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| CV header | Dr Carolyn J. Lundquist | https://one.niwa.co.nz/download/attachments/15761512/NIWA_colour_Hor.jpg?api=v2 |

**Present position and institution**

Principal Scientist – Marine Ecology, National Institute of Water & Atmospheric Research

Associate Professor – School of Environment, University of Auckland

PO Box 11115, Hamilton, 3251, New Zealand

[carolyn.lundquist@niwa.co.nz](mailto:carolyn.lundquist@niwa.co.nz) Phone: 07 859 1866

**Specialist expertise**

* Scenarios and models of biodiversity and ecosystem services
* Marine spatial planning and biodiversity modelling
* Social-ecological systems
* Coastal and estuarine ecology, including mangroves, seagrass and shellfish restoration
* Disturbance/recovery dynamics and connectivity in marine ecosystems
* Climate change impacts on marine systems

**Professional experience**

**Summary of experience**

Principal Scientist and Associate Professor with >20 years post-graduate experience in ecological research and consultancy projects assessing the impacts of human activities on marine ecosystems. Her publication record includes >120 peer-reviewed publications and >100 technical reports. She regularly leads large, multi-disciplinary research projects for MBIE, NIWA SSIF, National Science Challenges and central and regional government organisations.

Example projects

* IPBES (United Nations). Co-chair, Task force on global biodiversity models and scenarios framework. (2016-2023)
* Sustainable Seas National Science Challenge (NSC) ($71 million). Programme leader, social-ecological systems (2014-2019); Project leader, spatial decision-support tools (2014-2024)
* Decision-support tools to inform marine spatial planning and identification of significant ecological areas. Project leader, commercial, NSC and NIWA SSIF (since 2005)
* Marine biodiversity, connectivity and health. Project leader, NIWA SSIF (since 2010)
* Coastal wetland research including mangrove and seagrass ecosystems and ecosystem services. Project leader, commercial, MBIE and NIWA SSIF (since 2010)

**Academic qualifications**

2000 PhD Ecology, University of California at Davis (USA).

1993 BS Biology, University of California at Los Angeles (USA).

**Professional positions held**

2016- Principal Scientist - Marine Ecology, NIWA Hamilton (80%).

2018- Associate Professor – Institute of Marine Science, University of Auckland (20%).

2012-2018 Senior Lecturer– Institute of Marine Science, University of Auckland (20%).

2000-2016 Scientist - Marine Ecology, NIWA Hamilton.

**Selection of publications**

**Refereed Publications**

Jefferson, T.; Palomares, M.L.D.; **Lundquist**, C.J. (2022) Safeguarding seafood security, marine biodiversity and threatened species: can we have our fish and eat it too? Frontiers in Marine Science 9:826587.

Stephenson, F.; Rowden, A.; Brough, T.; Petersen, G.; Bulmer, R.; Leathwick, J.; Lohrer, A.M.; Ellis, J.I.; Bowden, D.; Geange. S.W.; Funnell, G.; Freeman, D.; Tunley, K.; Tellier, P.; Clark, D.; **Lundquist**, C.; Greenfield, B.; Tuck, I.; Mouton, T.L.; Neill, K.; Mackay, K.; Pinkerton, M.H.; Anderson, O.; Gorman, R.; Mills, S.; Watson, S.; Nelson, W.; Hewitt, J. (2022) Development of a seafloor community classification for the New Zealand region using a gradient forest approach. Frontiers in Marine Science 8:792712.

Bulmer, R.H., Stephenson, F., Lohrer, A.M., **Lundquist**, C.J., Madarasz-Smith, A., Pilditch, C.A., Thrush, S.F., and Hewitt, J.E. (2022) Informing the management of multiple stressors on estuarine ecosystems using an expert-based Bayesian Network model. Journal of Environmental Management 301: 113576.

Stephenson, F.; Leathwick, J.R.; Geange, S.; Moilanen, A.; Pitcher, C.R.; **Lundquist**, C.J. (2021) Species composition and turnover models provide robust approximations of biodiversity in marine conservation planning. Ocean & Coastal Management 212: 105855.

Watson, R.T.; Sebunya, K.; Levin, L.A.; Eisenhauer, N.; Lavorel, S.; Hickler, T.; **Lundquist**, C.; Gasalla, M.; Reyers, B. (2021) Post-2020 aspirations for biodiversity. One Earth 4, 893-896.

