intermittently. Do they contain same meaning ?	Thank you for your comments, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	2	2	84	84	under negative consequences suggest to include social unrest and lack of trust on IAS management programs	Thank you, but this is beyond the scope and not covered in Ch5
Robinson-Smythe, Tammy	No	Chapter 5	3	3	88	89	Something is wrong with the line spacing here	Thank you, we have corrected this in the final draft
Gallardo, Belinda	No	Chapter 5	3	3	93	95	I vedry much agree with this statement, but the corresponding section about restoration transmits the opposite message (that restoration is not possible)	Thanks for this suggested change. We have included it in the new version.
Robertson, Peter	No	Chapter 5	3	3	97	98	Rather optimistic, While cost effective, prevention will never be 100%. I do not think it can be described as 'sustainable'	Wording has been adjusted. The message here is that prevention and preparedness must be sustained. You can't undertake it for a while and then stop
Robinson-Smythe, Tammy	No	Chapter 5	3	3	100	100	Replace "prevent" with "preventing"	Thank you for your comments, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	3	3	100	100	suggest to add preventing and reducing the impact as surveillance may lead to early detection and early action which may reduce the impact	Thank you for your comments, the paragraph was corrected
Gallardo, Belinda	No	Chapter 5	3	3	101	102	I agree with this sentence but the message is not clear in the chapter	Thanks for this suggested change. We have included it in the new version.
Evans, Thomas	No	Chapter 5	3	3	107	107	facilitate(s)	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 5	3	3	111	111	delete and	Thank you, we have corrected this in the final draft
Sathyapala, Shiroma	No	Chapter 5	3	3	111	112	this should be "sanitary and phytosanitary standards" (these cover both animal and plant pests & diseases)	Thank you for your comments, the paragraph was corrected
Day, Michael	No	Chapter 5	3	4	119	137	Point 8 depends on biology and ecology of species e.g. bird-dispersed species may not be good targets for eradication, as it is harder to delimit the area.	Thank you for your comment. A level of detail we can't go into in the Executive Summary but it is covered in 5.5.3
Robertson, Peter	No	Chapter 5	3	4	125	137	I disagree with this section, there are an increasing number of eradications of vertebrate species which are widespread on continental land masses. This statement limits the aspiration to do more management at large scales. (see Robertson, P.A., Roy, S., Mill, A.C., Shirley, M., Adriaens, T., Ward, A.I., Tatayah, V. and Booy, O., 2019, March. Invasive species removals and scale-contrasting island and mainland experience. In Island invasives: scaling up to meet the challenge.: Proceedings of the international conference on island invasives. (pp. 687-691). IUCN.)	Thank you for your comment. We do not have a space to go into the details here (see Section 5.5.3) however most even well planned eradication programs fail on continents because the target is already too widespread. Emphasizing those that have worked would set up false expectations and potentially lead to investments in lost causes driven by political decisions.
Robinson-Smythe, Tammy	No	Chapter 5	4	4	133	133	Should "close" be "closed"?	Thank you for your comments, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	4	4	135	137	add directly impacting agriculture, enviornment, ecosystem services	Thank you for your comments, the paragraph was corrected
Government of Canada (Ferreira, Catarina)	Yes	Chapter 5	4	4	139	148	Cross-sectoral collaboration is as important as international collaboration. IAS management is done by multiple agencies from environmental and health to food safety organizations, so a better understanding of the roles and responsibilities of different agencies on IAS will likely improve their effective management. The role of bridging organizations is also extremely important here (Bixler 2021: https://link.springer.com/chapter/10.1007/978-3-030-81085-6_6)	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	4	4	139	148	This seems like a governance issue, and is perhaps more appropriate in Chapter 6	Thank you for your comment. It is not so as this was in the Guiding Question for Ch 5 but complimented by Ch 6
Heger, Tina	No	Chapter 5	4	4	141	143	"As invasive alien species have multiple drivers..." - this sentence should be revised, since it contains anthropomorphism and makes it sound like IAS have a will. Suggestion: "As IAS are mobile or associated with multiple vectors, property and jurisdictional boundaries do not affect their spread."	Thank you for your comments, the paragraph was corrected
Sathyapala, Shiroma	No	Chapter 5	4	4	142	143	This sentence is not clear - mutiple drivers which are mobile ? and multiple vectors ?	Thank you for your comments, the paragraph was corrected.
Robinson-Smythe, Tammy	No	Chapter 5	4	4	145	145	Replace "on" with "of"	Thank you for your comments, the paragraph was corrected.
Day, Michael	No	Chapter 5	4	4	150	158	Point 10 Feasible and clear action plans?	Thanks for this suggested change. We have included it in the new version.
Robertson, Peter	No	Chapter 5	4	4	150	158	and lack of effective control methods	Thanks for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	4	4	150	151	add regulatory - can result from regulatory, societal ----	Thank you for your comments, the paragraph was corrected.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Germany	Yes	Chapter 5	4	4	154	158	Clarification needed: "context dependency of interests and values". It would be extremely important to have a thorough discussion of this issue within the chapter. What does it mean for management that IAS may provide benefits to some groups within society and threats to some other groups? How is this reality in many IAS contexts taken into account in management? Which approaches exist to contribute to a reconciliation of interests?	Thank you for your comment. Edited to capture this point and the link to 5.6.2.1.
Sathyapala, Shiroma	No	Chapter 5	4	4	154	158	In many countries many failures are attributed to lack of technical expertise	Thank you for your comment. Technical capacity was already included in the sentence.
Day, Michael	No	Chapter 5	4	5	160	172	Point 11 What about consider the use of ecoclimatic modelling?	Thank you, but this is beyond the scope of the Executive Summary
Sathyapala, Shiroma	No	Chapter 5	5	5	171	171	escapes rather than threats	Thank you for your comment. The paragraph was corrected.
Day, Michael	No	Chapter 5	5	5	174	181	Point 12 needs to be aligned to feasible and clear action plans. Otherwise, what are you monitoring?	Thank you for your comment. We made the paragraph clearer but this point is implicit through its association with existing actions plans.
Sathyapala, Shiroma	No	Chapter 5	5	5	176	176	need to be monitored and studied-	Thanks for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	5	5	180	181	The cost benefit analyses should include both direct and indirect costs and benefits- This is a major gap	Thank you for your comment. Please see section 5.2. The Executive Summary cannot address this level of detail.
Day, Michael	No	Chapter 5	6	6	182	218	Expand to include all non-standard terms. There are a few terms mentioned in the Executive Summary that could be included.	Thank you for your comment. Ch5 key terms and definitions have now been incorporated into the full Glossary for the whole assessment.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	6	6	182	182	There inconsistencies between terms in this list and the glossary. While useful at the review stage, it is will be important not to introduce competing terms and to make definitions easy to locate - all definitions should be moved to the glossary unless there are compelling reasons otherwise.	Thank you for your comment. Ch5 key terms and definitions have now been incorporated into the full Glossary for the whole assessment and consolidation of definitions is underway.
Pan, Xubin	No	Chapter 5	6	6	182	218	This section should be integrated into the Glossary	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	183	218	Please have definitions from this sections moved to the glossary section only, some are already there, it is unnecessary to repeat them in both sections. Also the definitions in the glossary have references, most of these do not. Please add references where needed.	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	183	183	Suggest removing this definition as citizen science is already included in both the glossary and chapter 1. Citizen surveillance has not been mentioned in the document. If it is decided to keep it, re work it to a clearer definition and move to the glossary	Thanks for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	6	6	183	192	where possible suggest to use IPPC and OIE definitions some of the definitions can be find https://assets.ippc.int/static/media/files/publication/en/2021/05/ISPM_05_2021_En_Glossary_2021-05-27_PostCPM-15_Fixed.pdf	Thank you for your comment. Assessment Glossary has carriage of this to ensure consistent definition and term use across the whole assessment.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	184	184	Add the definition of citizen science since it is mentioned within the definition of Citizen surveillance, thus implying that they are different which could cause confusion unless both are specified. As defined in Chapter 1: Citizen science (also known as community science, participatory monitoring, community-based environmental monitoring, crowd science, crowd-sourced science, civic science, or volunteer monitoring) describes the diverse range of approaches in which scientific research is conducted, in whole or in part, by volunteers with varying levels of expertise	Thank you for your comment. Both citizen surveillance and citizen science are now defined in the Assessment Glossary.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	185	185	Substitute the word contain for keep enclosed, prevent escape, or something similar in the definition of Containment to avoid using the same word being defined in the definition.	Thank you for your comment. The definition was changed.
Dufour-Dror, Jean-Marc	No	Chapter 5	6	6	189	189	Control is defined as an action whose objective is to SUPPRESS, I would recommend to extend the definition so it includes also actions whose objective is to REDUCE to some extent the distribution, abundance and impacts of AIS. This is important because a control can be very successful and effective also in cases where the targeted AIS has not been necessarily fully suppressed but whose extent /distribution/abundance has been reduced. E.g. When controlling infestations of Ailanthus altissima, and other dioecious invasive tree species, reducing the presence of female individuals has a positive effect onto the controlled area though all individuals have not been suppressed.	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	189	189	In the glossary this definition has FAO as a reference but it is lacking the term eradication. Suggest using the actions in Blackburn et al. 2011 and change this definition to: "eradication, containment or mitigation activities of an invasive species population to diminish their abundance and impacts". Since control can also apply to species in the process of establishment suggest not specifying that it only applies to established or naturalised species.	Thank you for your comment. We treat "control" as separate from and not inclusive of "eradication" to avoid definition overlap and in line with policy usage. Defined now in the Glossary
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	189	189	Please specify what is meant by "direct actions"	Thank you for your comment. The definition is now refined.
Dufour-Dror, Jean-Marc	No	Chapter 5	6	6	191	193	In order to regard eradication as successful it is necessary to set a time frame during which no AIS individuals are reported in the controlled area. This time frame needs to be defined according to the biological and dispersal traits of the targeted AIS. In other words eradication cannot be defined only as an ELIMINATION but as a DURABLE ELIMINATION.	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	191	191	Add: "the time period after which an absent invasive species can be considered eradicated depends on the species and location" or, if available provide more information regarding this key point in determining whether a species can be considered eradicated	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	6	6	191	191	Add the following term to the glossary: Cost. 1: the price of something, the amount of money that is needed to pay for or buy something; 2: an amount of money that must be spent regularly to pay for something (such as running a business or raising a family); 3: something that is lost, damaged, or given up in order to achieve or get something. Source: https://www.merriam-webster.com/dictionary/cost	Thank you for your comment. A simple definition is added to the Glossary with a reference.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	6	6	191	191	Add the following term to the glossary [choose one of them in this excel file]: Cost-effectiveness analysis. When benefits cannot be expressed in monetary values in a meaningful way, a cost-effectiveness analysis (CEA) should be carried out to assist in making effective decisions. A CEA calculates cost-effectiveness ratios of different alternative policy options and then compares the resulting ratios so that the most efficient option is chosen. In a sense, a CEA ensures technical efficiency in the process of achieving a desired outcome. The pure cost-effectiveness of a policy option is calculated by dividing the present value of total costs of the option by the present value of a non-monetary quantitative measure of the benefits it generates. The ratio is an estimate of the amount of costs incurred to achieve a unit of the outcome from a policy option. Source: Canada. Treasury Board of Canada Secretariat. Canadian Cost-Benefit Analysis Guide Regulatory Proposals. Catalogue No. BT58-5/2007 ISBN 978-0-662-05039-1. https://www.tbs-sct.gc.ca/trap-parfa/analysis/analys-eng.pdf	Thank you for your comment. We added a simple definition to the Glossary with a reference.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	6	6	191	191	Add the following term to the glossary: Cost. 1: the price of something, the amount of money that is needed to pay for or buy something; 2: an amount of money that must be spent regularly to pay for something (such as running a business or raising a family); 3: something that is lost, damaged, or given up in order to achieve or get something. Source: https://www.merriam-webster.com/dictionary/cost	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	6	6	191	191	Add the following term to the glossary: Cost-effectiveness analysis (CEA). The technique compares the relative costs to the outcomes (effects) of two or more courses of action. CEA is an alternative to cost-benefit analysis (CBA). CEA measures costs in a common monetary value and the effectiveness of an option in terms of physical units. Source: https://www.betterevaluation.org/en/evaluation-options/CostEffectivenessAnalysis	Thank you for your comment. We added a simple definition to the Glossary with a reference.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	6	6	191	191	Cost-Benefit Analysis (CBA) is an analytical tool for judging the economic advantages or disadvantages of an investment decision by assessing its costs and benefits in order to assess the welfare change attributable to it. The analytical framework of CBA refers to a list of underlying concepts which is as follows: opportunity cost, long-term perspective, calculation of economic performance indicators expressed in monetary terms, microeconomic approach, incremental approach. Source: EUROPEAN COMMISSION. Guide to Cost-Benefit Analysis of Investment Projects. Economic appraisal tool for Cohesion Policy 2014-2020. December 2014. Directorate-General for Regional and Urban policy ISBN 978-92-79-34796-2 doi:10.2776/97516 © European Union, 2015. Reproduction is authorized provided the source is acknowledged. Printed in Italy. https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/cba_guide.pdf OR THE NEXT DEFINITION Cost-benefit analysis (CBA) is a technique used to compare the total costs of a programme/project with its benefits, using a common metric (most commonly monetary units). This enables the calculation of the net cost or benefit associated with the programme. Source: https://www.betterevaluation.org/en/evaluation-options/CostEffectivenessAnalysis	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	6	6	191	191	Effectiveness means the extent to which the activity's stated objectives have been met. Source Publication: Effects of European Union Accession, Part 1: Budgeting and Financial Control, OECD SIGMA Paper No. 19, March 1998, Appendix 3: List of Useful Terms + businessdictionary.com . Hyperlink: http://www.businessdictionary.com/definition/effectiveness.html	Thank you for your comment. Authors have decided not to adopt it. This term is covered in most dictionaries
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	6	6	191	191	Efficiency means achieving maximum output/ outcome from a given level of resources used to carry out an activity. Source Publication: Effects of European Union Accession, Part 1: Budgeting and Financial Control, OECD SIGMA Paper No. 19, March 1998, Appendix 3: List of Useful Terms + businessdictionary.com . http://www.businessdictionary.com/definition/efficiency.html	Thank you for your comment. Authors have decided not to adopt it. This term is covered in most dictionaries
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	194	194	Add: "this management method seeks control using the most economical means, and with the least possible hazard to people, property, and the environment (EPA, 2022. https://www.epa.gov/safepestcontrol/integrated-pest-management-ipm-principles)	Thanks for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	6	6	194	194	the definition of IPM is broader than this. FAO definition Integrated Pest Management (IPM) means the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms.	Thanks for this suggested change. We have included it in the new version.
Dufour-Dror, Jean-Marc	No	Chapter 5	6	6	195	195	Why integrated pest management is limited to the combination of control techniques designed to control INSECT pests? Integrated pest management is relevant for other types of invasive organisms such as plants	Thank you for your comment. The definition is now refined.
Marchante, Elizabete	No	Chapter 5	6	6	198	203	This definition includes two distinct definitions - shouldn't one be adopted for the present Assessment and start with "For the purpose of this assessment" as in other cases?	Thanks for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	6	6	201	201	Risk is likelihood X consequence/impact,	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	206	206	The word "jurisdiction" is incorrectly used here please substitute for a term such as "regions, territories, areas" that has geographic not political meaning . https://dictionary.cambridge.org/us/dictionary/english/jurisdiction	Thank you for your comment. The definition is now refined.
Marchante, Elizabete	No	Chapter 5	6	6	207	207	I think there is an "and" to be deleted after "including"	Thank you for your suggestion, the sentence was modified
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	209	209	Prevention can also apply to alien species even if they are not recognized as invasive. Please modify to "stop the arrival of an alien or invasive alien species...."	Thanks for this suggested change. We have included it in the new version.
Marchante, Elizabete	No	Chapter 5	6	6	209	209	I think these definitions are standard, but I would say it doesn't need to be "recognized" as an invasive, prevention can also target invasive species not yet recognized. Additionally, lines 323-325 clearly state that prevention must target all alien species.	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	210	210	The word "jurisdiction" is incorrectly used here please substitute for a term such as "regions, territories, areas" that has geographic not political meaning . https://dictionary.cambridge.org/us/dictionary/english/jurisdiction	Thank you for your comment. The definition is now refined.
Robinson-Smythe, Tammy	No	Chapter 5	6	6	211	212	(Site-based management) Should this definition relate to protected areas? Maybe its just the South African context but we have instances where management happens in areas that are not formally protected (thus not considered protected areas) yet are still important for protecting biodiversity	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	212	212	Site based management refers to actions in a specific site, not specifically protected areas. Suggest changing to a specific area based on its size or vulnerability, for example protected areas.	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Chapter 5	6	6	216	216	Remove the words "newly-established", eradication activities would be focused on those species but the definition also mentions containment and this can apply to species that many not be newly established but because of their importance require management actions even if they are not already established.	Thank you for your comment. The definition is now refined.
Robinson-Smythe, Tammy	No	Chapter 5	6	6	217	218	(Surveillance) Alien species cant have an indirect presence. I think what is meant is "any action take to directly or indirectly detect the presence of..."	Thank you for your comment. The definition is now refined.
Alaux, Christine	No	Chapter 5	7	8	220	297	Same: Move all of Box 5.1 to line 297 because it is better to start a chapter with normal text and not with a box corresponding to a Box	Thank you, formatting has been harmonized across chapters
Sathyapala, Shiroma	No	Chapter 5	7	7	222	236	Box 5.1: Here no mention about the climate change though the chapter has sections discussing about adaptation to climate change	Thank you for the comment. Your suggestion was added.
Sathyapala, Shiroma	No	Chapter 5	7	7	227	227	Box 5.1: biosecurity approaches include quarantine measures	Thank you for your comment. The definition is now refined.
Gallardo, Belinda	No	Chapter 5	7	7	238	254	Very appropriate guiding questions.	Thank you for your feedback.
Evans, Thomas	No	Chapter 5	7	7	239	239	Box 5.1: frameworks (one word)	Thank you, we have corrected this in the final draft
Government of Canada (Bourchier, Rob)	Yes	Chapter 5	7	7	239	239	Box 5.1: The guiding questions are helpful but are very specific. It would be clearer in terms of following the roadmap of the chapter to have a section addressing each question. For example question 1 and question 3 are primarily addressed by section 5.2. Question 7 is 5.6. Even pointers from the questions to where they are primarily addressed would be helpful	Thank you for the comment. The pointers are added.
Sathyapala, Shiroma	No	Chapter 5	7	7	241	243	Box 5.1: suggest to add landscape level management	Thank you for the comment. We added ecosystem-based management.
Day, Michael	No	Chapter 5	7	7	251	252	Box 5.1: Expand point 7 to include "and implementation" Organizations may adopt and uptake but lack capacity etc to successfully implement.	Thank you for the comment. It is accepted.
Pan, Xubin	No	Chapter 5	8	8	259	259	Where is the introduction of Section 5.1?	Thank you, formatting has been harmonized across chapters
Sathyapala, Shiroma	No	Chapter 5	8	8	259	263	suggest to add SDG 15.8 prevent invasive alien species on land and in water ecosystems	Thank you for the comment. It is accepted.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	8	8	260	260	Insert "draft" before "post-2020" because that framework is not yet agreed and may still not be agreed by the time this assessment is released.	Thank you for your comment. It now reflects Kunming-Montreal Global Biodiversity Framework.
Evans, Thomas	No	Chapter 5	8	8	271	271	consideration(s)	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	8	8	273	273	insert "available" after "are"	Thank you, we have corrected this in the final draft.
Evans, Thomas	No	Chapter 5	8	8	273	275	This is not easy to read - 'and the integration thereof' is confusing. You use the terms 'implement' and 'implemented' in the same line too (274). I suggest revisiting this sentence.	Thank you. The sentence has been made more clear.
Marchante, Elizabete	No	Chapter 5	8	8	273	275	The writing is a little confusing, maybe it could be rewritten differently?	Thank you. The sentence has been made more clear.
Robinson-Smythe, Tammy	No	Chapter 5	8	8	274	274	Delete ", which can be implemented"	Thank you. The sentence is corrected.
Evans, Thomas	No	Chapter 5	8	8	281	283	Again this line is hard to read. It needs breaking up I think.	Thank you. The sentence is corrected.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Day, Michael	No	Chapter 5	8	8	285	289	It mentions examples of successful programmes but does it highlight why some programmes failed? It does not specifically mention that here.	Thank you for the comment, it states that Section 5.5 addressed unsuccessful programs
Evans, Thomas	No	Chapter 5	8	8	286	286	insert 'and' after decision-making	Thank you, the sentence is corrected.
Day, Michael	No	Chapter 5	8	8	291	294	Could be expanded considerably. Suitable and appropriate plans, funding, capacity (not just expertise), size of task (area and complexity)	Thank you for the comment, we have already been through a process to minimise content covered elsewhere in the Chapter
Robinson-Smythe, Tammy	No	Chapter 5	8	8	291	291	Replace 'achive' with "achieving"	Thank you for the suggestion. The sentence is corrected.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	9	9	299	302	Care in language is needed. In many cases, management interventions have been top-down and simply targeted one species. We frequently and appropriately take quick action to eliminate a potential invasive in the process of establishment - it would be foolish to wait for fire ants to spread while we undertake consultation. There are times when such action is not appropriate, but nonetheless, action is possible and doesn't require collectively developed objectives in any literal sense. This sentence is directive about how to make good policy, and it should be revised to say that the most successful management interventions have certain characteristics.	Thank you for the comment, the point is covered in great detail later in the Chapter (Section 5.2).
Robinson-Smythe, Tammy	No	Chapter 5	9	9	299	299	Delete "Making" and start the sentence with "Any management..."	Thanks for the suggestion. The sentence is corrected.
Sathyapala, Shiroma	No	Chapter 5	9	9	299	300	mitigate current or future potential impacts. Suggest to change into Mitigate spread and potential impacts	Thanks for the suggestion. The sentence is corrected.
Evans, Thomas	No	Chapter 5	9	9	301	301	I think 'go' should be 'goes'	Thank you, we have corrected this in the final draft
Gallardo, Belinda	No	Chapter 5	9	9	301	313	Fig. 5.1 (again in Fig. 5.4). The conceptual diagram is very illustrative, although I don't think the separation into terrestrial and aquatic habitats is necessary, since the feasibility of management is very context-dependent and the difference between both figures is minimal. A comment in caption would be enough.	Thank you for your comment. Management responses are significantly different between terrestrial/closed water systems and marine/connected water systems; the same invasion phase cannot be handled in the same way. Therefore, we decided to have two separate figures.
Frésard, Marjolaine	No	Chapter 5	9	11	302	368	I am surprised that it is stated that adaptive management (management once the invasive species is established) is not possible for the case of invasive alien species in marine and water connected systems. Stating that prevention, monitoring and early detection are the only possibilities in these ecosystems seems to be very restrictive and should be balanced. Fig. 5.1. leaves no room for the control of invasive species in the proliferation phase in marine and water connected ecosystems, unlike in terrestrial and closed water systems. A large number of papers have addressed the question of the optimal level of control of a spreading invasive species population, showing that the terrestrial, aquatic or marine, animal or plant nature of the invasive species does not influence the possibilities of control. These papers have shown the sensitivity of the results to the level of invasion reached when action is taken (in the proliferation phase), and to other variables linked, for example, to the dynamics of the species, to environmental disturbances or to human behaviour, but the nature of the habitat does not affect management possibilities. Moreover, these papers allow us to get out of the "all or none" dilemma (complete laissez-faire or eradication) in which Figure 5.1. puts us for the marine and water connected systems. The results highlight a recommended level of stabilization of the invasive population, allowed by a permanent control effort. These perspectives seem more constructive and positive to face this major environmental challenge in marine or water connected systems. Thus, these results must be integrated in the report, in order to consider management possibilities in the spread phase in marine habitats and water connected systems. The references of the above mentioned works are: BURNETT K. M., KAISER B., PITAFI B. A. and ROUMASSET J. [2006]. Prevention, eradication, and containment of invasive species : illustrations from Hawaii. Agricultural and Resource Economics Review, 35(1), 63-77. EISWERTH M. E. and JOHNSON W. S. [2002]. Managing nonindigenous invasive species : insights from dynamic analysis. Environmental and Resource Economics, 23(3), 319-342. FRESARD M. and ROPARS-COLLET C. [2014]. Sustainable harvest of a native species and control of an invasive: a bioeconomic model of a commercial fishery invaded by a space competitor. Ecological Economics, 106, 1-11. FRESARD M. and BONCOEUR J. [2006]. Controlling the biological invasion of a commercial fishery by a space competitor : a bioeconomic model with reference to the bay of St-Brieuc scallop fishery. Agricultural and Resource Economics Review, 35(1), 78-97. MACPHERSON A. J., MOORE R. and PROVENCHER B. [2006]. A dynamic principalagent model of human-mediated aquatic species invasions. Agricultural and Resource Economics Review, 35(1), 144-154. OLSON L. J. and ROY S. [2002]. The economics of controlling a stochastic biological invasion. American Journal of Agricultural Economics, 84(5), 1311-1316. WILMAN E. A. [1996]. Pests : sustained harvest versus eradication. Journal of Environmental Management, 46(2), 139-147. SAPHORES J. D. M. and SHOGREN J. F. [2005]. Managing exotic pests under uncertainty : optimal control actions and bioeconomic investigations. Ecological Economics, 52(3), 327-339.	We have clearly defined "Marine and connected water systems" as being fully marine (not coastlines and estuaries (the focus of the Refs provided are not true marine)), and in this context the statement stands based on a comprehensive review of the literature and in consultation with the global expert leaders in this space.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	9	10	304	332	The repetition of material from 1.4.5 is a bit problematic, particularly as it happens again in Fig 5.4 - it lengthens an already lengthy report, although it does serve as a useful reminder. Perhaps the initial paragraph and figure could be replaced with a reference to 1.4.5 (linked in electronic versions), and the second paragraph adjusted to provide the necessary reminder. At a minimum, terminology should be consistent - it is either an invasion curve or a "management-invasion continuum" - the simpler term is preferable. I'm not quite sure what that second thing is, as management occurs at all phases of the invasion.	Thank you for the comment. Repetition between chapters shows clear linkages across chapters, but such overlaps/repetition is important for such an important figure/concept for the assessment. Chapter 1 has been asked to review the content there on this to minimize repetition.
Dufour-Dror, Jean-Marc	No	Chapter 5	9	9	309	309	Figure 5.1: The graph on the left for "Terrestrial and closed water systems" lacks two important informations: The first is the mention of the exponential phase following the lag phase. The second is the mention of the first detection of the AIS after the entry point. This last point is important when addressing the issues related to EDRR methodology. I recommend to add these two parameters into the graph.	Thank you for the comment. The information is added to legend.
Government of New Zealand (Perry, Joanne)	Yes	chapter 5	9	9	309	310	figure 5.1 I useful, however it doesn't fully reflect the difficulty in managing some species in terrestrial and closed water systems. Species such as bacteria and fungal pathogens can be highly mobile and follow a similar trajectory as that shown for the management objectives in (B)	Thank you for the comment. This level of complexity is beyond the scope of fig 5.1
Lang, Iris	No	Chapter 5	9	9	309	310	Figure 5.1 (idem for figure 1.8 in chapter 1) : the difference between managing ecosystem and managing site is not clear, and should be specified if relevant here. The notion "ecosystem" encompasses "functional ecology" and "structure", thus it could be relevant by itself	Thank you for your comment. The differences between site-based management (managing site) and ecosystem-based management (managing ecosystem) are defined in Glossary.
Lang, Iris	No	Chapter 5	9	9	309	310	Figure 5.1 (idem for figure 1.8 in chapter 1) : Action of ecosystem restoration can be an effective prevention measure, so it could be apply when invasive species is "absent" in the timeline.	Thank you for your comment. Restoration here refers to the process of assisting the recovery of a degraded, damaged, or destroyed ecosystem, as a consequence of biological invasions (see Glossary), and therefore the option is more optimal at later stages of invasion.
Robertson, Peter	No	Chapter 5	9	9	309	318	Figure 5.1:I have real reservations about these figures although they are widely used. While they illustrate the 'typical' progression of events, they do not reflect the increasing number of cases where large scale management, particularly of vertebrates, has led to the eradication of widespread species. They therefore risk limiting the aspiration to work towards effective management at large scales as experience and improved methods become available. These also do not reflect the use of biological control, which has potential to achieve effective post establishment management in B).	Thank you for your comment. As explained in the text, this chapter is focused on practical solutions based on the experience of invasive alien species management as covered in existing peer-reviewed and grey literature available to the assessment team. We are aware of that there are successful management cases at widespread stage or in marine systems, but they are still regarded as special cases. In the light of showing practical solutions, we have decided not to include management experiences that have not been replicated in many areas in the figure.
Government of USA	Yes	Chapter 5	9	9	310	310	In Fig. 5.1 and 5.4 the action "containment" is misplaced - it should target the spread phase, not the introduction phase	Thank you for your comment. We are aware of that containment is implemented in various contexts/situations including where the invasion stage of the species of interest is unknown. The figure is reflecting such variations. For the definition of "containment" we refer to here, see Glossary.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of USA	Yes	Chapter 5	9	9	310	310	in Fig. 5.1 and 5.4 replace "early detection" with "surveillance"	Thank you for your comment. Early detection here is management objective while surveillance is an action to achieve such objectives. Therefore, we decided to keep the current positions.
Eschen, René	No	Chapter 5	9	9	311	311	Fig. 5.1 Right panel – should there not be physical or chemical controls indicated under the establishment phase (only), since this is where eradication of slow-spreading species should happen? Otherwise no management is included in the black bars under the graph. Prioritising and decision making at spread and wide-spread stages should not be there, or less prominent, if management in these stages is largely ineffective	Thank you for your comment. We are aware of that in the certain environment/context such as small spatial scales, eradication involving physical and chemical controls is still possible in small areas as marinas and small enclosed bays. However, in general it is not an optimal option and therefore, we have decided not to include physical and chemical controls in the figure. Please see section 5 for more details about some examples.
Government of Canada (Tita, Guglielmo)	Yes	Chapter 5	9	9	311	311	Fig 5.1: This model should better discriminate the phases that lead to the establishment of an alien species in a given recipient habitat with their respective probabilities, i.e. arrival (or entry), survival, reproduction, and establishment. The assessment of the probability of success of the species at each phase is what helps determining the actions to be undertaken. This is the risk based approach applied by the department of Fisheries and Oceans in Canada, with guidelines that had been developed about a decade ago (DFO, 2009; Mandrak et al., 2012). DFO (2009). Proceedings of the workshop to finalize National Guidelines for Assessing the Biological Risk of Aquatic Invasive Species (AIS) to Canada; June 3-5, 2008. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2009/006. https://waves-vagues.dfo-mpo.gc.ca/Library/337722.pdf Mandrak, N.E., Cudmore, B and Chapman, P.M. (2012). National detailed-level risk assessment guidelines: Assessing the biological risk of aquatic invasive species in Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/092. vi + 17 p. https://waves-vagues.dfo-mpo.gc.ca/Library/345462.pdf	Thank you for your suggestion. The probability of success at each invasion stage of a species cannot be quantified without explicitly narrowing the context and taxa. This figure is conceptual and generic, and therefore we decided not to include the probability information.
Sathyapala, Shiroma	No	Chapter 5	9	9	321	321	In aquaculture eradication is very rare it is mainly containment and ongoing population suppression	Thank you for the comment. Clarification is provided somewhere else in the Chapter.
Dufour-Dror, Jean-Marc	No	Chapter 5	10	10	321	321	I would recommend to add one generic management objective which is the detection, right between prevention and eradication. The detection implies actions are planned and taken in order to locate potential AIS in a within areas where prevention was not successful	Thanks for this suggested change. We have included it in the new version.
Sagoff, Mark	No	Chapter 5	10	10	323	325	"Prevention is implemented by jurisdictions in the pre-entry and points of entry for intercepting a new alien species, but by definition has to target arrivals of all alien species, not just those that will go on to become invasive." While this is reasonable, it appears to contradict the definition of "prevention" at line 209, "Prevention: Any policy and/or action undertaken to stop the arrival of a recognised invasive alien species into new jurisdictions." That preventive policies target all non-native species seems to be true, because one cannot predict which will become invasive and harmful. Perhaps there could be some citation to the literature (sometimes argued in terms of whitelists vs. blacklists) which debates whether invasive species prevention applies to all non-native species or only to those known to cause harm.	Thank you for the comment. Definition of glossary entry changed to include alien and IAS.
Evans, Thomas	No	Chapter 5	10	10	326	327	I'm not sure opportunities 'are created'. How about ...opportunities 'may exist' for eradication...	Thank you for the suggestion. The sentence is corrected.
Marchante, Elizabete	No	Chapter 5	10	10	329	332	in the definition of "species-led management" (lines 215-216) it says it includes newly-established specific invasive species, but here is applied to widespread IAS which seems somewhat contradictory - maybe clarify?	Thank you for the comment. It has been addressed.
Evans, Thomas	No	Chapter 5	10	10	337	337	The decision making? Maybe delete 'The'	Thank you. We have corrected this in the final draft.
Evans, Thomas	No	Chapter 5	10	10	341	342	the following four management options - I only see three here?	Thanks for the comment - please see the response above.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	10	10	341	342	These three possible management targets form a very useful organizing concept - the section would be clearer it was introduced even earlier.	Thank you for the comment. We decided not to adopt this suggestion.
Pan, Xubin	No	Chapter 5	10	10	341	341	"four" or "three"?	Thank you for your suggestion. There are four management options when we consider sites and ecosystems separately.
Evans, Thomas	No	Chapter 5	10	10	353	353	insert the word 'species' after the word 'single'	Thank you for your comment, added
Government of Argentina	Yes	Chapter 5	11	12	355	357	What does it mean "natural value" in this sentence? We suggest to delete the reference or to clarify it. It should be in line with the notion of diverse value of nature of the values assessment.	Thank you for the comment. It is addressed in the final version.
Eschen, René	No	Chapter 5	11	11	356	360	Ecosystem-based management surely not only focuses on an ecosystem defined by its natural value but also on the social and economic value derived from it? It is not only about biodiversity conservation but also about protection of (traditional or indigenous) livelihoods. I realise that natural value may be interpreted as to include ecosystem services, but I would make it explicit	Thank you for the comment. Ecosystem-based management is as defined in the Glossary.
Dufour-Dror, Jean-Marc	No	Chapter 5	11	11	361	362	The first sentence should be highlighted	Thank you for the comment. The suggestion is not clear.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	11	11	369	369	I kindly suggest add next text: The actions that are carried out during the curve of management of invasive species need financing/money, that is, the expenses or costs of management, to carry them out, for both scientific field and actions of communities; as well as for linkage between different interest groups (communication)	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Bourchier, Rob)	Yes	Chapter 5	11	11	381	382	Figure 5.2 , the 3 bullets on right quality of life etc are not connected to anything ? If these are outcomes it would be helpful to be explicit or remove them	Thank you for your comment. We have revised the figure accordingly.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	11	11	381	382	Figure 5.2: Highlight the contents or topics and not numbers of figure 5.2	Thank you for your comment. We have revised the figure accordingly.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	11	11	381	382	Figure 5.2: I kindly suggest change color of text, from white to black, inside the small rectangles of the Figure 5.2	Thank you for your comment. We have revised the figure accordingly.
Gallardo, Belinda	No	Chapter 5	12	12	383	384	Fig. 5.2 is not very informative. I find Sections 5.2 and 5.3 very repetitive. I would merge them into a single section with examples following framework descriptions.	Thank you for the comment. Fig 5.2 depicts the connection between Ch. 5 and other Chapters. So, it would be worthwhile to include it.
Gallardo, Belinda	No	Chapter 5	12	12	390	394	It is a pity that these challenges are not further elaborated.	Thanks for the comment. These challenges are elaborated in Section 5.6.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	12	13	390	409	This section seems misplaced, and the level of detail uneven. It may be more appropriate at line 433, and rather than simply listing challenges, it could explain what they are: "Jurisdictional boundaries prevent effective management when....," and so on.	Thank you for the comment. This section is an introduction to the challenges to management as indicated in the title. Management challenges are discussed in more detail in Sections 5.5 and 5.6.
Evans, Thomas	No	Chapter 5	12	12	393	393	the last challenge could be 'uncertainty regarding where to allocate limited resources'	Thank you for the suggested change. We have adopted it in the new version.
Evans, Thomas	No	Chapter 5	12	12	396	396	if this is the impacts of a single alien species you're referring to, then species should be written as species'	Thank you for the suggested change. We have revised the sentence.
Government of Canada (Bourchier, Rob)	Yes	Chapter 5	12	12	399	399	see comment on lethal control options definition, statement here separated them from chemical pesticides which if they are needs to be clear	Thank you for the suggested change. We have adopted it in the new version.
Marchante, Elizabete	No	Chapter 5	12	12	399	399	misspelling in chemical	Thank you for the comment. We have corrected this in the final draft.
Monaco, Andrea	No	Chapter 5	12	12	399	399	"chemical" instead of "chemcial"	Thank you for the comment. We have corrected this in the final draft.
Government of Netherlands (Van Dijk, Chris)	Yes	Chapter 5	12	12	400	400	add between brackets: Bio-control methods. By this I mean introducing an exotic species to control another exotic species, there are risks involved that lead to concerns about unforeseen effects	Thank you for the suggested change. We have adopted it in the new version.
Van Dijk, Chris	No	Chapter 5	12	12	400	400	add between brackets: Bio-control methods. By this I mean introducing an exotic species to control another exotic species, there are risks involved that lead to concerns about unforeseen effects	Thank you for the suggested change. We have adopted it in the new version.
Sagoff, Mark	No	Chapter 5	12	12	407	409	Well said. The Chapter is particularly valuable because it describes case studies and does not hand-wave at mythical "decision-makers" or "policy-makers" as does much of the literature.	Thank you for your feedback.
Monaco, Andrea	No	Chapter 5	12	12	409	409	add the word "visions" after "conflicting"	Thank you for the comment. We decided not to adopt this suggestion.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Monaco, Andrea	No	Chapter 5	12	12	414	414	"There is a global willingness..." I wouldn't generalize, it doesn't seem to be like that everywhere.	Thank you for the comment. It has been addressed.
Evans, Thomas	No	Chapter 5	12	12	416	416	the issues? Maybe just issues?	Thank you. We have corrected this in the final draft.
Evans, Thomas	No	Chapter 5	12	12	421	421	land users? Landowners? Maybe both?	Thank you for the comment. Land users would be more appropriate.
Frésard, Marjolaine	No	Chapter 5	12	13	423	426	It seems wrong to assume that economic perspectives take precedence in cost-benefit analyses. This is an error of meaning insofar as economic analysis considers market and non-market costs and benefits. This refers to the total economic value of an environmental good and its components, which also includes environmental and social dimensions. Cost-benefit analysis identifies and evaluates the total costs and benefits (including environmental ones) of each possible action for each group of agents involved (including communities). Thinking that cost-benefit analysis only considers market costs and benefits and does not integrate the positive and negative effects for communities therefore seems restrictive and inappropriate. This point needs to be clarified in the report.	Thank you for your comment. Great clarification. Corrections made.
Marchante, Elizabete	No	Chapter 5	12	13	423	426	Is there any study to back up this sentence? Is this really for "In most cases"? I would suspect that benefit-cost analysis are not available for most IAS, nor in every country, not even for the ones that are most used by stakeholders...	Thanks for the comment. The sentence is deleted.
Evans, Thomas	No	Chapter 5	13	13	426	426	There is evidence to suggest	Thank you for the suggested change. We have adopted it in the new version.
Day, Michael	No	Chapter 5	14	36	433	1176	Does the prioritization process include feasibility or just impacts and importance of a species or site? In the table of contents, it is not clear on assessing feasibility of managing species, sites or landscapes and taking into consideration factors of each that will influence, i.e. attributes of a species or a site etc. This may be embedded under one of the subheadings but it doesn't stand out. Scanning the relevant sections it is not clear. I can't see it in 5.3 either.	Thank you for your comment. Considerations on the feasibility of management in prioritization processes are presented in 5.2.2.1 under the section 'Risk Management'. They are also described in case studies in 5.2.2.2 under the section 'Management prioritization for species'.
Day, Michael	No	Chapter 5	14	36	433	1176	Section 5.2 Could be expanded considerably. Shouldn't there be a section on prioritization of what? i.e. species, specific sites or landscapes. While it is fine to prioritize individual species or sites or landscapes but what about which of these groups should be undertaken? There should be a section on the pros and cons of each. It may not be possible to do landscapes but it may be possible to do one important species or one key site.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	14	14	434	453	While recognizing the value of the para, it's not clear why it is here, as it does not address frameworks	Thank you for your comment. We have deleted the word "frameworks" from the title of this section as the content is clearly broader than this.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	14	14	435	436	Invasive alien species are the result of human activity, situation or event that is subject to human experiences, concerns and values,	Thank you for your suggestion. The text was adapted accordingly.
Monaco, Andrea	No	Chapter 5	14	14	436	436	after "values" add "(Veerbrugge et al., 2013)" DOI 10.1007/s00267-013-0170-1	Thank you for your comment. We cannot add additional text or references to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these later on.
Monaco, Andrea	No	Chapter 5	14	14	436	436	add the word "visions" after "concerns"	Thank you for the comment. We decided not to adopt this suggestion.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	14	14	447	448	The phrase "... in many parts of the world women action takers while men make most of the decision makers" is incoherent in English. Rephrase.	Thanks for this suggested change. We have included it in the new version.
Robinson-Smythe, Tammy	No	Chapter 5	14	14	447	448	Some words seem to be missing here. Do you mean " For example, in many parts of the world women are the action takers, while men are the predominant decision makers"	Thanks for this suggested change. We have included it in the new version.
Gallardo, Belinda	No	Chapter 5	14	14	449	451	This example about women in Kenya and Lantana contrast with the rest of the section that is very general and lacks similar examples.	Thank you for the comment. The sentence is deleted.
Robinson-Smythe, Tammy	No	Chapter 5	14	14	460	460	Add "in" after "assist"	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	14	16	467	541	This section provides examples of community-based management, and does not provide much insight into frameworks. It reads as if community-based management is a goal in and of itself, and is directive in how to achieve that. Community-based management is one policy option - it would be appropriate to discuss it in the context of a set of options, and note the biological and social conditions needed for success.	We have deleted the word "frameworks" from the title of this section as the content is clearly broader than this.
Government of Canada (Ferreira, Catarina)	Yes	Chapter 5	14	14	469	469	I would argue that communities also have a different understanding of the terminology and language used around IAS that is very much linked to their knowledge base. Reaching consensus on terminology is as foundational to IAS management as community engagement (exemple given above about the definition of 'management' inside and outside the EU is a good reflection of this.	Thanks for this suggested change. We have included it in the new version.
Eschen, René	No	Chapter 5	15	15	490	492	the first sentence is incomplete. These examples don't illustrate that such initiatives/collaborations "helps management of or adaptation to a new invasive alien species in localities and regions" (L489-490)	Thank you for your comment. The sentence was modified and an example comes after this sentence.
Gallardo, Belinda	No	Chapter 5	15	15	490	492	Examples come out of the blue and are somehow disconnected from the rest of the text.	Thank you for your comment. We have modified the sentence.
Pan, Xubin	No	Chapter 5	15	15	490	492	No predicate	Thank you for your comment. The sentence was modified.
Dufour-Dror, Jean-Marc	No	Chapter 5	15	15	495	496	I suggest to add a box with a brief presentation of the pine control on the Atlantic forest biome in Brazil with one photo. In such type of report examples are crucial and needed.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Adding a new box implies more text and we briefly explained this example in the text.
Government of Netherlands (Van Dijk, Chris)	Yes	Chapter 5	15	15	502	502	Suggestion to add an example from Europe: In some villages in The Netherlands (Europe) senior residents spend several hours a week on manually eradicating Japanese knotweed successfully in their neighbourhood. Ref:https://www.landschapsbeheergelderland.nl/duizendknoopbrigade/	We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Van Dijk, Chris	No	Chapter 5	15	15	502	502	Suggestion to add an example from Europe: In some villages in The Netherlands (Europe) senior residents spend several hours a week on manually eradicating Japanese knotweed successfully in their neighbourhood. Ref:https://www.landschapsbeheergelderland.nl/duizendknoopbrigade/	We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Eschen, René	No	Chapter 5	15	16	513	523	I would add that informing all involved stakeholders (indigenous, local or other) in a way that results in a common, equal level of understanding of the IAS its impacts and potential management, must be aimed for as it is essential for informed, constructive discussions that are the basis of decision making	Thank you for your comment. We think that the written text captures the idea suggested by the reviewer.
Atchison, Jennifer	No	Chapter 5	16	16	516	517	They must also acknowledge and respect Indigenous knowledge and intellectual property.	Thank you for this suggested change. We have re-worked the sentence it in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	16	16	516	517	"These participatory mechanisms must respect social structure, land rights and self-determination through free, prior and informed consent." Not that I disagree, but this text is policy-prescriptive, not just policy-relevant. Might be better to cite international documents that emphasize FPI consent, such as the UNDRIP.	Thank you for this suggested change. We have re-worked the sentence it in the new version.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	16	16	544	547	While preparedness is undoubtedly better than a lack of preparedness, it is impossible to anticipate everything - organizations and governments must retain the flexibility to respond in an "ad hoc manner" (line 546) when surprises arise, and the value of such flexibility should be recognized.	Thanks for this suggested change. We recognize the advantage of flexible ad hoc action and adapted the text accordingly.
Sagoff, Mark	No	Chapter 5	16	16	544	560	Very true. There is rarely any central authority for this kind of engagement.	Thank you for your feedback.
Robinson-Smythe, Tammy	No	Chapter 5	16	16	548	548	Replace "incurison" with "incursions"	Thank you for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	16	17	557	559	https://www.ippe.int/en/publications/626/. This is providing the latests standards (IPPC, 2021)	Thank you for this suggested change. We have included it in the new version.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	17	18	561	589	as noted at line 341, this categorization is very useful, but it belongs to the introductory section, as a conceptual framework for the chapter, rather than in a section on decision-making frameworks.	Thank you for your coment. Although the categorisation itself belongs to the introduction (in which it is also described), we consider the respective associated questions are necessary to understand the rationale of the decision making