Parsons, D.M.; Hartill, B.W.; Broekhuizen, N.; McKenzie, J.R.; Stephenson, F.; Petersen, G.L.; **Lundquist**, C.J. (2021) Integrating multi-disciplinary data sources relating to inshore fisheries management via a Bayesian network. Ocean & Coastal Management 208: 105636..

Delabre, I.; Rodriguez, L.O.; Smallwood, J.; Scharlemann, J.P.W.; Alcamo, J.; Antonarakis, A. S.; Rowhani, P.; Hazell, R.J.; Aksnes, D.L.; Balvanera, P.; **Lundquist**, C. J.; Gresham, C.; Alexander, A.E.; Stenseth, N.C. (2021) Actions on sustainable food production and consumption for the post-2020 global biodiversity framework. Science Advances 7(12): eabc8259.

Stephenson, F.; Hewitt; J.E.; Torres, L.G.; Mouton, T.L.; Brough, T.; Goetz, K.T.; **Lundquist**, C.J.; MacDiarmid, A.B.; Ellis, J., Constantine, R. (2021) Cetacean conservation planning in a global diversity hotspot: dealing with uncertainty and data deficiencies. Ecological Applications. Ecosphere 12(7):e03633.

Thrush, S.F.; Hewitt, J.E.; Gladstone-Gallagher, R.V.; Savage, C.; **Lundquist**, C.; O’Meara, T.; Vieillard, A.; Hillman, J.R.; Mangan, S.; Douglas, E.J.; Clark, D.E.; Lohrer, A.M.; Pilditch, C. (2021) Cumulative stressors reduce the self-regulating capacity of coastal ecosystems. Ecological Applications 31(1): e02223.

Jefferson, T.; Costello, M.J.; Zhao, Q.; **Lundquist**, C.J. (2021) Conserving threatened marine species and biodiversity requires 40% ocean protection. Biological Conservation 264: 109368.

Le Heron, E.; Le Heron, R.; Taylor, L.; **Lundquist**; C.J.; Greenaway, A. (2020) Remaking ocean governance in Aotearoa New Zealand through boundary-crossing narratives about ecosystem-based management. Marine Policy 122: 10422.

Rosa, Isabel M.D.; Lundquist, Carolyn J.; Ferrier, Simon; Alkemade, Rob; Drummond de Castro, Paula. (2020) Increasing capacity to produce scenarios and models for biodiversity and ecosystem services. Biota Neotropica 20(suppl. 1): e20201101.

**Lundquist**, C.J. Hashimoto, S.; Schoolenberg, M.; members of the IPBES task force on scenarios and models. (2020) Transformative scenarios for biodiversity conservation and sustainability. Conservation Letters 2020:13:c12713.

Pereira, L.; Davies, K.; den Belder, E.; Ferrier, S.; … **Lundquist**, C. (2020) Developing multi-scale and integrative nature-people scenarios using the Nature Futures Framework. People and Nature 2: 1172-1195.

Hillman, J.R.; **Lundquist**, C.J.; O’Meara, T.A.; Thrush, S.F. 2020. Loss of large animals differentially influences nutrient fluxes across a heterogeneous marine intertidal soft-sediment ecosystem. Ecosystems 24(2): 272-283.

Norrie, C.R.; Dunphy, B.J.; Roughan, M.; Weppe, S.; **Lundquist**, C.J. (2020) Spill-over from aquaculture may provide a larval subsidy for the restoration of mussel reefs. Aquaculture Environment Interactions. 12:231-249.

Bulmer, R.H.; Stephenson, F.; Jones, H.F.E.; Townsend, M.; Hillman, J.R.; Schwendenmann, L.; **Lundquist**, C.J. (2020) Blue carbon stocks and cross-habitat subsidies. Frontiers in Marine Science 7:380.

Zhao, Q.; Stephenson, F.; **Lundquist**, C.; Kaschner, K.; Jayathilake, D.; Costello, M.J. (2020) Where Marine Protected Areas would best represent 30% of ocean biodiversity. Biological Conservation 244: 108536.

Suyadi; Gao, J.; **Lundquist**, C.J.; Schwendenmann, L. 2020. Aboveground carbon stocks in rapidly expanding mangroves in New Zealand: regional assessment and economic valuation of blue carbon. Estuaries and Coasts 43:1456-1469.

Hamilton, D. J.; Bulmer, R. H.; Schwendenmann, L.; **Lundquist**, C. J. (2020). Nitrogen enrichment increases greenhouse gas emissions from emerged intertidal sandflats. Scientific Reports 10(1): 6686. 4

Davies, K.K.; Fisher, K.T.; Couzens, G.; Allison, A.; van Putten, E.I.; Dambacher, J.M.; Foley, M.; **Lundquist**, C.J. (2020) Trans-Tasman Cumulative Effects Management: A Comparative Study. Frontiers in Marine Science – Global Change and the Future Ocean 7:25.