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	17	17	570	570	Note that the finding of "detrimental" is a given for a species recognized as invasive - this question might be better phrased as "what are the impacts of species X?"	Thank you for this suggested change. We have included it in the new version.
Dufour-Dror, Jean-Marc	No	Chapter 5	17	17	575	576	Rather than "focusing on invaded sites" I presume the authors mean what sites harbour the most sensitive habitats prone to AIS establishment. I would recommend to modify the sentence accordingly.	Thank you for this suggested change. We have included it in the new version.
Eschen, René	No	Chapter 5	17	17	575	576	Again, it is not only about biodiverse sites, but also about sites that provide significant ecosystem services to livelihoods. Many stakeholders don't care enough about biodiversity as such to be motivated to act	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Bourchier, Rob)	Yes	Chapter 5	17	17	580	581	Figure 5.3 the arrows , purple green and yellow should be point the other way as Pathway analysis is a method that works on Pathways. Horizon Scanning etc work on species . Risk modelling works at a site level	Thank you for this suggested change. We have included it in the new version.
Eschen, René	No	Chapter 5	18	18	585	585	Location sounds small, even though the area that needs to be managed (especially when talking about early detection and/or containment) may be very large. Wat is meant with "static"? Rather say something like a clearly defined area, which may be an area of land, marine or freshwater habitat and the size may range from small to large depending on the IAS or context.	Thank you for this suggested change. We have included it in the new version.
Dufour-Dror, Jean-Marc	No	Chapter 5	18	28	591	952	Section 5.2.2.1 includes 13 sections, with 13 different concepts for tools & methods for decision making. This is far too much. I would recommend to reduce as much as possible this number and to regroup several sections together for a better clarity of the text	Thank you for your comment. We fully agree and have added a sentence reflecting that the range of tools presented is not intended to be exhaustive but to illustrate the diversity of tools available to meet different decision-making objectives. We tried to improve the structure of the section.
Marchante, Elizabete	No	Chapter 5	18	36	591	1176	I don't think it's an easy task, but I think this section needs a bit of digestion and maturing to be most useful. As it is, it may not be very useful for decision makers and practitioners because it presents several options, but it is impossible to do them all and I'm afraid it doesn't help much to choose the most appropriate options for each situation... a decision maker or practitioner can feel lost and not knowing what to do	Thank you for your comment. We fully agree and have added a sentence reflecting that the range of tools presented is not intended to be exhaustive but to illustrate the diversity of tools available to meet different decision-making objectives. We tried to improve the structure of the section.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	18	18	600	601	This sentence is unclear - lack of knowledge should not undermine a process. Suggest deletion.	Thanks for this suggested change. We have modified the sentence in the new version.
Robertson, Peter	No	Chapter 5	18	18	603	605	Table 5.1: This mixes methods to achieve an objective with analytical approaches which may be general to many objectives (economic approaches, multi-criteria analyses). No mention of cost-benefit	Thank you for this comment. We have adapted the title of the table accordingly.
Eschen, René	No	Chapter 5	18	18	604	605	Table 5.1: "Best management practices" is not a tool or method for "Identification of best management methods". Delete?	Thank you for this comment. We have enlarged the title of the section to approaches as well to better cover best practice management.
Karayannis, Theofanis	No	Chapter 5	18	18	605	605	This comment is on Table 5.1 and had also been made during the review of the first order draft: Pathway analysis (second row) can also be relevant for the identification of best management options (last column) but this combination is not marked. For example, all IAS-related work at IMO is at the level of a pathway (international shipping) and it's all about the best management of the relevant vectors (ballast water and biofouling) at the prevention stage.	Thank you for your comment. This was well noted at the previous stage of the review process. However, we would like to state that the pathways analysis, although a prerequisite, does not allow the identification of best management options. Identifying which are the priority pathways of introduction does not allow to choose what to do to curb this phenomenon via these individual pathways. We have therefore decided not to incorporate this suggestion.
Government of Canada (Bourchier, Rob)	Yes	Chapter 5	19	19	605	606	Figure 5.4 , everything below the graphs (below where it says Target) seems to look the same for panel A and Panel B . I am not sure this is case as relative importance of the activities bars or effort under the A targets and B targets could be very different. If they are actually the same then this part of the figure could be removed.	Thank you for this comment. We have adapted the figure according to the different comments received.
Eschen, René	No	Chapter 5	19	19	606	608	Fig. 5.4: Now in the right panel site management is put on the right (in 5.1 it was across the range with the text on the left). Given that management is rarely successful for widespread marine spp, I would not put this on the right. "Site" management seems inappropriate working for large areas. I would argue that pathway analysis is not useful for very widespread species and I would not draw the bar all the way to the right, the same for risk assessment and risk modelling and mapping.	Thank you for this comment. We have adapted the figure according to the different comments received.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	19	19	606	606	Figure 5.4: this figure conflicts with Table 5.1. At a minimum, it could be simplified, as applicability is the same in terrestrial and marine and only horizon-scanning is time-constrained.	Thank you for this comment. We have adapted the figure according to the different comments received.
Robertson, Peter	No	Chapter 5	19	19	606	607	Figure 5.4: The boxes in green 'Managing Species' describe methods to support decision making, not methods to manage species	Thank you for this comment. We have adapted the figure according to the different comments received.
Government of Netherlands (Van Dijk, Chris)	Yes	Chapter 5	19	19	607	608	Figure 5.4. It's unclear to me what the relation is between the different tools and methods and the invasion continuum. The continuum is based on a time line, the methods are listed	Thank you for this comment. We have adapted the figure according to the different comments received.
Van Dijk, Chris	No	Chapter 5	19	19	607	608	Figure 5.4. It's unclear to me what the relation is between the different tools and methods and the invasion continuum. The continuum is based on a time line, the methods are listed	Thank you for this comment. We have adapted the figure according to the different comments received.
Robertson, Peter	No	Chapter 5	19	28	610	952	This structure of subheadings mixes methods to achieve an objective with analytical approaches which may be general to many objectives (economic approaches, multi-criteria analyses).	Thank you for your comment. We fully agree and have added a sentence reflecting that the range of tools presented is not intended to be exhaustive but to illustrate the diversity of tools available to meet different decision-making objectives
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	19	28	611	952	Clear alignment with Table 5.1 is needed here, and numbering the tools and methods would be very helpful. The logic is confusing: for example, risk assessment is a component of risk analysis, but pathway risk assessment is its own entry. A number of the examples provided seem unconnected, without explanations of why they are relevant, what their conservation outcomes were, or why they are in this section rather than with the case studies that follow. Similarly, shortcomings (line 758) always exist; they should either be explained or not mentioned.	Thank you for your comment. We fully agree and have added a sentence reflecting that the range of tools presented is not intended to be exhaustive but to illustrate the diversity of tools available to meet different decision-making objectives. We tried to improve the structure of the section and aligned with Table 5.1
Sathyapala, Shiroma	No	Chapter 5	19	19	611	626	Horizon scanning is used for emerging pests which also helps pest and pathway risk analysis	Thank you for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	19	19	620	620	pest and pathway risk analysis or assessments are mainly conducted to identify emerging pests which eventually become quarantined pests . Not mainly on established pests	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be suggested elsewhere.
Eschen, René	No	Chapter 5	19	20	626	628	One promising tool of obtaining such information are sentinel plants. See Eschen et al. (2019): https://doi.org/10.1007/s10340-018-1041-6 , or EPPO (2020): DOI: 10.1111/epp.12698)	Thank you for your comment. This was already covered under the original Section 5.4.3.1. "sentinel surveillance and monitoring". We have added the suggested reference.
Eschen, René	No	Chapter 5	20	21	631	676	I found this section written in a quite "staccato" style, consisting of many, sometimes not well-connected statements. Some of the major pathways have not been mentioned, such as wood packaging material that is successfully being managed as a result of ISPM 15: https://doi.org/10.1371/journal.pone.0096611 or https://doi.org/10.1890/130311	Thank you for your comment. We fully agree and have added a sentence reflecting that the range of tools presented is not intended to be exhaustive but to illustrate the diversity of tools available to meet different decision-making objectives. We tried to improve the structure and style of the section. We have included your suggestion on wood packaging material under 5.3.1.1.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Eschen, René	No	Chapter 5	20	20	636	653	I'm surprised that the only works referred to here have been written by academics and not by (and for) practitioners. See for example the book by Devorshak (2012: Plant Pest Risk Analysis: concepts and application; ISBN-13: 978 1 78064 036 5). Moreover, especially in light of fairly recent changes in regulations in the USA and EU there is a much stronger use of pathway risk analysis for plant pests and the number of (published and unpublished) pathway risk analyses has increased in recent years	Thank you for your comment. We cannot add additional text and associated references to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Eschen, René	No	Chapter 5	20	20	664	665	Border interception data are notoriously "biased" and incomplete (for reasons that are well understood) and the quality and availability of such data varies enormously among countries. In general, and this applies to this entire paragraph, the data required for pathway risk analysis are probably lacking or very incomplete for most countries outside North America, Australia/New Zealand, China(?) and Europe.	Thank you for this suggestion. We have now highlighted the need for increased data in the text.
Sathyapala, Shiroma	No	Chapter 5	21	21	676	676	suggest to include Risk analysis in aquaculture: FAO(2009) Understanding and applying risk analysis in aquaculture: a manual for decision-makers. https://www.fao.org/3/i1136e/i1136e.pdf or https://www.fao.org/publications/card/en/c/2786cf16-269a-5dbb-95df-9b23834f1c9f/	Thank you for this suggestion and reference. We have included it in the new version.
Gallardo, Belinda	No	Chapter 5	21	22	678	758	So as far as I understand, species impact assessment is one of the steps in the risk analysis framework. Then it is confusing to present them in this order. Differences between impact assessment, risk analysis and risk assessment should be clearer.	Thank you for your comment. We fully agree and have added a sentence reflecting that the range of tools presented is not intended to be exhaustive but to illustrate the diversity of tools available to meet different decision-making objectives. We tried to improve the structure and style of the section and clarified risk analysis description.
Eschen, René	No	Chapter 5	21	21	679	695	I'm surprised that studies that compare impact assessment schemes are not referred to, as just listing the multitude of approaches is not very informative. Two recent studies have assessed differences and similarities among such schemes and the results obtained through them: https://link.springer.com/article/10.1007/s10530-018-1872-3 and DOI : 10.3897/neobiota.44.31650	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Please note that in previous rounds of reviews we have been asked to delete the text comparing the different analysis schemes to reduce the length
Robinson-Smythe, Tammy	No	Chapter 5	21	21	682	682	A word seems to be missing "ways of characterising and uncertainty"	Thank you for this suggested change. We have modified the sentence in the new version.
Luisa Nunes, Ana	No	Chapter 5	21	21	689	692	Evans et al. 2016 should not be cited for describing EICAT, only Hawkins et al. 2015.	Thank you for this suggested change. We have modified the sentence in the new version.
Luisa Nunes, Ana	No	Chapter 5	21	21	692	693	Should be rephrased to 'The Environmental Impact Classification for Alien Taxa (EICAT) has been adopted as an official standard by the International Union for Conservation of Nature (IUCN, 2020)'. The correct reference for the EICAT standard is "IUCN (2020). IUCN EICAT Categories and Criteria. The Environmental Impact Classification for Alien Taxa First edition. Gland, Switzerland and Cambridge, UK: IUCN. X + Xpp."	Thank you for this suggested change. We have modified the sentence in the new version.
Sathyapala, Shiroma	No	Chapter 5	21	21	693	695	In general Impact assessments are conducted for different scenarios of likelihood of establishments	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be suggested elsewhere.
Dufour-Dror, Jean-Marc	No	Chapter 5	21	23	697	758	The difference between Risk Analysis and Risk Assessment is not clear. Also there is no distinction between these in figure 5.1 page 18. In line 698 it is said that "risk assessment" is a subset of "risk analysis". If so it should be displayed as such in a subtitle pertaining to "risk analysis" section. Otherwise it is very confusing.	Thank you for your comment. We fully agree and have tried to improve the structure and style of the section and clarified risk analysis description.
Sathyapala, Shiroma	No	Chapter 5	21	21	698	699	Prior to risk assessment there should be a stage for hazard identification.	Thank you for this suggestion. Hazard identification is addressed through several sections here including horizon scanning, pathways analysis, risk assessment, risk modelling and mapping and multi-criteria analyses as indicated in table 5.1
Sagoff, Mark	No	Chapter 5	22	25	725	843	Unfortunately, the document wanders off into an academic discussion of risk assessment, modeling, etc. It is crucial to recognize that when it comes to getting things done -- like cutting down invasive pine trees -- academics and their literature are impotent and irrelevant. Who is going to do all this assessment, horizon-scanning, and analysis? Academics. Maybe academics who reply to, cite, and contribute to the literature, which only they and a few outside philosophical agitators could or would read, also participate in real-world conservation efforts. The question is not whether one has a model; it is whether one has a chainsaw. Only those who are engaged in some actual prevention or restoration activity -- who have skin in the game -- have the kind of local knowledge that is everything. If this chapter had catalogued case studies of actual efforts, if it did not regurgitate academic nostrums about risk assessment in general, it could be more helpful.	Based on the large amount of policy experience on the Ch5 team we reject the premise that our coverage of Risk Analysis is too "academic" in the context of policy makers understanding of these concepts in the context of IAS. RA in a policy context can also not be the best practice available (i.e. probability theory) as simpler approaches are required. Many policy makers in this field are already understanding and undertaking Risk Analysis in the context of this assessment to support decision makers. We therefore believe our section is both targeted at the right level and comprehensive enough.
Robinson-Smythe, Tammy	No	Chapter 5	22	22	744	745	I don't follow this sentence. Should it be "Risk assessment tools have been developed for...?"	Thank you for this suggested change. We have modified the sentence in the new version.
White, Michael	No	Chapter 5	22	22	751	751	typo characteristics	Thank you, we have corrected this in the final draft
Eschen, René	No	Chapter 5	23	23	756	758	I'm surprised that studies that compare impact assessment schemes are not referred to, as just listing the multitude of approaches is not very informative. Two recent studies have assessed differences and similarities among such schemes and the results obtained through them: https://link.springer.com/article/10.1007/s10530-018-1872-3 and DOI : 10.3897/neobiota.44.31650	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. In addition, we were asked at a previous step of the reviewing process not to address the comparison between risk/impact assessment schemes in order to reduce the length of the text.
Gallardo, Belinda	No	Chapter 5	23	23	792	792	TAPPAS is very interesting but also a very specific example, why here and not in the example section? Why not mentioning other similar platforms like Aquamaps? https://www.aquamaps.org/	Thank you for this suggestion. We have chosen to include it in the current section and 5.2.2.4. We cannot add additional examples to the chapter due to word length restrictions.
Robinson-Smythe, Tammy	No	Chapter 5	24	24	805	809	This sentence does not make sense. Maybe "they have been developed " needs to be inserted after "however, "?	Thanks for this suggested change. We have modified the sentence in the new version.
Government of Netherlands (Van Dijk, Chris)	Yes	Chapter 5	24	24	825	825	Proposal for an addition to this paragraph: Risk communication has an effect on risk perception. Lima (1996) showed that risk perception can have an effect on the quality of life (health, environment, income) and mental well-being by introducing a dimension of potential risk in the residential environment. Furthermore, if residents continuously reminded to a risk this requires extra effort (stress responses) to minimize the risks and adapt to the threat. Lima, M.L., 1996. Individual and Social Determinants of Attitudes Towards the Construction of a Waste Incinerator: Two Case Studies. Paper Presented at the Annual Meeting of the Society for Risk Analysis (Europe). University of Surrey, Guilford, UK. Lima, M.L., 2004. On the influence of risk perception on mental health: living near an incinerator. J. Environ. Psychol. 24, 71–84	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Van Dijk, Chris	No	Chapter 5	24	24	825	825	Proposal for an addition to this paragraph: Risk communication has an effect on risk perception. Lima (1996) showed that risk perception can have an effect on the quality of life (health, environment, income) and mental well-being by introducing a dimension of potential risk in the residential environment. Furthermore, if residents continuously reminded to a risk this requires extra effort (stress responses) to minimize the risks and adapt to the threat. Lima, M.L., 1996. Individual and Social Determinants of Attitudes Towards the Construction of a Waste Incinerator: Two Case Studies. Paper Presented at the Annual Meeting of the Society for Risk Analysis (Europe). University of Surrey, Guilford, UK. Lima, M.L., 2004. On the influence of risk perception on mental health: living near an incinerator. J. Environ. Psychol. 24, 71–84	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Germany	Yes	Chapter 5	25	26	843	874	Proposal: Thank you very much for this short summary on available methods for cost and benefits assessments. We would like to point to the ongoing IPBES assessment on values which includes such techniques as well. Please refer to this assessment or to the IPBES methodological guidance on values and valuation (https://ipbes.net/methodological-guidance-diverse-values-valuation). Furthermore, please include some shortcomings- as it reads now, it seems that it is easy and straightforward to identify all possible costs and benefits of IAS for successful cost-benefit and cost-effectiveness analysis. Since we are dealing with social-ecological systems we think that there are inherent challenges and uncertainties.	Thank you for this suggested change. We have included it in the new version.
Robinson-Smythe, Tammy	No	Chapter 5	25	25	852	853	Missing words/ difficult phrasing and a spelling mistake: Should it be "Cost-benefit analysis can also inform the appropriate choice of biosecurity interventions across pathway and species-led management approaches"?	Thank you for this suggested change. We have modified the sentence in the new version.
Luisa Nunes, Ana	No	Chapter 5	25	25	853	853	pathway and forms are misspelled	Thank you, we have corrected typos in the final draft
Robinson-Smythe, Tammy	No	Chapter 5	26	26	884	884	Replace "have" with "has"	Thank you, we have corrected this in the final draft
Sagoff, Mark	No	Chapter 5	26	27	900	911	My hopes were lifted when I came to the section, "Case studies: learning's from past successes and failures." One might think that this section would be central to a Chapter titled "Management: Lessons Learned." One would think that a chapter with that title would not rehearse the pedantry that overwhelms the literature about risk assessment, cost-benefit analysis, priority-setting, etc., in general. No such luck. Apparently, the experts who have built the scholarly risk-assessment literature, which they intend to be read by decision-makers and policy-makers, believe these figures of authority exist and listen to them. For anyone interested, I wrote a paper partly on the melancholy history of futile attempts at the US Environmental Protection Agency to make ecological risk assessment intelligible and applicable. See Sagoff, M., 2013. What does environmental protection protect?. Ethics, Policy & Environment, 16(3), pp.239-257. Where are the case studies that teach lessons about how to get things done – as opposed to how to get grants funded and articles published? I read (beginning line 901), "Reviews of reports of successful or failed management actions, approaches or programs available in peer-reviewed scientific studies, databases, books, published and unpublished reports across all taxonomic groups, environments or geographical areas can be used to inform future invasive alien species management decisions." If you want to know about "Lessons Learned" you will have to look to this literature, none of which is cited. No risk assessment, cost-benefit analysis, or anything of that sort ever cut down an invasive pine or pulled up a water hyacinth.	Thank you for the comment. This comment appears not based on the understanding that this section is about how to support decision making and not how to take actions, which comes later. To address the concerns that the supporting decision makers section entitled "Case studies: learning's from past successes and failures" does not actually provide a series of case studies, we have retitled this section to "Importance of documenting successes and failures in invasive alien species decision making".
Government of Canada (Ferreira, Catarina)	Yes	Chapter 5	27	27	918	930	The book 'What works in Conservation' 2021 (https://books.openbookpublishers.com/10.11647/obp.0267.pdf) also includes many examples of actions to control IAS. This is a publication from the same lab ad Conservation Evidence but will be updated on a regular basis (unlike the synopses that CI produces many of which are out of date)	Thank you for your suggestion. We cannot add additional examples to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Gallardo, Belinda	No	Chapter 5	27	27	924	297	Great, this is the kind of summary of evidence available that I was expecting in this chapter.	Thank you for your feedback.
Eschen, René	No	Chapter 5	27	27	927	927	Depending on the scope of the studies and the overall objectives, I would expect many more of the studies to reveal beneficial and harmful effects, especially in the light of IAS – many stakeholders will see some benefit of the IAS, especially if the species is recognised as a resource that is exploited. There are many examples of this exist for IAS. It would be valuable to point this out, not just the value of the described method, and highlight the need to consider different measures of impact or effect: biological and social aspects must be considered to get comprehensive insights.	Thank you for your comment. The analysis of the benefits presented here are not intended to be generic and are only based on 161 actions identified by the authors for freshwater taxa as specified in the text. We have now clarified the text.
Sathyapala, Shiroma	No	Chapter 5	27	27	932	932	Best practice or good practice management ?	Thank you for this suggested change. We have modified the sentence in the new version.
Government of Canada (Ferreira, Catarina)	Yes	Chapter 5	27	28	933	952	In the EU there is a draft manual on the humane management of vertebrate IAS being developed that will contain good practices on how to humanely manage vertebrate IAS collected across Europe (https://www.iucn.org/regions/europe/our-work/biodiversity-conservation/invasive-alien-species/humane-management-vertebrate-ias). Later mentioned in lines 2439-2440 although not properly referenced	Thank you for your suggestion. We cannot add additional reference due to length restriction, in particular for a document still under preparation.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	27	28	933	952	it's not clear how best practice management is different from learning from case studies.	Thank you for the comment. We have modified the title of 'Case studies' for the sake of clarity.
Eschen, René	No	Chapter 5	27	28	941	942	This really depends on the context, how much evidence there is and what measures of effect were taken into account. Many organisations promote utilisation of IAS as management, but there is very little to support this as best practice management of the species (Prosopis management in developing countries or in a refugee context is an excellent example for this). In fact, in many cases it supports communities implementing the management through cash payments (often at higher rates than what people would earn doing other jobs), but it does little if anything in terms of long-term management, leave alone restoration of ecosystem services. The latter is rarely mentioned, as the metric for success is how many people were employed or what area was managed, without consideration of whether the management has been successful in the long run. Of course the guidelines cited are nice and have value, but there are many situations where these are not useful or not known.	Thank you for your comment. We agree and deleted the sentence accordingly
Eschen, René	No	Chapter 5	28	28	961	962	please also consider societal benefits here.	Thank you for this suggested change. We have modified the sentence in the new version.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	28	28	962	963	The value of repeatability or comparability is not apparent. Prioritisation should optimize conservation outcomes - what is considered 'good' will vary over space and time, as well as the social and biological contexts.	Thank you for this suggested change. We have modified the sentence in the new version.
Gallardo, Belinda	No	Chapter 5	28	28	975	975	"determining which sites are at greatest risk"	Thank you. We have corrected this in the final draft.
Eschen, René	No	Chapter 5	28	28	979	981	The development of a spatially explicit management strategy is very relevant for established species. It would be good to emphasise and expand on this aspect more! Investing in prevention of further spread, eradication of sparse invasions and containment is much more effective and useful than management of areas where an IAS has become well established and abundant, as is commonly done. In this context, the section on Site prioritisation (P40-41: L1066-1079) is weak and would benefit of having just a single example that is well explained. Prioritisation can have different levels requiring different management interventions, sometimes over large areas. It would be good to describe this.	Thank you for your suggestion. We cannot add additional text nor examples due to length restriction. However, we have adapted the sentence to highlight the interest of spatially explicit prioritisation
Eschen, René	No	Chapter 5	29	29	982	983	This sentence seems out of place of unnecessary. What did the authors want to say here?	Thanks for this suggested change. We have deleted the sentence accordingly.
Gallardo, Belinda	No	Chapter 5	29	29	982	982	"given the many prioritisation..."	Thank you for the suggestion. We have deleted the sentence.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	29	29	982	983	Suggest deletion. They may not be necessary but they remain an option. A case has already been made for the value of different approaches.	Thanks for this suggested change. We have deleted the sentence accordingly.
Eschen, René	No	Chapter 5	29	29	984	990	Fig. 5.6. does not add much. Given the structure of the chapter and the early focus on species, sites and pathways it is obvious that you could rank any, or any combination of these.	Thank you for your comment. We have decided to keep the figure as we also received positive comments on it.
Gallardo, Belinda	No	Chapter 5	29	29	986	990	Fig. 5.6. Not very informative, could at least include different representative drawings in each circle. "Allows to prioritise sites exposed to species introduced through..." ("introduced" need to be corrected several times in this caption).	Thank you for your comment. We have decided to keep the figure as we also received positive comments on it. We have modified the caption accordingly.
Eschen, René	No	Chapter 5	29	29	992	995	I find these case study descriptions not very informative. It would be helpful to focus on single case studies (such as the first one), rather than mentioning several (such as the second), and explain well what was done and what specifically it is an example of.	Thank you for your comment. After discussion with the different authors of this section and the Review Editor, we felt that it was more relevant to show a variety of examples of prioritization studies rather than to describe one type in detail.
Gallardo, Belinda	No	Chapter 5	29	30	997	1012	Very good example. How about New Zealand.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. However, we cannot include additional examples due to length restriction.
Eschen, René	No	Chapter 5	29	29	998	1006	It is unclear from the description what the prioritisation was based on and how impact in the literature was converted into the scores. The figure legend (Fig. 5.7) does not help much, but the figure adds that apparently the scores are mean values of several studies?	Thank you for this comment. We have modified the sentence in the new version. As explained later in the text, impacts were retrieved from an exiting database.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Eschen, René	No	Chapter 5	37	37	1179	1202	This paragraph could be more clearly written, perhaps by putting some information in bullet points and being more concise. I disagree with some of the statements, however. "The ability of a species-led program to eradicate, contain or suppress the target invasive alien species is limited or where the emphasis may be to maintain natural assets" seems incorrect. If there is one main species and the aim is to protect assets in an area with high densities of the IAS, then management of the species through local eradication and limiting of re-invasion of the cleared area can very well be successful and would be appropriate. Similarly, I have an issue with "Following site identification and prioritization, site-based management strategies generally include invasive alien species removal combined with site restoration in terrestrial ecosystems". This may be true for areas where the IAS is present, but management must also focus strongly on areas that have not yet been invaded: this will protect such areas and is likely to be more effective and cheaper than managing areas that have become invaded. Thus, the focus of landscape management should be on prevention and EDRR in areas without the IAS or with sparse IAS abundance (the invasion front).	Thank you for these suggestions. Regarding the use of bullets, we have chosen not to adopt the structure. We have adapted this sentence: "Where the ability...". Regarding the comment on uninvaded sites, we have reworded this sentence as: "...multiple invasive alien species, or un-invaded sites."
Pan, Xubin	No	Chapter 5	37	37	1179	1179	L1198, "four" or "three"?	Thank you, we have corrected this in the final draft.
Dufour-Dror, Jean-Marc	No	Chapter 5	37	37	1180	1180	Typing error in the first word. It should be "species" instead of "speceis"	Thank you, we have corrected this in the final draft.
Government of Canada (Ferreira, Catarina)	Yes	Chapter 5	37	37	1194	1195	include key biodiversity areas (https://www.keybiodiversityareas.org/)	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Gallardo, Belinda	No	Chapter 5	37	37	1196	1196	"generally"	Thank you, we have corrected this in the final draft.
Eschen, René	No	Chapter 5	37	37	1201	1215	given that this is highlighted as so important, one would expect some more detail about surveillance operations: how and why. I later realised that this is written in section 5.3.1.2, but it is needed here.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We have chosen not to include it here as it is included in section 5.3.1.2.
Government of USA	Yes	Chapter 5	37	41	1204	1324	In the discussion of pathway risk management there should be some mention of limitations to this approach arising from the SPS agreement. Countries are not able to impose prohibitions or mandatory phytosanitary treatments without identifying risk associated with individual species.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Also, the assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Dufour-Dror, Jean-Marc	No	Chapter 5	37	40	1205	1271	Since most countries do not have appropriate legislation and structure in order to implement surveillance regarding goods entering their borders I think it could be important to suggest that developed countries take responsibility for the goods they export to other countries. For example I was stunned to see in shops at Kona's airport in Hawai'i alive rhizomes of ginger for sale... one of the worst invasive plant in Hawai'i and in the Pacific. In order to be effective the surveillance should be implemented not only in at the entry of countries but also in the exporting countries, so responsibilities and costs could be shared in a fair way. Maybe IPBES could make such a suggestion.	Thank you for your comment. The comment is out of the scope of chapter 5, however these concepts are covered in chapter 6. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Eschen, René	No	Chapter 5	37	37	1214	1214	I would not mention NPPOs in this sentence, as it may give the wrong impression that NPPOs don't engage in active surveillance.	Thank you for this suggested change. We have removed it in the new version.
Government of Canada (Ferreira, Catarina)	Yes	Chapter 5	37	37	1214	1214	Boundary organizations play a very important role here too - see https://www.iucn.org/regions/europe/our-work/biodiversity-conservation/invasive-alien-species/eu-regulation-technical-support/identification-species-union-concern	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Government of Canada (Tita, Guglielmo)	Yes	Chapter 5	38	38	1220	1221	It would be worth mentioning that the trade of aquarium, live food and water garden pets represents important sets of pathways of introduction. The department of Fisheries and Oceans in Canada completed a risk assessment on this topic in 2021. DFO (2021). Science Advice on the Potential of Introducing Live Organisms by the Aquarium, Water Garden, and Live Food Trades in Canada. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2021/032. https://www.dfo-mpo.gc.ca/csas-sces/Publications/SAR-AS/2021/2021_032-eng.html	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Karayannis, Theofanis	No	Chapter 5	38	38	1220	1221	Here is another instance of ballast water and hull biofouling mentioned as 'pathways' whereas they are actually vectors - shipping is the pathway encompassing these two vectors.	Thank you for your comment. This term is defined in the glossary following the CBD glossary.
Karayannis, Theofanis	No	Chapter 5	38	38	1222	1224	It seems remiss not to include IMO in the examples listed in the brackets, as IMO is a very obvious example of 'legislation, regulation and international guidelines', especially noting that IMO's relevant instruments address the very vectors mentioned in the immediately preceding sentence.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Eschen, René	No	Chapter 5	38	38	1227	1227	write what these are standards for, they are not just standards on pathways and the ISPMs cover many other aspects of plant biosecurity.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. This is currently described in section 5.5.2.
Monaco, Andrea	No	Chapter 5	38	38	1231	1231	I suggest to change the reference "Stringham et al., 2021" with a more general and comprehensive text on the e-commerce issue: ISAC 2012. Invasive species and e-commerce. Invasive Species Advisory Committee 8pp., Washington, DC.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Monaco, Andrea	No	Chapter 5	38	39	1232	1240	I suggest to review the e-commerce section (table included) considering also Monaco A., 2021. Guidance Document on E-commerce and Invasive alien species. Council of Europe Document T-PVS/Inf(2021)39, Council of Europe, Strasbourg, 34 pp.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Dufour-Dror, Jean-Marc	No	Chapter 5	38	38	1239	1239	Repeat header row of Table 5.3 as it is split over two pages	Thank you for your comment. It is corrected in the final version.
Government of Argentina	Yes	Chapter 5	38	38	1239	1239	Table 5.3: On page 38 under risks it is recommended to "Establish an international invasive alien species risk-based labeling system for shipments potentially containing invasive alien species as environmentally hazardous living organisms." It should be emphasized that if such a proposal is to be considered, it should be "WTO-consistent", based on multilaterally agreed scientific evidence and in compliance with the WTO Agreements, including the Agreement on the Application of Sanitary and Phytosanitary Measures.	Thanks for this comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Eschen, René	No	Chapter 5	39	39	1248	1252	endorsement of codes of conduct does not mean that effective management is enforced, as shown by the continuous increase in alien species establishments in Europe. Would there not be a better example? The last sentence appears repetitive.	Thank you for your feedback. As this strategy exists and is applied in several regions of the world, it is necessary to present and describe it. The assessment report is mandated to provide policy-relevant information, not policy recommendations.
Gallardo, Belinda	No	Chapter 5	39	39	1248	1248	"excellent pathway management can be achieved" any evidence for this?. "Various codes" such as? Can you elaborate?	Thank you for your comment. An example for pathway management is described in Box 5.2. Examples of codes of conduct are listed in the reference cited. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Monaco, Andrea	No	Chapter 5	39	39	1250	1250	The reference "(Council of Europe, 2021)" is incorrect because it refers to a website where it is possible to find all the codes of conduct.	Thank you for making this point. It does not seem to require changes to the text.
Gallardo, Belinda	No	Chapter 5	39	39	1254	1256	Does this sentence refer to aquatic ecosystems only? Then please specify	Thank you for your comment. We have now changed the text accordingly.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Eschen, René	No	Chapter 5	39	39	1256	1271	It is unclear what the risk assessment of trade pathways and the well-explained example of Painsi et al. have to do with intentional introductions; this seems to be more about contaminants. Either clarify this or find better examples, such as woody species intentionally introduced to provide some benefit and that have become invasive; Brundu et al (2020: doi: 10.3897/neobiota.65.58380) provide useful insights and guidance for the latter.	Thank you for the comment. We have reworded the following sentence ["According to the same study, the biggest agricultural producers ..."] to illustrate that the Painsi et al. reference shows the role of agriculture in transfer of alien pests and pathogens.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	39	39	1263	1264	The statement that "the biggest agricultural producers were the greatest potential sources of invasive alien species" needs to be contextualized. Are they the "greatest potential sources" just because they're the biggest? What does the term "potential" mean in this context? There should at least be a reference to justify this opinion.	Thank you for your comment. The sentence was written in the context of the study described in the previous sentence. We have now changed the text to make it clearer and the context more explicit.
Government of Canada (Ferreira, Catarina)	Yes	Chapter 5	39	39	1266	1267	A key element here though is the training of border officials to be able to recognize IAS and increase reliability of these data. Increased capacity and expertise (through training) are key hindrances to effective IAS management, particularly at the detection and rapid response stages (at borders for example) that the chapter does not highlight.	Thanks for this comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Gallardo, Belinda	No	Chapter 5	40	40	1269	1269	which app? Can you provide more details?	Thank you for your comment. We have now changed the text accordingly. The part of the sentence referring to the app was out of context and has now been removed.
Eschen, René	No	Chapter 5	40	40	1273	1302	Box 5.2.1 would also avoid calling the programme a "resounding success"; rather be more neutral and say that to date no IAS establishments have been recorded that were related to the works.	Thank you for your comment. We have removed the word 'resounding'.
Sagoff, Mark	No	Chapter 5	40	40	1273	1273	Box 5.2: In this case study, the source of funding is identified -- Chevron. Unless one knows who pays, one does not have a case to study. I often have the feeling that scholars who contribute to the invasion literature believe that if they can figure out -- or figure out how to figure out -- the best things to do, somebody will pay to do them.	Thank you for making this point. It does not seem to require changes to the text.
Eschen, René	No	Chapter 5	40	40	1304	1305	I would be much more interested in examples of where and specifically how intentional introductions were reduced than in the following sentence about the ongoing spread of species as contaminants etc. The first may help readers to identify successful interventions.	Thank you for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	40	40	1306	1311	Why are these examples included in the management chapter?	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Gallardo, Belinda	No	Chapter 5	41	45	1313	1456	This section is largely focused on examples by indigenous people. No clear figures or examples of species successfully managed are given. How many invasive species have been eradicated from islands and from continental areas? Any example of large scale eradication? e.g. ruddy duck in European continent, rinderpest virus which was eliminated from the IUCN 100 worst list following eradication (WOAH 2011)	Thank you for your comment. Successful management programmes are included in more depth in section 5.5.
Eschen, René	No	Chapter 5	41	41	1321	1323	There is an ISPM that explains how to decide on sampling intensity (or is this FAO 2018a?).	The details of surveillance and sampling is given in more detail in sections 5.4 and 5.5 and supplementary material 5.9.
Eschen, René	No	Chapter 5	41	41	1323	1324	It is unclear to me why one would want to use a model to describe a surveillance system.	Thank you for your comment. We have changed the text to include "...to demonstrate that a zone or country is free from a particular disease".
Gallardo, Belinda	No	Chapter 5	41	41	1323	1323	What are stochastic scenario trees?	Thank you for your comment. We have altered the sentence to clarify the meaning: "Stochastic scenario tree models can be used to describe each component of the surveillance system to demonstrate that a zone or country is free from a particular disease".
Dufour-Dror, Jean-Marc	No	Chapter 5	41	41	1336	1337	The issue mentioned in the sentence "Many countries (...) from donor agencies" is crucial and should be elaborated and highlighted: When considering the programs related to environment worldwide, financed for example by the World Bank, GIZ, UNDP, UNEP, WWF and other agencies, programs that focus specifically on invasive species are extremely rare: A search in DevelopmentAid database would show that out of ca-50,000 programs less than 40 are related to AIS. This is a crucial issue that deserves a box in the present report. I can prepare this if the editors wish so.	Thank you for your comment. Proposed addition seems important but would be much more relevant for Ch6 so we have passed on the offer to them.
Gallardo, Belinda	No	Chapter 5	41	41	1341	1345	The last two sentences of this paragraph sound misplaced since species-led management is further approached in the next paragraph.	Thank you for your comment. We have moved these sentences to the following paragraph.
Eschen, René	No	Chapter 5	41	41	1343	1345	But there are many more examples where this is impossible or has been unsuccessful, which is important to mention as it further highlights the need for EDRR. Note, for example that grey squirrel control has only been successful on Anglesey and not in the rest of Great Britain or in Italy.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our analytical approach is more informative than individual case studies, and we have already incorporated a few of these.
Eschen, René	No	Chapter 5	41	41	1348	1348	another factor that can bring people together for IAS management is if there are severe impacts on livelihoods. In this paragraph, but also elsewhere, it would be very useful to clearly state what the aim of "management" was in each of the examples. Species suppression is vague: do you mean reductions in population size, distribution, or?	Thank you for the comment. We have added the wording "suppression (a reduction in the abundance of an invasive alien species population). This could include measurable benefits in biodiversity and ecosystem services or the reductions of threats to threatened and endangered species and communities". The impact on livelihoods has been discussed at various points in the chapter.
Sagoff, Mark	No	Chapter 5	41	50	1368	1753	Box 5.3: The case studies described are informative and helpful. Well written, too.	Thank you for your feedback.
Gallardo, Belinda	No	Chapter 5	42	42	1356	1356	"Indonesia has now taken ..." otherwise, confusing statement.	Thank you, we have corrected this in the final draft.
Government of China	Yes	Chapter 5	42	44	1365	1399	Figure 5.11: The boundaries of the map are unclear, it is recommended to delete it. It is better to avoid using maps with boundaries in the global report to avoid controversy.	Thank you for your suggestion. The figure was deleted.
Eschen, René	No	Chapter 5	42	44	1368	1399	Box 5.3: I'm not aware of a single example where using the IAS as a resource has led to sustained management. It must also be noted that it is probably a bad idea to make people dependent of IAS, as it will lead to conflicts of interest (some people wanting to remove a species and others wanting it to stay as it provides income). The same issue for P44, L1424-1433. The statement in L1433-1435 cannot be understood; what socio-economic concerns are meant and is this a reason not to manage such species?	Thank you for your comment. Box 5.3 highlights that management of this species was not successful. We have strengthened the section on conflict species.
Gallardo, Belinda	No	Chapter 5	42	42	1370	1370	Box 5.3: "Sun corals (Tubastrea spp.)..." please specify the type of species you're talking about because it is not clear until later on (can be deduced from Line 1381, but still not clear). + Doesn't the manual collection of sun corals promote further reproduction? sounds like a density dependent species, which means that manual removal would only stimulate reproduction to fill empty niches.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific approach.
Gallardo, Belinda	No	Chapter 5	43	43	1394	1394	Fig 5.10: Can you explain the photo? Assuming the right is the coral after removal.	Thank you for your suggestion. We have now added more detail to the figure legend.
Eschen, René	No	Chapter 5	43	44	1396	1399	Fig. 5.11: are these containment lines a good example (of what, exactly; limiting spread?), since there is an invaded area upstream, along the Yangtze River?	Thank you for your suggestion. The figure was deleted.
Eschen, René	No	Chapter 5	44	44	1401	1402	It would be good to be precise and specific about biological control. It seems that here the text refers to _classical_ biological control, not biological control in general. Classical biological control carries few non-target risks if done correctly and is often the most cost-effective management method, aiming to reduce IAS population size and impact to below an economic threshold.	Thank you for the comment. We have added the word "classical" to indicate the specific type of biological control we refer to. Details are also cross-referenced to section 5.4 and 5.5.
Gallardo, Belinda	No	Chapter 5	44	44	1407	1409	Rephrase. What is the "O. stricta genotype of cochineal"? Is the genotype of the plant or the insect? The sentence is very confusing.	Thank you, we have done that where appropriate in the second order draft of the SPM
Eschen, René	No	Chapter 5	44	44	1413	1413	This statement is hard to interpret: what cases and what challenges?	We have deleted this sentence.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Dufour-Dror, Jean-Marc	No	Chapter 5	44	45	1416	1456	This section gives the illusion that some use of invasive plant species can be eventually profitable in the perspective of their management and that it would finally reduce the adverse effects of these AIPs. It is an illusion: The use of <i>Prosopis juliflora</i> in Africa did not reduce the damages resulting from the proliferation of this species. See its proliferation now in northern Tanzania and in southern Botswana.	Thank you for your comment. We agree there are no known instances where using IAS as a resource has led to sustained management. However, these strategies do exist and we must acknowledge them. The assessment report is mandated to provide policy-relevant information, not policy recommendations.
Gallardo, Belinda	No	Chapter 5	44	44	1416	1416	"that the majority". The same can be assumed for public administrations (that the majority of management so far is species-led), not sure why the sentence focuses on indigenous people here.	Thank you, we have corrected this in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	44	44	1419	1422	The increasing demand for conservation is interesting - what was the outcome?	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. However, we wish to illustrate that due to the invasion of an invasive beetle and the threat to a native tree that is important to the indigenous Kahnawake people, there has been an increasing demand for the beetle's management.
Day, Michael	No	Chapter 5	44	44	1424	1446	In 5.3, there is discussion about utilization as a means of management. As soon as one puts a value on an invasive, it is no longer managed. It becomes a resource. Local reductions may be possible but if it is reduced too much, then people will plant or cultivate the species. It is naive to think otherwise. People use invasive species as they are abundant, but that doesn't mean the species is managed. It just means they have adapted to using a species which is plentiful and easily obtained, even if it is inferior. Strongly suggest that this is re-worded. Lines 1444-1446 even states that it does not lead to long-term effective management. Mixed messages here.	Thank you for your comment. We agree there are no known instances where using IAS as a resource has led to sustained management. However, these strategies do exist and we must acknowledge them. We have added the wording: "in many cases combining adaptation to utilizing available resources with local scale management". The assessment report is mandated to provide policy-relevant information, not policy recommendations.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	44	44	1425	1429	Not clear what is "S. cimarron" nor its relation to the Saucó tree. Please clarify.	Thank you for your comment. The text has now been corrected to improve clarity and fix a couple typos. Saúco cimarrón is one of the common names of the species and not a scientific name (should not be in italics or abbreviated). The sentence has now been rewritten.
Gallardo, Belinda	No	Chapter 5	44	44	1427	1427	S. cimarron not mentioned before, please include full common and sci name	Thank you for your comment. The text has now been corrected to improve clarity and fix a couple typos. Saúco cimarrón is one of the common names of the species and not a scientific name (should not be in italics or abbreviated). The sentence has now been rewritten.
Gallardo, Belinda	No	Chapter 5	45	45	1443	1443	"invasive aliens"	Thank you, we have corrected this in the final draft.
Dufour-Dror, Jean-Marc	No	Chapter 5	45	46	1459	1504	I recommend to indicate in the site-based management section (5.3.1.3) that this strategy is very relevant when nature reserve or any protected areas are heavily infested by alien invasive plants while the surroundings of these protected areas are also heavily infested, actually beyond feasible and durable control. In that case the authorities may decide to concentrate all their efforts and resources onto the control of the protected area only = site-based management.	Thank you for your comment. Due to space length restrictions we cannot add additional examples. However, we have this information in section 5.3.1. that is relevant to this point "This is particularly true for sites of high biodiversity and ecosystem significance in the context of nature's contributions to people and good quality of life. Site-based approaches also aim to manage sites at risk from, or impacted by, multiple invasive alien species, or un-invaded sites. Site-based approaches are focused on delineated areas based on the values, objectives and environmental assets of the site. These may include islands, protected areas, indigenous sacred sites or other designated areas that contribute to good quality of life."
Eschen, René	No	Chapter 5	45	45	1461	1461	I would call asset protection the situation where a site, or part of a landscape that is considered high value, is protected against (re-) invasion by IAS in situations where it is impossible to eradicate the IAS from the entire area. So this possibly goes best with the "sensitive sites" mentioned later.	Thank you for your comment. We have used asset protection/site management to delineate those areas that have high value from a range of defined perspectives. These would include protection against (re-) invasion as well. Therefore we have opted to keep the structure as it is.
Eschen, René	No	Chapter 5	45	45	1467	1469	monitoring should be part of any effort, whether it is targeting sites or species.	Thank you for the comment. We do not imply that monitoring is not needed for species management, but to determine whether community and ecosystem level impacts are being reduced, evaluation is important.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	45	45	1467	1469	This sentence says that measurement requires measurement - it can be deleted.	Thank you for the comment. We have edited the sentence.
Eschen, René	No	Chapter 5	45	46	1471	1480	It is strange that at this point in the chapter site-based is separated from ecosystem-based. I made a comment about the term "site-based" before and I would argue that "ecosystem-based" is also inaccurate or inappropriate, as many IAS will spread and have impact over much larger areas than what may be considered as an ecosystem. For example, the example of riverine invasions may, depending on the particular IAS and local conditions, be managed most effectively and most sustainably on the level of the catchment.	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	46	46	1483	1485	Is it possible that the reference to the Galapagos Islands marine reserve is Box. 5.5, not Box 5.3?	Thank you for pointing this out.
Eschen, René	No	Chapter 5	46	46	1492	1494	This is not unique to indigenous lands. Moreover, I would not only mention negative socio-ecological impacts; the (perceived) benefits pose an equally important problem in this context.	Thank you for your comment, but we can see no connection between the highlighted text and the comment, so we are unable to respond appropriately.
Eschen, René	No	Chapter 5	46	46	1503	1504	Box 5.4: I remain highly sceptical of utilisation as a means of IAS control; it would be useful to specify how utilisation was supposed to contribute to control and whether it was successful.	Thank you for your comment. Box 5.4 aims to highlight the invasion and management strategies in a large multi-national, socio-ecological system. Utilisation as a means of management is now discussed elsewhere in the chapter.
Gallardo, Belinda	No	Chapter 5	46	47	1506	1527	Box 5.4 is mentioned in the site-management section but is actually an example of holistic approach and should be cited in the next section.	Thank you for this suggested change. We have included it in the new version. Box 5.4 is now mentioned in both sections.
Eschen, René	No	Chapter 5	47	48	1542	1565	Box 5.5: Half of the text in this box is a description of the Galapagos and the established IAS, which is too much. What I find lacking is a structured description of the IAS management concept: what are the specific aims of pathway, site and species led management, what is the overall aim of the strategy? This should also be highlighted in Fig. 5.12	Thank you for your suggestion. The structure of the Chapter as it stands results from a long process of consultation through the ZOD and the FOD and we selected and were supported by reviewers down our structure which captures both the basic components of species, pathway, sites and ecosystem management. It was not the aim or intention of Ch5 on IAS management to write a comprehensive treatise on each topic. We believe we have covered this area to sufficient depth that it will be useful to policymakers active in the area of this assessment even if specialists in this field will remain disappointed.
Government of Germany	Yes	Chapter 5	47	47	1545	1545	Proposal: It is suggested to correct "world heritage location site".	Thank you for pointing this out. we have corrected it.
Gallardo, Belinda	No	Chapter 5	48	50	1567	1631	Section 5.3.2. The relevance of examples in this section is unclear.	Thank you for your comment, but as no specific examples are referred to, we are unable to respond appropriately.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Germany	Yes	Chapter 5	48	48	1567	1568	Proposal: 1) The heading should read "Managing invasive alien species impacts in protected areas, islands, national parks, Ramsar sites, Man and UNESCO Biosphere reserves and UNESCO World heritage sites" The name "Man and biosphere reserves" does not exist.2) Comment: the addition of "islands" in the heading seems not consistent: as islands can be protected areas, however many aren't. It is suggested to concentrate the chapter on protected and either have a separate sub-chapter for the "islands" as protected areas are a management instrument and not a "location".	Biosphere reserves are explicitly referred to in the scoping document. Islands were also included as an assessment 'cross-cutting' theme. Islands may be PAs, but we wanted to ensure they are captured as they can be specially designated sites. Therefore we have elected not to change the text.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 5	48	48	1569	1577	Some context is missing here. 487 out of how many? Why are Mediterrean MPAs singled out? Surely IAS management programs have been undertaken in more than 24 reserves?	Thank you for the comments. The GISP report aimed to identify how many parks at that time had reported invasive alien species to be illustrative. We have deleted the sentence on marine protected areas in the Mediterranean sea. The 24 reserves refer to a study by SCOPE, which was then reassessed after 30 years, to be illustrative of how the scenarios had changed. We have altered the wording for these sentences.
Dufour-Dror, Jean-Marc	No	Chapter 5	48	48	1573	1577	The sentence "Successful species-led (...) nature reserves studies" is utterly important for both reasons: (1) Only very few nature reserves have been targeted for AIS control and (2) these were not successful when it comes to AI Plant control. This should be highlighted as one of the main conclusions of this report should be to call for more attention and fundings from international agencies for alien invasive species control, whot a special focus on alien invasive PLANT species control.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. However, the assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Dufour-Dror, Jean-Marc	No	Chapter 5	49	50	1617	1631	The infamous case of the Lochinvar NP (Zambia) closed to tourists because of the proliferation of Mimosa pigra should be highlighted here.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Dufour-Dror, Jean-Marc	No	Chapter 5	50	50	1629	1630	I recommend to keep in mind that the biological control of the water hyacinth in Africa (Victoria lake) is a failure. Though initially succesful the bioagent collapsed and the plant recovered very quickly. One of the reasons for the proliferation of the water hyacinth is the high nutrient enrichment of wate bodies due to the lack of used waters facilities. Any control of floating invasive plants should begin with a program for used waters control	Thank you for making this point. Clearly biological control of water hyacinth was a major success story in the early 2000's and around the world, but the water hyacinth situation is dynamic and as mentioned water quality has a significant role to play in obtaining long-term success as the plants can outgrow the weevils in high nutrients. What is clear is that control of water hyacinth is reliably achievable but the conditions need to be right (accompanied by waste water quality treatment). Claiming it is not successful is a bit like saying herbicide is not effective when applied during a thunderstorm. We have provided the extra context that success has been compromised by poor water quality management. Clearly biological control of water hyacinth also needs funded agent rearing programs too as the weevils get flushed out of the system in storms along with the weed but again this doesn't mean it can't be successful again. This does not seem to require changes to the text.
Government of Germany	Yes	Chapter 5	50	50	1633	1633	Box 5.6: It is suggested to have the name of the protected area in the heading of the box.	Thanks for this suggested change. We have included it in the new version.
Gallardo, Belinda	No	Chapter 5	51	51	1688	1690	"clearly assisted native vegetation regeneration" can you be more specific? Provide numbers?	Thank you, the sentence has been revised.
Government of Germany	Yes	Chapter 5	51	52	1700	1715	Box 5.8: This example does not seem to refer to a protected area: Another excellent example from a remote site is the management of IAS is the WH site Terres et Mers australes (France). Another very good WH example would be the transboundary site The Waddensea (Germany, Denmark, The Netherlands) which in 2019 has adopted a Trilateral Wadden Sea Management and Action Plan for Alien Species ((Source: WG-AS & Gittenberger, A. 2019. Trilateral Wadden Sea Management and Action Plan for Alien Species. Eds. Busch, J. A., Lürßen, G., de Jong, F. Common Wadden Sea Secretariat (CWSS), Wilhelmshaven, Germany. see: https://www.waddensea-worldheritage.org/sites/default/files/2019_MAPAS.pdf)	Thank you for your comment. As part of the subsection "Managing invasive alien species impacts in protected areas, islands, national parks, Ramsar Sites, Man and Biosphere reserves and World heritage sites"; the example in Box 5.8 was related to species-led approaches on multiple invasive alien species in island (protected or not). We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made on management in remote islands, and not crucial to our critical evaluation, we have chosen not to include it.
Guareschi, Simone	No	Chapter 5	51	51	1700	1700	Box 5.8: These cases of study are interesting, but the time scale should be provided to help the reader (when did these happen?)	Thank you for the suggestion, the date has been inserted.
Guareschi, Simone	No	Chapter 5	52	52	1715	1715	The citation style with 2 author names seems wrong.	Thank you, this has been addressed in the final draft.
Guareschi, Simone	No	Chapter 5	52	52	1730	1730	These cases of study are interesting, but the time scale should be provided to help the reader (when did these happen?). Also in line 2111.	Thank you for the suggestion, the dates have been inserted.
Gallardo, Belinda	No	Chapter 5	52	52	1733	1733	Box 5.9: Can you restore seabirds? Wouldn't it be more appropriate "recovery" or something similar?	Thank you for your comment. We have now changed the text accordingly.
Gallardo, Belinda	No	Chapter 5	52	52	1744	1744	Box 5.9: "By April 2018..." Not sure why is the date mentioned here. When did the program start? Where achievements rapid? Or is it jut to state that these are the last updated data in 2018?	Thank you for the comment, the date when the programme was initiated has been inserted.
Robertson, Peter	No	Chapter 5	53	53	1752	1752	It would be good to see a section discussing examples of successful eradication of species that have already become widespread - Robertson, P.A., Adriaens, T., Lambin, X., Mill, A., Roy, S., Shuttleworth, C.M. and Sutton-Croft, M., 2017. The large-scale removal of mammalian invasive alien species in Northern Europe. Pest management science, 73(2), pp.273-279. Possibly also reference to 'Predator Free New Zealand'	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Sagoff, Mark	No	Chapter 5	53	53	1774	1774	The Chapter asks, "how can the right decisions be made?" The discussion is useful and informative. I offer the suggestion that the problem is often not in making the right decision but in identifying who will pay to implement it. If nobody is willing to pay for a project, it is frustrating to have put so much effort into determining what it should be. Often those who pay the piper call the tune. It is a commonplace to say that in a world of limited resources one has to prioritize among projects. This commonplace, however, may assume that there is a fund for conservation efforts and projects must compete on their merits for those funds. Insofar as this is true, the discussion here is helpful. It may more often be true, however, that there are no resources; the project has to pay for itself. Bringing people together to contribute time, know-how, and money is the most important step, and it will likely depend on what different people care about more than on what scholars believe is the best decision.	Thank you for making this point. It does not seem to require changes to the text. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Day, Michael	No	Chapter 5	56	103	1795	3135	In 5.4, I would suggest that there is a warning when using databases. Not all are accurate, or have been checked, and databases use each other to up date so misinformation is circulated. We used 5 different databases to prepare weed lists for the Pacific region. All had errors from incorrect taxonomy, species names, spelling to distribution of a species. Three databases reported a species in one country when we know from local knowledge that it is not. One needs to know how reliable are some databases and is there any quality control.	Thank you for the comment. A sentence has been added.
Robinson-Smythe, Tammy	No	Chapter 5	56	56	1805	1805	It is not clear what is meant by "the use context"	Thank you for the comment. We changed the text to "the context under which they can be used".
Brooks, Thomas	No	Chapter 5	56	57	1831	1838	Important introduction to key IAS databases. It would be valuable to complement this with text on the crucial importance of sustained funding to maintain these; see eg Juffe-Bignoli et al. (2016 PLoS ONE; https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0160640)	Thank you for the comment. This issue is addressed in Chapter 6.6. as a policy issue.
Smith, Kevin	No	Chapter 5	57	57	1835	1838	Doesn't really read well - I would rephrase "The International Union for Conservation of Nature (IUCN) Red List of Threatened Species, which currently has assessed the risk of extinction for 142,577 species, uses a hierarchical classification scheme to record drivers of species decline, including threats from invasive alien species (Salafsky et al., 2008)	Thank you for the comment. The new text has been adopted.
Gallardo, Belinda	No	Chapter 5	57	57	1851	1852	What are Ecolex and Faolex?	Thank you for the comment. The text is now linked to Table 5.4.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Day, Michael	No	Chapter 5	57	57	1854	1854	should read sectors	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	58	58	1856	1858	Table 5.4 For taxonomy, gaps include misnaming species, incorrect taxonomy etc; There's also EPPO, under spatial. Some databases are very incomplete with only a few species listed, others list all exotics including introduced crops. There's also a problem with some of these databases how they classify species. If one searches by invasives, you may not pick up all and some are also missed if you search by introduced. Need to know the limitations of each and how they are structured, otherwise you will not get a full set of data. This applies to status and provenance as well. We found many errors in 5 databases.	Thank you for the comment. For completeness we list databases but do not go into reviewing their strengths and weaknesses.
Gallardo, Belinda	No	Chapter 5	58	62	1856	1858	Table 5.4 is superuseful. Reason is a bit arbitrary, could be replaced by the categories in Table 5.1. I would add further gaps: Identification - lack of specific guides to rapidly identify listed species. Spatial data - spatial and taxonomic biases, microorganisms and highly mobile species (insects) underrepresented, data from native regions often missing	Thank you for the comment. This table is focussed on information important for management, and it is not supposed to be comprehensive nor do we attempt to identify gaps (which are covered in a general sense in 5.6). Other reviewers have not questioned the table structure.
Smith, Kevin	No	Chapter 5	58	58	1856	1856	Table 5.4: I would include the IUCN Red List in the 'Taxonomy' section, in addition to the 'Spatial data' section. The RL provides the taxonomy for almost 150,000 species (in the same way as the other data sources do), however the distribution data it provides (in terms of shapefiles) will mostly be of native ranges - though for many species the country of occurrence for alien ranges will be recorded	Thank you for the comment. Changes have been made.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	58	62	1857	1858	Table 5.4: under Taxonomy another Reason is to locate species specimens (at least for GBIF). Under Spatial Data, if EPPO is listed, so should be other regional PPOs be listed, in particular NAPPO for North America.	Thank you for the comment. Changes have been made.
Guareschi, Simone	No	Chapter 5	59	59	1857	1857	Table 5.4: A parenthesis is missing after speaking about Argentina.	Thank you for the comment. The table has been revised and the comment is no longer relevant.
Luisa Nunes, Ana	No	Chapter 5	61	61	1856	1858	Table 5.4: GISD has already started to incorporate EICAT assessments for some species, and will do the same for many more species very soon. For an example, please see http://www.iucngisd.org/gisd/speciesname/Duttaphrynus+melanostictus (click on Major)	Thank you for the information.
Luisa Nunes, Ana	No	Chapter 5	61	61	1856	1858	Table 5.4: Not sure why EICAT (and SEICAT) are included under the 'Risk assessments' row, as they do not develop risk assessments. Maybe this refers to other components of EICAT/SEICAT? It is not clear.	Thank you for the comment. The information is correct.
Day, Michael	No	Chapter 5	62	62	1857	1858	Table 5.4: Under Management could include CABI species compendium	Thank you for the comment. The table has been revised.
Day, Michael	No	Chapter 5	63	63	1859	1877	Under surveillance, could include a section on sniffer dogs, currently used by the RIFA programme in Queensland and drones which are used to detect Mikania micrantha during the flowering season in north Queensland.	Thank you for the comment. A phrase and a reference has been added.
Fabre, Sophie	No	Chapter 5	63	63	1859	1877	"RS can be used in two different ways: (1) to map and survey invasive species (2) to provide input environmental variables for ecological model. Ecological model techniques are of interest for example to predict future scenario of invasion. It could be interesting to highlight these two points and add reference like K.S. He et al. (2015) Will remote sensing shape the next generation of species distribution models? https://doi.org/10.1002/rse2.7 "	Thank you for the comment. We are not sure what RS is, but the application to ecological modelling is true but not directly relevant to management so more relevant to chapter 2.
Government of USA	Yes	Chapter 5	63	71	1860	2226	The use of pheromone and other semiochemicals in traps is of huge importance for surveillance for insect pests but it is hardly mentioned here at all.	Thank you for the comment. A short section has been added.
Sagoff, Mark	No	Chapter 5	63	63	1870	1877	Good point. Cell phones have greatly advanced health care in remote places. How they may be used to track species could be discussed more.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Gallardo, Belinda	No	Chapter 5	63	63	1893	1893	What do you mean by proof of freedom in this context? Proof that the species is naturalized or in the wild?	Thank you for the comment. It has been clarified.
Gallardo, Belinda	No	Chapter 5	65	65	1941	1941	"behaviour"	Thank you, we have corrected this in the final draft.
Government of Netherlands (van Delft, Jeroen)	Yes	Chapter 5	65	66	1952	1990	This international review report includes a review of the use of eDNA cross-taxonomically with special attention for IAS: Herder, J.E., A. Valentini, E. Bellemain, T. Dejean, J.J.C.W. van Delft, P.F. Thomsen and P. Taberlet, 2014. Environmental DNA - a review of the possible applications for the detection of (invasive) species. Stichting RAVON, Nijmegen. Report 2013-104. It is widely used and could be added in line 1955.	Thank you for the comment. The reference has been added.
Monaco, Andrea	No	Chapter 5	65	65	1952	1952	The airborne environmental DNA is an emerging technique that will open new perspectives for IAS management in the next years and should be cited (ex. Banchi E, Ametrano CG, Stanković D, Verardo P, Moretti O, et al. (2018) DNA metabarcoding uncovers fungal diversity of mixed airborne samples in Italy. PLOS ONE 13(3): e0194489. https://doi.org/10.1371/journal.pone.0194489 or Johnson, M.D., Fokar, M., Cox, R.D. et al. Airborne environmental DNA metabarcoding detects more diversity, with less sampling effort, than a traditional plant community survey. BMC Ecol Evo 21, 218 (2021). https://doi.org/10.1186/s12862-021-01947-x)	Thank you for the comment. The references have been added.
Rius Viladomiu, Marc	No	Chapter 5	65	66	1952	1990	Worth noting here cross-phyla studies combining eDNA metabarcoding with taxonomy and population genetics to detect new introductions of species and genotypes, as well as general biogeographic patterns: Holman LE, Parker-Nance S, de Bruyn M, Creer S, Carvalho GR, Rius M (2022) Managing human mediated range shifts: understanding spatial, temporal and genetic variation in marine non-native species. Philosophical Transactions of the Royal Society B 377: 20210025; Holman LE, de Bruyn M, Creer S, Carvalho GR, Robidart J, Rius M (2021) Animals, protists and bacteria share marine biogeographic patterns. Nature Ecology & Evolution 5: 738-746; Holman LE, de Bruyn M, Creer S, Carvalho GR, Robidart J, Rius M (2019) Detection of introduced and resident marine species using environmental DNA metabarcoding of sediment and water. Scientific Reports 9:11559	Thank you for the comment. The references have been added.
van Delft, Jeroen	No	Chapter 5	65	66	1952	1990	This international review report includes a review of the use of eDNA cross-taxonomically with special attention for IAS: Herder, J.E., A. Valentini, E. Bellemain, T. Dejean, J.J.C.W. van Delft, P.F. Thomsen and P. Taberlet, 2014. Environmental DNA - a review of the possible applications for the detection of (invasive) species. Stichting RAVON, Nijmegen. Report 2013-104. It is widely used and could be added in line 1955.	Thank you for the comment. The reference has been added.
Government of Canada (Tita, Guglielmo)	Yes	Chapter 5	65	65	1954	1954	"It may be worth citing a recent guidance document for eDNA analysis of aquatic species, published by the department of Fisheries and Oceans in Canada: Abbott C, Coulson M, Gagné N, Lacoursière-Roussel A, Parent GJ, Bajno R, Dietrich C, May-McNally S (2021). Guidance on the use of targeted environmental DNA (eDNA) analysis for the management of aquatic invasive species and species at risk. DFO Can. Sci. Advis. Sec. Res. Doc. 2021/019. iv + 42 p. https://www.dfo-mpo.gc.ca/csas-scs/Publications/ResDocs-DocRech/2021/2021_019-eng.html "	Thank you for the comment. The reference has been added.
Day, Michael	No	Chapter 5	66	66	1992	2018	Sentinel monitoring. Could include the programme in Torres Strait to monitor in coming pests into Australia from PNG.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Gallardo, Belinda	No	Chapter 5	66	67	2021	2051	It surprising that the Alien-CSI COST Action is not even mentioned. https://alien-csi.eu/	Thank you for the comment. It is mentioned elsewhere in the assessment.
Monaco, Andrea	No	Chapter 5	67	67	2022	2036	I suggest to consider as example of a large scale application of citizen-science the Mosquito alert project: http://www.mosquitoalert.com/en/	Thank you for the comment. A phrase and the link have been added.
Gallardo, Belinda	No	Chapter 5	67	67	2026	2027	Is there any data to support effectiveness? E.g. number of species reported, total number of calls	Thank you for the comment. It is not that we are aware of.
Day, Michael	No	Chapter 5	67	67	2027	2027	should read directly	Thank you, we have corrected this in the final draft.
Monaco, Andrea	No	Chapter 5	67	67	2049	2050	I suggest to consider as specific example of a large scale application of citizen-science the Mosquito alert project: http://www.mosquitoalert.com/en/	Thank you for the comment. A phrase and the link has been added.
Fabre, Sophie	No	Chapter 5	68	68	2068	2068	Lidar is an interesting device to provide information on the vegetation structure. Another benefit of 3D point cloud provided by LiDAR is to give information on the understory. This point can be emphasized.	Thank you for the comment. It has been added.
Monaco, Andrea	No	Chapter 5	69	69	2105	2105	"Xylella" instead of Xylela	Thank you, we have corrected this in the final draft.
Karayannis, Theofanis	No	Chapter 5	72	72	2239	2239	The word "treatment" in this heading is quite peculiar, as at least what is described in the first paragraph is not 'treatments' but management options or other appropriate wording but certainly not 'treatments'. This is also an issue in other places, see other rows below.	Thank you for your comment. We have revised the paragraph and considered your comment.
Sathyapala, Shiroma	No	Chapter 5	72	72	2239	2239	Prevention treatment for pathway management	Thank you for the comment. A hyphen has been added.
Sathyapala, Shiroma	No	Chapter 5	72	72	2243	2243	add conveyance	Thank you. It has been added.
Karayannis, Theofanis	No	Chapter 5	72	72	2249	2249	The word "treatment" at the end of this line needs to be replaced with the word "management" as the two options mentioned in this sentence are the two management options, which moreover do not necessarily entail treatment as such (in fact the first option, exchange, does not entail treatment at all).	Thank you for your comment. We have revised the paragraph and considered your comment.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Karayannis, Theofanis	No	Chapter 5	72	72	2252	2254	This comment had also been made during the review of the first order draft but has not been addressed. There are three methods for ballast water exchange and not two as this sentence says: the "sequential" method, the "flow-through" method and the "dilution" method. The current text mentions only the first two and omits the dilution method. In addition, ballast water exchange has to be conducted at a determined distance from nearest land and not simply from the arrival port as the current text says. These points need to be corrected as they are factually inaccurate.	Thanks for this suggested change. We have included it in the new version.
Outinen, Okko	No	Chapter 5	72	72	2261	2262	"The first of these is mechanical filtration of larger particles with self-cleaning filter systems." - The purpose of filters with regards to complying with the BWM Convention is to remove/filtrate organisms, not particles.	Thanks for this suggested change. We have included it in the new version.
Karayannis, Theofanis	No	Chapter 5	72	72	2262	2263	As had been highlighted during the review of the first order draft, electrochlorination and UV irradiation are used in the vast majority of ballast water management systems (over 90%) so they should be the technologies mentioned primarily whereas now they are at the end of a list that starts with other technologies that are hardly used at all in practice.	Thanks for this suggested change. We have included it in the new version.
Karayannis, Theofanis	No	Chapter 5	72	72	2264	2267	This part has several issues. First, the word "treatment" is again used incorrectly in Line 2264, this time for biofouling management, which is not a "treatment" so an appropriate word needs to be used. Second, the word "removal" towards the end of Line 2264 needs to be replaced with "management", as the management of biofouling significantly entails prevention (i.e. proactive actions aimed at preventing the accumulation of biofouling in the first place) and is most certainly not limited to removal, which is a subsequent complementary reactive action. Further, the text "there are no internationally accepted biofouling treatments and biofouling is poorly regulated under International Conventions" needs to be redone as there is currently simply no international legally binding instrument (convention or other) on biofouling so it is not regulated at all at the international level and it is not about any existence of anything 'accepted'; this text should therefore be replaced with "there is currently no international convention regulating biofouling" and you may also add the text "but only national or local regulations in a few jurisdictions such as Australia, New Zealand, and California in the United States". Notwithstanding the previous point, it should however be recognised that IMO does have the Biofouling Guidelines in place since 2011 (even if they are voluntary) so this should be mentioned here and added in the reference list. Finally the wording "biofouling treatments" in Line 2267 needs again to be replaced with "biofouling management".	Thanks for this suggested change. We have included it in the new version.
Outinen, Okko	No	Chapter 5	72	72	2264	2264	"undeirable organisms" - smaller undesirable organisms?	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Tita, Guglielmo)	Yes	Chapter 5	73	73	2267	2267	The department of Fisheries and Oceans in Canada recently completed a risk assessment on hull biofouling (will be published in Spring 2022). This study showed that niche areas (such as the sea-chest, propeller, and thruster tunnels, where biofouling may accumulate non-uniformly) are of high concern for the transportation of alien species.	Thanks for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	73	73	2276	2276	add Heat treatment	Thanks for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	73	73	2288	2288	add irradiation	Thanks for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	73	73	2293	2293	add IPPC 2017 for The use of integrated measures in a systems approach for pest risk management https://www.fao.org/3/y4221e/Y4221E.pdf	Thank you. It has been added.
Dufour-Dror, Jean-Marc	No	Chapter 5	73	76	2297	2358	The following remarks are related to the section titled "Pesticide management of invasive alien animals and plants": 1 - This section is utterly important and I would recommend to distinguish two subsections: One related to the use of pesticides in invasive animal species control management and the other focusing on alien invasive plant (AIP) species control management. 2 - It should be highlighted that the use of pesticides for the control of AIP is still the main option and it will remain so for a long time. Though biocontrol has made huge progress, the use of biocontrol is still very restricted; unfortunately, the number of cases where alien invasive species have been eradicated or significantly reduced over a long period of time thanks to biocontrol, are still limited, especially for AIPs. The success and the wide use of biocontrol is much more limited than initially anticipated 20 years ago. There are many reasons for that. So, I would stress that the use of pesticide, though not popular, is still very relevant (at least for AIPs). 3 - It is necessary to mention that the "dosage of the poison makes the poison" (Dosis sola facit venenum): That means that the problems related to the uses of pesticides stand in the misuse of pesticides and in the lack of compliance with the label restrictions: in many cases the maximum concentration values are not respected as well as the volume per surface area per time. A proper use of pesticides would reduce to nearly zero the damages associated with pesticides. 4 - The use of herbicide against invasive plants is not done only by spraying: Many ligneous invasive species, particularly tree species, can be controlled by direct application techniques, such as hack & squirt that enable to perform accurate and targeted control while preventing diffusion of herbicide straight into the soil. This control application technique is highly efficient and can be applied over large areas. 5 - There are new herbicides recently developed that display outstanding ecotoxicological profiles and that are effective with much smaller volumes than older herbicides. For example, the use of Aminopyralid (Milestone©) applied with the Hack & Squirt technique has led to unprecedented success of Acacia saligna control in protected areas in Israel in the past 2 years (Dufour-Dror & Yaacoby 2019 [in English], Dufour-Dror 2002, technical report [in Hebrew]). This control technique is now tested and extended to other alien invasive trees such as Acacia salicina and Acacia Victoria (Dufour-Dror 2021 [technical report in Hebrew]). 6 - More and more herbicides are selective: For example, Aminopyralid does not impact Poaceae. This should be stressed. So I would recommend to modify significantly this section in order to provide more accurate information. I would be keen to provide information and to participate to the editing of this section.	Thank you for the comment. Point 1. We disagree as this would significantly lengthen the section. Point 2. We added some text to make this clear (line 2556) Point 3. We added sp,e text to address this (line 2596)
Sathyapala, Shiroma	No	Chapter 5	73	73	2297	2297	Biopesticides are widely used for management of invasive alien species -especially moth species. There should be a section for biopesticides	Thank you for the comment. A paragraph has been added to 5.4.4.2.
Monaco, Andrea	No	Chapter 5	73	73	2300	2302	I think this topic needs to be treated in a more balanced way because there are cases where the effects seem to be very limited or zero. For example look at Capizzi, D., Baccetti, N., & Sposimo, P. (2016). Fifteen years of rat eradication on Italian islands. In <i>Problematic wildlife</i> (pp. 205-227). Springer, Cham.	Thank you. It has been added.
Pan, Xubin	No	Chapter 5	74	74	2332	2332	Change "organophosphates and nicotinoids and glyphosate" to "organophosphates, nicotinoids, and glyphosate"	Thank you. It has been corrected.
Pan, Xubin	No	Chapter 5	74	74	2336	2336	Change "d)" to "e)"	Thanks for this suggested change. We have now changed the text accordingly.
Dufour-Dror, Jean-Marc	No	Chapter 5	76	77	2360	2427	"Robotic technology for targeted management" We must keep in mind that many countries do not have the resources to apply this type of (wonderful) technology. Many countries in Africa or in South America cannot afford this control option.	Thank you. It has been mentioned.
Sathyapala, Shiroma	No	Chapter 5	76	76	2360	2360	suggest to include remote sensing and other statelife based monitoring Well-operating monitoring and prediction systems for the desert locust (by FAO) and the Australian plague locust (by APLC)	Thank you for the comment. Remote sensing is in its own section.
Sagoff, Mark	No	Chapter 5	76	76	2377	2379	Typo -- the words "that perform" is missing after "use" in "Unmanned ground-based vehicles-based systems are in prototype or commercial use many agricultural tasks including pest, weed and disease management, using a range of methods which may be applicable to some invasive alien species management situations." The point is very well taken. As agriculture becomes more industrialized, software running it may be able to eliminate all life but the crop from millions of acres. By genetically engineering plants and managing soil conditions, technicians are able to destroy not only invasive species but every form of life that is not the crop. This results in gluts of food and feed a.k.a. "nature's contribution to people."	Thank you. It has been corrected.
Government of USA	Yes	Chapter 5	78	80	2433	2541	Incorrect usage of "toxin" throughout. Toxins are toxic substances produced by an organism. Toxins are only a subset of toxicants, and do not cover all of the examples above (examples: sodium nitrite, PAPP, zinc phosphide are not toxins, but are toxicants and pesticide active ingredients).	Thank you for the comment. It has been corrected throughout the section.
Luisa Nunes, Ana	No	Chapter 5	78	78	2439	2440	The sentence is incorrect. IUCN is undertaking a project looking at the management of vertebrate invasive alien species of Union concern (22 species), incorporating animal welfare.	Thank you for the comment. It has been removed.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Smith, Kevin	No	Chapter 5	78	78	2439	2440	IUCN are currently working on a project that is assessing welfare impacts of management measures for some European IAS. However this project is still ongoing and I would recommend that this sentence is removed as I don't think it adds anything to the chapter. We can't provide any results at the moment. If you want to retain it, please rephrase to "IUCN is currently running a project that is assessing welfare impacts, alongside effectiveness, of the known management measures for a number of vertebrate IAS in Europe". Please note that IUCN have also undertaken a review on Non-lethal measures IUCN, 2017. Information on non-lethal measures to eradicate or manage vertebrates included on the Union list. Technical note prepared by IUCN for the European Commission. http://circabc.europa.eu/sd/a/518231a9-abdd-47b1-b455-9d78a7e98f0e/Non-lethal%20measures.pdf	Thank you for the comment. It has been removed.
Robertson, Peter	No	Chapter 5	78	79	2468	2469	This refers to my paper, Robertson et al 2019, but this is not what the paper says and I do not agree with the comment, please remove.	Thank you for the comment. It has been removed.
Gallardo, Belinda	No	Chapter 5	79	89	2469	2470	Can cite Zavaleta et al 2011 on the unexpected consequences of species removal. This calls for better understanding of the interaction between the invasive species and other native and invasive species before eradication.	Thank you for the comment. We couldn't find reference.
Dufour-Dror, Jean-Marc	No	Chapter 5	79	79	2479	2479	"Judas animals" is an expression I would refrain from using in this report. For most reader "Judas" means, or is understood as, "Jewish" and it is presented here in a very negative context (betrayal, treason). So the use of this expression is in fact relating to almost two thousand years of antisemitic rhetoric in Christian culture where the message was that Jesus was betrayed by a Jew (although Jesus himself and all the apostles were religious Jews). By the way, it is likely that Judas intention was rather to force Jesus to reveal himself as the Messiah so he will overturn the Roman occupation in the land of Israel, rather than a simple treason. When he realized that this failed the poor guy killed himself, which it not exactly the reaction one could expect from a traitor. However, I recommend to use another term instead of "Judas animal" maybe "Bait animal" or something like that.	Thank you for the comment. The text has been adjusted although we still mention the terminology (and the controversy) in brackets around it because it is widely used in the literature.
Gallardo, Belinda	No	Chapter 5	79	79	2487	2495	This paragraph is focused on culling/hunting animals, but could be applied to fish and crayfish too. Removal can lead to stimulation of reproduction for density-dependent species, and fish permits are rapid and cheap to reduce populations but generate an industry that may become a bigger problem. A classic example for this is the industry around the red crayfish in southern Spain (Oficialdegui, F. J. (2020). Conquering the world: The invasion of the red swamp crayfish.). Reintroductions are also pretty common for fish and crayfish.	Thank you for the comment. Great example. Unfortunately we don't have the space to use it as it doesn't illustrate a different approach just a different context. Setting up markets to try and manage IAS is covered elsewhere in the chapter and assessment. The culling leading to increase reproduction (density dependence) is covered later in the section.
Government of USA	Yes	Chapter 5	80	80	2516	2518	Recommend using the term "pesticide" or even "toxicant" rather than "poison." Relative humaness of a pesticide is not a registration consideration in all countries, including under FIFRA in the United States.	Thank you. The text has been changed.
Government of USA	Yes	Chapter 5	80	80	2518	2524	I question whether the development of new pesticide active ingredients is actually in decline or has even been recently quantified for vertebrate pesticide products. Since when? There is no reference cited to support this statement. Several new toxicant and non-toxicant pesticide active ingredients are actively in development in the U.S., Australia, New Zealand, and Europe (and probably elsewhere) for invasive vertebrate species in addition to new baits and bait delivery methods. Also, what is "new" to registration is the rediscovery and modification of active ingredients studied decades prior.	Thank you for the comment. The text has been changed to reflect this. The point about re-registration of existing actives is mentioned in the Pesticides section so we will not repeat it here.
Government of USA	Yes	Chapter 5	80	80	2520	2520	"Wildlife" should be capitalized in National Wildlife Research Center.	Thank you, this has been addressed in the final draft.
Robinson-Smythe, Tammy	No	Chapter 5	81	81	2560	2560	Add a comma after "goats"	Thank you, we have corrected this in the final draft.
Monaco, Andrea	No	Chapter 5	81	81	2562	2562	At the end of the line could be cited this paper: Campbell, T. A., Long, D. B., & Massei, G. (2011). Efficacy of the Boar-Operated-System to deliver baits to feral swine. Preventive Veterinary Medicine, 98(4), 243-249.	Thank you. The reference has been added.
Robertson, Peter	No	Chapter 5	81	81	2562	2562	These methods are limited by much more than just bait delivery - for oral baits these include - how to ensure an appropriate dose, non-target species issues, stakeholder opposition (particularly from hunters), sex specific welfare implications, many compounds are effective for females but affect secondary sexual characteristics in males (eg antler formation in deer).	Thank you for the comment. Good points but no reference was provided.
Robertson, Peter	No	Chapter 5	81	81	2564	2564	Wording is overly optimistic, while these methods have been used on a small scale, on semi-domesticated species or in fenced plots, there are very few cases where they have been successfully used to control free-living populations or to achieve eradications. This section needs to give a more balanced appraisal.	Thank you for the comment. The text has been adjusted.
Gallardo, Belinda	No	Chapter 5	81	81	2576	2577	Mechanical removal is also largely used for molluscs, gastropods and corals (basically sessile species). Mechanical removal can trigger increased reproduction for species that are density dependent and try to fill-in cleared areas.	Thank you for the comment, but no reference was provided.
Dufour-Dror, Jean-Marc	No	Chapter 5	81	82	2584	2598	It should be highlighted that physical and mechanical techniques used for the control of alien invasive plants is in most cases (more than 80%) ineffective because many invasive taxa resprout and regenerate. In some cases it can be efficient, but only with few species. Generally cutting is inefficient and in many cases it is counterproductive: the recurrent cutting of <i>Prosopis juliflora</i> in Africa is a good example of that.	Thank you for the comment. There were no references provided but we found one, and a phrase has been added to provide balance.
Sathyapala, Shiroma	No	Chapter 5	81	81	2584	2585	add burning	Thank you. It has been added with a reference.
Pan, Xubin	No	Chapter 5	81	81	2590	2590	"re invasion" or "reinvansion"	Thank you, this has been corrected in the final draft.
Dufour-Dror, Jean-Marc	No	Chapter 5	82	82	2600	2610	The use of grazing herds for the control of invasive plant species can have adverse effects as some invasive plants, e.g. Xanthium species are dispersed by herds as they cling onto the animal hairs, while other invasive plant species are dispersed via the feces of the animals. This should be mentioned.	Thank you. It has been added along with a reference.
Government of Netherlands (Van Dijk, Chris)	Yes	Chapter 5	82	82	2608	2608	Addition: grazing is less suitable for invasive species with a large rhizome system (eg japanese knotweed) from which re-growth will quickly occur when the grazing is stopped.	Thank you. It has been added at line 2708.
Van Dijk, Chris	No	Chapter 5	82	82	2608	2608	Addition: grazing is less suitable for invasive species with a large rhizome system (eg japanese knotweed) from which re-growth will quickly occur when the grazing is stopped.	Thank you. It has been added at line 2708.
Dufour-Dror, Jean-Marc	No	Chapter 5	82	85	2612	2751	The section about biocontrol should mention several important points: (1) In most cases biocontrol (against alien invasive plants) did not work (Winston et al 2014); (2) Though tremendous progress have managed to reduce significantly the non-target effect, there are additional risks posed by the introduction of alien bioagents in an ecosystem, such as its role in the local and regional trophic systems, its interactions with other organisms, including aliens, and its ability to move to adjacent areas. These aspects are very complicated to modelize and we cannot, at this stage, fully know beforehand what will be all the impacts of the introduction of a bioagent; (3) for numerous plant species, especially herbaceous, but not only, biocontrol is the only realistic control technique, particularly when the invasive plant has extended over huge areas (e.g. Parthenium hysterophorus in East Africa). The full picture of biocontrol is complex and we need to present all its aspects here. Otherwise we give the feeling that we master biocontrol and it is the only solution for controlling AIS. This is more complicated than that.	Thank you for the comment. 1) is incorrect from the perspective of the target where successes are >50%, 2) indirect non-target impacts are dealt with at lines 2694-2698 and we think this is sufficient given the audience and the space available. Many references cited cover this in more detail, 3) Again our space was very limited and we cite many key references that go into this in more detail
Gallardo, Belinda	No	Chapter 5	82	85	2612	2751	Biological control is far more developed than any other management option which creates an imbalance. It could be substantially shortened. Same happens with the gene-drive section.	Thank you. Because it is well developed it needs more explanation.
Government of Canada (Mason, Peter)	Yes	Chapter 5	82	83	2627	2648	This section captures the perspective that is missing from chapter 3 (see comments above)	Thank you for your feedback.
Gallardo, Belinda	No	Chapter 5	83	83	2638	2640	"built on internationally agreed best practise principles and guidelines" is repeated	Thank you. The repetition has been deleted.
Government of Canada (Mason, Peter)	Yes	Chapter 5	83	83	2638	2640	The phrase "...built on internationally agreed best practice principles and guidelines ..." is repeated. The second one should be deleted and the "IPPC ISPM 3" reference placed after "Barratt et al. 2021".	Thank you. The repetition has been deleted.
Pan, Xubin	No	Chapter 5	83	83	2638	2638	L2639-2640	Thank you. The repetition has been deleted.
Day, Michael	No	Chapter 5	83	3	2639	2640	repetition of lines 2637 and 2638	Thank you. The repetition has been deleted.
Gallardo, Belinda	No	Chapter 5	83	83	2646	2646	"need to take into account"	Thank you, we have corrected this in the final draft
Dufour-Dror, Jean-Marc	No	Chapter 5	83	83	2650	2650	Among the examples of successful biocontrols the case of <i>Azolla filliculoides</i> in South Africa should be mentioned	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Government of Canada (Mason, Peter)	Yes	Chapter 5	83	83	2654	2656	Additional references could be added here. One example is (Mason, 2021) Mason, P.G. (ed) 2021 Biological Control: Global Impacts, Challenges and Future Directions of Pest Management. CSIRO Publishing, Clayton South.	Thank you for the comment. The reference has been added.
Government of Canada (Mason, Peter)	Yes	Chapter 5	83	83	2660	2660	The phrase "... can only be initiated ..." if there is broad agreement across different stakeholder communities ..." is not applicable in all countries. Suggest replacing "can only be initiated with "should be initiated"	Thank you for the comment. We could not make the suggested change as it is policy prescriptive.
Gallardo, Belinda	No	Chapter 5	83	83	2668	2668	"classical biological control"	Thank you, we have corrected this in the final draft

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sathyapala, Shiroma	No	Chapter 5	84	84	2682	2684	suggest to add FAO reference (FAO, 2019) Guide to the classical biological control of insect pests in planted and natural forests https://www.fao.org/documents/card/en/c/CA3677EN/	Thank you for the comment. The reference has been added.
Government of Canada (Mason, Peter)	Yes	Chapter 5	84	84	2704	2704	The phrase "... following a release permit application having been granted ..." is confusing. Suggest replacing with "... following application for and approval of a release permit ..."	Thank you for the comment. The change has been made.
Government of Canada (Mason, Peter)	Yes	Chapter 5	85	85	2740	2743	Suggest adding "Catton, 2021" to the citations" Catton provides a comprehensive review of the public perceptions issue: Catton H (2021) Public perceptions of biological control. In Biological Control: Global Impacts, Challenges and Future Directions of Pest Management (Ed PG Mason) pp. 262-287. CSIRO Publishing, Clayton South.	Thank you for the comment. The reference has been added.
Government of Canada (Mason, Peter)	Yes	Chapter 5	85	85	2751	2751	Suggest adding "Barratt et al., 2021 and "Hodde et al., 2021" after "ISSG 2018". Barratt et al. provide a comprehensive global overview of the regulations (reference is already cited). Hodde et al. 2021 provide an overview of risk assessment methods: Hodde MS, Lake EC, Minter CR, Daane KM (2021) Importation biological control. In Biological Control: Global Impacts, Challenges and Future Directions of Pest Management (Ed PG Mason) pp. 67-89. CSIRO Publishing, Clayton South.	Thank you for the comment. The references have been added.
Gallardo, Belinda	No	Chapter 5	86	86	2759	2759	"managing invasive alien disease"	Thank you, we have corrected this in the final draft
Sathyapala, Shiroma	No	Chapter 5	86	86	2759	2773	suggest to add FAO reference (FAO, 2016) Integrated pest management using the sterile insect technique ao.org/publications/card/en/c/5a91900f-0f30-4ecc-8f40-b15b6eb1143a/	Thank you for the comment. The reference has been added.
Gallardo, Belinda	No	Chapter 5	86	86	2789	2789	"Viral biological control..."	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 5	87	87	2823	2823	Change "World Organization for Animal Health (OIE)" to "OIE"	Thank you for the comment. The name of the organization has changed.
Day, Michael	No	Chapter 5	88	88	2845	2847	line spacing	Thank you, we have corrected this in the final draft.
Robinson-Smythe, Tammy	No	Chapter 5	88	88	2845	2847	Line spacing is wrong	Thank you, we have corrected this in the final draft.
Government of Germany	Yes	Chapter 5	88	88	2857	2858	comment: It should be considered that mutations in the RNAi machinery of the target organism might render future applications of RNAi ineffective (see e.g. Khajuria, Chitvan; Ivashuta, Sergey; Wiggins, Elizabeth; Flagel, Lex; Moar, William; Pleau, Michael et al. (2018): Development and characterization of the first dsRNA-resistant insect population from western corn rootworm, <i>Diabrotica virgifera virgifera</i> LeConte. In: PLoS one 13 (5), e0197059. DOI: 10.1371/journal.pone.0197059.) Please include this aspect in the para.	Thank you for the comment. The reference has been added.
Government of Germany	Yes	Chapter 5	90	90	2902	2902	Proposal: "Humaneness – do not result in invasive alien species deaths if recruitment is targeted" > This statement is a simplification. Removing one sex from the population will disturb natural balances for reproduction, which might in turn lead to "inhumane" situations for the target organisms.	Thank you for the comment. The sentence has been added.
Sagoff, Mark	No	Chapter 5	90	90	2931	2942	I chose this paragraph because it exemplifies the careful, succinct, and informative pages on new technologies. Of course few if any technologies discussed were designed for use against invasive species, but they may be very useful in various combinations. I found pages 76-90 helpful; I have no comment other than to commend.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Gallardo, Belinda	No	Chapter 5	91	91	2951	2951	"inocuous chemical agent"	Thank you, we have corrected this in the final draft.
Government of Germany	Yes	Chapter 5	91	91	2958	2958	Proposal: The release of gene drive organism will inevitably increase population size of the invasive species first. This is especially relevant if a certain percentage of gene drive organisms in relation to the overall population size is necessary ("threshold dependency") and/or a population size reduction is to be obtained in a relevant time frame. We propose the following sentence: "Importantly, using gene drive technology requires the release of additional organisms of the invasive alien species, those numbers are especially relevant where either threshold dependent gene drives (thresholds can be up to 50 per cent of the overall population) are to be used or the result is to be obtained in a relevant time frame."	Thank you for the comment. The sentence has been added but edited for length.
Gallardo, Belinda	No	Chapter 5	91	91	2960	2962	Rephrase sentence, missing elements.	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	91	91	2976	2976	"informed consent"?	Thank you, we have corrected this in the final draft
Government of Germany	Yes	Chapter 5	91	91	2979	2980	Comment: Gene drive models have described a third option, by which, under certain parameters, wild type and gene drive organisms can exist in equilibrium, which would significantly increase temporal environmental exposure with increased probability of rare events (e.g. escape of a GDO or rare and unwanted mating events across (sub-)species borders). Chamber, Jackson; Kim, Isabel; Chamber, Samuel E.; Clark, Andrew G.; Messer, Philipp W. (2019): Suppression gene drive in continuous space can result in unstable persistence of both drive and wild-type alleles 28. DOI: 10.1101/769810. Please include this aspect in the para.	Thank you for the comment. The reference has been added with explanation.
Brooks, Thomas	No	Chapter 5	92	92	2998	3013	It's very good that these important reports are mentioned, but would be preferable if this section could synthesise their key messages (and commonalities and differences between the reports), over and above simply the fact that they exist	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Gallardo, Belinda	No	Chapter 5	92	92	2998	3014	This type of literature review section is interesting but not done in any other section of the chapter, which creates an imbalance. The gene-drive section is too long and repetitive and could be substantially reduced.	Thank you for the comment. The section has been revised and substantially reduced. It is however we believe critically important to explain in some detail this highly controversial approach.
Sathyapala, Shiroma	No	Chapter 5	92	92	3015	3015	suggest to add section for conservation biological control taking example of Management of <i>Cryphonectria parasitica</i> using its Hypovirulent strains which is a very successful	Thank you for the comment. Successes are in Section 5.5.6 where we will consider including it. However Conservation Biological Control is really an agricultural pest management approach which we considered (we wrote a section) but decided not to include.
Gallardo, Belinda	No	Chapter 5	92	92	3016	3016	Functional eradication could be mentioned in this section (Green, S. J., & Grosholz, E. D. (2021). Functional eradication as a framework for invasive species control. <i>Frontiers in Ecology and the Environment</i> , 19(2), 98-107.). Functional eradication is defined as suppressing invader populations below levels that cause unacceptable ecological effects within high-priority locations such as protected areas or islands. I think it is a very interesting concept for invasive species beyond control; when protection of native species or habitats is needed, but still requires research into threshold points.	Thank you for the comment. Functional eradication is not eradication as defined in the assessment and while it may be useful in an ecological impact concept we do not believe it is useful in a long-term management context.
Dufour-Dror, Jean-Marc	No	Chapter 5	93	93	3036	3042	It should be mentioned if the control applied to <i>Vachellia nilotica</i> is only based on physical control actions or if it includes chemical control; also the efficiency of the control should be specified.	Thank you for the comment. We did not mention chemical control because it is not part of the IPM.
Dufour-Dror, Jean-Marc	No	Chapter 5	94	94	3048	3078	In this section a clear distinction should be made between: (1) the necessity of prioritization regarding the potential impacts of AIP; (2) the efficiency of control techniques applied, and (3) the objectives set in a control program, e.g. (a) eradication, (b) decrease of extent or density and (c) containment. These are three different aspects in AIP control management planning and they are utterly important.	Thank you for the comment. A section has been added but it needs editing.
Gallardo, Belinda	No	Chapter 5	94	95	3080	3107	Missing several important topics in this section, such as legacy effects, unexpected consequences of species removal, connectivity (of restored and un-restored sites), use of invasive species for restoration (and when that might be acceptable, see Vimercati et al. 2020), a discussion about re-invasion patterns and the need for long-term monitoring. This section is quite brief considering the importance of restoration for invasive species management and highly contrast with the length and level of detail of the biological control and gene-drive sections.	Thank you for the comment. We have added all the contexts that are listed here that we had missed and even found relevant references. Restoration is also covered in multiple chapters in this assessment (see also Chapter 3 section 3.3.5.1, Chapter section 6.3.3.3).
Sagoff, Mark	No	Chapter 5	94	94	3086	3086	The phrase "active restoration" is revealing. It suggests gardening. People have to introduce plants to serve the ecological function -- whatever that means -- of the extirpated invaders. These introduced plants, presumably because they were there in prelapsarian times (before the Europeans), are still native albeit introduced. This looks like a conceptual pretzel to me.	Thank you for the comment. Revegetation is a clearly recognised component of restoration so I am not sure what this issue is here?
Dufour-Dror, Jean-Marc	No	Chapter 5	94	94	3089	3090	"(...) other invasive alien species that might replace those removed" this secondary invasion. It could be good to mention references for this phenomenon.	Thank you for the comment. A reference has been added.
Gallardo, Belinda	No	Chapter 5	96	96	3119	3119	Table 5.6: "Broad effectiveness" is not actually measured in anyway, this is simply applicability to the different stages of the invasion process.	Thank you for the comment. "Broad effectiveness" has been replaced by "applicability".
Sathyapala, Shiroma	No	Chapter 5	96	96	3119	3121	Table 5.6: Suggest to add semi-quantitative and qualitative decision support tools as many risk assessments are semi quantitative	Thanks for this suggested change. We have included it in the new version.
Sathyapala, Shiroma	No	Chapter 5	96	96	3121	3121	Table 5.6: Remote sensing is used by FAO for management of desert locust. Current satellites can provide continuous estimates of rain-producing clouds and ecological conditions, such as vegetation development, which are important factors for monitoring Desert Locust habitats and forecasting locust development. The temporal, spectral and spatial characteristics of the sensor instruments onboard these satellites provide a wide range of sensing capabilities.	Thank you for the comment. Desert locusts are native species.
Government of New Zealand (Perry, Joanne)	Yes	chapter 5	97	97	3122	3122	footnote 5. does not take into account that for offshore islands and highly contained and fenced areas such as mainland islands also provide for widespread long term control	Thank you for the comment. This element has been added to this footnote (now #3).