Stephenson, F.; Goetz, K.; Sharp, B.; Mouton, T.; Beets, F.L.; Roberts, J.; MacDiarmid, A.B.; Constantine, R.; **Lundquist**, C.J. (2020) Modelling the spatial distribution of cetaceans in New Zealand waters. Diversity and Distributions 26(4): 495-516.

Hillman, J. R., F. Stephenson, S. F. Thrush, and C. J. **Lundquist**. (2020) Investigating changes in estuarine ecosystem functioning under future scenarios. Ecological Applications 30(4): e02090.

Hunt, H.L.; Pilditch, C.A.; Gladstone-Gallagher, R.; **Lundquist**, C.J. (2020) Spatial and temporal variation in the dispersal of clam populations on intertidal flats. Journal of Experimental Marine Biology and Ecology 524: 151291.

Hillman, J. R., **Lundquist**, C. J., Pilditch, C. A., & Thrush, S. F. (2020) The role of large macrofauna in mediating sediment erodibility across sedimentary habitats. Limnology and Oceanography 65(4), 683-693.

Stephenson, F.; Leathwick, J.; Francis, M.; Lundquist, C. (2020) A New Zealand demersal fish classification using Gradient Forest models. New Zealand Journal of Marine and Freshwater Research 54(1): 60-85.

Foley, M.M.; **Lundquist**, C.; Couzens, G.; Davies, K. (2019) The implications of uncertainty on cumulative effects management. Resource Management Journal. November 2019: 22-27.

Davies, K.; Couzens, G.; **Lundquist**, C.; Fisher, K. (2019) Partnerships and processes for cumulative effects management Resource Management Journal. November 2019: 5-10.

Allison, A.; Fisher, K.; **Lundquist**, C.; Davies, K. (2019) Knowledge and information needed to inform cumulative effects management in Aotearoa New Zealand. Resource Management Journal. November 2019: 16-22.

Stephenson, F.; Bulmer, R.; Meredyth-Young, M.; Hewitt, J.; **Lundquist**, C. (2019) Effects of benthic protection extent on recovery dynamics of a conceptual seafloor community. Frontiers in Marine Science 6:607.

Collier, K.J.; Pilditch, C.; **Lundquist**, C.J. (2019) Mountains-to-the-sea conservation: an island perspective. Aquatic Conservation: Marine and Freshwater Ecosystems. 29: 1383-1390.

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Rowden, A.A.; Stephenson, F.; Clark, M.R.; Anderson, O.F.; Guinotte, J.M.; Baird, S.J.; Roux, M,J.; Wadhwa, S.; Cryer, M.; **Lundquist**, C.J. (2019) Examining the utility of a decision-support tool to develop spatial management options for the protection of vulnerable marine ecosystems on the high seas around New Zealand. Ocean and Coastal Management 170: 1-16.

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Asaad, I.; **Lundquist**, C.J.; Erdmann, M.V.; Costello, M.J. (2019) An interactive atlas for marine biodiversity conservation in the Coral Triangle. Earth Syst. Sci. Data 11: 163-174.

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Hewitt, J.E.; **Lundquist**, C.J.; Ellis, J. (2019) Assessing sensitivities of marine areas to stressors based on biological traits. Conservation Biology 33 (1): 142–151.

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Suyadi; Gao, J.; **Lundquist**, C.J.; Schwendenmann, L. (2018) Characterizing landscape patterns in changing mangrove ecosystems at high latitudes using spatial metrics. Estuarine, Coastal and Shelf Science 215: 1-10.

**Lundquist**, C.J.; Bowden, D.A.; Cartner, K.J.; Stephenson, F.; Tuck, I.; Hewitt, J.E. (2018) Assessing benthic responses to fishing disturbance over broad spatial scales that incorporate high environmental variation. Frontiers in Marine Science 5: 405.

Asaad, I.; **Lundquist**, C.J.; Erdmann, M.V.; Costello, M.J. (2018) Designating spatial priorities for marine biodiversity conservation in the Coral Triangle. Frontiers in Marine Science 5:400.

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Townsend, M.; Davies, K.K.; Hanley, N.; Hewitt, J.E.; **Lundquist**, C.J.; Lohrer, A.M. (2018) The challenge of implementing the marine ecosystem service concept. Frontiers in Marine Science 5 :359.