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sathyapala, Shiroma	No	Chapter 5	97	97	3122	3122	Table 5.6: footnote : suggest to add using resistant varieties of host plants	Thank you for the comment. This comment is no longer relevant following table changes.
Slade, Glen	No	Chapter 5	97	97	3122	3122	Table 5.6: In the last line of the table, biocontrol should have a tick for eradication, as per lines 2757-2758, sterile insect technique is successfully used for eradication.	Thank you for the comment. This comment is no longer relevant following table changes.
Gallardo, Belinda	No	Chapter 5	98	98	3123	3123	change "weed, pest or disease" by aquatic or terrestrial invasive species. The terms "weed", "disease" and "pest" are frequently used throughout the text, likely as part of invasive species, but not clear. Terminology is confusing and I would suggest ensuring consistency, overall across chapters. So are diseases in general evaluated here or only if they are considered invasive? this is very confusing. Are there not fixed categories of plants and animals (e.g. terrestrial plants, terrestrial vertebrates, ...) that are used in the different chapters? the categories in this table sound quite arbitrary.	Thank you for the comment. We have removed pest, weed and disease from the table replaced by IAP, IAL, IAV and IADP for clarity. To us the categories make sense in the context of the way IAS are managed.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	100	100	3127	3127	Table 5.7 under "Future diagnostic technologies": consider changing X to check mark in the column on Agricultural invertebrate IAS for "CRISPR diagnostics" because CRISPR is already being used in experiments on controlling crop pests. Consider changing X to check mark in the column Agricultural invertebrate IAS for "track and trace genomics" because next generation sequencing and meta-barcoding are being used to diagnose these IAS.	Thank you for the comment. Future technologies have now been removed from this table. We have changed assessment to "relevant" for invertebrates under Track and Trace in this table.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	101	101	3127	3127	Table 5.7 under "Control technologies" the footnote 10 reference should be to Table 5.6, not Table 5.5. Same comment for Table 5.8 footnote 12, Page 103.	Thank you for the comment. The footnote is no longer relevant as we have expanded back out the different control technologies into individual rows.
Gallardo, Belinda	No	Chapter 5	102	102	3130	3130	Table 5.8. How is this table generated? Did all co-authors of the chapter participate? How do you decide on time frame benefit or cost-effectiveness unless references or other data are provided? Without further details, this table seems based on personal opinion.	Thank you for the comment. Final tables were validated by all co-authors.
Day, Michael	No	Chapter 5	103	103	3134	3135	Table 5.8 Biocontrol does not have to have a long time frame. Highly effective agents already tested and released in a new country without further testing can achieve very quick results (< 2 years from introduction). Also, I wouldn't say the conventional control methods are short term. Parent plants or above ground portions of plants may be killed but what about seeds and below ground plant parts. It may take literally years to control a plant because the seedbank is long-lived. In these cases using herbicides is no quicker than biocontrol. I think this is too simplistic.	Thank you for the comment. It has been addressed by altering definition of short-term in the table.
Government of China	Yes	Chapter 5	104	104	3136	3175	Priority should be given to the utilization of invasive alien species regarding governance of alien species, making the invasive species as valuable products. Actually, many invasive alien species have great value of utilization. Before taking eradication measures, analysis of economic efficiency of utilizing the invasive species can be conducted.	Thank you for the comment. We have made it clear on line 3252 that eradication decision making should only follow prior risk analysis of the IAS.
Robertson, Peter	No	Chapter 5	104	126	3136	3959	A recent paper has proposed a framework to describe and classify all management terms. This includes a number of management approaches not covered here - such as the management of captive populations and complete removal as distinct from full eradication. I suggest it would be worth including elements of this paper in this section. Robertson, P.A., Mill, A., Novoa, A., Jeschke, J.M., Essl, F., Gallardo, B., Geist, J., Jarić, I., Lambin, X., Musseau, C. and Pergl, J., 2020. A proposed unified framework to describe the management of biological invasions. Biological Invasions, 22(9), pp.2633-2645.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Management actions and strategies treated and presented in this chapter have been discussed and agreed.
Gallardo, Belinda	No	Chapter 5	104	106	3142	3243	what about the check, clean, dry strategy for freshwater species? This is a very well known strategy to deal with both first introduction and secondary spread. Another example is the campaign BePlantWise. This sections focus on a random subset of pathways, with no clear justification as to why they are selected.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Odé, Baudewijn	No	Chapter 5	104	105	3142	3217	Some important aspects of prevention through pathway management seem to be missing: 1. engaging the public in preventing ornamental plants and pets to be released in nature (usually as waist). 2. engaging both the public and trade companies to raise attention for using native plant species or non-invasive alternatives in gardening and ornamental planting in public spaces. Both aspects are promoted in the Belgian AlterIAS initiative and in the Dutch Tuinerniet.nl web database.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. These aspects are partially covered in section 5.4 (5.4.3.2).
Day, Michael	No	Chapter 5	104	104	3148	3148	should read effectiveness	Thank you, we have corrected this in the final draft.
Sathyapala, Shiroma	No	Chapter 5	104	104	3148	3148	typo: Implementation	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	104	104	3151	3151	"Convention and the International Standards..."	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	104	104	3157	3157	should read contiguous	Thank you, we have corrected this in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	104	104	3158	3159	The reference to Box 5.19 is clearly incorrect. Unable to find any box on the global spread of fall armyworm.	Thanks for this suggested change. We have included it in the new version. This particular reference to box 5.19 has now been removed. Box 5.19 is about the Working For Water Program and restoration.
Day, Michael	No	Chapter 5	104	104	3160	3160	should read contiguous	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	104	104	3160	3166	Sentence could be split after "jurisdictions" to avoid confusion. Bracket after Corn & Johnson 2013 should be removed.	Thank you for the comment. Sentence corrected.
Government of China	Yes	Chapter 5	104	104	3160	3166	First, there are three word-spelling errors: 1) contiguous should be contiguous; 2) jurisdictions should be jurisdictions; 3) initiatives should be initiatives. Second, regarding the sentence '.....and trade initiatives (e.g., China's Belt and Road; (Liu et al., 2019) are likely to have led to more rapid natural spread of invasive alien species than any form of curtailment', there is no factual basis to support it. The Belt and Road initiative is only trying to increase cooperation among countries. In fact, it is the same international trade activity as mentioned above, and its history is very short, the trade volume is much less than that among the above-mentioned trading groups. So far, there is hardly any examples of rapid spread of invasive alien species under the Belt and Road initiative. The cited paper (Liu et al., 2019) only predicted hotspots that may be at risk of being invaded under the Belt and Road Initiative. Hypothetical conclusions under simulated scenarios cannot be used to prove the impact of trade on the spread of invasive alien species, and verified factual events should be selected for evidence. Suggestion: delete (e.g., the China Belt and Road project, Liu et al., 2019).	Thank you, we have revised the draft as agreed.
Day, Michael	No	Chapter 5	104	104	3164	3164	should read initiatives	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	104	104	3167	3167	should read Australian	Thank you for the comment; correction added.
Gallardo, Belinda	No	Chapter 5	104	104	3169	3175	Not sure if you refer to New Zealand or Australia here. "the establishment rates of new AIS [...] is largely constant for plants, invertebrates and pathogens", but constant at what point? What was the % reduction in IAS rate after strong implementation of biosecurity programs? is there any graph to illustrate this? As one of the very few national scale successful experiences, it is important to portray this example in a clear manner.	Thank you for your comment. Sentence was modified and two references were added to support them.
Sathyapala, Shiroma	No	Chapter 5	105	105	3156	3156	IPPC (ISPM)measures are targeting unintentional introductions - please correct this	Thank you for the comment; correction added.
Sathyapala, Shiroma	No	Chapter 5	105	105	3168	3169	This sentence should be revised to provide a positive message. Although Australia and New Zealand are islands they also have well functioning and stringent regulatory systems.	Thank you for the comment; correction added.
Day, Michael	No	Chapter 5	105	105	3178	3178	insert "the" before brown	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	105	105	3180	3180	If system-based pathway management is such an effective management strategy, then maybe it should have been described earlier on, in section 5.1 or 5.2.	Thank you for your comment. The structure of the chapter was long discussed and agreed with the writing team and also it follows the suggestions of previous internal and external reviews.
Day, Michael	No	Chapter 5	105	105	3184	3184	should read intelligence	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	105	105	3187	3187	delete way	Thank you, we have corrected this in the final draft.
Pan, Xubin	No	Chapter 5	105	105	3187	3187	Delete "way", "want of"?	Thank you, this has been corrected in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Frésard, Marjolaine	No	Chapter 5	105	105	3198	3199	<p>Same comments than previously.</p> <p>I am surprised that it is stated that adaptive management (management once the invasive species is established) is not possible for the case of invasive alien species in marine and water connected systems. Stating that prevention, monitoring and early detection are the only possibilities in these ecosystems seems to be very restrictive and should be balanced. Fig. 5.1. leaves no room for the control of invasive species in the proliferation phase in marine and water connected ecosystems, unlike in terrestrial and closed water systems. A large number of papers have addressed the question of the optimal level of control of a spreading invasive species population, showing that the terrestrial, aquatic or marine, animal or plant nature of the invasive species does not influence the possibilities of control. These papers have shown the sensitivity of the results to the level of invasion reached when action is taken (in the proliferation phase), and to other variables linked, for example, to the dynamics of the species, to environmental disturbances or to human behaviour, but the nature of the habitat does not affect management possibilities. Moreover, these papers allow us to get out of the "all or none" dilemma (complete laissez-faire or eradication) in which Figure 5.1. puts us for the marine and water connected systems. The results highlight a recommended level of stabilization of the invasive population, allowed by a permanent control effort. These perspectives seem more constructive and positive to face this major environmental challenge in marine or water connected systems. Thus, these results must be integrated in the report, in order to consider management possibilities in the spread phase in marine habitats and water connected systems. The references of the above mentioned works are:</p> <p>BURNETT K. M., KAISER B., PITAFI B. A. and ROUMASSET J. [2006], Prevention, eradication, and containment of invasive species : illustrations from Hawaii. Agricultural and Resource Economics Review, 35(1), 63-77.</p> <p>EISWERTH M. E. and JOHNSON W. S. [2002], Managing nonindigenous invasive species : insights from dynamic analysis. Environmental and Resource Economics, 23(3), 319-342.</p> <p>FRESARD M. and ROPARS-COLLET C. [2014], Sustainable harvest of a native species and control of an invasive: a bioeconomic model of a commercial fishery invaded by a space competitor. Ecological Economics, 106, 1-11.</p> <p>FRESARD M. and BONCOEUR J. [2006], Controlling the biological invasion of a commercial fishery by a space competitor : a bioeconomic model with reference to the bay of St-Brieuc scallop fishery. Agricultural and Resource Economics Review, 35(1), 78-97.</p> <p>MACPHERSON A. J., MOORE R. and PROVENCHER B. [2006], A dynamic principalagent model of human-mediated aquatic species invasions. Agricultural and Resource Economics Review, 35(1), 144-154.</p> <p>OLSON L. J. and ROY S. [2002], The economics of controlling a stochastic biological invasion. American Journal of Agricultural Economics, 84(5), 1311-1316.</p> <p>WILMAN E. A. [1996], Pests : sustained harvest versus eradication. Journal of Environmental Management, 46(2), 139-147.</p> <p>SAPHORES J. D. M. and SHOGREN J. F. [2005], Managing exotic pests under uncertainty : optimal control actions and bioeconomic investigations. Ecological Economics, 52(3), 327-339.</p>	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence from experimental field studies. The literature suggested was reviewed and it was based on theoretical approaches through modeling studies.
Robertson, Peter	No	Chapter 5	105	105	3198	3198	Choice of word 'only' There are a few limited examples of eradications from marine systems which should be acknowledged	Thank you for your comment. We added the link to section 5.5.4 about eradication examples in marine systems with the explanation about the limitations.
Karayannis, Theofanis	No	Chapter 5	105	105	3200	3201	Another instance of ballast water being referred to as a 'pathway' whereas it is a vector.	Thank you for the comment. Please note the study followed the CBD (2014) classification. This is now included in the glossary.
Day, Michael	No	Chapter 5	105	105	3204	3204	insert "with" before "400"	Thank you, we have corrected this in the final draft.
Karayannis, Theofanis	No	Chapter 5	105	105	3207	3208	There are two separate issues in this sentence. The first is a factually incorrect reference to a "subsequent phase-in until 2024"; this is incorrect as the BWM Convention is fully in force since September 2017 and there is no phase-in - 2024 marks the end of the gradual (based on ship-specific deadlines) transition from the D-1 standard (ballast water exchange) to the D-2 discharge standard, but this is no phase-in as the Convention's provisions fully apply to all subject ships since September 2017 and simply each ship has/had to comply with the D-1 standard until its D-2 compliance deadline comes/come (so in a sense it could be said that ballast water exchange is being phased-out as an option, but that's just one aspect of this complex convention and it cannot be said that the convention itself has any phase-in). Therefore, the text "with subsequent phase-in until 2024" needs to be deleted (the alternative would be to replace it with some text outlining the above explanation, but this would be unnecessary for this Assessment). The second issue is the assertion that "compliance is still greatly uneven", which seems arbitrary and not backed by any evidence, in addition to being a rather obvious issue with every international instrument. As this assertion doesn't add any value to the discussion it should also be deleted (unless it could be replaced by something more concrete and justified). Overall, this sentence should retain only its first part "Today, the Ballast Water Management Convention has been adopted by the International Maritime Organization (IMO) and entered into force in 2017" and nothing further as the rest is either incorrect or unnecessary.	Thank you for your comment. We have now changed the text accordingly.
Day, Michael	No	Chapter 5	105	105	3213	3213	replace "at" with "in"	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	105	105	3214	3214	replace "with" with "by"	Thank you, we have corrected this in the final draft.
Robinson-Smythe, Tammy	No	Chapter 5	105	105	3214	3214	Delete "with a variety of vessels"	Thank you, we have revised the sentence accordingly.
Karayannis, Theofanis	No	Chapter 5	105	105	3216	3216	The text "regulations are recent and management has been only implemented in few countries and regions" is inaccurate. As discussed above (row 25), there simply are no international regulations on biofouling but only a few national or local ones (which indeed are recent), so text should be added to indicate that this reference is only relevant for those few existing regulations. On the other hand, biofouling management can be implemented even without mandatory regulations and this does take place in some countries or territories that don't have regulations as such. Therefore, this sentence should be improved to better capture and reflect these points.	Thank you for your comment. We have revised the paragraph and considered your comment.
Karayannis, Theofanis	No	Chapter 5	106	106	3220	3220	Another incorrect usage of the wording biofouling "treatment", which must be replaced by "management".	Thank you for the comment. We have now changed the text accordingly.
Gallardo, Belinda	No	Chapter 5	106	106	3227	3227	what do you mean by "after beach"?	Thank you, we have revised the sentence accordingly.
Robinson-Smythe, Tammy	No	Chapter 5	106	106	3227	3227	Should "beach" be "beaching"?	Thank you, we have revised the sentence accordingly.
Government of Canada (Tita, Guglielmo)	Yes	Chapter 5	106	106	3228	3228	The department of Fisheries and Oceans in Canada conducted a review of treatment protocols to prevent the spread of invasive species through recreational boating: DFO (2021). Science Advice on "Clean, Drain, Dry and Decontaminate" treatments and protocols to prevent the introduction and spread of aquatic invasive species. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2021/043. https://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2021/2021_043-eng.html	Thank you, we have added this reference.
Day, Michael	No	Chapter 5	106	105	3246	3246	It is impossible to prove the absence of something. It is only possible to state that something was not detected.	Thank you, this sentence has been revised accordingly.
Day, Michael	No	Chapter 5	106	106	3254	3255	How can one manage a species that is undetected? Perhaps it should read difficult to detect.	Thank you, this sentence has been revised.
Day, Michael	No	Chapter 5	107	107	3283	3283	Box 5.14: Should read "The ant".	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	107	107	3283	3283	Box 5.14: "The ant surveillance..."	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	107	107	3284	3284	Box 5.14: Shouldn't this read "the cost-benefit ratio is low" or "the benefit-cost ratio is high". I would have thought spending \$500K to save millions is a great investment.	Thank you, this sentence has been revised accordingly.
Sathyapala, Shiroma	No	Chapter 5	108	108	3290	3290	-animal and plant pests and diseases instead of animal health and plant diseases	Thank you, this sentence has been revised accordingly.
Day, Michael	No	Chapter 5	108	108	3296	3296	insert "the" before vector	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	108	108	3302	3302	insert a fullstop after the bracket.	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	108	108	3327	3327	"one off" can be removed	Thanks for this suggested change. We have included it in the new version.
Gallardo, Belinda	No	Chapter 5	109	109	3338	3338	Plenty of such apps for early reporting exist. Mosquitoalert is a good example (http://www.mosquitoalert.com/en/). I am wondering if their efficacy has been tested in any publication.	Thank you, we have added this example.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sathyapala, Shiroma	No	Chapter 5	109	109	3338	3346	suggest to add FAMEWS: A mobile app for monitoring and early detection of Fall Armyworm https://www.fao.org/food-chain-crisis/resources/success-stories/detail/en/c/1127653/	Thank you, we have added this example.
Outinen, Okko	No	Chapter 5	109	109	3348	3351	It is correct that the use of molecular methods are increasingly being used in marine monitoring. However, there are several limitations that prevent the use of molecular methods in marine monitoring. These analyses are expensive, time-consuming and sequence databases/libraries are developing for many species at a slow rate.	Thanks for this suggested change. We have included it in the new version.
Gallardo, Belinda	No	Chapter 5	109	109	3366	3366	Box 5.15: remove "of plant"	Thank you, this sentence has been revised accordingly.
Gallardo, Belinda	No	Chapter 5	109	109	3367	3367	Box 5.15: quarantine is imposed	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	110	110	3382	3382	batter or barter?	Thank you, this sentence has been revised accordingly.
Government of New Zealand (Perry, Joanne)	Yes	chapter 5	110	110	3387	3387	3387 insert macro over the a in Māori	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	110	117	3393	3615	Eradication. This section contains many typos and needs to be english-edited. Simply using the Word/google corrector would fix many of them.	Thank you, this section has been edited for clarity.
Dufour-Dror, Jean-Marc	No	Chapter 5	110	111	3394	3415	Comparing the necessity, the feasibility and the effectiveness of eradication of plants and animals, especially vertebrates, is somehow problematic: Even if an alien plant is not fully eradicated, a control that would lead to a significant decrease in its abundance or density in a given area, would seek its goal in terms of ecosystem functionality restoration. Of course this implies a permanent control management of the area. Whereas a non eradication of an invasive vertebrate may enables its population to recover much faster, just because the individuals cannot be monitored as easily as plant individuals are, since they do not move. It is important not to give the message that if eradication is not attainable then the control is useless.	Thank you for making this point. It does not seem to require changes to the text. We treat eradication (see Glossary) in the context of complete elimination from the designated target area, not funtional suppression.
Government of USA	Yes	Chapter 5	110	118	3394	3632	The section on eradication also fails to report data showing that insect eradication is increasing in both frequency and success rate. Among the papers that the authors apparently missed, they should consult Tobin, P. C., Kean, J. M., Suckling, D. M., McCullough, D. G., Herms, D. A., & Stringer, L. D. (2014). Determinants of successful arthropod eradication programs. Biological invasions, 16(2), 401-414. and Liebhold, et al. "Eradication of invading insect populations: from concepts to applications." Annual review of entomology 61 (2016): 335-352.	Thanks for this suggested change. We have included it in the new version.
Government of USA	Yes	Chapter 5	110	118	3394	3632	The section on eradication seems to be missing much of the literature on insect eradication. In particular, there appears to be zero mention here of the role of exploiting Allee effects during eradication. In fact the authors restate the common misperception that eradication can only be accomplished by finding and removing every individual in a population.	Thanks for this suggested change. We have included new references. We affirmed that eradication involves "effective means to remove all pre-reproductive individuals". We have chosen not to include actions by increasing Allee effect in the assessment, as you have not provided any supporting evidence for this specific approach and it does seem to be suggested elsewhere.
Linnamägi, Merike	No	Chapter 5	111	111	3418	3418	There seems to be word missing after word "native". Probably should be native species / plants/ vegetation or something similar.	Thank you, the sentence has been corrected.
Linnamägi, Merike	No	Chapter 5	111	111	3420	3422	Sentence about southern saltmarsh mosquito is really badly worded and unclear. Possible wording: New Zealand's mosquito surveillance programme was originally set up in 1998 in response to the discovery of southern saltmarsh mosquito (<i>Aedes camptorhynchus</i>) and its eradication campaign that lasted over 10 years and cost about 70 million NZ\$.	Thank you, we have edited the sentence.
Linnamägi, Merike	No	Chapter 5	111	111	3428	3428	"declared eradicated in 2020" needs to be fact checked, also contradicts 10 years stated above. All sources I found state 2010 (could not access cited article)	Thank you for the comment. Correction has been added.
Sathyapala, Shiroma	No	Chapter 5	111	111	3428	3428	To declare an eradication successful the monitoring needs to be conducted for a long period. The process is explain here ISPM9 and 8 https://www.fao.org/publications/card/en/c/30115bd4-b440-43e5-849d-ef425f343a41/ it is useful to reference these	Thank your for the comment. Necessary correction has been added.
Day, Michael	No	Chapter 5	111	111	3447	3447	Box 5.16: should read continuing	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	112	112	3453	3453	delete in	Thank you, we have corrected this in the final draft.
Dufour-Dror, Jean-Marc	No	Chapter 5	112	112	3473	3481	It is said that vertebrate eradication programs on islands have been particularly successful; but have the same efforts and resources been allocated to invasive plant control ? Probably not. So the claim that vertebrate control is more likely to success than invasive plant control is problematic and will eventually weaken our efforts to convince stakeholders to invest in alien invasive plant control	Thank you for making this point. However, we have not claimed that "vertebrate control is more likely to success than invasive plant control". We affirmed that: "It is harder to eradicate established invasive alien plants than vertebrates". It does not seem to require changes to the text.
Government of USA	Yes	Chapter 5	112	112	3473	3475	There may need to be a better distinction made here between when pesticide applications were first used on inhabited islands versus when other eradication methods, like trapping and hunting, were first used on inhabited islands. Also, there should be more discussion of different types of vertebrates or at least between rodents versus non-rodents. Also, these references are pretty old at this point.	Thank you for the comment. Unfortunately we do not have the word count available to go into this level of detail.
Government of USA	Yes	Chapter 5	112	112	3476	3476	Maximum is misspelled. There are several other spelling errors throughout Chapter 5.	Thank you, the sentence has been corrected.
Monaco, Andrea	No	Chapter 5	112	112	3479	3479	I suggest to add also this reference: Celesti-Grapow, L., Abbate, G., Baccetti, N., Capizzi, D., Carli, E., Copiz, R., ... & Blasi, C. (2017). Control of invasive species for the conservation of biodiversity in Mediterranean islands. The LIFE PonDerat project in the Pontine Archipelago, Italy. Plant Biosystems-An International Journal Dealing with all Aspects of Plant Biology, 151(5), 795-799.	Thank you for your suggestion. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Government of USA	Yes	Chapter 5	112	112	3480	3481	This database contains many, but not all vertebrate eradication projects. For example, some, but not all USDA-led eradications on islands are recorded, particularly recent ones.	Thank you for this comment. This report was not intended to be a review. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific argument.
Linnamägi, Merike	No	Chapter 5	112	112	3481	3481	ref to table 5.5 as island IAS eradication database. Should be Table 5.4	Thank you, we have corrected this in the final draft.
Achison, Jennifer	No	Chapter 5	112	112	3485	3485	Simberloff 2020 reference not listed	Thank you, we have revised the list of references.
Gallardo, Belinda	No	Chapter 5	113	113	3490	3490	Fig 5.18. Some of the graphs look counter intuitive. For instance (a) suggests bacteria and virus are far easier to manage than plants and animals, with plants apparently showing negative values. Likewise, negative values in (b) should be explained. What does the extremely low values of Europe mean? (c) is almost indecipherable, does it mean that the probability of success steeply drops ater first detection, but then it increases again? is it better to manage 600 months(according to the scale!) after introduction rather than 200 months? is the probability of success higher in mainland when compared to island as (f) seems to suggest? This figure needs some more explanation about the meaning of axes and origin of data.	Thank you for your comment. We revised the text and the figure was deleted.
Shin, Thant	No	Chapter 5	114	114	3516	3516	Meaning of sentence needs preposition "...are necessary to evaluate with economically..."	Thank you, we have corrected this in the final draft.
Linnamägi, Merike	No	Chapter 5	115	115	3532	3532	Replace "until" with "when" for readability	Thank you for the comment. Because the sentence already starts with "when", the authors chose not to include this suggestion.
Robertson, Peter	No	Chapter 5	115	115	3547	3547	word 'vital' is an overstatement, suggest replace with 'important'	Thank you for your comment. We have now changed the text to "essential".
Robertson, Peter	No	Chapter 5	115	115	3550	3552	To be clear, this description of the ruddy duck programme should be accompanied by a statement that very large scale eradications can be successful to make the message clear	Thank you for the comment. This has been addressed.
Robertson, Peter	No	Chapter 5	115	115	3552	3555	Statement that 'the cost of eradication increases in proportion to the area targeted'. This is not the case (bear in mind that 5.20 is a log-log plot) The slope of this plot suggests that cost increases at a slower rate than area such that cost per unit area is reduced by 10% each time the area doubles (Robertson et al 2017) . There are economies of scale.	Thanks for this suggested change. We have included it in the new version.
Day, Michael	No	Chapter 5	116	116	3561	3561	Delete of the references. Do not need it twice.	Thank you, we have corrected this in the final draft.
Robinson-Smythe, Tammy	No	Chapter 5	116	116	3577	3577	Replace "suggest" with "suggests"	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	117	117	3584	3584	Use the shortened form as the acronym has been defined earlier.	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	117	117	3588	3590	This sentence states prevention is the only option. However, just earlier the authors provided two examples of successful eradication. Suggest re-wording.	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	117	118	3617	3631	Box 5.18 needs to be re-written. Sentence structure is poor, words are missing, lack of punctuation. In one sentence, it is implied that <i>O. stricta</i> is a beneficial species. Should read <i>Opuntia</i> spp. instead of <i>Opuntia</i> .	Thanks for your comment. The box has been rewritten.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of USA	Yes	Chapter 5	118	118	3634	3663	The section on containment is grossly incomplete. At the beginning the authors suggest that containment is just a "fall-back" strategy to "overly zealous" eradication plans. The authors apparently lack an understanding of the benefits and practicality of containment. They should consult Grice, A. C., et al. "Containment as a strategic option for managing plant invasion." <i>Plant Protection Quarterly</i> 28.3 (2013): 62-65. They also should study the economic literature that describes the benefits of slowing or stopping invasions - e.g., Sharov, A. A., & Liebhold, A. M. (1998). BIOECONOMICS OF MANAGING THE SPREAD OF EXOTIC PEST SPECIES WITH BARRIER ZONES. <i>Ecological applications</i> , 8(3), 833-845. Finally, they might consider some of the successful examples of containment programs such as the program in the US that targets the forest insect <i>Lymantria dispar</i> Sharov, Alexei A., et al. "Slow the spread": a national program to contain the gypsy moth." <i>Journal of Forestry</i> 100.5 (2002): 30-36.	Thank you for the suggestion. The text has been amended to include your suggestion.
Day, Michael	No	Chapter 5	118	118	3636	3638	I question whether containment is a fall-back option. If one cannot contain a population, it is not possible to eradicate it. Therefore containment is a critical part of eradication. The fall back to unsuccessful eradication is long-term management.	Thank you for making this point but this does not accord with our definition of containment. It does not seem to require changes to the text.
Day, Michael	No	Chapter 5	118	118	3645	3645	should read reciprocal	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	118	118	3647	3648	Suggest re-wording. It is not clear what is meant by this sentence.	Thanks for the comment. This sentence has been deleted from the subsection.
Day, Michael	No	Chapter 5	118	118	3661	3661	insert "a" after using; should read tunicate	Thank you, we have corrected this in the final draft.
Lázaro-Lobo, Adrián	No	Chapter 5	119	119	3665	3665	It would be good to make a table with the most used control techniques and their use in different organisms (e.g., mechanical, chemical, physical and biological). For example, within chemical control make subdivisions such as herbicides for plants and insecticides for insects.	Good idea. We do not have the necessary review material to achieve this and we don't have the time now to complete.
Day, Michael	No	Chapter 5	119	119	3674	3690	Box 5.19 It would be good to provide an example of some of the species controlled and the ecological and social benefits.	Thanks for the comment. The program targeted several invasive alien species. Success rates are not available. Social and ecological benefits included.
Linnamägi, Merike	No	Chapter 5	119	119	3674	3690	Box 5.19 Is it intentional that no species are mentioned in the text box, the main (only?) species targeted in the program should be water hyacinth, this could be stated to give more data to reader	Thank you for the comment. The box mentions vegetation because the program is terrestrial but IAS agnostic.
Day, Michael	No	Chapter 5	119	119	3699	3700	Should read these instead of this; should read them instead of it.	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	119	119	3702	3702	insert "the" after to	Thank you, we have corrected this in the final draft.
Government of China	Yes	Chapter 5	119	120	3702	3707	First, the red turpentine beetle was found in China for the first time in 1998, not the 1908s. It needs to be modified. Second, China has made important achievements in using various methods to control the red turpentine beetle in the past 20 years. The invasive insect has been controlled for its rapid spread and serious harm. The last sentence of this paragraph quotes three papers of Chinese scientists (Sun Jianghua and Wan Fanghao) to question the "effectiveness of the control plan", it is inconsistent with facts. Suggestion: The program has basically limited the pest rapid spread trend and serious harm to native pine trees.	Thank you, this has been addressed in the final draft.
Linnamägi, Merike	No	Chapter 5	119	119	3703	3703	1908s should be 1980s	Thank you, this has been addressed in the final draft.
White, Michael	No	Chapter 5	119	119	3703	3703	Should this be 1980s	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	120	120	3711	3712	Sentence doesn't make sense as it is. I think it should read is undertaken largely by women and is	Thank you, we have corrected this in the final draft.
Sathyapala, Shiroma	No	Chapter 5	120	120	3712	3712	Women and young children	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	120	120	3719	3719	remove the punctuation mark after pastoralists or re-word. It is inappropriate in current form.	Thank you for your comment. We have revised the sentences and considered your comment.
Linnamägi, Merike	No	Chapter 5	120	120	3720	3720	Species name is <i>Prosopis</i> (not <i>Prosopis</i>)	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	120	120	3725	3725	should read desperately	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	120	120	3727	3727	should read traditional	Thank you, we have corrected this in the final draft.
Pan, Xubin	No	Chapter 5	120	120	3734	3734	Change "developed" to "developed"	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	122	122	3784	3784	should read target	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	122	122	3785	3785	"hunting"	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	122	122	3785	3787	Not sure what you mean, why is it culling when the target is most abundant a bad idea? What do you mean by "with respect to env. Impacts?"	Thank you, this has been clarified in the final draft.
Gallardo, Belinda	No	Chapter 5	122	122	3790	3791	Point d is also unclear, why is the installation of fencing needed?	Thank you for the comment. It has been clarified.
Day, Michael	No	Chapter 5	122	122	3792	3793	consider re-wording. Sentence does not make sense in current form.	Thank you for your comment, the sentence was modified.
Gallardo, Belinda	No	Chapter 5	122	122	3798	3798	Another example: in 2007 the red crayfish was listed in the Spanish Catalogue of Invasive Species but was challenged by public opposition due to its commercial value, prompting regional regulation allowing crayfish exploitation (Oficialdegui et al. 2020, Rigid laws and invasive species management, Conservation Biology).	Thank you for your suggestion. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Gallardo, Belinda	No	Chapter 5	122	122	3801	3804	Good example on effective invasive alien management and I am sure there are other examples. It is weird to find just one example at the end of a paragraph focused on conflicts in management. So this section seems quite pessimistic and it is not clear whether the statement that "lethal control is ineffective" is based on actual evidence, or just an opinion.	Thank you for the comment. We included the conclusions of the most widely cited review of this area (Hone, 2007) which meant we did not need to cite individual cases, so no statements in this section reflect the conclusions of that review.
Linnamägi, Merike	No	Chapter 5	122	125	3806	3913	In this chapter it should also be mentioned that use of alien species as biocontrol can be banned through legislation, and it might not be an option in some countries. This is the case for Estonia where Nature Conservation Act (https://www.rigiteataja.ee/en/eli/530062021001/consolide/§57_lg_1) bans release of alien species to wild and there is no exemption for biocontrol. This possibly could work as the final sentence in the chapter after mentioning that this tool is not risk free.	Thank you for the comment. That Estonia legislatively prevents the release of alien species as biological control agents, given that the approach has a long history of success globally and is recognised and actively supported by IPPC the CBD and the IUCN, remains the individual choice of this state, but legislative impediments to IAS management are not the subject of Ch5 and are covered more generically in 6.3.3.2.
Day, Michael	No	Chapter 5	122	122	3811	3811	delete and as such	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	123	123	3817	3818	"success" repeated twice in the same sentence	Thank you for your comment, the sentence was modified.
Day, Michael	No	Chapter 5	123	123	3822	3822	should read coconuts	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	123	123	3822	3822	"coconuts"	Thank you, we have corrected this in the final draft.
Sathyapala, Shiroma	No	Chapter 5	123	123	3825	3826	successful example classical biological control of The Asian chestnut gall wasp (ACGW) <i>Dryocosmus kuriphilus</i> in Chestnut Forests in Turkey Colombari, Fernanda & Ipekdal, Kahraman. (2016). Classical biological control of the Asian chestnut gall wasp (<i>Dryocosmus kuriphilus</i>).	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Day, Michael	No	Chapter 5	123	123	3829	3829	the reference is prior to the data. Suggest using the on-line version 2021.	Thanks for pointing this out. Latest reference added.
Day, Michael	No	Chapter 5	123	123	3832	3832	should read to	Thank you, we have corrected this in the final draft.
Dufour-Dror, Jean-Marc	No	Chapter 5	123	123	3832	3233	This section is utterly important. Biocontrol has given rise to huge hope during the 1990s regarding invasive plant control. But, as specified here, only 33% of the targeted plants were controlled at a reasonable level. That means that biocontrol ALONE does not make it in most cases and it is important to stress that integrative control management is required in order to overcome the proliferation of plant species.	Thanks for your comment. This is covered in Section 5.4.4.3. A link will be added. Also, a sentence is added in this subsection to indicate this.
Mottet, Marilou	No	Chapter 5	123	123	3832	3832	one letter missing : "elapsed o assess effectiveness".	Thank you, this has been corrected in the final draft.
Day, Michael	No	Chapter 5	123	123	3833	3838	suggest re-wording this sentence. It is too long and does not make sense in its current form.	Thank you, we have corrected this in the final draft.
Mottet, Marilou	No	Chapter 5	123	123	3836	3836	"Opraella communa" should be written "Opraella communa" with an "h"	Thank you, we have corrected this in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of China	Yes	Chapter 5	124	124	3858	3864	Box 5.21: Change "Republic of China" in line 3860 to "China", and change "five countries (Taiwan, Republic of China...)" in line 3862 to "five countries and regions (Taiwan Province of China...)". Taiwan is a province of China, it cannot be listed with other countries independently.	Thank you, we have corrected this in the final draft.
Liu, Chunlong	No	Chapter 5	124	124	3860	3860	Box 5.21:"Republic of China" should be changed to "People's Republic of China", or just to 'China'.	Thank you, we have corrected this in the final draft.
Pan, Xubin	No	Chapter 5	124	124	3860	3860	Box 5.21: Change "Republic of China" to "China"	Thank you, we have corrected this in the final draft.
Liu, Chunlong	No	Chapter 5	124	124	3862	3862	Box 5.21:According to "United Nations General Assembly Resolution 2758", Taiwan is part of China. therefore, "Taiwan, Republic of China" can be changed to (1) "Taiwan, mainland China", or (2) 'China'.	Thank you, we have corrected this in the final draft.
Pan, Xubin	No	Chapter 5	124	124	3862	3862	Box 5.21: Change "Taiwan, Republic of China" to "China"	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	124	124	3864	3864	Box 5.21: I would have thought it would be best to cite the original work. This current reference just cites earlier work.	Thank you for your suggestion. For the purpose of the chapter, the reference cited is correct.
Sagoff, Mark	No	Chapter 5	124	124	3870	3871	The passage reads, "The benefits of successful programs, however, can more than pay for projects that were not successful." Pay whom? The suggestion is that a successful project should be taxed heavily to compensate those who invested in an unsuccessful one. How would this be arranged? Would those who engage in a project have to put in escrow enough money that, should the project succeed, the funds would go to those who did not succeed. Who pays and who receives payment? What does "pay for" mean? Presumably, it means that a collective agent, society, is supposed to exist; this collective entity receives net benefits. Does society believe it is better off when the costs of failed projects are deducted from the benefits of successful ones? How is this accounting supposed to be done? A successful project may eliminate an invasive plant that is not particularly harmful, while an unsuccessful project may fail to eliminate a horrific scourge. How does the successful project pay for the unsuccessful one?	Thank you for your comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested nor do the authors support it.
Day, Michael	No	Chapter 5	124	124	3875	3875	Should be Page and Lacey. The reference needs to be corrected as well.	Thank you. This has been corrected in the final draft
Day, Michael	No	Chapter 5	124	124	3886	3886	should read had	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	125	125	3907	3913	I would not consider the owl as a classical biological control agent. It is not specific nor has it co-evolved with the pest. I would put the owl in the same category as the cane toad, mongoose and myna. Its release as stated was unregulated, whereas classical biological control agents for weeds is regulated and uses natural enemies of the weed species. Using the owl as an example is misleading and offers a disservice to classical biological control. Strongly suggest remove or re-word.	Thank you for the comment. Clarification has been added.
Day, Michael	No	Chapter 5	125	126	3915	3959	I am a little puzzled by this section. I doubt any control method on its own will lead to restoration. There usually needs to be some other active process such as planting of native or preferred species. Unless there is a well established seedbank, restoration is going to need some help. There is only 2 lines given to sowing other species.	Thank you for the suggestion. The sub-section has been edited to include your suggestions.
Day, Michael	No	Chapter 5	125	125	3921	3921	should read particularly	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	125	125	3927	3928	should read Yangtze River	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	125	125	3929	3929	should read S. alternifolia	Thank you, this has been corrected in the final draft.
Day, Michael	No	Chapter 5	125	125	3930	3931	what's flooding, su curing?	Thank you, this has been corrected in the final draft.
Gallardo, Belinda	No	Chapter 5	125	125	3930	3930	"flooding"	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	125	125	3931	3931	"scouring"?	Thanks you for the comment. The word is deleted.
Pan, Xubin	No	Chapter 5	125	125	3931	3931	"su curing"?	Thanks you for the comment. The word is deleted.
Gallardo, Belinda	No	Chapter 5	125	125	3932	3936	The example of Kettenring and Adams (2011) seems to describe alternative techniques (chemical, physical, fire) but is not about restoration. There exists other reviews about restoration: Gaertner et al 2012 (Insights into invasion and restoration ecology: Time to collaborate towards a holistic approach to tackle biological invasions, Neobiota), Norton 2020 (Species Invasions and the Limits to Restoration: Learning from the New Zealand Experience, Science) and Weidlich et al 2020 (Controlling invasive plant species in ecological restoration: A global review, J. Applied Ecology) among others. Also surprised not see something about legacy effects (Hess et al. 2019 Ecol. Engineering, Corbin and D'Antonio 2012 Invasive Plant Science and Management).	Thank you for your comment. Ecological restoration is discussed also in section 5.4.4.3 with specific literature while in section 5 we provided examples about experiences and effectiveness.
Day, Michael	No	Chapter 5	125	125	3934	3934	should read controlled	Thank you, this has been corrected in the final draft.
Government of Germany	Yes	Chapter 5	126	127	3961	3988	Need for clarification: This section is supposed to deal with management costs. Please differentiate between costs associated with the (active) management of IAS and those associated with (managed or unmanaged) impacts of IAS and give convincing definitions. Starting this section with general "economic impacts" of IAS, is confusing as it remains unclear, what impacts this cost figure covers. Furthermore, how are all these cost estimates linked to the single number included in Figure SPM 2?	Thank you for your comment. We have now edited the text to clarify the points raised. The text presented in section 5.5.8 refers only to the cost of management actions (prevention, detection, control and monitoring). It does not include cost of impacts. The first sentence aimed at providing some context on the overall economic cost of biological invasions. The cost of impacts is described in chapter 4 of the assessment. In section 5.5.8 we only refer to management costs, whereas the number in Fig SPM 2 refers to all known and documented costs.
Government of Germany	Yes	Chapter 5	126	127	3961	3988	Proposal: It is recommended to contrast the management costs with the estimated benefits of IAS control as discussed in other chapters in order to highlight that often, measures are cost-effective and benefits outweigh the costs. For an interesting case study, please consult: Jardine, Sunny L.; Sanchirico, James N. (2018): Estimating the cost of invasive species control. In Journal of Environmental Economics and Management 87, pp. 242–257. DOI: 10.1016/j.jeem.2017.07.004.	Thank you for making this point. IAS control is one aspect of IAS management. Management includes prevention, detection, control, monitoring, and adaptation. Thus, it is not possible to contrast management cost with control costs. Also, economic cost is only one aspect of management, which must also consider environmental and social aspects.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	126	126	3962	3962	add year 2017, to USD 1 trillion	Thank you for your suggestion, but the specific reference was already cited with the text.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	126	126	3962	3963	I kindly suggest add word expenditure: Global costs or expenditures of invasive alien species management are presented in Figure	Thank you for your comment. we have now slightly modified the text to improve clarity in face of this and other comments received. The text now reads "The global reported costs of invasive alien species management".
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	126	126	3962	3963	The economic impacts, damage and costs management, of invasive alien species are over USD 1 trillion and rising. Or "The type of cost included damage (economic losses due to direct and/or indirect impacts of invaders) and management (economic resources allocated to actions to avoid or limit invasion impacts)" are over USD 1 trillion and rising.... Source: Diagne et al (2021), https://www.nature.com/articles/s41586-021-03405-6/figures/8	Thank you for your comment. We have now slightly modified the text to improve clarity in face of this and other comments received. The text now reads "The global economic impacts cost of invasive alien species are over USD 1 trillion and rising (see chapter 4; Diagne et al., 2021). This cost represents documented expenditures with management of biological invasions (e.g. prevention, control, and monitoring) and economic losses associated with the impact of invasive alien species. The global reported costs of invasive alien species management (excluding impacts) are presented in Figure 5.22 (Diagne et al., 2020) totalling USD 120.5 billion (2017 USD values) over the last 50 years (Figure 5.22; Diagne et al., 2020)."

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of USA	Yes	Chapter 5	126	126	3962	3976	This very short section "management costs" does a poor job covering economic aspects of biosecurity. There is a large literature on this that apparently has been neglected in this report. For example, the authors might consult Olson, L. J., & Roy, S. (2002). The economics of controlling a stochastic biological invasion. American journal of agricultural economics, 84(5), 1311-1316. Epanchin-Niell, R. S., & Liebhold, A. M. (2015). Benefits of invasion prevention: effect of time lags, spread rates, and damage persistence. Ecological Economics, 116, 146-153.	Thank you for your comment. It was not the authors' intention to cover all the economic aspects of biosecurity. Furthermore, adopted biosecurity measures vary by country, so there is no standard framework to guide such analysis. Some proposed frameworks exist in the literature, and are mentioned in the assessment, but they are recommendations only. The literature suggested in the comment also does not cover the economic aspects of biosecurity as they only consider some aspects of biosecurity. Finally, covering or reviewing the economic aspects of biosecurity is out of the scope of the chapter. Section 5.5.8. aims at describing the reported costs of IAS management across the globe.
Day, Michael	No	Chapter 5	126	126	3965	3967	The figures are a bit misleading as there needs to be taken into account the ability to pay. In the Pacific, much of the weed management is done by hand which has low out-of-pocket costs but high in time. Numerous studies have shown how much time is spent on weed management. However, for many people time is not a resource and is not necessarily factored into costs. The same can be said for many African countries which also rely on manual control. One also has to factor in the low wages in many of these countries. Hence, perceived low management costs, compared to other countries. Misleading.	Thank you for your comment. We agree these factors are important and should be taken into consideration. These concerns would need to be addressed by the individual studies and publications in order for us to be able to capture it in this global review. As we did not have data to scrutinize individual management actions, we are unable to partition costs related to labour, material, equipment, variable wages, etc.
Government of Germany	Yes	Chapter 5	126	126	3971	3976	Proposal: Please give concrete numbers for the cost savings in order to provide the evidence for the effectiveness of this investment	Thank you for your suggestion. Unfortunately we found no data on cost savings per se. There are some estimates in the literature, but those are often guesses based on potential scenarios and no actual measurements of cost savings.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	127	127	3979	3980	Figure 5.22 specify if the dollars are at current or constant prices, specify the prices of which year. Is the 2017 US dollars according to Diagne et al. (2020)?, on the Y-axis on the graph or figure title	Thank you for this suggested change. We have included it in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	127	127	3983	3987	Please indicate the time period in Fig. 5.23. Are these annual costs? If not, from when to when?	Thank you for this suggested change. We have included it in the new version.
Government of Japan (Okawa, Natsumi)	Yes	Chapter 5	127	127	3984	3984	Figure 5.23: Please ensure that the Northern Territories of Japan, namely the Habomai Islands, Shikotan Island, Kunashiri Island and Etorofu Island (See the map here: http://www.mofa.go.jp/territory/index.html) are shown as part of Japan (described in the color of Japan), not as part of Russia in Figure 5.23.	Thank you for your feedback. The scale of the map does not allow us to clarify this point (these islands appear in black color as they are too small), and authors have chosen not to enlarge it as it would not add any value to the map and its message.
Government of Germany	Yes	Chapter 5	127	127	3985	3986	Figure 5.23 is very interesting since it shows the aggregated management costs per region. Surprisingly, Africa seems to spend double the amount of Europe and Central Asia on management of IAS. It would be extremely useful if the authors could elaborate further on the findings of this figure. Please add some more evidence for the reasons behind this picture.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Figure 5.23 shows reported costs on invasion management. South Africa and west Africa have large and long term IAS management programmes that contribute greatly to the added cost. South Africa, for instance, has the Working for Water and Working on Fire programmes that have been running since 1995 (so for over 20 years). Since its inception in 1995, the programme has cleared more than one million hectares of invasive alien plants providing jobs and training to approximately 20 000 people from among the most marginalized sectors of society per annum. Of these, 52% are women. WFW currently runs over 300 projects in all nine of South Africa's provinces with an annual budget of USD27 million. Europe does not have any large scale long term IAS management programs in place that match the cost of the African programmes.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	127	127	3985	3986	Figure 5.23 Is 2017 USD dollar? Add year 2017; is according to Diagne et al. 2020 or 2021?	Thank you for this suggested change. We have included it in the new version.
Sagoff, Mark	No	Chapter 5	128	128	3990	3992	The capacity of governments to prevent and manage biological invasions depends on how wealthy they are, how politically effective and organized, and how concerned they are about invasive species. In a developing country with all kinds of health, security, education, and other social needs, it is unlikely that the political leadership will have the money to invest in environmental causes. Their capacity depends on outside funding. The leaders may have the best scientific information available about invasive species, but they also may have invasive neighbors, that is, people who attack their country or want to immigrate there. Once you have paid the army there is no money left for the army worm. The principal question in the fight against invasive species, especially in the developing world, is where the funding is supposed to come from. Those with no idea how to answer this question have developed all kinds of good scientific evidence-based advice but it does not solve the threshold funding problem..	Thank you for this comment. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific argument.
Day, Michael	No	Chapter 5	128	128	3997	3997	should read invaded	Thank you, we have corrected this in the final draft.
Karayannis, Theofanis	No	Chapter 5	128	128	4001	4001	Another instance of incorrect designation of "pathways". The wording "shipping pathways" should be replaced by "shipping vectors" or "vectors under the shipping pathway".	Thank you for the comment. Please note the study followed the CBD (2014) classification. This is now included in the glossary.
Robinson-Smythe, Tammy	No	Chapter 5	128	128	4014	4014	Table 5.9: Add "them" after "circumvent"	Thank you, this has been corrected in the final draft.
Sathyapala, Shroma	No	Chapter 5	129	129	4007	4011	suggest to add as an example the Regional Forest Invasive species networks facilitated by the FAO in Africa, Asia Pacific, Near East, and Europe and central Asia https://www.fao.org/forestry/pests/94102/en/	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Gallardo, Belinda	No	Chapter 5	129	129	4018	4020	The British non-native species secretariat (http://www.nonnativespecies.org/home/index.cfm) is a much better long-term example of collaboration at national scale.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions.
Government of Germany	Yes	Chapter 5	129	132	4024	4158	Section 5.5.10 details very interesting and comprehensive findings on sometimes substantial general impediments to effective management. We wonder whether there are linkages between these impediments and if they could be identified. Furthermore, it would be very helpful to contrast the (potentially linked) impediments with options to address and (potentially) overcome them. This would be extremely helpful for managers and policy to see a table/list of solutions for each of this challenge.	This section was a lot longer but we needed to cut this back to a strict IPBES word limit to Chapters. Chapter 6 is mainly focused on solutions.
Gallardo, Belinda	No	Chapter 5	129	129	4026	4027	That "invasive species management is largely unsuccessful" is repeated several times over the Chapter but is not supported with specific data on % success and failure. When such data is provided (e.g. island eradication, biological control), it does not support the statement which makes the whole Chapter confusing. If the main conclusion is that invasive species are largely unmanageable, then what's the point of a 200-pages describing management strategies? Does it mean that the substantial costs of control reported in the previous chapter are basically a waste of money? Is this the intended message for stakeholders? It is fantastic to conclude that prevention is the key, but such negative connotation about post-establishment management is not supported by actual data and undermines the many local to global initiatives in place to manage invasions.	Thank you for the comment. The relevant section has been re-written to provide better context around this statement.
Day, Michael	No	Chapter 5	129	129	4031	4032	I challenge the statement that invasive species are a human caused issue. I can think of numerous weed species that are either wind borne or bird-dispersed. There are numerous diseases and arthropod pests which can also spread by wind. Yes, there are some species that are human caused but not all. Countries can have the best procedures in place and wind-borne pests will still get in. Too general and simplistic.	Thank you for your comment. Invasive alien species concept is defined in the glossary.
Robinson-Smythe, Tammy	No	Chapter 5	129	129	4032	4032	Replace "is a human construct" with "are a human construct"	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	129	129	4037	4037	Table 5.10 doesn't seem much informative, could be removed.	Thanks for the comment. Table deleted.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Athison, Jennifer	No	Chapter 5	130	130	4052	4067	The section on policy inadequacies would be improved with reference to elaboration on contradictory policy settings between biosecurity and land-use development policies. i.e. policies which promotes, encourage, regulate land use diversification or development need to integrate with biosecurity policy and not be developed separately. See for example Gill, N., Graham, S., Cross, R. and Taylor, E., 2018. Weed hygiene practices in rural industries and public land management: variable knowledge, patchy implementation, inconsistent coordination. Journal of environmental management, 223, pp.140-149.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. The main suggestion is captured in the first sentence of the section.
Sathyapala, Shiroma	No	Chapter 5	130	130	4052	4067	suggest to add weak governance or aspects of governance, such as Political Stability, Voice and Accountability, Government Effectiveness, Regulatory Quality Thomas Evans, Philine zu Ermgassen, Tatsuya Amano, Kelvin S.-H. Peh (2018) Ecology and evolution	Thank you for your suggestion. These topics are better discussed in chapter 6.
Gallardo, Belinda	No	Chapter 5	130	130	4053	4053	remove "to invasive"	Thank you, this has been corrected in the final draft.
Monaco, Andrea	No	Chapter 5	130	130	4056	4056	I suggest to use (or also use) the terms "negative" or "positive" lists, now frequently used in common language	Thank you for this suggestion. We have chosen not to use them in the assessment, as you have not provided any references.
Pan, Xubin	No	Chapter 5	130	130	4056	4056	"(live imports)?"	Thank you for your comment. The sentence was modified.
Day, Michael	No	Chapter 5	130	130	4066	4067	The sentence does not make sense. Also should read establishment.	Thank you, this sentence has been revised.
Pan, Xubin	No	Chapter 5	130	130	4066	4066	Change "un regulated" to "unregulated"	Thank you, we have corrected this in the final draft.
Robinson-Smythe, Tammy	No	Chapter 5	130	130	4066	4066	Remove the same between "un" and "regulated"	Thank you for your comment. We have revised this section and this comment is no longer relevant.
Robinson-Smythe, Tammy	No	Chapter 5	130	130	4081	4081	Add "this" after "against"	Thank you, this has been corrected in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	130	130	4084	4085	Should indicate somehow that this "Global Biodiversity Framework" has not (yet) been agreed by the CBD COP - not even this name...	Thanks for this suggested change. We have included it in the new version.
Day, Michael	No	Chapter 5	130	130	4087	4087	should read related	Thank you, we have corrected this in the final draft.
Hieda, Shinya	No	Chapter 5	130	131	4087	4102	In this section, I think it is important that examination for the basic question: who is responsible for managing the invasive alien species and invaded sites? (e.g. Kamigawara et al. 2020. J. Int. Wildl. Law Policy 23(2):83-108.)	Thank you for your comment. We have included it in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	130	131	4088	4094	Is it true that "the vast majority of agribusinesses ... do not manage the risk of" alien pasture plants and the ornamental horticulture industry? Is this the role of business? What about in Canada?	Thank you for the comment. Why does the business making money out of selling plants including IAS not have a stakeholder role to play in preventing their impacts? That is not logical whatever the local legal context might be. Canada may not yet recognise this but it is recognised in other jurisdictions with effective biosecurity systems.
Day, Michael	No	Chapter 5	131	131	4100	4100	should read Marshall et al. 2016?	Thank you, this has been corrected in the final draft.
Day, Michael	No	Chapter 5	131	131	4104	4104	poor punctuation throughout; numerous places where commas are missing.	Thank you, this sentence has been revised accordingly.
Hieda, Shinya	No	Chapter 5	131	131	4104	4120	Misidentification impedes species regulation. In the case of <i>Ludwigia grandiflora</i> subsp. <i>hexapetala</i> in Japan, its trade, hold and release have been prohibited from 2014. <i>Ludwigia grandiflora</i> subsp. <i>hexapetala</i> could be misidentified as a native, threatened species, <i>L. peploides</i> subsp. <i>stipulacea</i> in Japan. Genus <i>Ludwigia</i> , sect. <i>Jussiaea</i> species are known as taxonomically difficult, misidentification is could lead to unintentional, illegal cultivation. References: Hieda et al. 2020. Acta Phytotax. Geobot. 71:65-71	Thanks for this suggested change. We have included it in the new version.
Day, Michael	No	Chapter 5	131	131	4110	4100	should read its	Thank you, we have corrected this in the final draft.
Robinson-Smythe, Tammy	No	Chapter 5	131	131	4112	4114	Replace "The Japanese sea star (<i>Asterias amurensis</i>) was also misidentified in Australia 4112 with the native species (<i>Uniophora granifera</i>)" with "In Australia the Japanese sea star (<i>Asterias amurensis</i>) was also confused with the native species (<i>Uniophora granifera</i>)". Additionally remove the initial M from the in-text reference.	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	131	131	4114	4114	should read Campbell et al. 2007?	Thank you for the comment. We have corrected this according to the APA style.
Day, Michael	No	Chapter 5	131	131	4122	4133	I would have thought there should be more on capacity and capability. However, it rates a mention in the last sentence. Capability could be included in expertise but I think more could be said on capacity. Throwing more dollars may not achieve much more if the capacity is not there.	Thank you for making this point. It does not seem to require changes to the text.
Day, Michael	No	Chapter 5	131	131	4127	4128	this is a circular argument. Success is partially influenced by adequate resourcing. If a management programme is not adequately resourced, the chance of success is lower. Thus there is reluctance to provide more resources. There will always be debates on what's adequate resourcing. Hence, trying to source funding will always be difficult.	Thank you for making this point. It does not seem to require changes to the text.
Robinson-Smythe, Tammy	No	Chapter 5	132	132	4142	4142	Add "(" after "(Howarth, 1991)" - currently only a closing bracket at the end of the sentence but no opening bracket.	Thank you, we have corrected this in the final draft.
Gallardo, Belinda	No	Chapter 5	132	132	4145	4145	Rephrase "not helped by its benefits", is unclear	Thank you for your comment. The sentence was modified.
Day, Michael	No	Chapter 5	132	132	4153	4158	I think this section could be expanded considerably. I agree that many people are not aware of the impacts of invasive species. The section could benefit by highlighting activities and awareness programs that educate people in invasive species. There are numerous papers and socio-economic studies that highlight impacts. This applies to invasive species of protected areas as well as agricultural systems. Without such studies, governments and stakeholders are unlikely to act.	Thank you for your comment. This section was a lot longer but we needed to cut this back to a strict IPBES word limit to Chapters.
Sathyapala, Shiroma	No	Chapter 5	132	132	4153	4158	suggest to discuss lack of awareness of IAS at school level and not included in the school curriculums	Thanks for this suggested change. We have included it in the new version with a short sentence.
Dufour-Dror, Jean-Marc	No	Chapter 5	133	133	4159	4159	Knowledge gap in management could be easily filled by an on-line platform displaying of up-to-date control management technique for each invasive taxon. Such a platform should be multilingual and regularly updated by specialists devoted to this task. This is a huge but necessary project to set up such a platform where anyone can type the name of an invasive species and gets the most updated information regarding control techniques applied in various regions of the world.	Thank you for your comment. Such platforms do exist with information on a range of issues. As these are presented in Section 5.4., we have decided not to discuss them here again.
Gallardo, Belinda	No	Chapter 5	133	133	4162	4181	This basic synthesis about global evidence of IAS eradication should be presented way earlier in the Chapter. Is the kind of data based synthesis I was expecting in the part about eradication.	Thank you for the comment. In this chapter we were not able to provide a literature review synthesis of eradication programs, rather a few case studies, but we have linked this section to 5.5.4 so the two can be considered together.
Robinson-Smythe, Tammy	No	Chapter 5	133	133	4177	4177	Delete "in places"	Thank you, we have corrected this in the final draft.
Bliss, Cebuan	No	Chapter 5	134	136	4216	4304	Suggested additional literature re. social (un)acceptability of IAS management: Carter, L., Mankad, A., Zhang, A. et al. A multidimensional framework to inform stakeholder engagement in the science and management of invasive and pest animal species. <i>Biol Invasions</i> 23, 625–640 (2021); Liordos, V., Kontsiotis, V. J., Georgari, M., Baltzi, K., & Baltzi, I. (2017). Public acceptance of management methods under different human-wildlife conflict scenarios. <i>Science of the Total Environment</i> , 579, 685–693; van Eeden LM, Newsome TM, Crowther MS, Dickman CR, Bruskotter J. 2019. Social identity shapes support for management of wildlife and pests. <i>Biological Conservation</i> 231:167–173; Jacobs, M. H., Vaske, J. J., & Stijtsma, M. T. J. (2014). Predictive potential of wildlife value orientations for acceptability of management interventions. <i>Journal for Nature Conservation</i> , 22(4), 377–383	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.
Monaco, Andrea	No	Chapter 5	134	134	4234	4234	add the word "visions" after "different"	Thanks for this suggested change of wording. As it does not change the meaning, it is a matter of style and we will not adopt it.
Robinson-Smythe, Tammy	No	Chapter 5	134	134	4239	4239	Replace "has" with "have"	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	135	135	4247	4247	should read become; could also include those species used for medicinal purposes such as <i>Mikania micrantha</i> in the treatment of cuts	Thanks for this suggested change. We have included it in the new version.
Monaco, Andrea	No	Chapter 5	135	135	4256	4261	For what concern the human dimensions of alien fish introductions for recreational fishing see also Cerri, J., Ciappelli, A., Lenuzza, A., Zaccaroni, M., & Nocita, A. (2018). Recreational angling as a vector of freshwater invasions in Central Italy: perceptions and prevalence of illegal fish restocking. <i>Knowledge & Management of Aquatic Ecosystems</i> , (419), 38.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Guareschi, Simone	No	Chapter 5	135	135	4260	4261	This is probably my fault, but It is not totally clear where "This conflict" refers to. Trout example?	Thank you for your comment. We have reworded the sentence to clarify the meaning.
Atchison, Jennifer	No	Chapter 5	135	135	4266	4266	Typo - becomes	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	135	135	4271	4271	should read impediment	Thank you, we have corrected this in the final draft.
Government of Netherlands (Van Dijk, Chris)	Yes	Chapter 5	135	135	4272	4272	new risks may arise from developments in other sectors such as agricultural forestry (Food forests). This often involves planting exotics that are potentially invasive	Thank you for making this point. It does not seem to require changes to the text.
Van Dijk, Chris	No	Chapter 5	135	135	4272	4272	new risks may arise from developments in other sectors such as agricultural forestry (Food forests). This often involves planting exotics that are potentially invasive	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions, however, examples of risk from agro-forestry and other sectors are referred to in later paragraphs, and in table 5.11.
Day, Michael	No	Chapter 5	135	135	4277	4277	should read understands	Thank you, we have corrected this in the final draft.
Atchison, Jennifer	No	Chapter 5	135	136	4280	4285	For a recent example of this in Australia see the 'PlantSure' scheme - the development and introduction of voluntary codes for the Australian Gardening and Horticulture Industry https://www.gardeningresponsibly.org.au/ Curtis, D.J., Gill, N.J., Atchison, J.M. and McKiernan, S., 2018. Plant Sure Environmentally Safe Ornamental Plant Scheme: Review of existing certification or accreditation schemes and recommendations for a model scheme. Article available at https://ro.uow.edu.au/cgi/viewcontent.cgi?article=5151&context=sspapers	We cannot add additional text to the chapter due to word length restrictions. As this is another example to support a point already made, and not crucial to our critical evaluation, we have chosen not to include it here.
Guareschi, Simone	No	Chapter 5	137	137	4305	4307	Table 5.11. Check <i>Procambarus clarkii</i> too if you want a freshwater invertebrate example. See the recent and relevant: - Oficialdegui et al. 2020 Conservation Biology; - Oficialdegui et al. 2020 Reviews in Fish Biology and Fisheries	Thanks for this suggested change. We have included it in the new version.
Government of Mexico (Méndez-Sánchez, Federico Alfonso)	Yes	Chapter 5	137	139	4307	4308	In Table 5.11, the last row (page 139) is missing the information for the first two columns (species, group). It should read Feral goat and Terrestrial mammal.	Thanks for pointing this out, we have now changed the text accordingly.
Government of New Zealand (Perry, Joanne)	Yes	chapter 5	139	139	4308	4308	4308: Table 5.11: appears to be something missing on the table on page 139 in relation to Mexico, Guadalupe etc. the first two columns are incorrect.	Thank you, we have corrected this in the final draft.
Pan, Xubin	No	Chapter 5	139	139	4308	4308	Table 5.11: Mexico is not in Asia	Thank you for the comment. In the row Mexico relates to the invaded range and Asia the native range.
Monaco, Andrea	No	Chapter 5	140	140	4311	4311	After "species" add "Gaertner et al., 2017". Gaertner, M., Wilson, J. R., Cadotte, M. W., MacIvor, J. S., Zenni, R. D., & Richardson, D. M. (2017). Non-native species in urban environments: patterns, processes, impacts and challenges. <i>Biological Invasions</i> , 19 (12), 3461-3469.	Thanks for this suggested change. We have included it in the new version.
Government of Netherlands (Van Dijk, Chris)	Yes	Chapter 5	140	140	4340	4340	important pathways for the spread of invasive alien species are railways and highways. These often converge in urban areas	Thank you for the comment. We have added a sentence to make this point.
Van Dijk, Chris	No	Chapter 5	140	140	4340	4340	important pathways for the spread of invasive alien species are railways and highways. These often converge in urban areas	Thank you for your comment. We have added a sentence to highlight this point.
Government of New Zealand (Perry, Joanne)	Yes	chapter 5	141	141	4366	4366	4366 please recheck reference re NZ MPI biosecurity 2025 as this doesn't appear to match the reference title list in the back. On the MPI website it is just referred to as Biosecurity 2025. https://www.mpi.govt.nz/biosecurity/about-biosecurity-in-new-zealand/biosecurity-2025/	Thank you for the comment, the reference has been corrected.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	141	143	4379	4454	Many of the bullet points in Section 5.6.2.1 are not "knowledge gaps" as much as non-application of existing knowledge, or unresolved situations of conflict management. For example: Pathways; e-commerce; compliance to ballast water treatments; surveillance of ports; decision-making; intangible impacts. Species-led; animal ethics; IAS with benefits; incorrect taxonomic identification. Site-based; inclusion in decision-making; prioritization.	Thank you for your comment. This section was revised based on a standard system for presenting knowledge gaps across the different chapters in the assessment. The section now includes both knowledge gaps as well as implementation gaps, which are of special importance to this chapter.
Monaco, Andrea	No	Chapter 5	141	141	4379	4379	I suggest to consider to add in this section also the knowledge gaps for what concern the most effective approaches and skills to better communicate and raise awareness on this issue; we also lack of scientific evaluation of the effectiveness of communication strategies and approaches	Thank you for your comment. We have revised this section to deal with knowledge gaps and implementation gaps (between science and management).
Day, Michael	No	Chapter 5	141	141	4380	4380	should read knowledge	Thank you, we have corrected this in the final draft
Gallardo, Belinda	No	Chapter 5	141	141	4380	4380	knowledge	Thank you, we have corrected this in the final draft
Monaco, Andrea	No	Chapter 5	141	141	4389	4389	I'm not sure that is correct to focus on "illegal pet trade". I suggest to replace with "pet and ornamental plant trade".	Thank you for your comment. We have revised this sentence as "particularly the pet and ornamental plant trade".
Sathyapala, Shiroma	No	Chapter 5	141	141	4389	4389	suggest to add ornamental plant industry (nurseries)	Thank you for your comment. We have revised this sentence as "particularly the pet and ornamental plant trade".
Karayannis, Theofanis	No	Chapter 5	142	142	4391	4391	Another instance of incorrect use of "treatment"; the wording "ballast water treatments" must be replaced by "ballast water management".	Thank you for the comment. We have now changed the text accordingly.
Day, Michael	No	Chapter 5	142	142	4394	4394	could include between islands within countries e.g. Indonesia, the Philippines and many Pacific island nations. Why mention state or county borders? What about moving species from one region within a state to another? Some states are huge. I can think of a few weed species where some regions wouldn't want them despite the weed being present in other parts of the state. Too simplistic.	Thank you for your comment. This section was revised based on a standard system for presenting knowledge gaps across the different chapters in the assessment. The section now includes both knowledge gaps as well as implementation gaps, which are of special importance to this chapter.
Day, Michael	No	Chapter 5	142	142	4398	4398	Delete of	Thank you, we have corrected this in the final draft
Gallardo, Belinda	No	Chapter 5	142	142	4427	4427	"Evaluation of the impacts of chemical..."	Thanks for this suggested change. We have included it in the new version.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Guareschi, Simone	No	Chapter 5	143	143	4456	4471	<p>Sub-section: Challenges to management in relation to knowledge gaps in invasion biology. Here (or in Chapter 4) I feel still missing a part about the implications of IAS on current biomonitoring policies. How to manage or consider IAS in biomonitoring still represents a knowledge gap/challenge. Moreover, this relevant part will further benefit from splitting it into terrestrial, freshwater, and marine contexts.</p> <p>The purpose of the monitoring may also affect the decision to consider them, and it seems reasonable to include IAS within biodiversity monitoring approaches (e.g., all the morpho-species present in a site), while it is more problematic to assign a positive value to an IAS for ecological status assessments aimed at providing information regarding ecosystem health or quality.</p> <p>Focussing on freshwaters, the arrival and spread (even potential dominance in some cases) of new fauna in a river system raises questions regarding the whole monitoring paradigm.</p> <p>Biological invasions could have major implications for the management and conservation of freshwater systems if they lead to a misclassification of waterbodies. IAS can be very abundant and/or cryptic in some rivers and directly affect biotic index calculation and reliability (Gabriels et al. 2005; Ćuk et al., 2019; Guareschi and Wood, 2019). What can we do about IAS when biomonitoring? How to integrate IAS in river biomonitoring systems when they share the same taxonomic level (family) as native taxa? Moreover, the integration of their presence and associated information into official biomonitoring and management frameworks has been applied heterogeneously internationally (Boon et al. 2020; Guareschi and Wood, 2021). The topic represents a clear example of the knowledge gaps existing at the interface between invasion science and resource management.</p> <p>Please see:</p> <ul style="list-style-type: none"> - Boon, P.J., Clarke, S.A. & Copp, G.H. (2020). Alien species and the EU Water Framework Directive: a comparative assessment of European approaches. <i>Biological Invasions</i>, 22, 1497–1512. - Gabriels et al. 2005. Implications of taxonomic modifications and alien species on biological waterquality assessment as exemplified by the Belgian Biotic Index method. <i>Hydrobiologia</i>, 542(1), pp.137-150. - Guareschi S & PJ Wood (2019). Taxonomic changes and non-native species: An overview of constraints and new challenges for macroinvertebrate-based indices calculation in river ecosystems. <i>Science of the Total Environment</i> 660, 40-46 - Ćuk et al. 2019. Biocontamination of benthic macroinvertebrate assemblages in Croatian major rivers and effects on ecological quality assessment. <i>Knowledge & Management of Aquatic Ecosystems</i>, (420), p.11. - Olden et al. 2021 <i>Invasive Species in Streams and Rivers</i>. Reference Module in Earth Systems and Environmental Sciences, Elsevier, https://doi.org/10.1016/B978-0-12-819166-8.00083-9 - Guareschi and Wood, 2021. <i>Biological Invasions of River Ecosystems: A Flow of Implications, Challenges, and Research Opportunities</i>. Reference Module in Earth Systems and Environmental Sciences, Elsevier, ISBN 9780124095489, https://doi.org/10.1016/B978-0-12-821139-7.00147-1 	Thank you for the comment. Additions added to the knowledge gap list and section 5.6.2.2 to include this.
Day, Michael	No	Chapter 5	143	143	4463	4463	should be mis-informed	Thank you, we have corrected this in the final draft.
Government of Netherlands (Van Dijk, Chris)	Yes	Chapter 5	144	144	4498	4498	The aversion to biocontrol is mainly due to the introduction of an othr exotic species for control purposes. Biocontrol can also consist of a native species (eg soil pathogen that can attack rhizomes of knotweed) for the control of the invasive exotic species, there will be less resistance against this. Disadvantages are the expensive and lengthy processes	Thank you for the comment. This is a useful observation but we can not address this here as it is out of context of the brief point on biological control (which is covered in section 5.4 and 5.5 and does not reflect international agreement on biological control.
Van Dijk, Chris	No	Chapter 5	144	144	4498	4498	The aversion to biocontrol is mainly due to the introduction of an othr exotic species for control purposes. Biocontrol can also consist of a native species (eg soil pathogen that can attack rhizomes of knotweed) for the control of the invasive exotic species, there will be less resistance against this. Disadvantages are the expensive and lengthy processes	Thank you for your comment. The advantages of biocontrol far outweigh its disadvantages. Agree that it is better to use native agents wherever possible.
Government of Germany	Yes	Chapter 5	146	146	4565	4569	Proposal: It would be extremely valuable to have a more indepth discussion of the management options for IAS with regard to SDG goals 15.8.1. Which role could the chapter play to summarize the important information on management aspects in order to reach this SDG? Furthermore, stressing the role that climate change will play for IAS particularly in marine environments, are there specific recommendations for policy to better prepare existing IAS management for those new but likely challenges?	Thank you for the comment. This is covered in Chapter 6.
Karayannis, Theofanis	No	Chapter 5	146	146	4565	4567	The fact that IAS are considered under the SDGs only in the context of the terrestrial environment (Goal 15.8.1) is an issue that IMO is regularly highlighting in various fora (see also relevant comment on the Summary for policymakers, row 12 above) so it is good to see it pointed out here. However, I have some concern with the second part of this sentence, which seems to imply that climate change is the only reason for IAS to also be considered equally in marine environments. This is a bit puzzling as IAS have always been equally important in the marine realm so it seems peculiar to point out this imbalance of the SDGs in a section that is specifically about climate change. This issue is overarching and pre-existing and not something that is emerging due to climate change, so it should be highlighted at a more appropriate location in the Assessment and with a broader angle.	Thank you for the comment. This is covered in Chapter 6.
Guareschi, Simone	No	Chapter 5	146	146	4566	4567	Just terrestrial and marine ecosystems are mentioned. Are freshwater systems included in terrestrial as inland ecosystems? It would be useful to specify. Land use changes may affect riverine communities too in both riparian and aquatic components.	Thank you for the comment, we have included freshwater in the final draft.
Day, Michael	No	Chapter 5	148	148	4587	4587	remove one set of brackets	Thank you, we have corrected this in the final draft.
Day, Michael	No	Chapter 5	151	151	4613	4613	should read AUD 314 billion	Thank you, we have corrected this in the final draft.
Government of Germany	Yes	Chapter 5	152	152	4639	4695	Need for clarification: Do you see any specific strength and weaknesses or gaps of available scenarios and modeling approaches for IAS management? Please elaborate a bit further on the role and perspective of scenarios and models for IAS mangement as this section ends rather abruptly.	Thanks for this suggested change. The S&M has been revised substantially since the SOD and a sentence has been added at the end of the paragraph to clarify gaps identified.
Yu, Dandan	No	Chapter 5	152	152	4666	4667	Only the problems of S&M in the application of IAS are discussed here, but the direction of solution is not pointed out. Therefore, it is recommended to add the following content: "Some new scenarios framework, such as the Nature Futures Framework (NFF) that produced by the former IPBES expert group on scenarios and models and current IPBES task force on scenarios and models, could facilitate integration of interlinkages of social-ecological systems across direct and indirect drivers, nature, nature's contributions to people, and good quality of life, and the incorporation of multiple systems of knowledge across scale and sectors (Pereira et al., 2020).The application of the NFF will allow for the exploration of the impacts of alternative policy and management options in nature conservation and sustainable development with action-oriented science and a wide range of tools in scenarios and modelling. "	Thanks for this suggested change. We have included it in the new version.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	153	154	4690	4695	More explanation of Figure 5.25 is required. The Sankey diagram looks like everything is connected to everything...	Thank you for the comment. Figure 5.25 caption has been edited for clarity.
Gallardo, Belinda	No	Chapter 5	153	154	4693	4693	Fig. 5.25. Not clear what this figure contributes to the section. It's difficult to follow since elements are not explained.	Thank you for the comment. Figure 5.25 caption has been edited for clarity.
Government of Canada (Bourchier, Rob)	Yes	Chapter 5	154	154	4690	4695	Figure 5.25 is not clear and needs explanation/guidance in the figure caption	Thank you for the comment. Figure 5.25 caption has been edited for clarity.
Government of Germany	Yes	Chapter 5	155	155	4696	4697	Proposal: "The main objective of this chapter was to review and assess the efficacy of various approaches". It would be helpful to have a list, or an overview of those most efficient approaches for IAS management- depending on for instance, terrestrial, marine or freshwater contexts.	Thank you for your suggestion. We cannot add additional text to the chapter due to word length restrictions and all approaches were discussed across the chapter.
Robertson, Peter	No	Chapter 5	155	155	4696	4696	I would suggest a statement in the conclusions to say that current management is not dealing with the scale of the problem, all major targets have been missed and most impacts remain unmanaged.	Thank you for the comment. This is included in Section 6.
Sathyapala, Shiroma	No	Chapter 5	155	157	4697	4796	The conclusions need more discussion on climate change based on 5.6.2.4 and other sections	Thanks for this suggested change. We have included it in the new version.
Atchison, Jennifer	No	Chapter 5	156	156	4737	4742	Caution that while there are clear benefits to incorporating Indigenous knowledge into IS governance and policy, efforts to do so must be respectful of that knowledge and the principles and practices for protecting Indigenous intellectual property.	Thanks for this suggested change. We have included it in the new version.
Gallardo, Belinda	No	Chapter 5	157	157	4781	4781	"This chapter has taken a deliberately + and a solutions focussed approach [...] the vast majority of actions taken to manage invasive alien species around the world over the last 70 years have been largely unsuccessful." It is all just very contradictory and confusing. If the Chapter didn't "undertake a complete and objective review of successes vs failures", this type of strong stements should be avoided. A method section at the begining to clarify what kind of review has been undertaken should clarify things.	Thank you for the comment. A methods text has been added to the start of the chapter. We believe it is self evident that most attempts to management IAS have not been successful and is an objective observation, because if so IAS would not be causing the impacts recognised in Chapter 4.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	157	157	4781	4783	Change: "It is true that the vast majority of actions taken to manage invasive alien species around the world over the last 70 years have been largely unsuccessful." I kindly suggest: The management actions carried out around the world, during past decades, and experience of miscalculation /equivocation have served to guide and make progress in management knowledge of invasive alien species	Thank you for your comment. The paragraph was modified and now it captures your suggestion.
Sagoff, Mark	No	Chapter 5	157	157	4781	4783	"It is true that the vast majority of actions taken to manage invasive alien species around the world over the last 70 years have been largely unsuccessful." The chapter overall served its positive purpose well. I wonder, though, if it would be helpful better to distinguish projects undertaken to prevent, control, or extirpate 1) species which cause economic damage, such as agricultural pests and 2) species that cause environmental or ecological damage, such as those that eliminate native species. I think programs undertaken for economic reasons will have a quite different profile, e.g., stakeholder involvement, than programs undertaken for ecological reasons. Chapter 5 makes a fair and useful contribution to a body of research that is plainly ongoing. It does not propose to say the final word.	Thank you for the comment. In this chapter we have taken a deliberately holistic approach that does not drill down into differences between the management of IAS in agricultural versus an environmental context. Both are within the scope of the assessment. Agricultural pest, weed and disease management is well reviewed and covered elsewhere and we include specific elements of it only where relevant (e.g. some forms of biocontrol). We made a deliberate decision not to separate this out in any other context as we believe the chapter is relevant for understanding solutions for both without the need to be more context specific.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 5	157	157	4791	4791	but, the successes described in this chapter chapter show	Thank you, we have corrected this in the final draft.
Government of Germany	Yes	Chapter 5	158	229	4797	8320	Proposal: It looks like only literature sources published in English language are being cited. However, our experience is that a lot of important information on invasive alien species is being published in local languages only. This points towards a bias of the analysis / the document regarding the western world / evidence from scientists and managers in countries able and willing to write in English and publish internationally. In the comments to the first order draft, we proposed to also include relevant literature sources from Germany published in German, which were, however not included.	Thank you for the comment. This is Challenging where papers can not be found on Google scholar. However many papers have been covered from around the world and our diverse authorship of this chapter would have provided relevant studies not in English had they been relevant.
Fabre, Sophie	No	Chapter 5	158	229	8047	8047	Some recent review publication could be added : (1) Vaz AS, Alcaraz-Segura D, Vicente JR and Honrado JP (2019) The Many Roles of Remote Sensing in Invasion Science. Front. Ecol. Evol. 7:370. doi: 10.3389/fevo.2019.00370 (2) N. Ahmed et al. (2020) Integration of remote sensing and bioclimatic data for prediction of invasive species distribution in data-poor regions: a review on challenges and opportunities Environmental Systems Research	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence to link the references to a specific text or example.
Government of New Zealand (Perry, Joanne)	Yes	chapter 5	163	163	5082	5085	the reference to Biosecurity NZ is spelled incorrectly	Thanks for this suggested change. We have included it in the new version.
Karayannis, Theofanis	No	Chapter 5	188	188	6316	6317	While the IMO press briefing on the BWM Convention's entry into force is a meaningful reference, it would make more sense to also add the Convention itself as a reference.	Thank you, we have corrected this in the final draft.
Jeschke, Jonathan	No	Chapter 5	215	215	7624	7624	Please remove "Scopus." (this is not part of this reference).	Thank you, we have corrected this in the final draft.
Marchante, Elizabete	No	Chapter 5	223	223	8039	8046	these 2 references are repeated	Thank you, we have corrected this in the final draft.
Karayannis, Theofanis	No	Chapter 5	236	237	8460	8489	While it is noted that this review should not concern with editorial aspects that will be considered later during proofreading, this entire paragraph/section is notably full of numerous language issues.	Thank you, we have corrected this in the final draft.
Karayannis, Theofanis	No	Chapter 5	236	236	8463	8463	IMO's Biofouling Guidelines are mentioned here as a reference but not included in the list of references. (noting row 25 above also relating to this addition in the reference list)	Thanks for this suggested change. We have included it in the new version.
Pan, Xubin	No	Chapter 5	238	238	8539	8539	": the?"	Thank you, we have corrected this in the final draft.
Slade, Glen	No	Chapter 5	238	238	8558	8558	The GM medfly strain with female specific lethality construct developed by Alpey is not available for use in a program as stated here; regulatory hurdles have impeded even a field release. However, you could cite Oxitec's fall armyworm (Spodoptera frugiperda) strain which was recently published in BMC Biotechnology (https://bmcbiotechnol.biomedcentral.com/articles/10.1186/s12896-022-00735-9) and has biosafety approval in Brazil. See Oxitec's announcement here (https://www.oxitec.com/en/news/study-heralds-a-new-transformative-solution-for-the-crop-destroying-fall-armyworm-1)	Thank you but we do not believe that the suggestion adds to the assessment. We have corrected the first observation.
Slade, Glen	No	Chapter 5	239	239	8573	8573	Please spell BigSis thus (ending with lower case 'is'), reflecting the updated trading style (see website www.bigsis.tech).	Thank you, we have corrected this in the final draft.
Slade, Glen	No	Chapter 5	239	239	8578	8578	Please spell BigSis thus (ending with lower case 'is'), reflecting the updated trading style (see website www.bigsis.tech).	Thank you, we have corrected this in the final draft.
Slade, Glen	No	Chapter 5	239	239	8578	8578	The BigSis solutions have been cleared by regulators in England (part of UK), not the whole of the UK.	Thank you, we have corrected this in the final draft.
Government of Australia	Yes	Chapter 5	239	240	8594	8608	This paragraph needs changing, otherwise it reads like a forgone conclusion.	Thank you, we have edited the draft as suggested.
Government of Germany	Yes	Chapter 5	240	240	8624	8627	Need for clarification: The scenario described here remains unclear. It should be clearly stated and referenced what the intended application of RNAi could be.	Thank you. It was edited out
Government of Germany	Yes	Chapter 5	241	241	8675	8678	Proposal: This statement is speculative, as costs for gene drive applications cannot be seriously estimated today. The report fails to mention e.g. the costs for monitoring, which will be significant. Also time frames will vary dramatically depending on the gene drive. For e.g. invasive alien mammals, like rodents, long environmental exposure is estimated, increasing cost of the management action. It is recommended to delete this part.	Thank you. It was deleted
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	241	241	8679	8681	The statement that "In almost all cases synthetically modified target organisms with invasive alien species control in mind will be classed as genetically modified organisms and will be subject to genetically modified regulatory approval" is not accurate. In several countries there is resistance to labelling these organisms as GMOs and a great deal of debate over it.	Given the situation as stated is still the case the statement is accurate
Government of Canada (Fraleigh, Brad)	Yes	Chapter 5	242	242	8689	8694	The cases of GMOs cited (chestnut, mosquito, zika) may well have significant public attention, but these examples do not apply to the topic of this section, which is synthetic gene drive. Moreover, many genetically modified agricultural organisms have already been released.	This section does not specifically relate to synthetic gene-drives it is titled "Genetic control approaches" which is therefore a broader context including these examples. This has been clarified
Government of Germany	Yes	Chapter 5	242	242	8698	8699	Proposal: Important statements should be evidence-based. This statement should be backed up by a recent literature source.	Ref added
Government of Germany	Yes	Chapter 5	242	242	8699	8701	Proposal: This statement should be balanced, otherwise it might not be correct. It is suggested to rephrase: "...by some non-governmental organisation, while has not been accepted by most conservation non-governmental organisations."	Thank you for the comment. It is corrected.
Government of China	Yes	Chapter 5	248	248	8942	8943	"Republic of China" should be revised to "China". The full name of China is the People's Republic of China rather than Republic of China. Please use "China" to keep consistency throughout the report.	Thank you, we have corrected this in the final draft.
Liu, Chunlong	No	Chapter 5	248	248	8943	8943	"Republic of China" should be changed to "People's Republic of China"	Thank you, we have corrected this in the final draft.
Smith, Kevin	No	Chapter 5	253	253	9156	9156	In this section on the ISSG, please add "IUCN and its ISSG have also recently published a global standard for the classification of the impact of alien species on the environment, called Environmental Impact Classification for Alien Taxa (EICAT) (IUCN 2020)". Reference: IUCN (2020). IUCN EICAT Categories and Criteria. The Environmental Impact Classification for Alien Taxa First edition. Gland, Switzerland and Cambridge, UK: IUCN. X + Xpp.	Thanks for this suggested change. We have included it in the new version.
Luisa Nunes, Ana	No	Chapter 5	254	254	9167	9169	Please delete the sentence, as currently ISSG is not producing the biannual newsletter anymore.	Thank you, we have corrected this in the final draft.
Diaz, François	No	Chapter 5	254	254	9174	9174	In the following sentence, "The nvasive Species Specialist", it misses the "I" to have "Invasive"	Thank you, this has been addressed in the final draft.
Luisa Nunes, Ana	No	Chapter 5	254	254	9174	9174	Invasive has been misspelled	Thank you, this has been addressed in the final draft.
Luisa Nunes, Ana	No	Chapter 5	254	254	9176	9178	Please delete the sentence, as it does not apply any longer.	Thank you, we have corrected this in the final draft.
Smith, Kevin	No	Chapter 5	254	254	9176	9178	I would remove reference to IBIS - I don't think it exists anymore	Thank you, we have corrected this in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Argentina	Yes	Chapter 6	0	0	0	0	Chapter 6 includes suggestions for developing codes to regulate trade. Reference is made to "green labeling" and certification systems, which could imply hidden restrictions on international trade, in contradiction to the WTO rules. We recommend to review this chapter and its alignment with WTO Agreements.	While we agree that the issue of "Environmental labelling schemes" is a ongoing debate in the WTO; we here propose them in the context of a "useful tool for informing consumers" and entities managing "parcels". Also a point to consider is that the use of labelling in the context of IAS is align with WTO rules, namely that "countries are within their rights under WTO rules to set criteria for the way products are produced, if the production method leaves a trace in the final product". And this is clearly the case for IAS.
Government of Armenia (Aghasyan, Levon)	Yes	Chapter 6	0	0	0	0	Would be useful to see more target on legal aspects of prevention and management of IAS	Thanks for this comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Government of Canada (Ferreira, Catarina)	Yes	Chapter 6	0	0	0	0	There are serious implications to human health related to IAS: https://portals.iucn.org/library/sites/library/files/documents/2022-004-En.pdf . This aspect is not very well highlighted in the chapter but when talking about cross-sectoral collaborations, health agencies should also be included (alluded to in line 1037)	The health implications of IAS is a topic dealt in Chapter 4 (impacts). We have also included these agencies when presenting the option of a (coordinated view of biosecurity across involved agencies).
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	0	0	0	0	The chapter provides conflicting advice on command-and-control vs broad engagement as strategies. Both approaches are said to be necessary to reduce harms from IAS, and both have shown successes and failures in different contexts. From reading the examples, it seems that command-and-control is often more successful at prevention and rapid-response eradication efforts, while broad engagement suits control and adaptation. Would this be a fair summary, and if so, could it be made clear in the key messages?	The term 'command and control' has been changed to hierarchical governance. The reviewer may be correct that this is the case and it is an interesting insight. However it is not a point that emerged as part of the evidence we evaluated. This point is more relevant to Chapter 5 rather than 6.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	0	0	0	0	The chapter would be more successful if it were more consistently forward-looking. While experience and existing knowledge must inform the assessment of which policy options are likely to be effective and what their enabling conditions are, the first part of the chapter tends to be critical of approaches to date. While perhaps justified, it downplays progress so far and such a view is not particularly helpful to policy development: a more productive focus would aim at drawing relevant lessons from the past.	Thank you, we have revised the draft accordingly (see, especially, section 6.7)
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	0	0	0	0	the distinction between management and governance could be more clearly maintained - the chapter frequently melds the two, creating overlap with Chapter 5.	We have revised the chapter to ensure consistency in the use of the terms management vs governance. Also, the context in which these two terms is used is presented at the start of the chapter.
Government of Germany	Yes	Chapter 6	0	0	0	0	Clarification needed: In light of the title of chapter 6, which includes the term "prevention", it is critical to summarize the findings of the assessment and consider whether IAS can realistically be prevented? Or should chapter 6 realistically rather be focusing on the best ways to reduce, and minimize the harms of IAS? Box 6.1 (L155-181) starts off by stating that "this chapter describes response options for the management of invasive alien species." This formulation may be more open to discussing a wide range of options and combinations of options? These questions may not arise if the term "prevention" is clearly defined for this IAS assessment.	Thank you, prevention has been defined in the Glossary. Chapters 5, 6 and the SPM address this comment.
Government of Germany	Yes	Chapter 6	0	0	0	0	Clarification needed: The terms "restoration" and "rehabilitation" are used side by side in this chapter. The IPBES glossary and the IPBES Assessment on Land Degradation and Restoration suggest that these terms cannot be used interchangeably. Therefore, please check each case to determine whether restoration or rehabilitation is meant.	Thank you for the comment. We briefly discussed it with other LAs in the third author meeting and concluded that 'restoration' can be used instead of all 'rehabilitation' in the report. Therefore, only the terminology of restoration was used throughout Chapter 6.
Government of Germany	Yes	Chapter 6	0	0	0	0	Comment: Please ensure that all knowledge gaps and associated research needs described in Chapter 6, including in particular knowledge gaps in the social and economic context, are included in Table SPM.1. This may not currently be the case (see details below). As you point out in L4374-4376, there seems to be "an under-representation of socially relevant research in biological invasion science."	Table SPM1 has been updated with all knowledge gaps emerging from the assessment
Government of Germany	Yes	Chapter 6	0	0	0	0	General comment: Chapter 6 builds heavily on the evidence gathered in the previous chapters of the assessment to develop policy-relevant, but not policy-prescriptive options. This is very good, and to reinforce this roundedness in the discussions, references to the previous chapters should be strengthened, especially when discussing concepts and approaches that have already been presented in sufficient detail in the preceding chapters. For example, when reading Chapter 6, it is important to ensure that appropriate references are made to previous chapters for a better understanding of the concepts such as "EcoHealth," "One Health," and "One Biosecurity" (these terms are not included in the glossary).	All chapters collaborated on this at the TAM, and overlaps have been minimised, though left where we consider it important to reemphasise content in different contexts
Government of Germany	Yes	Chapter 6	0	0	0	0	General comment: Chapter 6 is a remarkable testament to the incredible efforts the authors have made over the past years. The amount of material evaluated to develop the discussions is remarkable. We commend the authors for their ambitious and valuable work and hope that our comments on Chapter 6 will help further refine the chapter where necessary.	Thank you for your feedback.
Government of Germany	Yes	Chapter 6	0	0	0	0	Proposal: It is recommended to ensure that all cited sources are listed in the reference list. For example, Herrick 2019 is frequently cited in the text but does not appear in the reference list: Herrick, Charles N. (2019): A review of the U.S. invasive species policy mix: Questioning the prospect of an integrated regime. In Env Pol Gov 29 (4), pp. 262–278. DOI: 10.1002/eet.1852), and Mato-Amboage et al. 2018 are currently missing in the reference list.	Thank you, this has been revised accordingly
Government of Germany	Yes	Chapter 6	0	0	0	0	Proposal: Chp 1 (L1399-L1401) states that chp 6 will be providing information on "balancing values across multiple and interrelated stakeholder groups". Chp 6 actually does inform about the need for the consideration of a plurality of values. Some examples can be found out of which possible ways to capture different values can be distilled (e.g. Table 6.6 suggests the creation of space for "multiple knowledge systems and experience ..." and Box 6.12 (L2796-L278) suggests the need for "horizontal integration of different sections, and a vertical integration of different governance scales"). However, although we agree that "no reliable 'one-size-fits'" (L2543) may exist, we still believe that chp. 6 could list some well established evidences on, for example, (1) how to identify relevant stakeholders (including in the policy and decision-making, governance and implementation, knowledge-holding and knowledge-generating sectors (including medicine, ILK, private sector, citizen science), (2) how to manage engagement with different stakeholders who hold different, particularly diverging values, (3) how to manage and balance different or diverging values, (4) how to manage different or diverging expectations, and (5) ways to measure performance of stakeholder engagement in the IAS context. We encourage the experts to provide these aspects to the degree possible for supporting strategic policies and add this information, possibly in a tabular format, possibly in association with Table 6.12 (p. 84)?	We have provided examples of balancing stakeholder values and stakeholder inclusion, best practice methods by which this can be achieved is not specific to IAS, and therefore beyond the scope of this assessment
Government of Germany	Yes	Chapter 6	0	0	0	0	Proposal: Chp 1 (L1399-L1401) states that chp 6 will be providing information on "balancing values across multiple and interrelated stakeholder groups". Chp 6 actually does inform about the need for the consideration of a plurality of values. Some examples can be found out of which possible ways to capture different values can be distilled (e.g. Table 6.6 suggests the creation of space for "multiple knowledge systems and experience ..." and Box 6.12 (L2796-L278) suggests the need for "horizontal integration of different sections, and a vertical integration of different governance scales"). However, although we agree that "no reliable 'one-size-fits'" (L2543) may exist, we still believe that chp. 6 could list some well established evidences on, for example, (1) how to identify relevant stakeholders (including in the policy and decision-making, governance and implementation, knowledge-holding and knowledge-generating sectors (including medicine, ILK, private sector, citizen science), (2) how to manage engagement with different stakeholders who hold different, particularly diverging values, (3) how to manage and balance different or diverging values, (4) how to manage different or diverging expectations, and (5) ways to measure performance of stakeholder engagement in the IAS context. We encourage the experts to provide these aspects to the degree possible for supporting strategic policies and add this information, possibly in a tabular format, possibly in association with Table 6.12 (p. 84)?	Thank you, we have corrected this in the final draft
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	0	0	0	0	This chapter is very important, but very long (164 pages) some parts are duplicated with previous chapters, must be focused on future options	Repetitive content has been removed and some content shifted to earlier in the assessment. The chapter length is within scope. The editing of this chapter to improve clarity, uniformity of style and conciseness will be done once all content is finalised

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Joshi Rijal, Srijana	No	Chapter 6	0	0	0	0	Some of the sections are repeated from other chapters and authors should carefully check such repetitions	All chapters collaborated on this at the TAM, and overlaps have been minimised, though left where we consider it important to reemphasise content in different contexts
Joshi Rijal, Srijana	No	Chapter 6	0	0	0	0	A list of acronyms and abbreviations towards the end of the document is incomplete, kindly provide the complete list of acronyms and abbreviations	Thank you, we have corrected this in the final draft
Joshi Rijal, Srijana	No	Chapter 6	0	0	0	0	Many reference cited in the text are missing in the reference list and many are not cited in text	Thank you, this has been revised accordingly
Joshi Rijal, Srijana	No	Chapter 6	0	0	0	0	Overall, the chapter is very interesting providing future options for the prevention and management of invasive alien species, some of the sections and subsections are quite lengthy and might need reordering and resequencing	The editing of this chapter to improve clarity, uniformity of style and conciseness will be done once all content is finalised
Joshi Rijal, Srijana	No	Chapter 6	0	0	0	0	Some of the sections are strongly biased especially most of the case studies presented in box are from Europe, more examples can be presented from Asia region	Thank you, we've reviewed all the case studies to include a broad range of examples across the regions, as much as possible.
Joshi Rijal, Srijana	No	Chapter 6	0	0	0	0	the chapter have provided examples and case studies from island, except for MIREN network, mountains are not much highlighted in the chapter, there are some good examples and case studies from Africa and other continents on management	Out of 22 boxes, information presented in 13 boxes are related to one or another IPBES regions while others do not have any geographic affiliations. Among IPBES regions, there is 2 text box representing Americas, 1 representing Africa, 4 representing Asia and the Pacific, 3 representing Europe, and 1 representing Antarctica. Two boxes represents multiple regions. Africa is relatively less represented among the IPBES regions, only with 1 Box, when areas of the IPBES regions are not considered. Probably, if areas of the IPBES regions are considered, current representation may not be much biased.
Miwa, Koji	No	Chapter 6	0	0	0	0	Although tourism is considered to be a driver of invasion, as mentioned in Chapter 3, tourism-related solutions are not well discussed in Chapter 6. The certificate mechanisms of sustainable tourism (e.g. Global Sustainable Tourism Council) or fair-trade system (e.g. Fairtrade International) could be introduced and discussed in 6.4 or 6.5.	Tourism is considered in sections 6.3.1.3, Fig. 6.11 and Box 6.10
Participants of ILK dialogue workshop (Chrissy Grant)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: Also in the area of capacity building for IPLCs, apart from FPIC what we have taken into our practice in the north of Australia is to observe and abide by communities' cultural protocols whether written or not, and also to look at community benefits from working with researchers. Quite often, at least in Australia, researchers will say they don't have money to pay, but it is not always about money. Benefits can be communities learning how to do research themselves, and that's something communities are interested in as well to build skills in their organisations and rangers' groups, so that they can do their work in a way that is going to meet the requirements and vigor of scientific research so when they report back it is taken seriously. Another example is the Local Biodiversity Outlook reports, where communities write their own reports, and its peer reviewed and looked at critically. This is something that I have been encouraging here in Australia. In some Pacific Islands too, through the SPREP policy for invasive aliens species, and in Australia we are more focused on threatened and endangered species as we have the worst record for species extinctions, but this may mean managing IAS as well. IPLCs are also engaged and involved in biosecurity, so those skills might allow aboriginal people to do work, including beach works (due to the large number of ships that go through the Great Barrier Reef and the items that get washed up on the beaches), and working with quarantine and customs. This is how we are looking at working with community to manage IAS.	Thank you very much for your feedback and for sharing your experience. We have revised Chapter 6 to respond to this comment.
Participants of ILK dialogue workshop (Faith Nataya)	No	Chapter 6	0	0	0	0	Ch 5, 6, SPM C, D: Also recommendation to encourage government, scientists, IPLCs to cooperate. Also need elders, priests, healers, youth and women in these discussions. Co-management should be emphasized.	Thank you. These concerns have been taken into account in Chapters 5 and 6, as well as the SPM.
Participants of ILK dialogue workshop (Gakemotho Satuu)	No	Chapter 6	0	0	0	0	SPM C, D, Ch 5, 6: In Botswana there is an inclusive government, in which mainstream ethnic societies have successfully and systematically wanted indigenous peoples and marginalized groups to assimilate to mainstream ways of doing things. So there are ways of doing things and understanding the world and environment according to mainstream society views, and this is a paradigm shift for IPLCs. In Botswana, San or Bushmen are not identified as indigenous peoples, yet San people do identify this way and history shows that they are different, and their lives are different from the mainstream. When the government goes to international forums, the narrative is about ILK but they are not comfortable addressing it locally. Botswana voted in favour of UNDRIP, but then at home they say all people are indigenous, so everyone is in the same box, so this makes ILK invisible on the ground. The Australian government brought people to Botswana to combat wildfires, but at the same time the system is unaware that San are fire adaptive societies, but the government doesn't want to acknowledge that, they prefer to turn to in Australia or New Zealand. There is a need to push government systems. If we talk about San as indigenous peoples, they ask why is it important, and argue recognition will bring disunity. We need local knowledge and local solutions, but need to combat misunderstandings of governments and have a proper debate about knowledge and gain complementarities. This is hard to achieve. Indigenous peoples say this, scholars say this, libraries are full of knowledge, but government systems are not ready to take up the initiative. This is the scenario, even if we know how we controlled species traditionally, we still need researchers and lobbying policy so they can eventually accept the knowledge and put it into policy frameworks. To make this work quickly it needs indigenous activists and research, and people to do research and champion debates to make change in decision making processes.	Thank you for this interesting comment. IPLC rights (including UNDRIP) are mentioned in Chapter 1 and Chapter 6, but we are afraid this goes beyond the scope of this assessment.
Participants of ILK dialogue workshop (Gakemotho Satuu)	No	Chapter 6	0	0	0	0	SPM C, D, Ch 6: There has been a vacuum between science and IPLCs knowledge capital. Africa, in particular, perceived development from a scientific perspective. This was the paradigm shift from IPLC worldviews to a scientific view. In the process they de-legitimized IPLCs knowledge base. However, the truth of the matter is science and IPLCs knowledge should be complementary.	Thank you, this is further addressed in Chapter 1
Participants of ILK dialogue workshop (Guadalupe Yesenia Hernández Márquez)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: In Oaxaca, in relation to biocultural protocols (BCPs), we have an important achievement with local government as it is now in the constitution as an indigenous right. In fact, we see the BCP as a document that establish the "rules of the house" from a community or region to the outside actors as governments, business, etc. based in the rights recognize at the international, national level and with the rules inside the community. BCPs regulate projects that can promote any damage to the land, resources, natural cultural or bicultural patrimony in the community e.g. biofuel, monoculture or tilapia farms, and they reinforce the recognition and importance of native species, and this can link also to IAS. https://drive.google.com/drive/u/1/folders/158f-NpJIFemyQTLB1OGNQRg1cYdRZTH to download BCPs	Thank you, we have added a section on biocultural protocols in Chapter 6.
Participants of ILK dialogue workshop (Guadalupe Yesenia Hernández Márquez)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: Indigenous peoples can help scientists using western science. IAS are affecting IPLC biodiversity and ecosystem services, and these affects are worse because of disparities due to disparities in access to information, lands, funding, and information on methods to oppose projects that can bring in more IAS like tilapia, and other government projects. Also as indigenous peoples we have our own methods for observation but sometimes because of climate change and other issues we lose control and are not able to monitor. Also, indigenous peoples need to be part of decisions to manage and control IAS because these are our lands and we want to preserve the Earth and natural beings. Reinforcing indigenous peoples' rights can help to ensure that indigenous peoples play a more active role in this field along with FPIC and other rights.	Thank you for your comment. We have revised chapters 3, 5 and 6 in response to it.
Participants of ILK dialogue workshop (Guadalupe Yesenia Hernández Márquez)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: Is there need for an international agreement on IAS to concentrate efforts on the issue?	Thank you, this is included in the chapter (section 6.3.1.4), but the executive summary and SPM focus on levers and conditions to enable IAS governance