**Lundquist**, C.J.; Jones, T.C.; Parkes, S.M.; Bulmer, R.H. (2018) Changes in benthic community structure and sediment characteristics after natural recolonisation of the seagrass *Zostera muelleri*. Nature Scientific Reports 8 (1), 13250.

**Lundquist**, C.J. (2018) One size does not fit all: Do taxonomic biases in marine connectivity studies reduce effectiveness of marine conservation? Aquatic Conservation: Marine and Freshwater Ecosystems 28(5):1026-1029.

Norrie, C.; Dunphy, B.; Ragg, N.; **Lundquist**, C. (2018) Ocean acidification will interact with ontogeny to shape the trace element composition of bivalve shell. Limnology and Oceanography Letters 3 (5): 393-400.

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Asaad, I.; **Lundquist**, C.J.; Erdmann, M.V.; Costello, M.J. (2018) Delineating priority areas for marine biodiversity conservation in the Coral Triangle. Biological Conservation 222:198-211.

Davies, K.; Murchie, A.A.; Kerr, V.; **Lundquist**, C. (2018) The evolution of Marine Protected Area planning in Aotearoa New Zealand: reflections on participation and process. Marine Policy 93: 113-127.

Reed, S.E.; Thomas, S.L.; Bednarek, A.T.; DellaSala, D.A.; Evans, M.C.; **Lundquist**, C.; Mascia, M.B.; McPherson, T.Y.; Watson, J.E.M. (2018) Roles for scientific societies to engage with conservation policy. Conservation Biology 32 (3): 513–515.

Davies, K.K.; Fisher, K.; Foley, M.; Greenaway, A.; Hewitt, J.; Le Heron, R.; Mikaere, H.; Speirs, R.; Ratana, K.; **Lundquist**, C. (2018) Navigating collaborative networks and cumulative effects for Sustainable Seas. Environmental Science and Policy 83:22-32.

Davies, K.; Fisher, K.; Foley, M.; Greenaway, A.; Hewitt, J.; Le Heron, R.; Mikaere, H.; Ratana, K.; Speirs, R.; **Lundquist**, C. (2017) From the mountains to the seas: developing a shared vision for addressing cumulative effects in Aotearoa New Zealand. Regions Magazine. 308 (4): 15-18.

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Bulmer, R. H.; Schwendenmann, L.; Lohrer, A.M.; **Lundquist**, C.J. (2017) Sediment carbon and nutrient fluxes from cleared and intact temperate mangrove ecosystems and adjacent tidal flats. Science of the Total Environment. 599-600: 1874-1884.

Suyadi; Gao, J.; **Lundquist**, C.J.; Schwendenmann, L. (2018) Sources of uncertainty in mapping temperate mangroves and their minimization using innovative methods, International Journal of Remote Sensing 39(1): 17-36,

Gladstone-Gallagher, R.V.; Sandwell, D. Lohrer, A.M.; **Lundquist**, C.J.; Pilditch, C.A. (2017) Quantifying macrodetritus fluxes from a small temperate estuary. Marine and Freshwater Research 68: 2289–2305.

Gladstone-Gallagher, R.V.; Needham, H.R.; Lohrer, A.M.; **Lundquist**, C.J.; Pilditch, C.A. (2017) Site-dependent effects of bioturbator-detritus interactions alter soft-sediment ecosystem function. Marine Ecology Progress Series 569: 145–161.

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Hunter, M.L., Jr. , Acuña, V., Bauer, D., Bell, K., Calhoun, A., Felipe-Lucia, M.R., Fitzsimons, J., Gonzalez, E., Kinnison, M., Lindenmayer, D., **Lundquist**, C.J., Medellin, R., Nelson, E., Poschlod, P. (2017) Conserving small natural features with large ecological roles: a synthetic overview. Biological Conservation 211:.88-95.

**Lundquist**, C.J., Bulmer, R.H., Clark, M.R., Hillman, J., Nelson, W.A., Norrie, C.R., Rowden, A.A., Tracey, D.M., Hewitt, J.E. (2017) Challenges for the conservation of marine small natural features. Biological Conservation 211: 69–79.

Bulmer, R. H.; Lewis, M.; O’Donnell, E.; **Lundquist**, C.J. (2017) Assessing mangrove clearance methods to minimise adverse impacts and maximise the potential to achieve restoration objectives. New Zealand Journal of Marine and Freshwater Research 51:1:110-126.

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