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Participants of ILK dialogue workshop (Katie Kamelamela)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: Related to integrated governance we published a paper with Native Hawaiian community members related to our process of working with government and non-profit: https://www.sciencedirect.com/science/article/pii/S0378112721010422 . In this paper, we discuss land acknowledgements, which are common in North America and New Zealand, and how this can be a show of support rather than an action of support. It also discusses the pig issue in Hawaii, which is a complicated issue due to its relationship with native Hawaiians. We also look at how a holistic approach to insight change is needed when working intentionally with indigenous communities and goals, including looking at communication gaps and overlaps between the needs and benefits of indigenous peoples and government agencies, because that gets muddled even with native species management. Also, sometimes governments or agencies approach IPLCs over a backyard fence rather than providing a proposal in writing that can be formally responded to. IPLCs need to be accorded the same respect and formalities that governments expect in return.	Thank you, we have added this suggested reference to Chapter 6.
Participants of ILK dialogue workshop (Lucy Mulenkei)	No	Chapter 6	0	0	0	0	Ch 5, 6, SPM C, D: Capacity building for IPLCs working in this field is essential, on how to document, compile and share information. Also need an expert group of IPLCs to continue working on IAS so we can bring this issue to the top of agendas when we meet scientists.	Thank you. These concerns have been taken into account in Chapters 5 and 6, as well as the SPM.
Participants of ILK dialogue workshop (Lucy Mulenkei)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: Biocultural protocols (BCPs) can be very important for IPLCs to help them manage their knowledge, and relationships with governments and other entities. Biocultural protocols emerged out of discussions during Nagoya protocol discussions. Quite a few BCPs were developed in LA and Africa. There is a need for communities to work with governments on their development as well. Once completed and validated, BCPs can be sent to the clearing house programme of CBD. In this way the governments are able to refer to the BCP and look at it, and even business community and other stakeholders who are interested in species and resources can be informed, and connect with IPLCs with a clear mind on what is possible within an area. IPLCs believe in this so much. It also brings in and supports traditional institutions.	Thank you, this is now addressed in section 6.4
Participants of ILK dialogue workshop (Lynn Jacobs)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: Integrated governance would require recognition/respect for indigenous rights and this is another challenge with including Indigenous Peoples in the category of "stakeholders". There is an important distinction between stakeholders and holders of rights. This is a challenge that IPLCs are facing at all levels. Is there a way to reflect that in the document?	Reference to stakeholders has, where relevant, been changed to stakeholders and IPLC throughout
Participants of ILK dialogue workshop (Maria Elena Regpala)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: When IPLCs talk about biocultural protocols, another key aspect is respect for customary governance. On the issue of governments introducing IAS it is important that government and other people respect customary governance in territories of indigenous peoples. This means that it is good that indigenous peoples are informed of the species that are being introduced with the original intention of being beneficial, but may later become invasive.	Thank you, this is now addressed in section 6.4
Participants of ILK dialogue workshop (Ndiaga Sall)	No	Chapter 6	0	0	0	0	Ch 5, 6, SPM C, D: Integrated governance should be addressed in a transversal, systemic and intersectorial manner for each category of actor, and focus on the role of each actor in that governance. Initiatives of IPLCs are often not considered by governments, and ILK is not taken into account. This should be done and done in a respectful manner and governments should try to see how these knowledge systems could be considered alongside science when implementing management. Respectful integration, taking into account ILK, could achieve better local management and integrated management.	Thank you, this is now addressed in section 6.4
Participants of ILK dialogue workshop (Onel Masadule)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: Biocultural protocols (BCPs) are very important – this helps the process of carrying out work between institutions, governments and indigenous peoples. Often there is the idea that indigenous peoples are opposed to a lot of conservation and research activities, but for indigenous peoples it is a right to protect and ensure our rights. I believe BCPs have been worked on considerably with respect to genetic resources and in the context of REDD+ also. In the platform of IPBES it would be important to include this and this could drive the process and orient it regarding the sharing of knowledge, as very often we have problem of recognition of indigenous peoples and their knowledge system. This is a topic that IPBES should look into more in greater detail, and work on principles around what are the different components of the protocols. This could also help to harmonise the protocols between each country. It will give more credibility to work of indigenous peoples, governments and institutions. This is a key point, and should be taken on by IPBES. It should also be taken on by other conventions, where there has been progress but not as much as we would like e.g. around the climate process. Biocultural protocols would help, and a team could be created to work on this topic.	Thank you, this is now addressed in section 6.4
Participants of ILK dialogue workshop (Ruth Spencer)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: For local communities, the role of advocacy is very important, to stop information just staying in meetings. In Antigua, the focus on environmental governance means we need to include so many stakeholders, including churches, politicians, teachers. Information from IPBES assessments is relevant to our daily lives, as we live on a small island where everything impacts each other. In relation to IAS we have lion fish and giant African snail, and we have to educate and teach because everyone has a role to play.	Identify the many different roles of engagement through out the chapter, and is one of the key levers now identified as part of our overall solution.
Participants of ILK dialogue workshop (Te Tui Shortland)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: The linkages between IAS and indigenous peoples rights, which are existential rights, would be important to highlight. Many indigenous peoples do not have legal acknowledgement in national government legislation and therefore have ongoing rights issues. Meanwhile miners, loggers and poachers come into their territory, and destroy biodiversity and bring in IAS. So there is an important linkage between indigenous peoples' self-determination and tenure rights and how they can manage IAS.	Thank you, this is now clearer in Chapter 6 (Section 6.4) and in Chapter 1
Participants of ILK dialogue workshop (Te Tui Shortland)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: Transformative change for Pacific indigenous peoples can be articulated by our proverbs and ceremonies... "Titiro atu ki te taumata o te moana...ākiri ko te ata. Look beyond to the configurations on the horizon... for the breaking of a new dawn"... this was often expressed when we (Maori) had serious challenges we were seeking to overcome	Thanks for this important point, and we have made effort's to include the importance of cultural values in the chapter
Participants of ILK dialogue workshop (Viviana Figueroa)	No	Chapter 6	0	0	0	0	SPM D, Ch 6: We need to recommend support for indigenous peoples to develop biocultural community protocols (BCPs). We always mention the importance of having dialogues of knowledge systems, but as the same times ILK is not protected so it is difficult to have dialogue as IPLCs are always worrying about misappropriation of our knowledge. Support for BCP development will contribute to developing new knowledge together, and of indigenous peoples collectively.	Thank you, this is now addressed in section 6.4
Peterson, Garry	No	Chapter 6	0	0	0	0	I congratulate the authors on an excellent second draft. This really represents a huge and novel contribution. Below I will make some suggestions about things that I think are missing or could be improved, but I wanted to start off with a big thank you to all the author team. Having worked on other assessments I appreciate the huge amount of effort that has gone into this chapter.	Thank you for your feedback.
White, Michael	No	Chapter 6	0	0	0	0	Comprehensive and most issues known. We have far to go still	Thank you for your feedback.
Peterson, Garry	No	Chapter 6	1	164	0	0	At 172 pages this chapter is an assessment in itself. The chapter needs to be compressed. I expect that by coordinating with other chapter some portions may be moved to other places in the assessment, but I urge the authors and editors to carefully consider how the chapter can be compressed to highlight its key messages. While in my other comments I suggest areas that need to be further addressed, I think the existing text needs to be substantially compressed while other issues are added.	The editing of this chapter to improve clarity, uniformity of style and conciseness will be done once all content is finalised
Verwer- van Amerongen, Cynthia	No	Chapter 6	1	164	0	0	In general, considerations on invasive species should also include the consideration of animal welfare in the trapping- and killing methods that are used. And not only for the welfare of the invasive species itself, but also for the species that live in the surrounding areas, that might be disturbed by these practices.	The section on animal welfare in Chapter 6 has been fully revised
Government of Germany	Yes	Chapter 6	1	4	1	152	Proposal: It is surprising that the executive summary of chapter 6 does not contain a strong message that could support multilateral cooperation and integrated approaches. For instance decision IPBES-8/1 clearly underscores the need to improve IPBES' scientific and collaborative partnerships with other bodies, including the IPCC. It is suggested that consideration be given on whether there is strong supporting evidence to include a new para in the executive summary that shows that the outcomes of human activities, both sustainable and unsustainable (L3857), also requires adequately integrating invasive alien species problems in policies and management interventions targeting environmental threats, such as land degradation and climate change (see for example sections 6.3, 6.7 and Tables 6.2 and 6.6). After all, L5340-L5341 state that IAS may exacerbate the negative impacts of climate change on quality of life.	Thank you, the draft has been revised accordingly
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	1	1	2	16	I would advocate for plain language here: "Despite some successes, Aichi Target 9 was not met and Sustainable Development Goal 15.8 is not on track to be met." Missing international targets should be a key message separate from data gaps (which are covered in point 8 in any case). A "need to invest" is policy prescriptive - it's preferable to say that without investment, it will remain difficult to measure success. Lines 293-294 are an important supporting element.	Edited accordingly
Government of Germany	Yes	Chapter 6	1	1	2	16	Clarification needed: We anticipate that the executive summary (the chp.) will also consider aspects related to IAS-relevant targets under the post-2020 global biodiversity framework, in accordance with the decisions of CBD COP-15.1?	Thank you, the framework has been approved and the assessment now reflects it.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sagoff, Mark	No	Chapter 6	1	1	5	6	"Many countries have little to no funding for invasive alien species activities (well established)." No proposition is so well established as this. Why is this?	Thanks for the comment, however, we can not understand what is the point raised. We consider that our confidence statement does reflect the status. Also the rezoning is presented in the Chapter text.
Evans, Thomas	No	Chapter 6	1	1	16	16	(well established)	Thank you, we have corrected this in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	1	2	18	43	These two points focus on current state - it's not immediately clear why they would be key messages from a chapter on response options. The lines-of-sight refer only to Chapter 6 sections when much of this material was included in previous chapters.	Thank you. We updated the executive summary to focus on policy options and their rationale.
Evans, Thomas	No	Chapter 6	1	1	25	25	delete unwanted extra space after 'approach'	Thank you, we have corrected this in the final draft
Sagoff, Mark	No	Chapter 6	1	1	25	25	The text states that difficulties in prediction necessitate a precautionary approach. What not a fatalistic approach?	We base our suggestions on the legal principles currently used in the legislation and governance of environmental problems.
Sagoff, Mark	No	Chapter 6	1	1	31	32	"There are many multinational agreements, regulations, and management approaches aimed at preventing the introduction of invasive alien species." These are meaningless in the absence of funding and enforcement, as the paragraph recognizes.	This is a point we address in other point of the Executive summary, and provide tools for this in the chapter.
Government of Canada (Ariey-Jougard, Rachel Tu-Van)	Yes	Chapter 6	1	1	36	37	It should be specified here that we are talking about IAS national strategies and action plans. It could otherwise be interpreted as biodiversity strategies.	We are explicit now that the proposed national strategies should focus on IAS
Evans, Thomas	No	Chapter 6	2	2	57	57	these can and improve? (delete and)?	Thank you, we have corrected this in the final draft
Joshi Rijal, Srijana	No	Chapter 6	2	2	57	57	Delete and after can	Thank you, we have corrected this in the final draft
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	2	2	65	68	Coherent policy instruments are important not only for management, but need to consider all stages of the invasion must be considered, so therefore, need to prevent introduction	Here we use a broad definition of management that includes prevention, eradication, and control.
Karayannis, Theofanis	No	Chapter 6	2	2	65	79	This paragraph appears to be clearly about the terrestrial realm only but without saying so and with no corresponding text on the marine realm anywhere in this executive summary, thus giving an impression that the terrestrial realm is all there is. For example this paragraph has references to agriculture and forestry, which are explicitly and exclusively terrestrial, without any mention to any corresponding marine sectors. This implicitly ignores completely the marine realm and as such, especially in such a place as the executive summary of Chapter 6, is a very striking indication of the perennial terrestrial bias of IAS discussions.	Edited to explicitly include activities related to the marine and freshwater environments
Evans, Thomas	No	Chapter 6	2	2	66	66	suggest delete 'the'	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 6	2	2	69	69	suggest delete both uses of the word 'the'	Edited as suggested
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	2	2	71	71	It is also important to add: "transdisciplinary" research	We have no evidence to support the transdisciplinary research in the context of our proposed options
Evans, Thomas	No	Chapter 6	2	2	73	73	suggest delete 'the' after the word across	Edited as suggested
Government of Argentina	Yes	Chapter 6	2	2	75	79	This sentence mixes multilaterally approved approaches (such as the one health approach) with other approaches that lack intergovernmental understanding (such as the one biosecurity approach). We suggest to make this distinction in the document.	Thanks for the comment. We have revised point in the Executive summary. While we agree with the point of "acceptance" of these approaches, our idea here is not to promote one idea over another. Instead we way not o highlight the underlying principle behind OneHealth, EcoHealth, Planetary Health and one Biosecurity, which is the need for coordination between groups or organizations.
Government of Germany	Yes	Chapter 6	2	2	76	76	Clarification needed: It needs to be ensured that the terms "EcoHealth," "One Health," and "One Biosecurity" cannot be used interchangeably as the development of these frameworks was guided and underpinned by different scientific considerations. All the more, it is important that these terms are included in the glossary for further reading. (see for instance Roger et al. 2016. One Health and EcoHealth: the same wine in different bottles? - In.: Infect Ecol Epidemiol. 2016; 6: 10.3402/ice.v6.30978. It is suggested to ensure that definitions with a brief summary of the rationale of each framework are provided somewhere in the report, either as a box or in a footnote so that Chp 6 can included references to these sections of the report..	Thanks for the comment. We have revised point in the Executive Summ. While we agree with the point of "acceptance" of these approaches, our idea here is not to promote one idea over another. Instead we way not o highlight the underlying principle behind OneHealth, EcoHealth, Planetary Health and one Biosecurity, which is the need for coordination between groups or organizations.
Government of Argentina	Yes	Chapter 6	2	2	81	91	We suggest to clarify that economic incentives will need to comply with existing multilaterally agreed trade rules.	We have taken into account the point in our revised version of the message
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	2	2	81	92	"can take into account" is surprising phrasing here. The key message seems to be something more like "Economic instruments can be effective, and can be designed to promote equity." Willingness to pay does not seem linked to the bold text.	We have taken into account the point in our revised version of the message
Government of Germany	Yes	Chapter 6	2	2	82	83	Clarification needed: Obviously, there are differences between the various stakeholders. But which "... asymmetries and differences ..." are specifically meant here? Kindly ensure that the bold parts of the key messages are sufficiently concrete.	We have removed the referred text in the latest version of the message
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	2	3	94	101	Suggest reframing to reflect options, rather than status.	The section has been revised to reflect the the current points made in the chapter, specifically options.
Niemiec, Rebecca	No	Chapter 6	3	3	99	101	Can this be re-worded slightly so it's clear that respect to indigenous people and knowledge should be provided no matter what, regardless of the outcome for invasive species?	We agree that IPLC right need to be respected broadly. However, here we defer to the fact that this is a IAS report, and hence place this important issue in this context.
Government of Canada (Ariey-Jougard, Rachel Tu-Van)	Yes	Chapter 6	3	3	112	113	It may be too prescriptive to focus on the FAIR principles	We have rephrased this point to avoid policy prescriptive language
Government of Argentina	Yes	Chapter 6	3	3	114	117	What does property rights mean in this sentence. There is need for clarification.	This point is been edited out of the current version of the Executive Summary
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	3	4	119	152	Authors may consider that integrated governance would be important to address global change, i.e. achieving the objectives of sustainable development requires an integrative vision, not per factor of change, as they are affected synergistically, e.g. biological invasions with ecosystem loss and degradation and climate change. (as it is clear in Figure 6.1)	We explicit make this point in our overall solutions in section 6.7.
Government of Argentina	Yes	Chapter 6	3	3	124	125	The correct wording of the principle is "common but differentiated responsibilities", in line with the wording of the principle number 7 of the Rio Declaration on Environment and Development.	We respectfully disagree with the suggested edit as we are not invoking the Rio declaration. Instead we are using the concept of shared and declaration responsibilities form the environmental policy literature.
Government of Argentina	Yes	Chapter 6	3	3	125	126	What are "transnational information connectivity infrastructures"? There is need for clarification. It should be consider the role of governments and national systems of information.	We have rephrase the term to "information infrastructures promoting open and equitable access to information". Moreover, We do not establish who should take on this responsibility, as our goal is not to be policy prescriptive
Evans, Thomas	No	Chapter 6	3	3	143	143	a focus?	Edited as suggested
Evans, Thomas	No	Chapter 6	3	3	143	143	Is the ; needed here?	Edited as suggested
Evans, Thomas	No	Chapter 6	4	4	148	148	national legislation(s)	Edited as suggested
Alaux, Christine	No	Chapter 6	5	5	154	194	Same: Move all of Box 6.1 to line 194	This Boxes have been set across the chapter to provide a setup of the chapter.
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	5	5	155	181	Box 6.1: Outreach activities seem not to be explicitly considered (despite awareness and education are mentioned), as mentioned in Table 6.1	While we agree that this is an important point, we consider that Outreach activities are part of the "engagement tools" we describe in the text.
Joshi Rijal, Srijana	No	Chapter 6	5	5	164	164	Box 6.1: Add "and inclusive" before governance	Thanks for your comment. We decide not make the suggested edit as the idea of integrated governance for IAS as a concept is at the core on the main results of the chapters.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	5	5	184	185	It should maybe be made clearer that the scope of IAS management in this case is all of IAS management and not management in the sense of trying to control or manage an IAS once established.	Thanks for your comment. We consider that although a large number of the policy options presented in the chapter focus on prevention, the points made regarding governance (6.2) policy across scales and stages (6.3), and stakeholder engagement (6.4), economics post invasion (6.5) and knowledge (6.6) go beyond prevention and include Policy instruments (while not management strategies) at other stages
Evans, Thomas	No	Chapter 6	6	6	194	194	Fig. 6.1. What does 'maintain' mean here? It's used in four places.	Maintain means keep
Government of Germany	Yes	Chapter 6	6	6	194	199	Clarification needed on Figure 6.1: The term "prevent" seems misleading here, because the red arrow highlights the two aspects "limit" and "reduce", which do not necessarily mean "prevent". In fact, the caption to Figure 6.1 only talks about "limiting and mitigating the effects of IAS". The term "prevent" as specified in the glossary ("... measures to prevent the introduction of invasive alien species, between and within States") is seemingly not discussed in the context of this figure. Please check.	The emphasis on prevention has been strengthened in the figure
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	6	6	201	214	Should to World Maritime Organization be included in this list?	We have added this important organization to the list.
Karayannis, Theofanis	No	Chapter 6	6	6	203	213	The absence of IMO from this list is very notable as this part is all about policy options and there are organisations listed here that are actually not even policymakers as such while omitting IMO which is a regulatory body with instruments including legally binding treaties regulating matters directly relating to IAS. Perhaps another instance of terrestrial bias.	We have added this important organization to the list.
Sagoff, Mark	No	Chapter 6	6	6	209	210	The text refers to the Global Invasive Species Programme (GISP). According to one commentator, GISP was "unceremoniously shut down in the spring of 2011 due to lack of funding." (Stoett, P.J., 2019. Global ecopolitics: Crisis, governance, and justice. University of Toronto Press, p. 166).	We consider is important to keep GISP here, as it generate documentation still in use when addressing the IAS problem.
Government of Germany	Yes	Chapter 6	7	7	222	251	Clarification needed: Are the three capacity building strategies (learning and engagement / facilitating access to expertise and information / strengthening national and regional capacity) described in the IPBES rolling capacity building plan considered as a cross-cutting aspect in all 7 sections? If not, then it is suggested to consider an additional Section 8 specifically addressing these capacity building needs for managing IAS, also to ensure the visibility of capacity-building needs at the science, governance and stakeholder engagement levels.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We agree that this is an important point, and is one we make as part of the levers we propose in section 6.7.
Evans, Thomas	No	Chapter 6	7	7	239	239	system(s)	Change made as suggested
Bliss, Cebuan	No	Chapter 6	7	8	253	260	There may be 'tipping points' at which eradication is not longer feasible, so mitigation/human adaptation are only possible options - could add this in this section or elsewhere in the chapter	We have added some text to highlight that adaptation is one of the possible responses given the identified challenges and opportunities.
Government of Germany	Yes	Chapter 6	8	9	262	269	Proposal for Table 6.2: isn't a lack of awareness-raising initiatives a crucial limitation to support monitoring and management of IAS, and also collective action (see L655-L674 and L676-L696)? It is suggested to explicitly mention this aspect as well, possibly in the rubric "societal response".	The item 2 of the rubric "societal response" list the need of "awareness-raising"
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	8	9	262	269	Table 6.2. Impact disparity. Issue 1 (referring chapters 4 and 5) is not clear. Suggestion: Management of invasive alien species is particularly difficult when either they have serious negative impacts or when from a human perspective they have benefits.	We have rephased this statement to make a clear distinction between the difficulties for positive and negative impacts
Government of USA	Yes	Chapter 6	8	9	262	269	Table 6.2 - Appreciate the clear statement of information disparity for marine systems at the top of this table. #1 under Technological Advancement is particularly important for marine ecosystems.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Evans, Thomas	No	Chapter 6	8	8	266	266	need(ed)?	Change made as suggested
Evans, Thomas	No	Chapter 6	8	8	268	268	Table 6.2. Left column. Last row. 'the' governance?	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 6	8	8	268	268	Table 6.2. Right column. Top row. 'relevant chapter sections and this/previous'? Replace 'and' with 'of'	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 6	8	8	268	268	Table 6.2. Right column. Sixth row. Point 1. I suggest 'their management becomes difficult'.	We have rephased this statement in relation to other comments so this change is nor relevant
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	8	8	268	268	Table 6.2: Items listed here are mostly indirect and the negative elements would be considered structural challenges rather than "risks" by many. For example, information disparity is an existing negative societal outcome. It creates a risk that management of IAS will be poorly informed. To best inform policy development, this causal chain needs to be made explicit: the focus is to improve IAS management, and policy advisors need to understand why and when tackling information disparity might advance that purpose. The discussion of each issue should provide enough detail that policy advisors will be able to make informed recommendations on which issues to address given their context and resource constraints. Without such an approach, it reads as a list of intractable problems.	The intention was to start by listing the key challenges - throughout the rest of the chapter we address these challenges. These sections have been edited to make this clear.
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	8	9	269	269	Comments on Table 6.2 Impact disparity - management may be more difficult because of a lack of information on the socio-economic impacts of IAS, and less so because they may have both negative and positive impacts. Technological advancement - Lack of monitoring should probably be added. Economic synergies - the first point should maybe be rephrased as there are international regulatory frameworks incorporating the control or prevention of IAS - if this point is only about Free Trade Agreements, it should be made clearer. The second point could be rephrased as "Difficulty to determine ...". Societal response point 3 - should be rephrased to better match with the structure of other points in the table.	We have added Items to address each of the points raised.
Government of USA	Yes	Chapter 6	9	14	272	416	While this section provides good coverage of adoption of agreements originating through the CBD, it neglects other international agreements, in particular the IPPC. It would be useful to describe some of the IPPC developments / accomplishments such as adoption of new ISPMs.	We have added a section to highlight the gains made by other non environmental focused agreements (i.e. IPPC and Ocie)
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	9	9	274	274	This is a mischaracterization of the mandate of the CBD, which includes the "sustainable use of the components of biological diversity" - that is, it has a mandate to avoid overuse, but it is biodiversity-centric and does not include maintaining or increasing benefits to humans.	The description of the CBD mandate was rephrased to capture the CBD main three objectives.
Evans, Thomas	No	Chapter 6	9	9	278	279	You have already written the CBD and COP terms in full in the lines above (275 / 276). You only need the abbreviations here.	Thank you for your comment. It has been addressed in the final version.
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	9	9	282	285	Saying that the governance of IAS has been ineffective over several decades may be too strong of a conclusion.	The sentence was rephrased focusing on a quantitative metric (the rate of invasive alien species globally is not slowing down) - crosslinking to Chapter 2
Evans, Thomas	No	Chapter 6	9	9	283	283	See previous comment regarding CBD on this line.	Thank you for your comment. It has been addressed in the final version.
Evans, Thomas	No	Chapter 6	9	9	288	288	As above	Thank you for your comment. It has been addressed in the final version.
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	9	9	289	290	Should data from the GBO-5 be used instead or as well? Data would be more recent.	When considering the GBO-5 output and that of the midway evaluation provides similar results. For the purpose of completeness we now add the GEB-5 as source
Evans, Thomas	No	Chapter 6	9	9	290	290	Aichi Biodiversity Target 9 of what?	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We consider that the name "Aichy target" is widely recognized as the goals of the Strategic Plan for Biodiversity 2011-2020. For clarity we do state the target name
Sagoff, Mark	No	Chapter 6	9	9	291	292	The Chapter acknowledges a gap between the development and adoption of invasive alien species policy and implementation at national levels. There may be no relation between 1) the development and adoption of invasive alien species policy and 2) implementation at national levels. It might be helpful to start with a study of implementation to see if it responds to the development and adoption of invasive alien species policy. The relation between the development and adoption of invasive alien species policy and implementation cannot be assumed.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Also we consider that the analysis suggests goes outside the scope of the chapter, and is part of some of the major knowledge gaps identifies in the report.
Joshi Rijal, Srijana	No	Chapter 6	10	10	293	294	Rephrase the statement "Overall, there was considered to be no reduction in the pressure from invasive alien species on biodiversity, ecosystems and society"	The statement was rephased to enhance clarity

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	10	10	296	300	It is unclear what the difference between "inadequate policy implementation" and "policy adoption" is within this sentence. The sentence is hard to understand.	We have expanded the idea of "inadequate policy implementation" to clarify how this is different from the argument referring to policy adoption.
Joshi Rijal, Srijana	No	Chapter 6	10	10	296	298	This statement is not clear on this outcome may be it is good to specify the outcome "Factors identified as underlying this outcome were"	The required clarification was added
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	10	10	300	303	This is a very mild statement given that strengthening governance is presented as the principle policy option. Does the existing information support a stronger statement? Note that lines 381-383 do not provide any supporting evidence. Lines 722-738 provide reasonable support and the section could be referenced.	The sentence was rephrased to highlight the need for good governance to achieve Biodiversity targets, aligning with the issue that strengthening governance is an important policy option
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	10	10	305	309	The SGDs look at the proportion of countries with national strategies, as well as adequate funding. It does not look at commitments by countries to relevant multinational agreements in the context of IAS.	We respectfully disagree as we consider that SDG17 (String partnerships for the goals) encapsulate the need for commitment to multinational agreements as way to show that SDGs can only be realized with strong global partnerships and cooperation.
Evans, Thomas	No	Chapter 6	10	10	306	306	CBD written in full again	Thank you for your comment. It has been addressed in the final version.
Sagoff, Mark	No	Chapter 6	10	11	313	316	This section refers to "The 15 guiding principles for the prevention, introduction, and mitigation of impacts of alien species that threaten ecosystems, habitats, or species." It repeats a 2002 document. The principles are all hortatory, precatory, and optative -- in other words, they say what people ought to do but may have no relation to -- or effect on -- what they actually do. That the Report has nothing to add to or subtract from the 2002 list of guiding principles suggests that they are only ornamental. Why bother with these principles if they are so nugatory no one has bothered to update them in 20 years?	We respectfully disagree with the assessment. We consider that these principles are still valid today, showcase the elements any policy instrument aimed at addressing a complex problem as IAS need to consider.
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	10	10	314	316	Table 6.3: C. INTRODUCTION OF SPECIES. It is necessary to point out the need to implement biosecurity measures.	Thanks for your comment. This is a import point that we consider is included in point 1 when saying "prior authorization from a competent authority of the recipient state(s)."
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	10	10	314	316	Table 6.3: D. MITIGATION OF IMPACTS. Add Restoration and species recovery programmes	We have decided not to include these as these are not part of the CDB guiding principles defined in the Summary of the decision by the Conference of Parties to the Convention on Biological Diversity
Joshi Rijal, Srijana	No	Chapter 6	10	10	314	315	Table 6.3 Education and public awareness: -correct specie as "species" add invasive before alien	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 6	10	10	315	315	Table 6.3. A. No. 6. specie(s)	Thank you, we have corrected this in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	10	10	315	316	In Table 6.3, Principle 1: add to the end "as described in Principle 15 of the 1992 Rio Declaration". This is the only definition subscribed by governments of all countries. This principle states "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environment degradation." [Emphasis added]	As suggested we have added the requested statement to provide context to the "precautionary approach idea".
Evans, Thomas	No	Chapter 6	11	11	315	315	Table 6.3. B. No. 9. lack expertise and resources (suggest delete 'the')	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 6	11	11	315	315	Table 6.3. D do these need to be capitalised? e.g., including Mitigation of impacts. It looks inconsistent with previous sections of the table.	Thank you, we have corrected this in the final draft
Brooks, Thomas	No	Chapter 6	11	14	317	416	Section 6.1.3 is a very useful and policy relevant assessment of progress towards SDG Target 15.8, as documented through the official UN SDG indicator 15.8.1.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	11	11	318	326	The scope of the meaning of "Response" seems too narrow. It should probably look at response plans or, from a governance perspective, the push and support from various levels of governments to develop response plans.	We have modified the text to make the idea of response more broad, but still focus on two key elements mals and monitoring
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	11	11	328	337	Should other effective international work, including guidances, be included as well, such as the work of the IPPC?	Text was added to highlight the important role of IPPC and OIE in linking biosecurity efforts and the prevention of IAS introductions.
Evans, Thomas	No	Chapter 6	11	11	330	330	60 to 98% ? Suggest 60% to 98%	Thank you, we have corrected this in the final draft
Karayannis, Theofanis	No	Chapter 6	11	11	333	336	This text is, on the one hand, very much out of date in terms of the BWM Convention's ratification status and, on the other hand, inaccurate or unclear in some parts. On the first point, the BWM Convention currently has 88 Parties representing over 91% of the world's tonnage, which is very different from the currently seen out-of-date text mentioning 60 countries and 70% tonnage (which presumably is due to a 2019 website article being used as a reference). Given that the ratification status constantly changes as more countries ratify, it would be best to provide the up-to-date figures I included here with a temporal qualifier (e.g. "as of January 2022" or similar) and with no reference that would quickly become obsolete. Further, I am not sure what the text "has reached a country signatory level of 33%" is supposed to mean as this doesn't correspond to any of the Convention's elements; given also that the ratification figures (to be updated as above) are given in the same sentence, this text should just be deleted as it doesn't add any value and only creates confusion. Finally, the text saying that the Convention was "ratified in 2017" is not correct, as there is no such thing (each individual Member State ratifies the Convention at a separate time) and the correct statement is that the Convention "entered into force in 2017".	The numbers on tonnage was updated as suggested. Regarding the percentages of signatories, we consider that having this numbers (% of all countries) is important to provide a standardized comparison across agreements. Having said that the nuance regarding tonnage gives the BWM clarity on why even it has a log signatory percentage, it cover most of the shipping world wide.
Evans, Thomas	No	Chapter 6	11	11	334	334	There is no former convention to compare this to so I don't think 'the latter' is correct here. Perhaps replace with 'this'.	Change made as suggested
Evans, Thomas	No	Chapter 6	12	12	343	343	species -specific (close gap?)	Thank you, we have corrected this in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	12	12	349	349	Here and elsewhere, elements like "concerningly" are inappropriate. Financial resources could be appropriately compared to what is needed to achieve particular purposes, or compared to commitments, for example. The authors' concern may be well-grounded, but it should not be part of an objective, non-prescriptive assessment.	We have removed the word "concerningly" and just present the results of Pagad et al., 2020
Joshi Rijal, Srijana	No	Chapter 6	12	12	358	358	"Outhwaite 2018" not in reference list	Thank you, we have corrected this in the final draft
Joshi Rijal, Srijana	No	Chapter 6	12	12	359	359	"Outhwaite 2010" not in reference list	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 6	12	12	367	367	but show?	Text Edited to clarify the point
Evans, Thomas	No	Chapter 6	12	12	367	367	solloed?	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 6	12	12	368	369	This is not a fully formed sentence?	Text Edited to clarify the point
Sagoff, Mark	No	Chapter 6	12	12	368	368	Typo: "solloed" should be "silloed." The passage makes an important point.	Thank you, we have corrected this in the final draft
Evans, Thomas	No	Chapter 6	12	12	371	371	Pan (plan)	Thank you, we have corrected this in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	12	12	374	383	On the whole, one would like to see evidence before conclusions are drawn such as "...failure to adequately resource, prevent and control invasive alien species" or "... governance systems for invasive alien species have to date not been adequate".	We respectful disagree and consider that our phrasing follows the evidence - conclusion setup suggested by the comment
Evans, Thomas	No	Chapter 6	12	12	377	379	I suggest revising this line. How about: It is not possible to establish how much worse the situation would be in the absence of the substantial collective investment made to date to prevent and control invasive alien species.'	Change made as suggested
Evans, Thomas	No	Chapter 6	12	12	383	383	multinational (singular)	Thank you, we have corrected this in the final draft
Bliss, Cebuan	No	Chapter 6	13	13	384	385	Figure 6.2 - also add Convention on Biological Diversity (CBD)? Has certain elements regarding IAS and inter-agency liaison group	We cannot add this, as the data only considers countries that have been signatories of the CBD
Karayannis, Theofanis	No	Chapter 6	13	13	384	384	I appreciate that this Figure 6.2 comes from an existing reference and as such probably cannot be modified, however a couple of issues need to be pointed out. First, it shows percentages of countries, which for the BWM Convention (as with all IMO conventions) is not particularly relevant - for our conventions the most important figure is the percentage of the world's tonnage, as compliance to IMO conventions is by individual ships. In addition, as discussed just above, this ratification status is rather out of date and has changed substantially by now. Finally, 2017 is given as "year of establishment", which is not correct - 2017 is the BWM Convention's entry into force.	We appreciate the point made. We have added all the nuance described in the comment in the text. And decided to keep the figure in its original format as it allows a comparison (perhaps not perfect) between different agreements
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	13	13	394	394	Figure 6.2: Including CITES may be a bit misleading as it does not look to control and prevent IAS specifically.	We consider that CITES is relevant here given the Decisions 10.54, 10.76 and 10.86 adopted by the CITES Conference of the Parties at its 10th meeting (https://cites.org/eng/res/13/13-10.php)

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	14	14	407	416	Fig 6.4 and 6.5: This is a lot of space to dedicate to patterns of funding without explicit links to policy options. Why is this level of detail presented here?	We want to present this values as a way to highlight the funding limitations faced when trying to implement agreed options and targets related to IAS. - see 6.1.3. section Resourcing
Sagoff, Mark	No	Chapter 6	14	14	407	416	Figure 6.4, 6.5: It would be helpful to have amounts not just percentages. It would be useful to know how much of the funding goes to 1) academics to scrutinize, theorize, and bewail the problem and 2) laborers to pull up or cut down invasive species.	While having this value would be important these are not available and countries are not willing to share these
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	14	14	411	412	Figure 6.5: The regional categories seem to be too broad for the graph to be helpful. More disaggregated data would be useful. If not, the usefulness of the table is decreased.	Here we are referring to the level of aggregation defined by IPBES as units of analysis. More disaggregated data is available in the original source, but would go counter the required level of reporting by IPBES.
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	15	15	421	423	This definition would probably be useful higher up in the document as well. It otherwise takes a while to understand what is meant by governance	We decided to include a definition here as it is part of the glossary. This is the definition uses throughout the report
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	15	15	425	426	While it is interesting to see that there is little research on governance, I wonder to what extent this type of research is needed. There are clearly needs for greater clarity of roles and structures (and thus governance); however, is research needed on this? Given limited funds to address this threat, maybe examining governance structure is more important rather than doing research on this specific point.	We kindly disagree with this point and decided to keep the point we raised here. We consider that assessing the effectiveness of policy and management for invasive alien species is critical to determine how alternative forms of governance, different legal and regulatory instruments, and economic instruments can help prevent, manage, or adapt to biological invasions. We also lack data on the relative effectiveness of management actions.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	15	15	428	439	Box 6.2: please include in glossary as well. There exists governance that does not meet the key features in the last sentence.	The box was rephrased so it links the idea Governance in the context of biological invasions
Joshi Rijal, Srijana	No	Chapter 6	15	15	456	456	please check if this ref is Gilek et al. (2016); or Gilek, M., & Karlsson, M.; Gilek et al. (2016): is missing in ref	Thank you, we have corrected this in the final draft
Sagoff, Mark	No	Chapter 6	15	32	485	1094	Table 6.4: I have no comments on these pages other than to say they are well written, persuasive, informative, and successful. I guess I would look for a little more on the roles of NGOs. NGOs are not merely "stakeholders" but often do more than governments to enforce treaties and legislation.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors. Regarding the role of NGOs in the context of the comments this role is explain in multiple part of the chapter, namely sections 6.4 and 6.5
Government of Argentina	Yes	Chapter 6	16	16	471	483	We request to delete the reference to the post 2020 global biodiversity framework. This is a process underway, it has not been agreed nor negotiated by Parties and it is unclear whether or not it will include a theory of change.	Thank you, the framework has been approved and the assessment now reflects it.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	16	16	473	476	Insert "draft" before "post-2020" in two places, because that framework is not yet agreed and may still not be agreed by the time this assessment is released. Delete "now".	Thank you, the framework has been approved and the assessment now reflects it.
Government of Argentina	Yes	Chapter 6	17	17	500	502	We request to delete the reference to the post 2020 global biodiversity framework. This is a process underway, it has not been agreed nor negotiated by Parties and it is unclear whether or not it will include a theory of change.	Thank you, the framework has been approved and the assessment now reflects it.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	17	17	500	502	This final sentence is out of scope and should be deleted. This paragraph is a really good example of linking elements in a way that makes the policy relevance clear.	Sentence removed as requested
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	17	17	506	510	Box 6.3: This is confusing, as DPSR has much wider applicability. My impression is that this is an example application of DPSR in a study intended to guide such investment.	the legend has been edited to make this point clear. The reviewer's interpretation of the intention is correct.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	18	18	516	518	If Figure 6.6 applies only to the Antarctic, as indicated on Page 17 Box 6.3, then that should be stated in the Title of Figure 6.6.	this has been clarified in the legend, and figure edited to make this more clear
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	18	18	516	518	Figure 6.6: Although the biogeographic regions approach is relevant and very appropriate, it is difficult to measure, and the indicators that do exist (e.g. species lists) are developed on a country-by-country basis. This framework will be difficult to implement	This approach has been implemented at international, regional and country scales (references in section). Antarctica is used here simply as an example. This figure has been edited to improve clarity.
Joshi Rijal, Srijana	No	Chapter 6	18	18	532	533	missing in references -Reed, Van 532 Vianen et al. 2016	Thank you for the comment. Reference added.
Brundu, Giuseppe	No	Chapter 6	18	18	538	538	I would suggest changing "problem" into "process"	Thank you for the comment. Change made as suggested.
Government of Germany	Yes	Chapter 6	19	19	547	550	Clarification needed on Figure 6.7: Further to the NFP national dialogue workshops on January 19, 2022, we would have expected that "trade" is mentioned in the "Drivers of Invasion" column because "trade" was introduced as a critical driver of IAS alongside changes in land and sea use. Please check (see also the specific mention of trade in Figure 6.8 as a prime driving force).	Thank you for the comment. The drivers details in fig. 6.7 uses the classification from Chapter 3 of this assessment - where 'trade' falls under the category 'Economic drivers' (Tabl 3.1)
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	19	19	557	557	Figure 6.14 is too far away (page 73) for effective reference. Either place the Figure closer to page 19 or delete the reference.	This Figure has been shifted to Chapter 1 of the assessment
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	20	20	582	589	The emotive language here should be revised. Contrast to lines 818-829 and lines 2552-2555, which are more balanced.	Thank you for the comment. The language has been edited
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	20	20	589	590	This affirmation should be substantiated (source or link to another chapter)	Thank you for the comment. The citations follow in the following sentences after the colon - the colon has been replaced with i.e. to clarify
Government of Germany	Yes	Chapter 6	20	20	592	592	Proposal: The term "traditional governance" may lead to misunderstandings with the IPLC / ILK approaches within IPBES. It may therefore be useful to briefly expand on the meaning of traditional governance.	Thank you for the comment. Replaced with 'currently dominant'
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	20	21	601	635	Lack of coordination across policy instruments seems to be the main point of both 5 and 6, could these be combined? "Need to be" is directive as currently phrased. This sentence could be reworded to avoid the assumption that a particular policy direction has been accepted: "To increase equity, costs and responsibilities need to be balanced between those directly responsible for the introduction and those who suffer a loss of NCP or good quality of life."	Chapter 5 is about disconnect and sometimes conflicting policy relevant to invasive alien species, whereas Chapter 6 is about the fact that the costs and impacts of invasion are often borne by actors distance from those responsible for the introducing and spreading them. directive phrase has been edited
Brundu, Giuseppe	No	Chapter 6	20	20	608	608	I would suggest to change "such an agriculture and the environment" into "such an agriculture, forestry and the environment"	Thank you, we have corrected this in the final draft
Joshi Rijal, Srijana	No	Chapter 6	20	20	608	608	change "such an" to such as	Thank you, we have corrected this in the final draft
Government of Argentina	Yes	Chapter 6	20	21	615	634	The relevance of considering WTO rules should be mentioned in this paragraph.	This is an important linkage we decided to keep separately in section 6.3.1.2 given its relevance for developing of possible solution to prevent the introduction of IAS
White, Michael	No	Chapter 6	20	20	619	621	Northern Cook islands got insect pests in infrastructure equipment (e.g. cyclone shelter build)	Thank you for this important example - unfortunately to include it we need a citation.
White, Michael	No	Chapter 6	20	20	623	624	Neale and Macdonald 2019 doesn't seem to be in references	Thank you for the comment. Reference added.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	21	21	630	630	Please include "externality" in the glossary	Thank you for the comment. Definition added to the glossary.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	21	21	637	652	This would benefit from reframing, possibly as a lack of formal institutions and resources. As it is, there is some circularity in listing implementation challenges as an entry in a list of implementation challenges.	Thank you for this good point - we have edited the title of the paragraph
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	21	21	637	653	Review articles on perception, attitude and possible conflicts with animal protection laws.	Thank you for the comment. Unfortunately it is not clear what is being suggested here? There is a revised section in the chapter now on conflicts with animal rights (Box 6.12)

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	21	21	644	655	Add: all, since son quarantine pest are regulated by international mechanisms. Suggestion: "There is no interbational authority... for all invasive alien species..."	Thank you for the comment. Changed as suggested
Joshi Rijal, Srijana	No	Chapter 6	21	21	648	648	Angulo and Gilna 2008 missing in ref	Thank you for the comment. Reference added.
Government of Canada (Ariey-Jouglard, Rachel Tu-Van)	Yes	Chapter 6	21	21	660	661	This example should be made a bit clearer. Maybe a word is missing (e.g., "when individual land managers ...")	Thank you for the comment. Changed as suggested
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	22	22	670	674	Figure 6.8: Missing as First driving forces: Markets and People's Demand.	Thank you for the comment. The content of this example is based on evidence from a publication
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	22	23	699	703	This seems a subset of point 8.	Collective action (8) is about the challenges of coordinating and organising large groups of diverse actors, whereas conflicting interests and trade-offs (9) are a related but specific challenge. The scoping document requested we deal with this point specifically. Nonetheless, the reviewer is correct that the sections have overlap - these have been edited.
Joshi Rijal, Srijana	No	Chapter 6	22	22	700	700	" inclusive o sectors" check this sentence	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 6	22	22	700	700	"o"?	Thank you, we have corrected this in the final draft
Brundu, Giuseppe	No	Chapter 6	22	22	746	746	Box 6.4: The correct scientific name is Mimosa pigra L. (no brackets)	Thank you for the comment. It was been rephrased.
Pan, Xubin	No	Chapter 6	23	23	745	746	Box 6.4: footnote, duplication	Thank you for the comment. It was been rephrased.
Atchison, Jennifer	No	Chapter 6	25	25	806	807	Table 6.5: Reference Barnhill-Dilling et al. 2019 not listed. (there are other references also not listed in this chapter, but I havent checked them all).	Thank you for the comment. Reference added.
Niemiec, Rebecca	No	Chapter 6	27	27	843	846	It might be worth citing papers here that look at how governance and behavior change strategies promote collective action for invasive species across boundaries. The current citations are mostly cross-sectional studies of barriers/motivations to collective action for invasive species control. But there has been research that has actually developed and/or evaluated approaches for encouraging collective action. For example: Niemiec, R. M., Willer, R., Ardoin, N. M., & Brewer, F. K. (2019). Motivating landowners to recruit neighbors for private land conservation. <i>Conservation Biology</i> , 33(4), 930-941. McKiernan, S. (2018). Managing invasive plants in a rural-amenity landscape: the role of social capital and Landcare. <i>Journal of Environmental Planning and Management</i> , 61(8), 1419-1437. These citations are also relevant to lines 1117-1120 and lines 2951-2954 as well. For example, the papers above describe specific interventions that governments can take to build the conditions for collective action described in lines 2950-2951.	Thank you for your comment. We cannot add additional text or referenes to the chapter due to word length restrictions.
Bliss, Cebuan	No	Chapter 6	28	29	890	948	Somewhere in this section perhaps highlight that, given limited resources, we may have to decide which species to mitigate and which to adapt to	Thank you. A sentence has been added to highlight this - referring back to the content in Chapter 5
Joshi Rijal, Srijana	No	Chapter 6	28	29	890	915	Some additional strategies could be identifying better techniques for the evaluation of impacts, biosecurity awareness, build and maintain long-term collaborations	Thank you, identifying better techniques for the evaluation of impacts is mentioned in Chapter 4 as one of the knowledge gaps. Chapter 5 also develops on awareness as one of the main impediments for management. Chapter 6 details how collaborations can improve management outcomes.
Pant Jugran, Harshit	No	Chapter 6	29	29	931	934	The inclusion of local level strategy for the eradication of IAS can be included in the sub-national and national level strategies so that the inclusion of TKS can be implied in the policy documents.	Thank you for the comment. This point - with the exception of TKS (meaning?) has been included in the section
Joshi Rijal, Srijana	No	Chapter 6	29	29	934	934	Add "containment" before eradication	Thank you for the comment. Change made as suggested
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	29	33	949	1122	6.2.4.3: This section provides little discussion of policy options. Its focus seems to be to outline of the complex interlinkages between different segments of society when considering IAS, and it is directive toward broad engagement of all relevant actors. While I recognize the ethics and value of this approach, nonetheless, it is not a discussion of options. Wide engagement is slow and expensive, and there are tradeoffs to be made, both in the allocation of limited resources and the the ability to take rapid action early on the invasion curve. Analysis of this tradeoff would improve policy relevance.	Thank you for the comment. Policy options for stakeholder inclusion is a subject broader in scope than biological invasions, and best practices of options for achieving this is beyond the scope of this assessment
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	29	30	950	954	I find myself increasingly confused over what "governance" means in this context - it does not seem to align to the definition in box 6.2. I think the intention here is to say that effective management of IAS needs broad engagement, and sustainability frameworks can help in this regard.	Thank you for the comment. Change made as suggested
Joshi Rijal, Srijana	No	Chapter 6	30	31	978	979	Arrange ref sequence in chronological order	Thank you, we have corrected this in the final draft
Joshi Rijal, Srijana	No	Chapter 6	31	31	1021	1024	management institutions are often at local level could you please elaborate how to transfer knowledge and management technology to them	Thank you for the comment. This point has been added to the section
Karayannis, Theofanis	No	Chapter 6	31	31	1033	1034	IMO should be added to CBD and WTO as a global example, given that transport and trade are highlighted in the next sentence and, notably, as highlighted earlier in this chapter, the BWM Convention is the only international treaty specifically about IAS.	Thank you for the comment. Change made as suggested
White, Michael	No	Chapter 6	32	32	1067	1080	I've seen instances where indigenous subsistence cultures want IAS dealt with, but remote central government has no interest in dealing with it. Low priority	Thank you for your comment, non indigenous peoples can also face this issue, and this has been delt with in sections on awareness (6.2.3).
Pan, Xubin	No	Chapter 6	32	32	1082	1082	"169"?	removed
Government of China	Yes	Chapter 6	33	33	1106	1122	It is critical to develop national and international collaboration as well as information sharing on invasive alien species. It is important to establish databases of invasive alien species, develop prediction and early warning system on invasive alien species.	Thank you for the comment. It does not seem to require text change.
Joshi Rijal, Srijana	No	Chapter 6	33	33	1121	1121	delete "of" after examples	Thank you, we have corrected this in the final draft
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	33	34	1124	1179	Use of the term "adaption" seems very different to "adaptive management" used in Chapter 5. Please review and cross-reference, to avoid confusion.	the use of the term adaptive in its multiple contexts has been clarified across the assessment
Sagoff, Mark	No	Chapter 6	33	33	1124	1125	This section is too short. The Chapter has often emphasized that most attempts to control or eliminate invasive species have failed. It follows that people have adapted to the invasions. A couple of case studies might be useful. When invasive species threaten native or endemic species, it is different; they may not adapt as readily as people do. If environmentalists emphasize the economic costs of invasive species, then it becomes plausible to argue that people, especially at the local level, are clever enough to work around, mitigate, or avoid these costs. If environmentalists emphasize economic costs -- "externalities" -- they invite the Coasian response that when it is cheaper for people to adapt to the externality than to pay the costs involved in preventing it, they will adapt to the externality. As the Report shows, the transaction and other costs involved in organizing an effective response to invasive species are formidable. On a cost-benefit basis, adaptation may be the only rational response given the transaction costs of collective action. In other words, the transaction and other costs involved in organizing an effective response to an invasion may be greater than the cost of the invasion itself. This is the reason most efforts have failed. It costs more to control invasive species, as a rule, than to adapt to them. For forty years, environmentalists have estimated the costs of invasive species and the benefits of controlling them. Let us assume that the benefits of controlling an invasive species greatly exceed the costs imposed by that species. But what about the costs involved in mounting and managing the control effort? The literature on the costs of control or prevention is sparse; what there is generally ignores the transaction costs of organizing a response and deals only with the costs of implementing it. With the threat to native species, it is different. Here the motivation is religious, cultural, moral, spiritual, and aesthetic. These motives are far more potent than the financial one. By emphasizing economic costs and benefits, environmentalists may pull the rug from under those who pursue their cause, which is fundamentally ethical not economic.	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Furthermore, we feel our approach addresses the point raised in the comments, as these are also part of other sections of the chapter and report
Bliss, Cebuan	No	Chapter 6	33	34	1125	1180	possible additional literature on human/wildlife coexistence e.g. König, H.J., Kiffner, C., Kramer-Schadt, S., Fürst, C., Keuling, O. and Ford, A.T. (2020), Human-wildlife coexistence in a changing world. <i>Conservation Biology</i> , 34: 786-794.	thank you for this additional reference - it has been added

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Joshi Rijal, Srijana	No	Chapter 6	33	33	1126	1126	Change "alien invasive species" to "invasive alien species" for uniformity	Thank you, we have corrected this in the final draft
Brundu, Giuseppe	No	Chapter 6	33	34	1141	1146	One paper supporting the idea behind this paragraph "When human adaptation becomes a response" is the following one: Kleinschroth, F., Winton, R.S., Calamita, E. et al. Living with floating vegetation invasions. <i>Ambio</i> 50, 125–137 (2021). https://doi.org/10.1007/s13280-020-01360-6	thank you for this additional reference - it has been added
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	33	34	1141	1156	Adaptation has been the dominant response to IAS. This background is largely covered in other chapters and is not needed here.	We respectfully disagree. We consider that Adaptation is an important point to discuss in the context of governance as has clear implication to how institutions as individuals respond to the IAS problem.
Government of Canada (Aricy-Jouglaard, Rachel Tu-Van)	Yes	Chapter 6	34	34	1149	1152	An example to substantiate this statement would be helpful.	Thank you for the comment. An example has been added
Pan, Xubin	No	Chapter 6	34	34	1154	1156	P33-34 L1146-1149	Thank you for the comment. It has been rephrased.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	34	34	1174	1177	This sentence provides excellent policy-relevant framing. The value judgement in the following sentence ("under appreciated") should be revised or removed.	Thank you for the comment. The sentence has been edited to address the comment.
Pan, Xubin	No	Chapter 6	34	34	1174	1177	P34 L1168-1172	Thank you for the comment. It has been rephrased.
Bliss, Cebuan	No	Chapter 6	34	34	1181	1259	Suggest adding reference about transformative governance: Ingrid J. Visseren-Hamakers, Jona Razzaque, Pamela McElwee, Esther Turnhout, Eszter Kelemen, Graciela M Rusch, Álvaro Fernández-Llamazares, Ivis Chan, Michelle Lim, Mine Islar, Ambika P Gautam, Meryl Williams, Eric Mungatana, Md Saiful Karim, Roldan Muradian, Leah R. Gerber, Gabriel Lui, Jinlong Liu, Joachim H. Spangenberg, Dara Zaleski, Transformative governance of biodiversity: insights for sustainable development, <i>Current Opinion in Environmental Sustainability</i> , Volume 53, 2021, Pages 20-28	Thank you for this valuable reference update-it has been added.
Sagoff, Mark	No	Chapter 6	35	35	1197	1204	Box 6.5: Integrated governance as defined seems so aspirational that it is rarely possible. It calls for every stakeholder and relevant authority to join in determining what to do and then doing it. What is wrong with integrated governance is the problem Oscar Wilde identified in socialism. "The trouble with socialism is that it takes up too many evenings." Can you imagine how many meetings you would go to if you were a stakeholder? How many phone calls you would need to take or return? How much reading you would have to do? One must be really motivated to join in the effort -- but who has the time? Those who are most affected by a particular invasive may be willing to make the effort -- but others might not return their calls.	The challenge identified here in terms of time involved is raised under section 6.2.3 '8' - collective action. With regards to the comment about being 'aspirational' - progress requires direction setting, visions and missions - all of which are a standard part of strategic planning.
Joshi Rijal, Srijana	No	Chapter 6	35	35	1218	1218	(Diaz et al., 2019; Weitz et al., 2017). Arrange ref sequence in chronological order	Thank you, we have corrected this in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	36	37	1261	1261	Table 6.6: This table should include expected benefits, to help analysts determine which tactics fit their policy needs. The table might be more accurately titled "tactics to enable policy reform" or for policy development	Thank you for the comment. Changes made as suggested
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	38	38	1297	1298	These four governance issues provide a powerful organizing frame. The chapter would benefit from an earlier section that supports the identification of these issues as the major governance issues that could be addressed to reduce IAS impacts. A clear exposition of evidence that these are the underlying issues would then support the discussion of options to address them.	Thanks for you point. This classification has been made in section 6.2.3, where we describe and justify the main challenges to IAS governance we address in this section
Brundu, Giuseppe	No	Chapter 6	38	39	1300	1303	In the Table "Table 6.7: International legal and institutional framework by sector", in my opinion, some international framework are missing, such as, e.g., Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), 1991 Protocol on Environmental Protection to the Antarctic Treaty (the Madrid Protocol), So maybe, in the title (or in the caption) it should be clarified that this is only a selection of texts. I also would suggest considering: Secretariat of the Convention on Biological Diversity (2001). Review of the efficiency and efficacy of existing legal instruments applicable to invasive alien species. Montreal, SCBD, 42p. (CBD Technical Series no. 2).	The Table legend was modified as suggested. Also we add the Protocol on Environmental Protection to the Antarctic Treaty (the Madrid Protocol) as it referred later on the chapter
Diaz, François	No	Chapter 6	38	39	1300	1302	"In the table 6.7. International legal and institutional framework by sector, at the Sector Transport and Trade I would add the World Organisation for Animal Health (OIE) and the International Plant Protection Convention (IPPC) Rationale: The WTO's SPS Agreement states that "to harmonize sanitary and phytosanitary measures on as wide a basis as possible, Members shall base their sanitary or phytosanitary measures on international standards, guidelines or recommendations". The Agreement names the OIE as the relevant organization for animal health and the IPPC for plant health standards."	Thank you for the comment. The table was modified as suggested
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	38	38	1301	1301	Table 6.7: the CBD is binding (https://www.cbd.int/undb/media/factsheets/undb-factsheet-cbd-en.pdf), as is the Bern Convention (https://www.cbd.int/undb/media/factsheets/undb-factsheet-cbd-en.pdf)	Thank you for the comment. Change made as suggested
Joshi Rijal, Srijana	No	Chapter 6	38	38	1301	1301	Table 6.7: correct (UNFCCC) as (UNFCCC)	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 6	39	39	1302	1302	Table 6.7: Do we need the expired GATT?	We consider that having it provides historical context, but to clarify the point made we have added a footnote to show that this treaty was replaced by the WTO
Sagoff, Mark	No	Chapter 6	42	42	1405	1407	"The overarching goal of the proposed solutions is to internalize the negative impacts of invasive alien species into the social or economic context responsible for their introduction and spread." How much will it cost to do this – to internalize the externality? I am referring to the transaction costs, for example, those involved in litigation. If the transaction costs involved in organizing an effective response to an invasive species are less than its negative impacts then a response will be organized, as is the case with successful projects or programs. If the transaction costs of bringing all the parties together, hashing out an agreement, and implementing it are greater than the invasion costs, then nothing will be done, or the project will fail. This is what generally happens. This is also efficient. The transaction costs of organizing and implementing an integrated response may be greater than the costs of adapting to the invasive or just living with it. Where a pathogen or pest affects human health or a particular industry, an effective response can be generated because those threatened will make it happen – they will bear the transaction costs of a response, and there are public health and agricultural organizations accustomed to do this. Where the invasive is not a disease organism and has not – at least yet – proved to be an important economic pest nothing will be done about it and, on economic grounds, nothing should be done about it because the transaction costs are too high. If the problem is not economic but ecological – the rarity, beauty, indeed, sanctity of native species and heirloom ecosystems – references to externalities draw red herrings across the moral and spiritual path societies ought to follow.	While the costs of "internalizing the externality" is important, this section focuses on showing the possible paths by which this could be done, rather than how these pathways should be financed. Providing such recommendations would be too prescriptive and outside the report mandate. However, different possible financing mechanisms to do this are presented and discussed in section 6.5. There are no data available, or methods, to estimate how much it would cost.
Government of Argentina	Yes	Chapter 6	42	42	1415	1415	Argentina is concerned regarding the recommendation on page 51 "Delineate the environmental jurisdiction of trade agreements, so the mandates of the Multilateral Environmental Agreements are enforceable." This statement underlines a false dichotomy between environmental agreements and trade agreements. Even more concerning, no reference is made to the multilateral trade system that already exists, and the WTO Agreements. This recommendation seems to be in line with the tendency of numerous developed countries to justify trade barrier measures under the excuse of environmental protection. Argentina does not share this premise, understands this recommendation as policy-prescriptive and maintains that any trade-related measure must be in line with the WTO rules.	At no point we state that there is a dichotomy between environmental agreements and trade agreements. Our point is that there are two different perspectives on how to address the risk imposed by IAS. Also, until now "saving clauses" have made MEA subordinate of trade agreements. Our point is these two should be in equal footing, and it should be clear when any dispute refers to trade or refers to the environment. As we do not state how this balancing should be done we see this not a policy prescriptive recommendation.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	42	42	1420	1423	Philosophically, this makes sense, but how, in practice, could it be done?	The phrasing was change to showcase that governments should to proactively define the relationship between during the negotiation of the MEA, and that thesis definition do not need to focus on "Saving cluses" but on actual definition of when environmental treaties should supersede trade agreements.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	43	43	1420	1425	It is rarely possible for governments to "proactively define the relationship between trade and environment centred agreements". This relationship is actually usually addressed by provisions in the international agreements themselves, which governments negotiate. Perhaps the text should put more emphasis on the so-called "savings clauses" which define the relationship between one agreement and other relevant instruments. These often emphasize mutual supportiveness.	The phrasing was change to showcase that governments should to proactively define the relationship between during the negotiation of the MEA, and that thesis definition do not need to focus on "Saving cluses" but on actual definition of when environmental treaties should supersede trade agreements.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	43	43	1430	1432	If you are going to write about "the multilateral trading system, which is increasingly criticised for its tendency to override social and environmental policies", then you should also mention that social and environmental agreements are increasingly criticized for attempting to override multilateral trading system rules.	We have added this nuance to the argument as suggested
Government of Germany	Yes	Chapter 6	43	43	1446	1446	Proposal: It is suggested to replace the term "man" with "human".	Thank you for the comment. Changed as suggested
Achison, Jennifer	No	Chapter 6	44	44	1480	1480	Are there opportunities to improve the linkages between Chapter 6 and Chapter 3? The discussion of drivers in Chapter 3 does not mention poverty, yet poverty and socio-economic marginalisation are discussed at various key places in Chapter 6. Strengthening the linkages to note the relationships between poverty and marginalisation and IS (in chapter 3), and then what can be done about these (Chapter 6) is important to the success of IS management (eg ensuring food security etc as mentioned in 6.3).	Now the issue of poverty and aid is dealt in both chapter 3 and 6
Diaz, François	No	Chapter 6	44	44	1488	1488	In the following sentence, "or truism can become a driver", the word "truism" should be I think "tourism"	Thank you, we have corrected this in the final draft
Joshi Rijal, Srijana	No	Chapter 6	44	44	1488	1488	Replace truism with tourism	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 6	44	44	1492	1492	Delete "and"	Thank you, we have corrected this in the final draft
Brundu, Giuseppe	No	Chapter 6	44	45	1525	1526	With regards to the sentence "These tree plantations programs are 1525 at the core of many national and regional climate strategies", the following citation could be used (cfr Table 1 in the paper): Brundu G, Pauchard A, Pyšek P, Pergl J, Bindewald AM, Brunori A, Canavan S, Campagnaro T, Celesti-Grapow L, Dechoum M de S, Dufour-Dror J-M, Essl F, Flory SL, Genovesi P, Guarino F, Guangzhe L, Hulme PE, Jäger H, Kettle CJ, Krumm F, Langdon B, Lapin K, Lozano V, Le Roux JJ, Novoa A, Nuñez MA, Porté AJ, Silva JS, Schaffner U, Sitzia T, Tanner R, Tshidada N, Vitková M, Westergren M, Wilson JR, Richardson DM (2020) Global guidelines for the sustainable use of non-native trees to prevent tree invasions and mitigate their negative impacts. NeoBiota 61: 65-116. https://doi.org/10.3897/ncobiota.61.58380	Thank you for the comment. We have added the reference.
Brundu, Giuseppe	No	Chapter 6	45	45	1522	1542	I think it might be worth recalling that tree plantations (and the massive cultivation of "bioenergy species") is also in relationship with international policy on energy production, e.g. in the European Union.	As suggested we have added a statement regarding biomass production for energy
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	45	45	1522	1542	This example has a clear IAS connection, and could be used in fig 6.11 to replace example (a) or (c), which are similar to each other and provide examples of unintended consequences but do not link to invasives.	We think that all the examples ad context to the issue of IAS, however, we have added two new cases here addressing forestry and biofuels
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	46	46	1544	1544	In Figure 6.11, under a) agriculture, the example of Carson is misapplied. The main use of DDT was to combat malaria vectored by mosquitos, not agriculture. The non-target impact promoted by Carson was on wild birds, as shown in c). Moreover, the example does not specify what the "perverse incentive" was supposed to be. In fact, this is not specified for any of the "examples", except f).	Here we do not directly link to Carson point on DDT, but the fact that it started and environmental movement focused on the use of board spectrum insecticides.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	47	47	1554	1591	Examples in this section are taken only from aquaculture and silviculture. By far, the greatest use of non-native species is in agriculture (crops and livestock). FAO has shown that no country's crops use more than 25% native germplasm, and most use far less [Reference: CONTRIBUTION TO THE ESTIMATION OF COUNTRIES' INTERDEPENDENCE IN THE AREA OF PLANT GENETIC RESOURCES by Ximena Flores Palacios. FAO Commission on Genetic Resources for Food and Agriculture. Background Study Paper No.7rev 1 at https://www.fao.org/cgrfa/resources/background-study-papers/en/] This section of text should reflect that reality, in the context of food security. The section should also acknowledge that if native species provided better livelihoods than introduced species in economic activities, they would already be used. Also, "voluntary regulations" sounds like a contradiction in terms - replace with "voluntary codes of conduct or guidelines"?	We now add some text to provide nuance to the argument of a need to native species replacement as suggested. We also change voluntary regulations to voluntary codes of conduct.
Sagoff, Mark	No	Chapter 6	47	47	1554	1592	This section identifies crops as invasive alien species. See, for example, ll. 1583-1584. This is inconsistent with the definition of an invasive alien species which excludes those that depend on cultivation for survival and reproduction. See the definition of "established" in Chapter 1, p. 5. So what is the problem with crops -- very few of which, indeed, hardly any, are native to the regions where they are cultivated? The problem cannot be that they are invasive because they are not established, thus they are not invasive. (Farmed species rarely go wild; this is a different matter.) So the problem must be that crops are non-native or alien. Since they are rarely if ever invasive, why is this a problem? The Chapter assumes that native is better -- which I think is true in the wild, but science cannot say why. Why is native better not in the wild but in cultivated or domesticated environments? The text states, There is no reason to believe that native species cannot replace some of the cultivated or grown alien species." There is a reason. The cultivated alien species have been subjected to hundreds, in the case of maize, wheat, and rice, perhaps thousands, of years of artificial selection and more recently genetic engineering to make them palatable and profitable. The challenge to bioengineers to jigger the genomes of native species to make them palatable and profitable where they are native seems bewildering. At farmers' markets, one can often find for sale "heirloom" or "artisanal" fruits and vegetables. The prices are so high, they make one gawk. Native species untouched by artificial selection would be inedible as well as unaffordable.	We now add some text to provide nuance to the argument of a need to native species replacement as suggested. We also change voluntary regulations to voluntary codes of conduct.
Pan, Xubin	No	Chapter 6	47	47	1585	1585	Delete ", Richardson 1998"	These are two different references. This is clarified in the text
Government of Germany	Yes	Chapter 6	48	48	1605	1605	Clarification needed: How is "irreversible" defined?	To align with the definition of IAS in Chapter one we remove the word irreversible.
Government of China	Yes	Chapter 6	48	48	1621	1625	Delete "by providing a relatively cheap source of animal protein for rural poor, as well as considerable export income". First, the cited article (De Silva 2004, De Silva, Nguyen et al. 2009) were not in the reference list. Second, "by providing a relatively cheap source of animal protein for rural poor, as well as considerable export income" is inappropriate. There is no differentiation among different groups for eating alien tilapias.	The sentence refers only to subsistence aquaculture, so we consider that the paraphrasing clearly refers only to one group of people. Also the references are added to the list.
Government of New Zealand (Perry, Joanne)	Yes	chapter 6	48	48	1641	1641	1641 - is this line meant to read "Perhaps the most efficient line of defense???" Not dense as it is written now?	Thank you for the comment. Change made as suggested.
Government of Argentina	Yes	Chapter 6	49	49	1670	1670	On page 57 it is proposed to "Include early warning systems of invasive alien species into Multilateral Environmental Agreements and national legal and regulatory instruments." Among the sources that justify this initiative is the "Charter of Syracuse" adopted by the G8 Ministers in 2009. If there is an international multilateral consensus to advance along these lines, there should be an agreement on the definition of early warning systems based on multilaterally agreed scientific evidence, and in line with the WTO rules. It should also be noted that G8 initiatives cannot be considered as multilateral precedents.	For clarity, and given the lack of a definition of early warning and rapid response systems in the documents cited, we provide one that is specifically tailored for the IAS case.
Joshi Rijal, Srijana	No	Chapter 6	50	50	1694	1694	correct (UNFCCC) as (UNFCCC)	Thank you, we have corrected this in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	50	50	1696	1703	Herculean, perhaps, but an international authority seems more feasible than national efforts in every country: national surveillance is resource-demanding and competes with other management efforts. It would be nice here to have some of the findings from the cited papers.	Thank you, we have addressed this comment in the final draft
Government of Argentina	Yes	Chapter 6	50	50	1698	1698	In line 1698, the creation of the "International Biosecurity Convention organization" is proposed. It is not clear what its functions and objective would be. It also seems to overlap the functions of the Convention on Biological Diversity, the Cartagena Protocol and the Kuala Lumpur Protocol. We suggest that this assessment refrains from recommending further international structures that will compete with existing ones. The correct approach should be the improvement of those that currently exist.	We disagree with the point, as the organisms we are opposing will be more align with the roles of the WHO. As the possible roles to fulfil are many focused on coordination of efforts and knowledge sharing, this role are clearly not overpaying those of the mission of CBD
Sagoff, Mark	No	Chapter 6	50	50	1707	1709	"At the core of biosecurity efforts is to control the introduction of pests and diseases, the introduction and release of genetically modified organisms and their products, and the introduction and management of alien invasive species and genotypes (FAO 2003)." This is a bizarre statement. I cannot find the reference (FAO 2003) in the bibliography. I have no idea what "genetically modified organisms" means. Nearly all crops have been genetically modified to a large extent by conventional breeding. First-generation genetic engineering involved splicing a gene from one species into the genome of another. This technique is giving way to more advanced methods of genomic editing and synthetic biology. What invasive species that are not pests or diseases have to do with biosecurity eludes me. The Chapter should explain why honeysuckle and purple loosestrife are biosecurity risks.	Thank you for your comment. We consider that point made fails to place the idea in the border context of the sentence, which is the current view of biosecurity, and the need to expand it beyond the Scopes of the IPPC and OIE.
Joshi Rijal, Srijana	No	Chapter 6	50	50	1709	1709	Change "alien invasive speccis" to "invasive alien speccis" for uniformity	Thank you, we have corrected this in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	50	50	1723	1725	Some clarity on the details would be helpful here. For example: Food crops shipped as seeds (or produce containing seeds) might be considered living organisms, and the change proposed here would increase red tape for minimal benefit.	We have added some nuances the point to so it clear that the suggested possibility would not affect trade. More detail cannot be added with out not making the suggestion policy prescriptive.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	51	51	1743	1743	please include this definition in the glossary	Definition added to the glossary

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Joshi Rijal, Srijana	No	Chapter 6	51	51	1755	1755	Morrisey, Inglis et al. 2011 missing in ref	Thank you, this has been addressed in the final draft.
Sagoff, Mark	No	Chapter 6	51	52	1791	1792	"about 10% in the case of horticultural species cf. (Hulme 2012.)" I do not know what "horticultural" means here. The reference -- Hulme (2012) -- does not appear in the bibliography. There is a nice article -- Hulme, P. E. (2012). Weed risk assessment: A way forward or a waste of time? Journal of Applied Ecology, 49, 10– 19 -- but it provides no support for the statement. What is "cf." doing here?	Changed horticultural to cultivated. Also, we respectfully disagree as the numbers are supported by the findings in Hulme 2012, as reiterated in Hulme et al 2017
Government of Ireland (Nelson, Brian)	Yes	Chapter 6	52	52	1818	1818	Box 6.6: 'foster' instead of 'fosters'	Thank you, we have corrected this in the final draft
Sagoff, Mark	No	Chapter 6	52	52	1825	1825	Box 6.6: Comment on "cultigens (plants resulting from artificial selection)." As far as I know, every plant is commercial use is a "cultigen" -- a term I have not encountered before. If cultigens are bad, then all species not in the wild are bad, because without artificial selection (breeding) they would not be grown. The IPBES report here verges on the idea that any species with the human taint is bad, risky, or wrong. I am not sure whether this is good science or not. I do believe it is bad theology.	It is an accepted term in the International Code of Botanical Nomenclature. To ensure the clarity of the term a definition was added and a reference.
Joshi Rijal, Srijana	No	Chapter 6	53	53	1831	1856	Box 6.6: may be it is good to refer Brundu and Richardson 2016 reference somewhere here where they have proposed a voluntary code of conduct for IAS for European Union comprising of 14 principles for 47 member council	Reference added
Sagoff, Mark	No	Chapter 6	53	53	1831	1856	The box uses Callery Pear and Purple Loosestrife as examples of harmful invasive species. If these were native they would be celebrated as beautiful and useful, which they are. It is that they are alien that makes them bad. But why is alien per se bad? Science cannot answer this question.	Thank you for this suggestion. We have chosen not to include it in the assessment, as it is a philosophical question that is not in the scope of the section or chapter.
Pan, Xubin	No	Chapter 6	53	53	1850	1850	Box 6.6: Delete "or codes of practices"	Change made as suggested
Government of Ireland (Nelson, Brian)	Yes	Chapter 6	53	53	1858	1858	word missing after 'incorporate'	Sentence edited to address the comment
Joshi Rijal, Srijana	No	Chapter 6	53	54	1858	1908	This section is very useful and very interesting on management plan of PAs which is lacking for both marine and terrestrial PAs and I feel that few more exaomles can be presented from terrestrial Protected Areas. Please consider going through some of the reference from Foxcroft et al. 2013, 2017, 2019	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. We feel our box 6.7 encapsulates some of these marine examples.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	53	53	1860	1860	This is overstated. I know of no-one who considers protected areas to be free of invasive species.	The systems edited to ad nuance the point - this is an assumption based on the current theories explain invasive Aliens specie success.
Government of Canada (Ferreira, Catarina)	Yes	Chapter 6	54	54	1868	1869	Many many examples within the hunting literature, e.g, small game species in the Iberian Peninsula (https://bioone.org/journals/wildlife-research/volume-45/issue-7/WR17185/First-assessment-of-the-potential-introduction-by-hunters-of-eastern/10.1071/WR17185.full ; http://issg.org/database/species/ecology.asp?si=1616&fr=1&sts=&lang=EN)	We have added additional examples to expand the argument to other areas of the world.
Government of Germany	Yes	Chapter 6	54	54	1883	1895	Typo: "protected areas management plants" same typo in lines 1883, 1885, 1895. Please check throughout the whole document.	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 6	54	54	1883	1883	L1885, L1895, change "plants" to "plans"?	Thank you, we have corrected this in the final draft
Joshi Rijal, Srijana	No	Chapter 6	54	54	1895	1895	Correct plants as plan	Thank you, we have corrected this in the final draft
Government of USA	Yes	Chapter 6	54	54	1902	1908	Prevention through decontamination, strong controls on vectors (e.g. improved ballast water treatments, hull fouling / biofilm requirements, and enforcement), and early detection are incredibly important for marine protected areas. However, funding and technical capacity are often lacking. There is a real need for improved technology to assist in this (e.g. use of eDNA or other barcoding techniques).	A clarification was added to address the point raised.
Government of Canada (Ferreira, Catarina)	Yes	Chapter 6	55	55	1931	1931	Figure 6.12: 'Really nice example of IAS contributing to local communities' livelihoods: https://www.lionfishcaribbean.com/	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	56	56	1959	1962	This assertion needs supporting evidence. Quantitative description would be preferable to "most" and "few" in this paragraph	While we would like to have such quantification, Assessment of the impact on IAS related policy instruments is one of the major knowledge past we face. For this reason we decided to maintain the qualitative rather than a quantitative assessment here
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	56	61	1959	2095	This section does a good job of summarizing progress to date on international goals, but it's not clear that such material belongs in a section on national strategies. Here I would expect to see an explanation of how national strategies could be effective in avoiding and mitigating impacts of IAS, followed by a discussion of elements that influence the effectiveness of national strategies, supported by evidence from case studies.	We have added text explaining how national strategies can help prevent invasion, and what should these National strategies contain.
Karayannis, Theofanis	No	Chapter 6	56	56	1981	1983	This is the same point made in the Summary for policymakers, see row 11 above, and the sentence here has several issues: (a) the number of Parties is not that important for an IMO convention but rather it's the shipping tonnage that is the most important; (b) a comparison with 2010 does not have any meaning as 2010 is a random year that does not have any significance for this convention which was adopted in 2004 and came into force in 2017; (c) the assertion that this convention was established in 2010 is simply incorrect (as per previous point in this list). Row 11 above provides a proposal of what could be used as a meaningful example of progress, which is the intent of this sentence. And there is also again the "BMW" typo :)	The text was adapted to accommodate the tonnage, entering into force and Typo
Pan, Xubin	No	Chapter 6	56	56	1987	1987	"decline"?	Changed as suggested
Brooks, Thomas	No	Chapter 6	56	59	1994	1995	Table 6.9 is useful, but would be stronger is expanded to include the elements of SDG Target 15.8 as well as Aichi Target 9	Thanks for point this. After revising the text in Table 6.9 we do consider that the indicator refelet the targets set by SDG 158 (as pointed put in the table header.
Karayannis, Theofanis	No	Chapter 6	57	57	1995	1995	This comment is on Table 6.9, and specifically the first row titled "Trends in pathways of introduction and spread" at the top of page 57. The assertion that "Major pathways are not efficiently controlled at a global scale" appears to be based on a SCBD reference from 2015, which may be a bit out of date at least with regard to shipping (in particular ballast water) in light of the BWM Convention being in force since 2017 and its high ratification rate discussed in earlier rows. Given that this table, and in particular the last column, is about global progress, perhaps this could be highlighted.	Text was added to make the suggested clarification
Karayannis, Theofanis	No	Chapter 6	58	58	1995	1995	This comment is also on the same Table 6.9, this time on the row titled "Process" near the top of page 58. It's again about the ratification status of the BWM Convention being very out of date as discussed already in earlier rows, which affects the assertion that it has the fewest signatories (recalling that at present it has 88, which represent over 91% of global tonnage), as well as the already discussed issue of the meaningless cited increase both in terms of percentage and in terms of the starting point it's measured against (and lastly again the "BMW" typo). All these elements need to be corrected in accordance with relevant earlier rows.	The Text was adapted to avoiding referring to the data and highlight the large proportion of the world shipping tonnage currently regulated under the BWM
Joshi Rijal, Srijana	No	Chapter 6	59	61	2010	2071	Box 6.8: The information is very relevant I feel that this section should be reduced and be concise	We have made some edits to the text to streamline the ideas in the box but we consider all the points referred in the box are needed to encapsulate the complexities of coordination of IAS actions
Government of Ireland (Nelson, Brian)	Yes	Chapter 6	60	60	2020	2020	Box 6.8: Replace 'Not one' with 'No single'	Thank you, we have corrected this in the final draft
Government of Ireland (Nelson, Brian)	Yes	Chapter 6	60	60	2020	2023	Box 6.8: Sentence starting 'Instead' is unclear at the end in my opinion.	The sentence was rephrased
Government of Ireland (Nelson, Brian)	Yes	Chapter 6	60	60	2037	2037	Box 6.8: delete native - the species does not occur in Britain. The policy was to protect the European population. Perhaps clearer to put indigenous European white-duck and the alien North American ruddy duck. Scientific names should be added to the examplar species given in this box for absolute clarity, especially for Asian hornet, as the common name of this is often misunderstood.	Change made as suggested
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	60	60	2049	2049	Box 6.8: Delete "well-resourced". This is a matter of opinion, which is not necessarily shared by the agencies in question. The point of the sentence is not lost by deleting this adjective.	Change made as suggested
Pan, Xubin	No	Chapter 6	61	61	2073	2073	Change "Is" to "It's"	Thank you, we have corrected this in the final draft
Pan, Xubin	No	Chapter 6	61	61	2083	2084	weird	Rephrased
Joshi Rijal, Srijana	No	Chapter 6	61	61	2097	2097	Correct plants as plan	Thank you, we have corrected this in the final draft

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Pan, Xubin	No	Chapter 6	61	61	2097	2097	Change "plants" to "plans"	Thank you, we have corrected this in the final draft
Kamigawara, Kenji	No	Chapter 6	62	62	2108	2108	The word 'blacks' should be changed to the word 'blocks'.	Thank you, we have corrected this in the final draft
Joshi Rijal, Srijana	No	Chapter 6	62	62	2120	2121	Box 6.9: Please check if Speziale, Lambertucci et al. 2012 and Speziale et al 2012 is same	Thank you for the comment. The box was edited to reduce its length and the related text to this comment was removed.
Pan, Xubin	No	Chapter 6	62	62	2148	2148	Box 6.9: "no 6"?	Clarified what the Working Subgroup n° 6 is
Pan, Xubin	No	Chapter 6	62	62	2151	2155	Box 6.9: No Subject	Sentence rephrase to address the grammatical error
Brundu, Giuseppe	No	Chapter 6	63	63	2168	2169	Box 6.9: Please note that the "European strategy on Invasive Species (Genovesi & Shine, 2004)" was launched by the Council of Europe (not by the European Union / European Council). The Council of Europe and the European Union share the same fundamental values – human rights, democracy and the rule of law – but are separate entities which perform different, yet complementary, roles.	The sentence was rephrased to add this nuance
Brundu, Giuseppe	No	Chapter 6	63	63	2181	2181	Box 6.9: Please change "Council of the European Communities" into "Council of the European Union".	Reference changed as requested
Government of Canada (Ferreira, Catarina)	Yes	Chapter 6	63	63	2195	2195	Box 6.9: 'Careful with this language: ("invasive alien species Blacklist")	Black list removed
Government of Canada (Ferreira, Catarina)	Yes	Chapter 6	63	63	2200	2204	Box 6.9: Review this paragraph based on information here: https://www.iucn.org/regions/europe/our-work/biodiversity-conservation/invasive-alien-species/eu-regulation-technical-support/regional-sea-conventions-ias	Thanks for point this. We could not access the link provided. However, we have revised the text in this box to also include regional ocean based convation.
Government of Canada (Ferreira, Catarina)	Yes	Chapter 6	64	64	2205	2211	Box 6.9: The IUCN was commissioned by the EC a study on the implementation of the EU regulation across Member States and so the EC should be able to provide a more accurate picture of the implementation of the regulation in Europe than this paper.	The Section was rephrased to shorten it and clarify the main points of integration between regional and national legislation. As such we include a more recent picture of the implementation of the regulation in Europe.
Brundu, Giuseppe	No	Chapter 6	64	64	2206	2206	Box 6.9: The term Plant Health Law should be in brackets "Plant Health Law" as it is the common name for the Regulation (EU) 2016/2031 on protective measures against plant pests	Edited as suggested
Joshi Rijal, Srijana	No	Chapter 6	64	65	2235	2272	The section have not covered all international agreements related to invasive species prevention and management better to add all those information	Thank you for your comment. We cannot add additional text to the chapter due to word length restrictions. Moreover, While such a list is useful (and presented in Chp1), here our focus in to highlight the need of a institutions that facilitate/mandate information exchange and coordination between policy instruments.
Government of Australia	Yes	Chapter 6	65	65	2270	2272	There are many more than 12 nations active in the Antarctic, and the title of the manual developed by the Committee for Environmental Protection is the 'Non-Native Species Manual'. Suggest modify this sentence to read 'An example of such a multinational coordinating body is the Committee for Environmental Protection (CEP) (Box 6.10) which has developed a Non-Native Species Manual for activities of the nations active in the Antarctic.'	Change made as suggested
Government of Australia	Yes	Chapter 6	65	65	2287	2287	Box 6.10: Suggest replace 'reducing' with 'preventing', to reflect the provisions of Annex II to the Protocol on Environmental Protection to the Antarctic Treaty and the Antarctic Treaty Parties' objective, as articulated in the Committee for Environmental Protection Non-Native Species Manual.	Change made as suggested
Government of Australia	Yes	Chapter 6	65	65	2289	2290	Box 6.10: To correctly reflect the title of the manual developed by the Committee for Environmental Protection, suggest repace 'Invasive Alien Species Manual' with 'Non-Native Species Manual'.	Change made as suggested
Government of Australia	Yes	Chapter 6	65	65	2291	2294	Box 6.10: For clarity, suggest modify this sentence to read 'The Manual covers the unintended introduction of species to the Antarctic region and the movement of species within Antarctica, and is an example of the effective translation of recent research to policy through the Committee for Environmental Protection (CEP) (e.g., Hughes & Convey, 2012; 2292 Hughes & Convey, 2010; Lee & Chown, 2011).'	Change made as suggested
Government of USA	Yes	Chapter 6	65	65	2314	2344	Box 6.10 - The inclusion of marine considerations highlights key points that are relevant to most marine systems - the absence of guidelines for prevention and response. This is a good example of the disparity between terrestrial and marine efforts.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Government of Australia	Yes	Chapter 6	66	66	2312	2323	Box 6.10: For clarity and accuracy, suggest modify this paragraph to read 'Although the Manual makes reference to marine invasion risks and controls, including the Practical Guidelines on Ballast Water Exchange in the Antarctic Treaty Area (Antarctic Treaty Consultative Meeting (ATCM, 2006)), it identifies the need for further guidelines for the preventing and responding to marine invasive alien species (McCarthy et al., 2019). The Manual contains a great deal of advice for terrestrial systems, including flow charts on how to respond to introductions. Notwithstanding all of the advice and agreements, Antarctic Treaty policy implementation proceeds through implementation in national law, which is highly variable between the nations that are party to the Antarctic Treaty and Protocol (Hughes & Pertierra 2016). These include all nations that are active in Antarctica.'	Change made as suggested
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	67	67	2355	2355	6.3 is about enabling instruments, rather than implementation. (Implementation is usually a management challenge, rather than a governance challenge.)	We consider that implementation is a key governance change that reflect the practicality of any instrument. For this reason we decided to keep the wording
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	67	68	2359	2436	The actual policy options are not clear in these sections. Could this be organized in paragraphs by type of policy, with associated benefits and challenges?	We have now organized this section focusing manly in specific policy and regulation actions
Joshi Rijal, Srijana	No	Chapter 6	67	67	2359	2359	replace prosed by proposed	Thank you, we have corrected this in the final draft
Kamigawara, Kenji	No	Chapter 6	67	68	2359	2436	Shine et al. pointed out that "national frameworks need to be much stronger on preventing introduction than on mitigating their impacts. Very few countries have a comprehensive basis for taking legal measures to tackle accumulated problems linked to past, untreated invasions". This is an important point which should be inserted in this part. See Clare Shine et al., Legal and institutional Frameworks for Invasive Alien Species, in Invasive Alien Species: A New Synthesis 271 (Mooney et al. eds, 2005)	We consider this is a point more relevant for section 6.3.3.2. We have added the suggested clarification there
Kamigawara, Kenji	No	Chapter 6	67	68	2359	2436	The 'clear definition of the roles and responsibility' as mentioned in the line 1309 is essential for the effective legislation, and this point should be inserted in this part. We cannot expect the voluntary-based system would work on invaded sites. See Kamigawara et al, What kind of legislation can contribute to on-site management?: Comparative case studies on legislative developments in managing aquatic invasive alien plants in France, England, and Japan, Journal of International Wildlife Law & Policy 23(2), 83-108, 2020.	This section is now rephrased to focus manly on the need for "Careful delineation of legal authorities, regulations, and policies that would enable the implementation of risks assessment protocols". Aspects about onsite management are now provided in the section preceding this one.
Kamigawara, Kenji	No	Chapter 6	68	68	2403	2436	Major sentences are concerning to technical methods, and unfortunately legal points are very limited in this parts.	We have now organized this section focusing manly in specific policy and regulation actions
Sagoff, Mark	No	Chapter 6	68	68	2434	2436	I do not know what "landowner responsibility" might mean. The citation -- Kamigawara et al. 2020 -- concerns aquatic species.	We added a definition of land owner responsibility
Joshi Rijal, Srijana	No	Chapter 6	68	68	2438	2519	A box with case study on restoration of native species would be useful	We have refocused section 6.3.3 (Legal and regulatory options at and across invasion stages) to consider policy actions only. All the information related to management (i.e., restoration is now part of Chapter 5)
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	68	69	2441	2512	Much of this section focusses more on research gaps than restoration policies, and would perhaps be better placed in Chapter 5.	We have refocused section 6.3.3 (Legal and regulatory options at and across invasion stages) to consider policy actions only. All the information related to management (i.e., restoration is now part of Chapter 5)

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sagoff, Mark	No	Chapter 6	69	69	2450	2450	"An ecological restoration is ultimate test of [the] basic science of ecology." This is an important observation. The following text over the next two pages struggles with the central question posed by invasive species -- how does the basic science of ecology apply? The question is particularly vexing because no general or characteristic biological differences distinguish native from alien species, or heirloom from upstart ecosystems. Absent historical knowledge, it is impossible to tell which is which. Yet the basic science of ecology should apply to the native and heirloom in a way it does not apply to just any collection of species found together at a time and place. The passage under review suggests that a test of the relevance of basic ecological theory may be its usefulness in restoring, reconstructing, or constructing ecosystems that exemplify its principles. If restored or reconstructed ecosystems maintain themselves -- whatever that means -- better than invaded ones, this speaks in favor of basic ecological theory. If they become re-invaded and go back to a "novel" state, this would be evidence that basic ecological science has little application to them. Where are the "intact" ecosystems to which the basic science of ecology applies? If ecologists can find no general or characteristic biological differences between the intact and the invaded -- if the distinction has to do only with the history and not the properties of a system -- what does that tell you about the basic science of ecology?	We have refocused section 6.3.3 (Legal and regulatory options at and across invasion stages) to consider policy actions only. All the information related to management (i.e., restoration is now part of Chapter 5)
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	69	69	2459	2459	please include "biotic resistance" in the glossary	I inserted the terminology of 'biotic resistance' into glossary.
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	69	69	2468	2474	An example of island restoration after eradication of invasive mammals http://www.issg.org/pdf/publications/island_invasives/pdfhqprint3aguirre-munozi.pdf	Thank you for this suggestion. We have chosen to include the example in the section.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	69	69	2501	2501	are required to achieve what? Suggest this sentence be reframed around policy options	Rephased to highlight the policy options linked to the idea of instruments related to early detection and rapid response .
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	71	71	2543	2548	as noted at line 1141, adaptation has been the dominant response to IAS. Regardless of any decisions on governance, adaptation must be considered, because all existing invasives cannot be eradicated. The purpose of these two sentences within the paragraph is not clear.	This section has been thoroughly revised
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	71	71	2560	2563	This point underpins the entire discussion about stakeholder engagement and could perhaps be brought more to the fore. Part of the purpose of an assessment is to evaluate findings from the literature; statements made on what a subsection of the literature argues lead to an expectation of counter-arguments from another subsection and an analysis by the authors.	This section has been thoroughly revised
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	73	73	2611	2611	Figure 6.14: This is an effective graphic. Suggest that the following text be aligned under subheadings reflecting these 3 groups	This figure has been moved to Chapter 1 and text revised
Joshi Rijal, Srijana	No	Chapter 6	74	74	2644	2646	Horizon scanning tool is an important tool for managing invasive species but it is not much elaborated in the chapter	This topic is dealt with under 'Scenarios and models' in the assessment
Verwer- van Amerongen, Cynthia	No	Chapter 6	76	77	2763	2787	Box 6.12 is no example of what is mentioned before in the text. It's an example of how things can escalate when not doing what is mentioned in lines 2763-2770. What is mentioned in Box 6.14 is a nice positive example of what is mentioned in lines 2763-2770.	The section was rephrased to ensure the text directly links to the points made in Box 6.12
Joshi Rijal, Srijana	No	Chapter 6	76	76	2774	2774	Box 6.12: Change "alien invasive species" to "invasive alien species" for uniformity	Thank you, we have corrected this in the final draft
Verwer- van Amerongen, Cynthia	No	Chapter 6	76	77	2774	2787	Box 6.12: "activists" are a very small group of people with extreme ideas that we won't be able to change. In this box extreme examples are mentioned. We all know some extreme actions that are based on emotions, but many don't know positive examples in which animal "protectors/protection organisations" were involved in a positive manner. Also just referring to animals that are more liked by humans is not correct, as all animals should be taken as serious in the discussion when it comes to killing them as a solution.	Thanks for this suggested change. We have corrected the text in the new version.
Joshi Rijal, Srijana	No	Chapter 6	80	81	2903	2933	Can we add a box highlighting the case on successful collaborations with indigenous peoples and local communities for invasive alien species management.	See Box 6.13, 6.14 and also earlier in the Chapter -
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	80	80	2906	2911	These examples cover only 12 out of 105 publications - were the other 93 examples successful? How does this align with 45 successes reported on line 2914? What are "unstable policies"?	Thank you, this has been revised for more clarity
Government of Canada (Arsenault, Andre)	Yes	Chapter 6	80	80	2924	2924	This reference is not in the references Poland et al, 2017	Thank you, this has been revised accordingly
White, Michael	No	Chapter 6	80	81	2929	2933	So true.	Thank you for your feedback.
Joshi Rijal, Srijana	No	Chapter 6	84	84	3063	3063	"Table 6.12 Collective action questions for improved invasive alien species governance".is missing in list of tables arrange the sequence of table 6.10, 6.11 and 6.12	Thank you for the comment. It has been fixed (now Table 6.11).
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	85	86	3107	3163	Box 6.14: What was the outcome for rabbit numbers or impacts?	Post action monitoring was not conducted unfortunately -statement about this added.
White, Michael	No	Chapter 6	87	87	3210	3214	Large Marine Ecosystems LME approach very useful	Thank you for the comment. We acknowledge this point but do not have evidence for the success of this approach for dealing with invasions.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	91	92	3389	3419	The examples provided are species-specific and have direct economic impact. Are there challenges to applying these approaches in other contexts?	We are not aware of research that examines this beyond direct and species-specific contexts
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	92	92	3438	3441	This para needs revision or deletion. There are several examples of successes using command-and-control. (cf Chap 3 1137-1139)	The term 'command and control' is not being used in the assessment - In Chapter 6 the governance model related to this approach is "Hierarchical governance"
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	93	93	3443	3457	This material relates to impacts of IAS, and could be moved to Chapter 4	Thank you for your comments. While the impacts caused by IASs in general are covered in great detail and depth in Chapter 4, the purpose of this brief introduction, which specifically touches on issues related only to economic impacts, is to provide the reader of this assessment with the minimum context necessary to make this section stand on its own and, at the same time, to avoid being repetitive with other chapters. We strived to achieve this balance by synthesizing this introductory text, but we believe that this connection is very useful to provide the necessary context for readers who arrive at this section without having read the previous chapters.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 6	93	100	3443	3780	Financial instruments and economic instruments are presented in chapter 6[6.5, 6.5.1.1, 6.5.1.2, 6.5.1.3, 6.5.2, 6.5.3 and 6.5.4]. I respectfully suggest developing them further in the following assessments because management actions involve expenditures from the beginning, and action must be taken due to the loss of species and biodiversity. It does not matter if environmental economics has difficulties in solving public goods, etc. The precautionary principle of the CBD establishes that when there is a danger of considerable reduction or loss of biological diversity, the lack of absolute scientific certainty should not be used as a reason to postpone the adoption of measures that prevent or minimize this danger. Both the polluter pays principle and the precautionary principle (Vorsorgeprinzip), can guide the decisions of the authorities in the case of biological invasions. In addition, economists have adopted bioeconomic models that can help design policies and economic instruments for IAS.	We appreciate and welcome the suggestion to develop these important topics in more depth in future evaluations. The Nexus evaluation, which is about to start, is rightly aimed at addressing synergies and trade-offs in terms of social, economic and environmental impact and could be a place where financial instruments and economic issues could be further explored in a more holistic manner.
White, Michael	No	Chapter 6	93	93	3443	3449	TRUE	Thank you for your feedback.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Sagoff, Mark	No	Chapter 6	93	93	3448	3449	<p>"It is clear, however, that the costs of [invasive species] impacts far outweigh the costs of prevention (Diagne et al., 2021)." Diagne et al. do not break out the costs of prevention but include prevention among other aspects of management. If the world did nothing to manage or counter invasive species, then the costs of the impacts would be far greater, indeed, than the costs of management. The less management or prevention that is attempted, the less it costs; thus the more the costs of invasive species will outweigh the costs of management.</p> <p>The costs of management, control, etc. can mean one of two things. It may mean the amount spent, including that paid for projects that fail, which comprise most attempts, according to the Chapter under review. Alternatively, management etc. costs could refer to how much money it would take to do the job. This will differ dramatically from species to species and context to context. In many or most instances, however, the greatest costs will be transaction costs, that is, the costs of bringing stakeholders together, getting agreement on a plan of action, assigning responsibilities, lining up funding, hiring, obtaining all the legal rights or easements, and dealing with legal challenges which can tie up everything in the courts. This would be true of collective action problems generally. In a collective action problem, if each person co-operates, he or she will gain benefits that exceed the costs of that co-operation. It is in everyone's rational self-interest, then, to cooperate. What this leaves out, however, are the costs of identifying and bringing the stakeholders together and getting them to agree on a plan, how to fund and implement it, and so on. As the IPBES report shows, this involves an enormous amount of education, persuasion, consciousness-raising, etc. The cost of management may consist largely in the cost of organizing a response rather than the cost of implementing it.</p> <p>There are economists, particularly of the Austrian persuasion, who believe that transaction costs are often so great that it is efficient not to solve the collective action problem but let the chips fall where they may. These economists argue that if the benefits of a collective action exceed the transaction costs plus the implementation costs, the action will be taken; entrepreneurs will see and seize the opportunity for profit. With an agricultural pest, for example, entrepreneurs in agribusiness will bring together the technical expertise needed to combat it, say, by genetically engineering the crop, applying the sterile insect technique or its many variants to defeat the pest, or designing a pesticide. The agribusiness will then profit by charging the beneficiaries for the technology. If the benefits of effective action exceed the costs, including the transaction costs, the remedial action will have already been taken. When the costs, especially the transaction costs, involved in solving the collective action problem – for example, controlling callery pear or purple loosestrife – are greater than the benefits, no action, other than symbolic gestures, will be taken. Either way, the market is efficient.</p>	We appreciate bringing to our attention this error of interpretation on our part on the results of the Diagne et al. 2021 article. We have edited the language of this sentence to ensure that it accurately represents the content and what was found in the article regarding invasive species management costs and impacts. We also appreciate and agree with their comment that the investment and efforts made in IAS management have the potential to reduce impacts, a point that has been captured in Chapter 4.
Government of Germany	Yes	Chapter 6	93	93	3460	3464	Clarification needed: The source of costs related to research, prevention, monitoring, control, management, and eradication of IAS seem to be estimates from the CBD to achieve Aichi Target 9. If this is the case, why is there no reference to the CBD document (prime source)? Rationale: If these estimates have emerged from the work of the CBD based on a decision of a Conference of the Parties, then these estimates have a different standing in the policy arena. Furthermore, if these estimates can be considered "well established", then the question arises as to why they are not included in the SPM?	Thank you very much for your comment. In order to respond to this request for clarification we have updated the presented values based on a new document produced by the Subsidiary Body for Implementation of the CBD, which provides estimates on the resources needed for the implementation of the Post-2020 Global Biodiversity Framework and specifically for the management of invasive species. Given that the range of these estimates is very wide, from \$36 billion to \$84 billion, depending on the assumptions used, we believe that the most conservative approach in this case is not to include these estimates in the SPM as a result of our chapter, as this issue is addressed in detail in another chapter of the assessment.
Government of Germany	Yes	Chapter 6	94	94	3494	3494	Clarification needed: Previously, the term "restoration" was used, now the term "rehabilitation" has been introduced. According to the IPBES glossary and the IPBES Assessment on Land Degradation and Restoration cannot be used interchangeably. Please check.	Thank you very much for your comment and for pointing out this inconsistency, we have modified the text to harmonize the terminology.
Government of Mexico (Saad Alvarado, Laura)	Yes	Chapter 6	94	94	3518	3519	I kindly suggest: Economic and financial instruments (EI) are based on the "polluter pays principle", the main objective is to modify the behavior of economic subjects by changing relative prices by internalizing externalities—in this case, the impacts derived from the introduction/production of IAS. EIs are grouped into: taxes, charges, tariffs, tradable permit systems, environmental performance or responsibility bonds, insurance, deposit-reimbursement systems, and payments for environmental services, among others instruments of environmental policy. In addition, economic instruments can be complementary to environmental standards or command control policies. Some authors that have been studying economic instruments for IAS are the following: Acquaye et al. (2005). Barbier et al. (2013). Baroni (2012-13). Costanza y Perrings (1990). Costello & MacAusland (2003). Evans, E. (2003). Fernandez (2011). Fernandez & Sheriff (2013). Holly Ameden et al. (2007). Horan y Lupi (2005). Jenkins (2007). Kettunen et al. (2014). Knowler y Barbier (2005). Kysar (2009). Margolis et al. (2005). McAusland y Costello (2004). Merel y Carter (2008). Padilla y Williams (2004). Perrings et al. (2001, 2002, 2005). Perry & Farmer (2011). Richards et al. (2010). Warziniacka et al. (2010).	Thank you very much for your comment. We regret not being able to add this suggested text as it not only takes our section beyond its scope, as it touches on national and international legal and jurisprudential issues but also these issues are explored in detail in a previous section (6.3).
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	95	96	3541	3590	Is this material relevant in this assessment? Money is fungible. If there is a compelling reason for particular funding sources to be used for particular actions, it needs to be supported.	Thank you very much for your comment. We have decided to preserve this section in this chapter, since not only is this section in line with the objective of this chapter, but it is here that we try to provide new spaces and directions that can serve as a basis for establishing new options of financing mechanisms for invasive. We decided to go a little further by connecting different types of tax revenues with different stages of the invasion process as we believe that this can be extremely useful in future explorations.
Government of Germany	Yes	Chapter 6	96	96	3616	3619	Comment: Please ensure that research needs addressing the tailoring of "ambient taxes" schemes (L3616-L3619), are also captured in Table SPM.1 on cross-chapter synthesis of knowledge gaps. This may currently not be the case.	Thank you for this comment. Table SPM.1 only includes the most important gaps, but this issue is addressed elsewhere in the summary for policymakers
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	96	96	3622	3625	The cited reference is a useful one, but it does not support the statement it is attached to. Please include citation of the CBD decision as well.	Thank you very much for bringing this oversight to our attention, we have adjusted the text and included additional references.
Government of Germany	Yes	Chapter 6	97	97	3642	3667	Clarification needed: Have the findings and options arising from Section 6.5.1.3 on control mechanisms for illegal wildlife trafficking also been shared with the experts currently finalizing the IPBES assessment on sustainable use of wildlife species? This could be important information in order to create synergies/complementarities between both IPBES assessments.	We appreciate this important suggestion to help us better connect the ideas and content of the different evaluations of the IPBES Program.
Government of Japan	Yes	Chapter 6	97	101	3667	3873	Neither 6.5.2 (Multilateral and bilateral financing organizations) nor 6.5.6. (Global funding) is mentioning existing global funding mechanisms, such as GEF (Global Environment Facility). Without reviewing previous efforts and contributions of these multilateral and bilateral funding to measures against invasive alien species, the assessment should not propose just an establishment of new global funding. It is also more practically useful to offer some suggestions to improve existing funding mechanisms rather than to establish a new funding.	We appreciate this comment, and fully agree with it. However, we would like to clarify that the content of the Global Finance subtitle does not suggest the creation of a new global funding mechanism. On the contrary, it recognizes that this is a multi-faceted problem that requires collaborative mechanisms between different sectors and different governance levels. We go even further by highlighting potential synergies with other established mechanisms, such as the carbon market or environmental impact assessments (EIAs).
Government of Germany	Yes	Chapter 6	98	98	3725	3729	Clarification needed: Please consider the need for research to develop analytical frameworks and risk indicators to assist private companies in incorporating and disclosing invasion risk in their reporting and their economic analysis of different investment options in Table SPM.1.	Thank you, we have addressed this comment in the final draft
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	99	99	3776	3776	There are quite a few studies of the effectiveness of certification - I am aware of none that demonstrate improved conservation outcomes. Greater support for this point exists in the literature. The GEF STAP did a review a few years back, older but still relevant - https://www.thegef.org/sites/default/files/publications/STAP_Certification_2010_1.pdf	Thank you very much for this suggestion. We have included this reference to this document in the text of the chapter: Blackman et al., 2010
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	100	100	3783	3825	This section cites no data.	Thank you for your comment. We have made an effort to properly reference this section.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	101	101	3833	3835	necessary in order to achieve what? Existing international goals? Reduction in IAS impact?	Thank you for your comment. We have completed the text to make more explicit the message that the solutions to the IAS management we reviewed in this chapter can benefit from considering different socio-economic and cultural realities.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	101	101	3862	3864	The logic does not follow here: safeguards will not quantify financial contributions.	Thank you for your comment. In this particular sentence we are referring to mechanisms such as carbon credit markets and not to safeguards. We have edited the language in this section to make the message clearer.
Government of Germany	Yes	Chapter 6	103	103	3921	3925	Clarification needed: We welcome the mention of challenges which indigenous peoples and local and also isolated communities face in the generation and flow of knowledge on IAS policies and management. However, based on the consideration that all IPBES-relevant stakeholders need to be integrated into the process, we would like to emphasize that other stakeholders, such as the private sector, may also face particular problems that may need to be addressed. Please consider this in the spirit of an inclusive and integrative approach.	We have added a point of clarification to highlight the point made by the comment
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	103	103	3943	3943	Box 6.18 does not demonstrate a black swan event, or describe unknown unknowns. Unknown unknowns are best contrasted to known unknowns.	Thank you for the comment. The text here has been edited to correct this
Duistermaat, Leni	No	Chapter 6	104	105	3993	3993	Table 6.10, Taxonomic gaps, under-studied taxonomic groups: also in vascular plants, e.g. genera with wide distribution; see comment on chapter 2, p. 62, line 1797. If accepted: also include vascular plants in Table SPM.1, Taxonomic gaps.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific point.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	104	104	3993	3993	Table 6.10: A foundational gap is in the raw data, meaning knowledge of the occurrence and impacts of alien species, something that is not restricted to understudied systems or taxa (expressed well in lines 4227-4229) - suggest promoting this basic issue to the top of the table. The gap referring to indicators in the first row of the table may not be a knowledge gap so much as a structural one: it is difficult to conceive of such an indicator of "invasions" even if data were available. Indicators are more likely to be possible for impacts, effectiveness of prevention measures, and so on.	Thank you, more details can be found in the relevant sections, noting that Table SPM.1 is a compilation of the most important gaps, as assessed by experts.
Government of USA	Yes	Chapter 6	104	106	3993	3993	Table 6.10 - Gaps on biomes and units of analysis - appreciate emphasis on deep sea and open ocean pelagic - these are serious concerns for marine protected area managers, fisheries, and more. I would have liked to have seen a little more discussion on this in the chapter.	Thank you, this discussion is included in Chapters 2 and 4.
Estoup, Arnaud	No	Chapter 6	106	106	3993	3993	Table 6.10 - Integrated scenarios and modelling - Please modify « Global scenarios and models of invasive alien species considering interactions with other drivers of global change {chapter 3} » into « Global scenarios and models of invasive alien species considering interactions with other drivers of global change, including evolutionary aspects {chapter 3} »	Thank you but this wouldn't be supported by the data assessed.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	107	107	4011	4012	This suggests that bias is not a problem - it makes sense place more research effort on problems that need to be solved - and the issue is quantity of information rather than taxonomic distribution.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	107	107	4021	4021	Figure 6.20: This table is not interpretable with the information provided.	Thank you for your comment, we have amended the legend to make it more clear what the figure represents.
Brundu, Giuseppe	No	Chapter 6	108	108	4004	4019	In my opinion, the section "Addressing taxonomic biases in research" is incomplete. I think it would be important to clarify (and/or refer to other parts of the IPBES report) that research on biological invasions might be biased non only by taxonomic, but also by systematics/biosystematics and nomenclature. In fact, taxonomy is only a part of the system. Mya this section is not the best one to address this aspect, but somewhere in the Chapter it would be useful to clarify this point.	Thank you for this suggestion. We have chosen not to include it in the assessment, as you have not provided any supporting evidence for this specific point.
Government of USA	Yes	Chapter 6	108	108	4045	4077	Box 6.19 - This is a good inclusion in this section to highlight the potential tools that should be developed to improve detection in marine systems.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Estoup, Arnaud	No	Chapter 6	108	108	4049	4049	Box 6.19: The term "Autecology" is not clear to me	Thank you for your comment. This is quite a common term in ecology. However, we appreciate this document will have a broad readership so we have amended the text. We have change the word from autecology into ecology, which broadens the meaning, but we think this is appropriate in this context.
Estoup, Arnaud	No	Chapter 6	108	108	4057	4057	Box 6.19: Please add the reference Estoup & Guillemaud 2010 Mol Ecol https://doi.org/10.1111/j.1365-294X.2010.04773.x after the reference Roman & Darling, 2007	Thank you for the comment. We added the suggested reference.
White, Michael	No	Chapter 6	108	108	4058	4060	Bo 6.19: A particular problem for deep ocean: we do not know what 'normal' species are, so can rarely tell what are IAS	Thank you for the comment. The nuance is added to the sentence.
Estoup, Arnaud	No	Chapter 6	108	108	4060	4060	Box 6.19: - Instead of «Where is the source population of these organisms?» you might write « What are the source populations (whether native or invasive) of the founding individuals (i.e. the routes of invasion/introduction)»	Thank you for the comment. We decided to keep our phrasing as we like to highlight the location of the source populations.
Estoup, Arnaud	No	Chapter 6	108	108	4060	4060	Box 6.19: Please add the reference Estoup & Guillemaud 2010 Mol Ecol https://doi.org/10.1111/j.1365-294X.2010.04773.x after the reference Barbour et al. 2010	Thank you for the comment. We added the suggested reference.
Government of Germany	Yes	Chapter 6	109	109	4089	4091	Comment: Differences in the taxonomic processing of species groups is a well-known problem that applies not only to invasive species but also to regular data collection / monitoring. As desirable as it is to look at more detail to lesser known species groups, the price of processing of monitoring samples may be disproportionately expensive over time and not practicable.	Thank you for the comment. While we agree with the point, we do consider that the point is true, we provide tools to minimize these costs in the text.
Government of USA	Yes	Chapter 6	109	109	4098	4109	Please re-emphasize the lack of information for marine systems particularly deep sea and open ocean pelagic. It may be helpful to have slightly stronger language in this section to make the discrepancies between terrestrial and marine systems clear.	Thanks for your comment. We consider that this point is made in the following sentence to the one marked in the comments
White, Michael	No	Chapter 6	109	109	4100	4102	Again, true for deep ocean ~ very few studies	Thank you for your feedback.
Joshi Rijal, Srijana	No	Chapter 6	109	112	4110	4231	This section is quite interesting to go through the geographical bias in research may be a figure can give a clear picture of geographical bias and what efforts are required to reduce such bias	Thank you for the comment. Added sentence: Since geographic biases is also apparent in authorship (corresponding author) of the research articles published in journals like Biological Invasions with disproportionately high submission by authors from North America, Europe and Australasia, such biases can be minimized by encouraging manuscript submissions from countries of other regions (Nunez et al. 2022)
Evans, Thomas	No	Chapter 6	110	110	4138	4146	Here you discuss alien birds and geographic bias in research. Another recent, relevant study shows that alien birds occupy many small islands around the world, but that information on impacts is unavailable for many of these islands. It would be good to include a short line on this here, starting at 4146. Evans, T. (2021), Quantifying the global threat to native birds from predation by non-native birds on small islands. Conservation Biology, 35: 1268-1277. https://doi.org/10.1111/cobi.13697	Following sentence added: Similarly, more than 190 small islands (<500 km2) worldwide are invaded by predatory invasive birds but information related to their impacts are unavailable in most of these island, particularly located in the less developed regions (Evans 2021)
Jeschke, Jonathan	No	Chapter 6	111	111	4213	4213	Please change "may results" to "may result".	Thank you, we have corrected this in the final draft
Jeschke, Jonathan	No	Chapter 6	112	112	4220	4220	Add comma before "may mean".	Thank you, we have corrected this in the final draft
Joshi Rijal, Srijana	No	Chapter 6	113	114	4268	4351	The findings in this section is very true. The statement on Additional investment of resources for applied research would generate knowledge suitable for managers and policy makers to make decisions should be reflected in summary	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Estoup, Arnaud	No	Chapter 6	113	113	4289	4289	Please add the reference Foucaud et al. 2020 DOI: https://doi.org/10.24072/pjournal.32 after the reference Lowry, 2013	We cannot add additional text to the chapter due to word length restrictions. Also we don't see the connection between the suggested reference and the point made in the referred section. Thank you for your comment.
Pan, Xubin	No	Chapter 6	114	114	4312	4322	P113 L4298-4310	The section was removed to avoid repetition of content.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
White, Michael	No	Chapter 6	115	117	4386	4480	6.6.1.9 all this section very important	Thank you for your feedback.
Atchison, Jennifer	No	Chapter 6	115	117	4387	4480	Comment - no mention or reference made to the UN declaration on the rights of Indigenous peoples, 2007. Worth inclusion to bolster this argument.	We have added the reference
Government of Germany	Yes	Chapter 6	116	116	4406	4407	Clarification needed: It is not clear what is meant by "... concerned with nuisances and the origin of knowledge ...". Please check and rephrase as necessary.	Thank you for the comment. Edited as suggested.
Yu, Dandan	No	Chapter 6	118	118	4495	4503	This paragraph suggests adding further elaboration on how the "scenario framework" relates to the targets.	Thank you for the comment. We cannot add additional text to the chapter due to word length restrictions. However we consider that the point in the following sentence adds the required nuance to the idea of which target we are referring.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	118	118	4531	4533	It also collects noisier, less consistent data with an unquantifiable sampling effort, resulting in difficulty in applying rigorous statistics. These limitations should at least be noted here	Thank you for the comment. The nuance was added.
Joshi Rijal, Srijana	No	Chapter 6	121	122	4652	4694	A table with different networks names functions and year of establishment will add value to this information.some existing networks information on InvasiBES, NEON, GUBIC are missing	Thank you for the comment. Deatail has been added to Supplementary material about this - SM 6.3
Government of Canada (Arsenault, Andre)	Yes	Chapter 6	122	122	4708	4708	Box 6.21:This statement requires a credible reference that actually compares developing countries developing countries.	Thank you for the comment. The section was rephrased to address the issue.
Jeschke, Jonathan	No	Chapter 6	125	125	4843	4843	The reference Jeschke, Börner et al. (2019), which is cited here, is missing in the reference list. I suspect the following reference was meant: Jeschke, J.M.; Börner, K.; Stodden, V.; Tockner, K. 2019. Open Access journals need to become first choice, in invasion ecology and beyond. NeoBiota 52, 1-8. https://doi.org/10.3897/ncobiota.52.39542	Thank you, this has been revised accordingly.
Estoup, Arnaud	No	Chapter 6	126	126	4855	4855	It might be worth modifying the sentence fragment « called advantage may come » into «called advantage represents an increasingly significant cost burden for the research laboratories and institutions due to the substantial increase of the fees associated to open access imposed by many publishers and may also come »	The section was rephrased according to the suggestion
Hirsch, Tim	No	Chapter 6	126	126	4886	4893	This section is now out of date, as the new terms Degree of Establishment and Pathway are now accepted through TDWG and deployed through GBIF (see GBIF Release Notes from 31 January 2022 https://www.gbif.org/release-notes)	Indeed, they have been implemented and the text has now been changed to reflect that.
Joshi Rijal, Srijana	No	Chapter 6	127	127	4895	4935	Prioritization of pathway of unintentional introduction of IAS is one of the major concern to achieve post 2020 targets of effectively managing 50% of pathways of introduction. as there has been no progress earlier to meet this targets. The section needs to highlight this and address the proper strategy and framework to manage the pathways of introduction. Although there is a separate section on pathway in chapter 5	Thank you, a link to chapter 5 has been added to address this comment
Joshi Rijal, Srijana	No	Chapter 6	128	128	4965	4966	Box 6.22: Add SEICAT as well	we have revised this section and this comment is no longer relevant
Brooks, Thomas	No	Chapter 6	128	128	4973	4973	Box 6.22: Suggest delete this sentence, or else be comprehensive rather than giving a single example.	Phase removed as suggested
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	130	130	5026	5029	Consistency would not be a virtue given the important findings from Vicente et al - fitness for purpose is primary.	Thank you for the comment. The term has been added to this effect.
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	130	130	5031	5050	This listing of options is beautifully clear and easy to apply.	Thank you for your comment. The positive feedback is greatly appreciated by the chapter authors.
Smith, Kevin	No	Chapter 6	130	130	5043	5047	Fully support the need for support of open infrastructure, data sources and collation processes etc. however I wonder if we could stress the need for financial support in particular for the long term data infrastructure maintance and data collation processes.	Thanks for this comment. The assessment report is mandated to provide policy-relevant information, not policy recommendations, so we would not be able to make the recommendation suggested.
Smith, Kevin	No	Chapter 6	131	131	5052	5058	Table 6.11: Great to see the inclusion of the indicators on countries enacting national IAS legislation/policies, and financial/resource mobilisation. This is a hugely important indicator that requires increased support, not least as it is the official indicator for SDG Target on IAS.	Thank you for your feedback.
Karayannis, Theofanis	No	Chapter 6	131	131	5058	5058	This comment is on Table 6.11 and specifically the penultimate row of page 131 titled "Process", where again the same incorrect reference is made to the year 2010 (this time as 'adoption' of the BWM Convention) as well as the "BMW" typo (twice). The important point is that, as discussed earlier above, the Convention's ratification status is by now quite high (over 91% of global tonnage) therefore the assertion about there being room for improvement does not really seem appropriate. Thus, the text after the comma (from "but still" to the end) should be deleted.	Thanks for your point. The section was rephrased to reflect the pint made
Peterson, Garry	No	Chapter 6	131	164	5059	6570	Transformative change typically involves risks for many actors in society. Plans to address climate change often speak of addressing climate justice, and in the transformations literature there is often a discussion of just transformations. Such discussions are missing from this section. However, in actual policies design policies to avoid provoking substantial backlash, and addressing the impacts of policies on vulnerable groups is often highlighted. It would be good to discuss how to approach such issues in the social and ecological transformations required to deal with impacts of IAS. Some useful references on this topic include: Blythe, J., Silver, J., Evans, L., Armitage, D., Bennett, N.J., Moore, M.L., Morrison, T.H. and Brown, K., 2018. The dark side of transformation: latent risks in contemporary sustainability discourse. Antipode, 50(5), pp.1206-1223.; Patterson, J.J., Thaler, T., Hoffmann, M., Hughes, S., Oels, A., Chu, E., Mert, A., Huitema, D., Burch, S. and Jordan, A., 2018. Political feasibility of 1.5 C societal transformations: the role of social justice. Current Opinion in Environmental Sustainability, 31, pp.1-9. Temper, L., Walter, M., Rodriguez, I., Kothari, A. and Turhan, E., 2018. A perspective on radical transformations to sustainability: resistances, movements and alternatives. Sustainability Science, 13(3), pp.747-764. - Along with more general papers on transformation mentioned in earlier comments.	This point and relevant refs has been added - thank you. Social justice elements are captured in new fig. 6.23 and in Fig. 6.24 and related text under the umbrella term 'equitable'
Peterson, Garry	No	Chapter 6	133	164	5059	6570	Models and scenarios are a key tool for developing, implementing, and evaluating policy alternatives. This section should devote more space to how models and scenarios have, could, and should be used to development, implment, and evaluate IAS related policies - as well as explain what currently exists in this space and what needs to be further developed.	Thank you, this has been revised accordingly
Peterson, Garry	No	Chapter 6	133	164	5059	6570	This section should articulate and evaluate alternative pathways to implement the proposed changes. Things that would be good to discuss would be 1) what type(s) of "theory of change" could lead these changes to occur, 2) what actors would be involved, 3) who would resist such changes and how, and how could this resistance be over come.	The new figure 6.23 achieves and other additions and edits to 6.7 now achieve this, with supporting detail earlier in the chapter.
Peterson, Garry	No	Chapter 6	133	164	5059	6570	This section should explicitly address how the indirect drivers of IAS would be changed. For example how would trade, production, consumption and inequality. In particular, given that economic activity and material trade are the main driver of IAS - policies that explicitly reduce economic activity of trade should be mentioned and evaluated. For example, 'degrowth', the controversial but widely discussed idea that rich countries should stop their economies from growing, or 'contract and converge' the widely discussed idea that rich countries need to reduce their GHG emissions much more than low emitters so their is either so future equality of future emissions or of total historical emissions.	Thank you for the comment. Part of this is covered in Chapter 3 and in section 6.5. Otherwise this topic is beyond scope - we can identify what will be needed from policy to support IAS governance, but can't suggest the technicalities of policy design - we also need to avoid being policy prescriptive
Peterson, Garry	No	Chapter 6	133	164	5059	6570	Transformative change is a topic that has been substantially studied by a diverse community of scholars, but the section starts by only citing IPBES work and a general sustainability review paper. This chapter needs to both address the literature on sustainability transformation and transition - e.g. people such as Loorbach, Olsson, Avelino, O'Brien, and Geels. Some recent papers that review recent research from different perspectives paper are: Loorbach, D., Frantzeskaki, N. and Avelino, F., 2017. Sustainability transitions research: transforming science and practice for societal change. Annual Review of Environment and Resources, 42, pp.599-626.; Westley et al 2011. Tipping toward sustainability: emerging pathways of transformation. Ambio, 40(7), pp.762-780. Scoones, et al, 2020. Transformations to sustainability: combining structural, systemic and enabling approaches. Current Opinion in Environmental Sustainability, 42, pp.65-75.; Herrfahrtd-Pähle et al., 2020. Sustainability transformations: socio-political shocks as opportunities for governance transitions. Global Environmental Change, 63, p.102097; Beck, S., Jasanoff, S., Stirling, A. and Polzin, C., 2021. The governance of sociotechnical transformations to sustainability. Current Opinion in Environmental Sustainability, 49, pp.143-152. If expertise in this area is lacking perhaps the IAS assessment can either engage some people from the new Transformation Assessment or people with expertise in this area from one of the IPBES task forces.	We agree - however, this subject extends well beyond invasive alien species and it is beyond the scope of this assessment to deal in further detail with this topic. We have drawn on IPBES-related outcomes to guide our treatment of the topic
Government of Canada (Gadallah, ZuZu)	Yes	Chapter 6	133	133	5089	5099	for 1) (multinational is unclear. "International", perhaps? Language focusing on what is needed, rather than process, may be more effective. That could be achieved by removing the words "establishment of" "promote" "development of" and "use of".	Thank you for the comment. This section has changed, although multinational is the correct term used when many countries are party to an agreement but not all.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	136	137	5182	5213	"differentiated" often is used with different connotations than how it is used here, and gives rise to many arguments at the international level. If it is meant to affirm that the responsibilities of stakeholders are different, perhaps it would be better to use the expression "shared but different responsibilities"	Thank you for the comment. This has been clarified.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	137	137	5244	5244	Insert "draft" before "post-2020", because that framework is not yet agreed and may still not be agreed by the time this assessment is released.	Thank you, the framework has been approved and the assessment now reflects it.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	137	137	5253	5253	"spill over" is only used in this Chapter as resulting from unintended effects of international trade. It appears to be used more generally in this line so requires more explanation.	Thank you for your comment. Edited as suggested.
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	138	138	5259	5262	Figure 6.25: Need feedback mechanisms, evaluation and to be adaptative to local conditions	the interconnectivity of these is now captured in the new Figure 6.23, and the legend to this figure edited accordingly. Responsive represents the adaptive ideas.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	139	139	5272	5273	Unable to find Table 6.13.	Thank you, this has been corrected.
Pan, Xubin	No	Chapter 6	139	139	5314	5314	Delete "or"	Thank you, this has been corrected.
Government of Canada (Fraleigh, Brad)	Yes	Chapter 6	141	141	5378	5382	This appears to be a rather bold generalization based upon a single reference dealing with a single IAS (emerald ash borer). Either support with more references or dial down the rhetoric.	this paragraph has been edited to provide further support and the specific sentence edited
Atchison, Jennifer	No	Chapter 6	141	141	5382	5382	Should be Dasgupta (also in reference list)	Thank you, this has been revised accordingly
Government of Mexico (Koleff, Patricia)	Yes	Chapter 6	141	141	5394	5402	The conclusions could give a better perspective of the whole chapter, of the options for the future if global change is not tackled with a profound change in various issues and sectors.	We view the entire section 6.7 as concluding the chapter and pulling the chapter together - the new Fig. 6.24 we believe helps address this comment also.
Joshi Rijal, Srijana	No	Chapter 6	141	141	5401	5402	arrange this (Dasgupta 2021, Sen 1982) ref as (Sen1982, Dasgupta 2021) Sen 1982 is missing in ref	Thank you, this has been revised accordingly
Karayannis, Theofanis	No	Chapter 6	152	152	5937	5939	As pointed out earlier (row 38 above), this reference is out of date and linked to a bit of text that should be replaced, so this reference should be removed from the list.	We have now updated this reference to IMO, London. "Status of multilateral conventions and instruments in respect of which the International Maritime Organization or its Secretary-General performs depositary or other functions as at 26 May 2022." (2022).
Joshi Rijal, Srijana	No	Chapter 6	160	160	6406	6408	move this ref to pg 158 below line "6254"	Thank you, this has been revised accordingly
Alaux, Christine	No	Entire Report	0	0	0	0	Very complete and very well done report, congratulations!	Thank you for your feedback.
Bliss, Cebuan	No	Entire Report	0	0	0	0	Throughout the assessment - emphasise the human factor and reduce 'threat' framing of IAS - negative terminology when it is not the fault of the species that they are moving, according to how they are defined by the assessment	we have adapted the term "biological invasions" instead of IAS in many cases to deflect from species-blaming narrative mentioned here. However, the assessment is formally mandated to deal with IAS, so they remain a focus
Brooks, Thomas	No	Entire Report	0	0	0	0	If I can provide any further information, especially from IUCN databases, to help the authors in addressing the peer review comments, they should feel free to contact me at thomas.brooks@iucn.org	Thank you for your comment. The feedback is greatly appreciated by the chapter authors.
Eckbo, Norith	No	Entire Report	0	0	0	0	Important to emphasize the future costs if nothing is done, and different scenarios if we do something at different scales. Emphasize for the policy makers in the SPM what could be done to mitigate different scenarios in the future based on business as usual or not.	Thank you. We feel the SPM does cover this
Eckbo, Norith	No	Entire Report	0	0	0	0	More information needed in the SPM about the negative sum of invasive species impact in interaction with other drivers for ecosystem change.	Thank you, we have clarified this point in the SPM
Eckbo, Norith	No	Entire Report	0	0	0	0	Provide more information about that an underlying problem connected to transportation and trade, is the demand for 'free movement' intrinsic in international trade agreement, making it difficult for national states to prevent or discourage risky practices and encourage e.g. local/national products.	Thank you, the underlying problems are covered in Chapters 3 and 6, but more on the interconnectiveness has been added in the final draft.
Government of Argentina	Yes	Entire Report	0	0	0	0	As a general comment, along the whole document, there are no specific comments regarding the need that risk assessments on invasive alien species are carried out in line with the World Trade Organization Agreements, in particular the Agreement on Sanitary and Phytosanitary Measures. We request the inclusion of this reference.	Thank you, this is covered in Chapters 3, 5 and 6.
Government of Argentina	Yes	Entire Report	0	0	0	0	In many sections of the report the terms "Multi-national" or "multinational" are used in a confusing way. In particular, multinational normally seems to refer to transnational companies and corporations, not to intergovernmental coordination. We believe that this reference could be better understood if replaced by "multilateral", "intergovernmental" or "international".	Thank you, this has been revised
Government of Argentina	Yes	Entire Report	0	0	0	0	In several sections, the document attempts to assess periods of time when introductions happened, when they intensified, etc. However, there are numerous acknowledgments of great knowledge gaps, poor documentation and, in particular, time lags between the moment of introduction and recognition of an species as an invasive species. This makes us wonder whether it is possible to make generalizations such as "since 1970 this happened", or "since 1950 that started". It has to be noted that this kind of statements may then feed discussions on responsibility to combat biological invasions so we would request careful reconsideration of time references in the whole assessment.	we are clear about knowledge gaps, yet it is still possible to infer the general time between invasion stages in most cases
Government of Argentina	Yes	Entire Report	0	0	0	0	Regarding the expression "precautionary principle", it is requested the use of the expression "precautionary approach" and not "principle", in accordance with the terminology used in the Rio Declaration. In this regard, it should be recalled that there is no international consensus on the legal nature of "precaution" as to whether it constitutes a principle of general international law, a principle of international environmental law, an approach or simply a criterion that is encouraged in the conduct of the States.	Thank you, we have revised the draft accordingly
Government of Canada (Gadallah, ZuZu)	Yes	Entire Report	0	0	0	0	Descriptions of patterns would be more useful if accompanied with fuller interpretation. Some patterns, such as the greater frequency of negative than positive impacts, are reported in a number of places, yet it remains difficult to ascertain its importance: such a finding is inevitable because species must have negative impacts before they are classified as IAS. The more important finding is that, across taxa and regions, negative impacts predominate by a very large margin. The information needed for policy support is an understanding of patterns of IAS occurrences (rather than patterns of observations) - so when describing geographic patterns, for example, the text should focus on what is known of the biological patterns, even if findings are uncertain, rather than describing data patterns that reflect known biases in collection.	Thank you for the comment. Authors have revised the SPM to reflect the overall patterns
Government of Canada (Gadallah, ZuZu)	Yes	Entire Report	0	0	0	0	Directive language needs to be reconsidered throughout and particularly in the SPM and in Chapters 1 and 6. Words like "vital," "imperative," "critical" or "needs to" should be used only in the context of a necessary element to achieve a particular goal. Assumptions on policy decisions should be avoided - the text sometimes assumes that policy decisions to increase efforts to control IAS are already in place. Data collection and knowledge development are means to an end: while needed for adaptive management, they are not ends in themselves. This is fundamental to IPBES assessments: in places the text veers towards advocacy and such policy prescriptive language must be removed.	Thank you, the assessment has been revised accordingly

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Entire Report	0	0	0	0	<p>Some attention should be given to readability, shortening and simplifying text where possible. This is particularly true for the SPM. Sentence lengths in summary sections should strive for 15-20 words on average.</p> <p>Placing overall findings first, followed by supporting evidence and any counterexamples, would support readers more than the current structure - in such a long document, readers will frequently be scanning through, searching for particular information. While not traditional in IPBES assessments, the long lists of examples or cited studies would be more readily navigable if typeset as lists instead of in lengthy paragraphs - these lists could be headed by the general observations, creating a simple pattern supporting ease of use.</p> <p>Some sections are very complex, with long multipart sentences and technical vocabulary. These are particularly difficult for non-specialists or those who are not reading in their native language, and will limit the usability of the assessment. Facts should be stated as facts, rather than "considered to be" or "viewed as," and consensus views simply stated as such. "Future potential threats" are just "threats." Other sections are repetitive - an irritant is the frequent description of something as important, critical, crucial or essential, followed by material that explains why this is so. Such sentences can simply be deleted - it can be assumed that things that are unimportant are not included in the assessment.</p>	Thank you for your comment. We have revised the draft with your comment in mind.
Government of Canada (Gadallah, ZuZu)	Yes	Entire Report	0	0	0	0	The authors are to be commended for their phenomenal success in gathering a large and disparate body of knowledge and integrating it into a cohesive report on a complex subject. The draft prompted deep engagement across government of Canada experts, as evidenced by a full set of comments provided here.	Thank you for your feedback, much appreciated.
Government of Canada (Tita, Guglielmo)	Yes	Entire Report	0	0	0	0	More balance should be brought between terrestrial and aquatic ecosystems, as well as between freshwater and marine water habitats characteristics and their differential challenges. To support the authors in accessing the literature on aquatic invasive species produced by scientists at Fisheries and Oceans Canada, we have provided an extract of an internal database. The latter contains primary publications as well as departmental publications, including Science Advice reports (e.g risk assessments).	Thank you so much for this comment and support.
Government of China	Yes	Entire Report	0	0	0	0	Avoid using the word "eradicate" when referring to alien invasive species where possible. Firstly, it is almost impossible to eradicate those alien species with a high level of invasion. Secondly, some invasive species have good utilization value for human. So, the diction "effectively control" is proper.	there have been successful eradications and the word is used widely on control and management
Government of China	Yes	Entire Report	0	0	0	0	Some literature cited in this report are very old, which could be updated by new ones. In addition, many Chinese authors were mis-abbreviated in the references, especially in Chapter 2. For instance, "Yang, M., Lu, Z., Liu, X., De Wulf, R., Hens, L., & Ou, X. (2018)" Should be "M. Y. Yang, Z. Lu, X. Liu, R. De Wulf, L. Hens, & X. K. Ou". It is recommended to review and revise them.	Thank you, authors have included the most relevant literature. Mis-abbreviated references have been corrected.
Government of France	Yes	Entire Report	0	0	0	0	In order to enter into a discussion with politicians, it is necessary to have a clear scientific position, but also to make it clear that not everything about species introductions is negative, and that priority must be given to risk analyses.	Thank you, agreed.
Government of Germany	Yes	Entire Report	0	0	0	0	Clarification needed: Please note that we did not find any references to how the IPBES conceptual framework was used in the assessment of invasive alien species. Please review Chapter 1, particularly section 1.5.1, and see what information can be provided on the "IPBES conceptual framework and its use in invasive alien species assessments." You may wish to consider including such information in our proposed introductory section /preamble for the SPM (see comment No. 8 below).	Thank you, we have revised the draft accordingly and clarified how the conceptual framework underpins all chapters (existing figures in Chapter 3 and 6 for instance clearly refer to the conceptual framework)
Government of Germany	Yes	Entire Report	0	0	0	0	General comment: It is very important to ensure that genetic options for controlling IAS (e.g., the proposed release of genetically modified organisms, gene modification or silencing etc.) discuss both opportunities and challenges in an objective format (without negative or positive connotation). All statements made in this context should be evidence-based pointing to suitable literature sources. Please cross-check throughout the entire report. It would be appreciated if cross-chapter references to discussions of GMOs, gene editing and the release of genetically modified organisms were strengthened, particularly in Chapters 3, 5, and 6 to ensure overall evidence-based coherence in the discussions on this matter.	Thank you, we have reviewed the assessment, especially chapter 5 with this comment in mind.
Government of Germany	Yes	Entire Report	0	0	0	0	General comment: The entire report and its SPM are generally already quite comprehensive. This allowed us to clearly see where we need more details. The titles for the different sections A-D in the Key Messages and Background are generally very straight forward and easy to understand even for policy-makers who may not be directly involved with the subject. We recognize that many useful details with solid confidence levels are given. We hope that our comments for clarification and our proposals will be useful in further developing the report and its SPM. We would like to express our deep gratitude for all the efforts and contributions to all assessment authors.	Thank you for your feedback.
Government of Germany	Yes	Entire Report	0	0	0	0	General comment: The IPBES document on "hematic assessment of invasive alien species and their control" represents a useful overview on the topic and the handling for policy makers worldwide. However, it was noticeable that there were a lot of repetitions in the individual chapters, thus the number of pages is very high. Please cross-check throughout the document to avoid repetition and streamline the text as far as possible.	Thank you for the comment. We have revised the chapters to avoid duplications and increase cross-referencing, noting that as chapters are meant to be stand-alone documents, there is a need for a little repetition.
Government of Germany	Yes	Entire Report	0	0	0	0	General comment: The suggestions in the Summary for Policymakers are helpful but not in detail: The paper contains rather descriptive enumerations of possible policies and measures. Practical, specific strategies concerning the handling and managing of IAS in the shipping sector and the implementation of possible management strategies into relevant law (shipping law, Water Framework directive etc.) are lacking. Specific methods for the handling of invasive species for the German Federal Waterways and Shipping Administration (WSV) could not be found. For example, the EU-invasive alien species Regulation 1143/2014, outlined in chapter 6.3.2.2, shows specific measures at a lower scale. As a suggestion, an annexure with available Information for each country would be helpful.	IT would not be possible to provide content "for each country"; references to previous databases could be used but they are generally outdated. We can look specifically at the shipping sector in Chpt 5
Government of Germany	Yes	Entire Report	0	0	0	0	Proposal: In general, we got the impression that many references and reference data in the entire document seem to be rather old for a new report. As many references are older than ca. 2015, there might be a risk that these references are somewhat outdated. Therefore, we strongly suggest and encourage the authors to take references from recent years (younger than 2015) into account in order for the report to be up-to-date when published and to ensure a strong evidence base.	Thank you for your comment. Authors have selected the most relevant references, noting that as this is the first assessment on this theme, some references may be older than 2015.
Government of Japan (Okawa, Natsumi)	Yes	Entire Report	0	0	0	0	The Disclaimer (currently shown on each Chapter and SPM) should be corrected by adding the following sentence(writing in red) to the end: Disclaimer: The designations employed and the presentation of material on the maps shown here do not imply the expression of any opinion whatsoever on the part of the IPBES concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. "These maps have been prepared for the sole purpose of facilitating the assessment of the broad biogeographical areas represented therein."	Thank you for the comment. We have included it in the final version.
Government of Mexico (Saad Alvarado, Laura)	Yes	Entire Report	0	0	0	0	Maybe use the acronym IAS and the full term invasive alien species alternately throughout the document	Thank you for your comment. Acronyms and abbreviations will be used sparingly in this assessment, following the UN editorial manual. Invasive alien species will therefore not be abbreviated
Grossart, Hans-Peter	No	Entire Report	0	0	0	0	In general I miss an estimation on how reliable the data and estimates are. Maybe give some probability calculations!!!!	Thank you, this assessment presents actual records, methods are introduced in the data management reports
Karayannis, Theofanis	No	Entire Report	0	0	0	0	This is not a comment on the report itself (which is an impressive piece of work) but on the consideration and implementation of my comments provided herein. While it is understood that this report collates numerous sources and views, and the consideration of the comments received by the various reviewers is generally up to the authors who decide what to implement or not and how when it comes to expression of views, some of my comments are about texts, statements and assertions that are factually incorrect or inaccurate with regard to subjects and instruments that are under the purview of IMO as the competent UN specialised agency. Therefore, I believe it is justifiable and reasonable to expect that those particular comments should be implemented, which would enhance the credibility of the report.	Thank you for your comments, authors have given appropriate consideration to all of them.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Mahoney, Shane	No	Entire Report	0	0	0	0	<p>While this is not my area of expertise, in reading this document I was once again impressed by the scope, thoroughness and professional tone of the IPBES Thematic Assessment of Invasive Alien Species and Their Control. The value of this compilation of current information as well the historical contextualization of the forces and pace of change relevant to this critical ecological issue are substantive and establish a new and solid basis for our understanding. I was further impressed with the thoughtfully constructed commentaries on the limitations of our data in some and differing circumstances as well as the emphasis on the complex interactions that often exist between social, economic and environmental forces as determinants of the depth and scale of IAS impacts, not only on ecosystems but also on resident and Indigenous cultures.</p> <p>Furthermore, as someone keenly interested in sustainable use policies and practices, I found the treatment of the roles (clearly) played by hunting and agriculture etc in assisting the spread of IAS and the possibilities (Chapter 5, Box. 5.6, Lines 1633-1655 - wild boar and chital) and limitations (wild boar in various countries) for utilizing recreational hunting, for example, to control IAS, to be consistently reasonable and objective. And most interesting was the insight example offered respecting goats in Australia (Chapter 5, Line 4263) which noted the policy and intervention implications and distortions associated with the transition of IAS from vermin to resource status.</p> <p>I was expecting more emphasis in the report on climate change and the role this would play in the IAS context but, as in my reviews of earlier IPBES efforts, I must extend, overall, my congratulations and encouragement to the many authors who led and contributed to this important work.</p>	Thank you very much for your feedback. It is much appreciated. We have tried to highlight climate change in the revised version
Marchante, Elizabete	No	Entire Report	0	0	0	0	Could "invasive alien species" be abbreviated to "IAS"? It is used so often that it could make the text a little more fluid.	Thank you for your comment. Acronyms and abbreviations will be used sparingly in this assessment, following the UN editorial manual. Invasive alien species will therefore not be abbreviated
Odé, Baudewijn	No	Entire Report	0	0	0	0	Although I can not be certain about this, it seems that the report has some bias towards knowledge that has been shared in the English language. I suppose for a scientific review this is not unusual, but regarding the global scope, I would guess some potential important information may be missing.	While we appreciate this comment, we have covered research gaps throughout the assessment
Pan, Xubin	No	Entire Report	0	0	0	0	Each chapter should have at least one person to read the whole chapter, in order to avoid text duplication.	Thank you for the comment. The coordinating lead authors have reviewed the whole chapters in order to harmonize writing style and avoid duplications. Co-chairs have reviewed the entire assessment.
Pan, Xubin	No	Entire Report	0	0	0	0	Please check the refernces, common name and scientific name again.	Thank you, we have checked this in the final draft
Pan, Xubin	No	Entire Report	0	0	0	0	Some figures are not clear, and every photo should have the permission/souce.	Thank you for your comment, we have addressed this in the final draft
Pan, Xubin	No	Entire Report	0	0	0	0	The relationship between the National and Regional, and their order should be unified in the whole text.	Thank you for your comment, we have addressed this in the final draft
Pan, Xubin	No	Entire Report	0	0	0	0	The sources of boundaries and names in the maps should be shown, then the readers can know where to download and check the shp. files.	Thank you, this information is available in the data management report. Also, please consult IPBES Technical Support Unit on Knowledge and Data. (2020). IPBES regions and sub-regions (1.1) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.3928281
Participants of ILK dialogue workshop (Guadalupe Yesenia Hernández Márquez)	No	Entire Report	0	0	0	0	Can covid 19 be an example of IAS, and can this be highlighted within the assessment?	Thank you, COVID-19 has been mentioned as an example among others across the assessment, but authors have decided not to highlight COVID-19 more, as only existing and available evidence can be assessed.
Participants of ILK dialogue workshop (Maria Elena Regpala)	No	Entire Report	0	0	0	0	Since the 2nd dialogue workshop we see that there is more information on ILK and our initial observation is that authors have captured the concerns of indigenous peoples. The Centres of Distinction on ILK held a webinar on invasive alien species and the minutes of this webinar will be available soon for the IAS authors.	Thank you very much for your feedback.
Razafarison, Fanirisoa	No	Entire Report	0	0	0	0	These are enriching documents concerning invasive species. It will be better if there is another version, at least on 2 languages (English and French). Even though the documents are long, the schematic illustrations really add to the understanding of the texts.	Thank you for your comment. The summary for policymakers will be available in 6 UN languages (including English and French)
Hilal Al-Rahbi, Sawsana	No	Entire Report	0	0	0	0	It is a very Informative report and really a good introductory for the IAS. I would read it more focused with more specific and efficient comments, but unfortunately, I got the account details very late.	Thank you for your feedback.
Singh, Baljinder	No	Entire Report	0	0	0	0	<p>Several recent publications should be noted & incorporated into this current draft.</p> <p>In December 2021, The Arctic Report Card 2021, by the US National Oceanic and Atmospheric Administration (NOAA), reported that the North American beaver (<i>Castor canadensis</i>) has expanded its range into much higher latitudes in recent years and is now colonising Arctic territory. Because beavers are ecosystem engineers & keystone species that can dramatically change landscapes, these recent incursions are adding to the already alarming Climate Impacts in the Arctic. The ever-increasing formations of beaver ponds are accelerating methane & carbon dioxide release. These alarming recent developments need to be carefully monitored & incorporated into IPBES reports, if not in this current incarnation, then certainly in future ones.</p> <p>DOI: 10.25923/0jtd-vv85</p> <p>A recent study presents the first evidence in Antarctica for accelerated ecosystem responses to climate warming, confirming similar observations in the Northern Hemisphere. Future warming is anticipated to trigger significant changes in these fragile Antarctic ecosystems, benefiting some and possibly many native Antarctic terrestrial species and communities. However, increased risks are also expected from the establishment of non-native species that may outcompete native species and trigger irreversible biodiversity loss and changes to these delicate and unique ecosystems.</p> <p>Acceleration of climate warming and plant dynamics in Antarctica Nicoletta Cannone et al; Current Biology; Published: February 14, 2022 DOI:https://doi.org/10.1016/j.cub.2022.01.074</p>	Thank you, experts have reviewed the citations and have decided not to include them
Wong, Nicholas	No	Entire Report	0	0	0	0	I know in certain styles the "i" in indigenous is lowercase when it is used to refer to people. However, please consider that in Canada we always capitalize Indigenous, Aboriginal, First Nation, Inuit, Métis as a sign of respect the same way that English, French and Spanish etc are capitalized.	Thank you for your comment. While we agree that capitalising "Indigenous" may be the accepted practice among researchers, we follow the IPBES editorial guidelines and do not capitalise it.
Wood, Christine	No	Entire Report	0	0	0	0	Species names should all be checked for being up to date taxonomically, and I suggest standardised according to WoRMS. As examples - in Chapter 2 <i>Ensis directus</i> should be <i>Ensis leei</i> https://www.marinespecies.org/aphia.php?p=taxdetails&id=140732 , and <i>Musculista senhousia</i> should be <i>Arcuatula senhousia</i> https://www.marinespecies.org/aphia.php?p=taxdetails&id=140470	Thank you, we have harmonized species names and added a nomenclature section in Chapter 1
Government of Belgium	Yes	Glossary	0	0	0	0	Some definitions are very specific (e.g. "rescaling environmental policies") while others are very general (e.g. "management"). Is there a rationale for the choice of terms included in the glossary (and what is it)?	Thank you, we have revised the glossary with your comment in mind for better consistency
Government of Belgium	Yes	Glossary	0	0	0	0	<p>Suggest to add definitions for:</p> <ul style="list-style-type: none"> - (invasive) alien species (eg. The one in the SPM, p. 10, line 272) - preventive responses - One Health - One Biosecurity - Good quality of life (& indicators such as "freedom of choice") 	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Arsenault, Andre)	Yes	Glossary	0	0	0	0	I would recommend that you have a clear definition of invasive alien species in the glossary.	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Glossary	0	0	0	0	Additional terms should include - "invasion risk" - The phrase is sometimes used to refer to the probability that the number of IAS will increase, and sometimes to the probability that additional species will become able to establish. - key terms from Chapter 5 - invasion curve	Thank you, "risk" has been added, as well as key terms from Chapter 5. "Biological invasion process" provides context for the "invasion curve"
Government of Canada (Gadallah, ZuZu)	Yes	Glossary	0	0	0	0	Definitions are scattered throughout the chapters, and should instead be consolidated in the glossary for easy reference. Since the document will be used most often in electronic format, hyperlinks between chapters and the glossary would be helpful - or, even better, popup text on mouse over.	Thank you, we have indicated at the first mention of the term when it is defined in the Glossary
Government of Canada (Gadallah, ZuZu)	Yes	Glossary	0	0	0	0	The definition of IAS and its elements should be included here. While redundant with the text in Chap 1, the glossary will be used as a reference source, so completeness is of value.	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	0	0	0	0	Please add the definition of alien species as used in figure 1.1 chapter 1 so that all definitions are found in the glossary	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	0	0	0	0	Please add the definition of dispersal species as used in figure 1.1 chapter 1 so that all definitions are found in the glossary	Thank you, other terms have been added to the Glossary but this one is better defined in the context of Figure 1.1
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	0	0	0	0	Please add the definition of impacts as used in figure 1.1 chapter 1 so that all definitions are found in the glossary	Thank you, this has been addressed in the final draft.
Heger, Tina	No	Glossary	0	0	0	0	For sure there is a reason why this glossary does not contain definitions of alien and invasive species, but I found this quite strange. I strongly suggest including definitions here; especially because of the very strong message in A1 of the summary for policy makers, suggesting that 'all' invasive alien species are detrimental to nature, nature's contribution to people and a good quality of life. In my point of view, this statement is only true if it directly follows from the definition (i.e., invasive are only those species that have such effects)	Thank you, this has been addressed in the final draft.
Marchante, Elizabete	No	Glossary	0	0	0	0	Shouldn't "invasive alien species" and "alien species" be included in the Glossary? The definition included in the IPBES Glossary for "invasive alien species" includes native species which is not the case in the present Assessment.	Thank you, this has been addressed in the final draft.
Smith, Kevin	No	Glossary	0	0	0	0	Would like to see definitions in for 'Alien species' and 'Invasive alien species' ideally (if possible) together. Please refer to CBD glossary to ensure consistent messaging.	Thank you, this has been addressed in the final draft.
White, Michael	No	Glossary	0	0	0	0	Looks good. Clear.	Thank you for your feedback.
Government of Canada (Fraleigh, Brad)	Yes	Glossary	1	1	3	7	The term "adaptive" is also used in the sense of "adaptive management" of IAS. This use of the term should also be explained in this entry, especially since many people would not otherwise understand it.	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	1	1	5	5	Add of invasive species as follows, not all introduced populations have potential for adaptation "consequently, introduced populations OF INVASIVE SPECIES..." have considerable potential	Thank you but this definition has been revised and the comment is no longer relevant
Brooks, Thomas	No	Glossary	1	1	8	8	Surely "Alien species" must be included in the Glossary. Reference to the "IPBES Core Glossary" (which is not an formally mandated product) is not sufficient - the Glossary of an IPBES Assessment (which does have a formal mandate) should stand alone. Suggest using "A species, subspecies or lower taxon, introduced outside its natural past or present distribution; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce" (https://www.cbd.int/invasive/terms.shtml); more generally, strongly recommend using the same definitions as the CBD Glossary throughout.	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	1	1	13	13	Suggest reworking this definition using the proposed unified framework for biological invasions from Blackburn et al. 2011. This definition overlaps with the definition of invasion stages/process which is based on Blackburn. Suggest putting "see invasion process" instead of a new definition	Thank you, this has been made consistent with the definitions from Chapter 1
Government of Netherlands (Groenewoud, Henk E.)	Yes	Glossary	1	1	13	13	The definition of 'biological invasion' does not speak of any damage to nature or other values. So even species that do not or hardly cause any damage, are now considered to be an 'invasion'	Thank you, this has been made consistent with the definitions from Chapter 1
Groenewoud, Henk E.	No	Glossary	1	1	13	13	The definition of 'biological invasion' does not speak of any damage to nature or other values. So even species that do not or hardly cause any damage, are now considered to be an 'invasion'	Thank you, this has been made consistent with the definitions from Chapter 1
Htar Maung, Molley	No	Glossary	1	1	13	13	Should be "process by which species are (or) were intentionally...."	Thank you, this has been made consistent with the definitions from Chapter 1
Htar Maung, Molley	No	Glossary	1	1	15	16	The transportationacross biogeographic barriers (Wilson et al., 2016) Can be deleted	Thank you, this has been made consistent with the definitions from Chapter 1
Htar Maung, Molley	No	Glossary	1	1	18	18	Should use ".....colonisation of species" rather than colonisation of organisms in the text body.	Thank you, this has been made consistent with the definitions from Chapter 1
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	1	1	29	31	Please unify the definition with the one used in Chapter 1 so that they are the same. Using different definitions throughout the whole document is confusing. In Chapter 1: Citizen science (also known as community science, participatory monitoring, community-based environmental monitoring, crowd science, crowd-sourced science, civic science, or volunteer monitoring) describes the diverse range of approaches in which scientific research is conducted, in whole or in part, by volunteers with varying levels of expertise	Thank you, this has been made consistent with the definitions from Chapter 1
Marchante, Elizabete	No	Glossary	1	1	29	31	This definition is a bit restrictive, as citizen science nowadays includes much more than data collection and sharing; suggest using the definition eg from ECSA: https://ecsa.citizen-science.net/	Thank you, this has been revised to be broader
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	1	1	33	35	Please add how collective action applies in reference to invasive species	Thank you, but this is a broader concept
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	2	2	44	46	This definition overlaps with Management, suggest adding "also see definition of management" since management and control are usually found together. In addition remove the words "already-established", eradication activities would be focused on those species but the definition also mentions containment and this can apply to species that many not be newly established but because of their importance require management actions even if they are not already established.	Thank you, this has been addressed in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Glossary	2	2	55	57	Replace "extinction" with "extirpation". Extinction means the species no longer exists anywhere.	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	2	2	59	60	Please see the definition in figure 1.1 chapter 1 to ensure the same definition is used in both and it is consistent across the document	Thank you, this has been addressed in the final draft.
Brooks, Thomas	No	Glossary	2	2	61	61	It would be valuable to include a definition of "Habitat" here. Suggest "The area, characterized by its abiotic and biotic properties, that is habitable by a particular species" (IUCN 2019; https://www.iucnredlist.org/resources/redlistguidelines).	Thank you, this has been addressed in the final draft.

Reviewer Name (Last, First)	Government representative	Chapter	From Page	To Page	From Line	To Line	Comments	Final response
Government of Canada (Gadallah, ZuZu)	Yes	Glossary	2	2	62	64	I did not find this term in the chapters.	Thank you, we have deleted this term in the final draft
Htar Maung, Molley	No	Glossary	2	2	76	79	"Therefore, to design strategic... integrated approach (Herrick, 2019) can be deleted since it makes no different meaning.	Thank you, this has been addressed in the final draft.
Karayannis, Theofanis	No	Glossary	2	2	81	89	No issue with this text, on the contrary taking the opportunity to note that these definitions confirm that shipping is a pathway while ballast water and biofouling are vectors within this pathway, which is something that is not correctly reflected in various points in the Assessment as highlighted in several rows above.	Thank you, this has been addressed in the final draft.
Htar Maung, Molley	No	Glossary	2	2	88	88	Need to change as "means of introduction of invasive species"	Thank you, this definition has been updated in the final draft.
Brooks, Thomas	No	Glossary	3	3	90	90	Surely "Invasive alien species" must be included. Suggest using "An alien species whose introduction and/or spread threaten biological diversity", from https://www.cbd.int/invasive/terms.shtml ; as noted above, consistency with https://www.cbd.int/invasive/terms.shtml is very important here. The definition from the IAS Assessment Scoping given in Ch 1, Fig 1.1, Line 42, Page 5 is consistent with this, which is good.	Thank you, this has been addressed in the final draft.
Jeschke, Jonathan	No	Glossary	3	3	94	94	Add period at the end of the sentence.	Thank you, we have corrected this in the final draft
Jeschke, Jonathan	No	Glossary	3	3	97	97	Add period at the end of the sentence.	Thank you, we have corrected this in the final draft
Government of Netherlands (Groenewoud, Henk E.)	Yes	Glossary	3	3	109	109	Insert a definition of 'Invasive alien species', for instance: Invasive alien species are defined as animals, plants or other organisms introduced directly or indirectly by people into places out of their natural range of distribution, where they have become established and dispersed, and are generating an impact on local ecosystems and species (IPBES, 2018a cited in Chapter 1 page 5)	Thank you, this has been addressed in the final draft.
Groenewoud, Henk E.	No	Glossary	3	3	109	109	Insert a definition of 'Invasive alien species', for instance: Invasive alien species are defined as animals, plants or other organisms introduced directly or indirectly by people into places out of their natural range of distribution, where they have become established and dispersed, and are generating an impact on local ecosystems and species (IPBES, 2018a cited in Chapter 1 page 5)	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Glossary	3	3	112	117	Management requires a clear definition that is applied consistently throughout the assessment. In particular, clarity is needed on whether i) control of transport and other prevention efforts are included and ii) whether adaptation measures are included. It is useful to discuss differing definitions, but it should be clear which definition is used here.	Thank you, this has been addressed in the final draft.
Marchante, Elizabete	No	Glossary	3	3	112	117	This definition includes two distinct definitions - shouldn't one be adopted for the present Assessment and start with "For the purpose of this assessment" as in other cases?	Thank you, this has been addressed in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Glossary	3	3	119	121	Please explain the difference between "metabarcoding" and "DNA barcoding" because the definition given here appears identical to what is used in numerous BarCode of Life and similar initiatives.	Thank you, both definitions have been merged in the final draft
Linnamägi, Merike	No	Glossary	3	3	119	121	Defention should include fungi	Thank you, this definition is however general
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	3	3	123	128	Please substitute this definition for one that is more appropriate in terms of biology, maybe leave this part "an international migrant is someone who changes his or her country of usual residence" and add the relationship of this definition in terms of invasive species. Whether a person can remain in a country for 3-6 months is irrelevant.	Thank you, this term has been deleted from the final glossary
Government of Canada (Fraleigh, Brad)	Yes	Glossary	3	3	124	124	Replace "someone" with "a person" or "a human" to improve clarity.	Thank you, this term has been deleted from the final glossary
Htar Maung, Molley	No	Glossary	3	3	126	126	Number format is not consistent as in "three and 12 months,..."	Thank you, this term has been deleted from the final glossary
Brooks, Thomas	No	Glossary	3	3	130	130	Delete "animals or plants" - unnecessary, and excludes eg fungi.	Thank you, this has been addressed in the final draft.
Government of Mexico (Barrios Caballero, Yolanda)	Yes	Glossary	3	3	130	135	Please see the definition for native species in figure 1.1 chapter 1 to ensure the same definition is used in both and it is consistent across the document	Thank you, this has been addressed in the final draft.
Linnamägi, Merike	No	Glossary	3	3	130	137	Defention should include fungi	Thank you, it does but authors do not think it is appropriate to mention it here. "animal or plants" has been deleted to clarify
Htar Maung, Molley	No	Glossary	3	3	135	137	Can be deleted since it is an extra meaning which does not need to be included in the context of Native species definition	Thank you, this has been addressed in the final draft.
Government of Canada (Fraleigh, Brad)	Yes	Glossary	4	4	169	171	Replace with Principle 15 of the 1992 Rio Declaration" which predates the CBD: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environment degradation." The CBD formula is consistent with the Rio Declaration word for word, however in the CBD it only has the status of a preambular statement, whereas in the Rio Declaration it is a full-fledged Principle.	Thank you, this has been addressed in the final draft.
Brooks, Thomas	No	Glossary	5	5	186	186	It would be valuable to include a definition of "Range" here. Suggest "The current limits of distribution of a species, accounting for all known, inferred or projected sites of occurrence" (IUCN 2016; https://portals.iucn.org/library/node/46259)	Thank you, this has been addressed in the final draft.
Government of Canada (Gadallah, ZuZu)	Yes	Glossary	5	5	214	215	I did not find this term in the chapters.	Thank you, this term has been deleted from the final glossary