


Dr Caitlin D. Kuempel

Lecturer · Griffith University, Brisbane, Australia
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Education

The University of Queensland, St. Lucia, QLD, Australia Nov. 2014- Aug. 2018

- PhD Conservation Science
- Thesis title: Evaluating trade-offs between quantitative and qualitative protected area objectives
- Supervisors: Prof. Hugh Possingham, Prof. Catherine Lovelock and Dr. Alienor Chauvenet

Northeastern University, Nahant, MA Dec. 2013

- M.S. Marine Biology (emphasis in Coral Reef Ecology (GPA 4.0/4.0))
- Three Seas Program: 15 months of intensive course and field work in three unique environments

University of Iowa, Iowa City, IA May 2012

- B.S. Environmental Bioscience (with honors), B.A. French, Certificate in Sustainability
- Honors in coral morphometrics

Professional Experience

Lecturer, Marine Ecological Modelling, Griffith University, Brisbane, Australia June 2022-present

Post-doctoral Fellow, ARC Centre of Excellence for Coral Reef Studies, UQ, Brisbane, Australia Feb. 2020-May 2022

Exploring ways to manage and monitor climate resilient reefs to benefit people and nature as part of the World Wildlife Fund's Coral Reef Rescue Initiative

Post-doctoral Fellow, NCEAS, Santa Barbara, CA Sept. 2018-Dec. 2019

Quantified, compared and mapped the production and environmental impacts of all major food systems as part of a collaborative working group

Research Assistant, University of Queensland, St. Lucia, QLD, Australia June-Sept. 2018

Developed projects and performed analyses related to international seafood trade.

Conservation Planning Consultant, IUCN and The University of Queensland July-Aug. 2018

Collated data and developed conservation plans for four Pacific Island nations using the spatial conservation planning software, Marxan.

Research Assistant, The University of Queensland, St. Lucia, QLD, Australia Sept. 2017-May 2018

Updated and built the online presence of the Centre for Biodiversity and Conservation Science

Research Assistant: University of Queensland, St. Lucia, QLD, Australia Jan.-March 2017

Contributed to stakeholder meetings and explored different scheduling scenarios for implementing land-sea spatial conservation plans in Papua New Guinea.

Volunteer Researcher: University of Queensland and WWF Indonesia Sept.-Oct. 2016

Led analyses and helped organize workshops to find priority regions for marine conservation in the Sunda Banda Seascape of Indonesia.

Research Assistant: Smithsonian Tropical Research Institute, Bocas del Toro, Panama April-Oct. 2014

Thalassia testudinum Experimental Network (TEN): investigated the impacts of nutrients and grazer abundance on seagrass across a latitudinal gradient (Florida, Belize, Panama).

Conservation Intern: Central Caribbean Marine Institute, Little Cayman, Cayman Islands Jan.-April 2014

Assisted with lionfish management research, coral nursery, and climate data collection. Provided weekly educational talks and tours to guests and tourists.

Short-Term Fellow: Smithsonian Tropical Research Institute, Bocas del Toro, Panama June-Dec. 2013

Investigated the role of consumers in coral-algal community dynamics under the supervision of Dr. Andrew Altieri.

Research Assistant: University of Iowa Department of Geoscience, Iowa City, IA May 2009-2010

Produced thin-sections of coral specimens and performed morphometric analysis of the coral species *Diploria*, resulting in a final honors thesis and research presentation under the supervision of Dr. Ann Budd.

Grants and Awards

Contributed to the Global Environmental Facility Coral Reef Rescue awarded to WWF (US\$7M) (2022)

CBCS Small Grants Scheme (\$4,500 across three successful proposals) (2021)

University of Queensland Faculty of Science Awards Rising Star - Academic category Finalist (Dec. 2020)

APEC Science Prize for Innovation, Research and Education Award - shortlisted for Australian nominee (2020)

University of Queensland Dean's Award for Outstanding HDR Theses (2018)

ARC Laureate Postgraduate Scholarship (\$119,376 over 4 years) Nov 2014-2018

Seafood Footprint Displacement Top-up Scholarship (Dr. Carissa Klein, \$5,000) March-June 2018

50 Reefs Top-up Scholarship (\$5,000) Sept. 2017

University of Queensland Career Development Award (\$5,000) May 2017

Great Barrier Reef Marine Park Authority Science for Management Award (\$1,000-declined) May 2017

Taylor and Francis University of Queensland Library Excellence Award in Research (\$1,000) May 2017

Australian Coral Reef Society Writing Retreat Scholarship (\$500) May 2016

Smithsonian Tropical Research Institute Short-Term Fellowship (\$2,000) June-Nov. 2013

University of Iowa Old Gold Scholarship (\$12,000) Aug. 2007-May 2011

University of Iowa Athletic Scholarship (Rowing) Jan. 2008-May 2011

Peer-Reviewed Publications

29. Kuempel, C.D., Frazier, M., Verstaen, J., Rayner, P.E., Blanchard, J.L., Bouwman, L., Cottrell, R.S., Froehlich, H.E., Gephart, J.A., Jacobsen, N.S., McIntyre, P.B., Metian, M., Moran, D., Nash, K.L., Tobben, J., Williams, D.R., Halpern, B.S. (2023). Feed drives land-sea overlap of the global cumulative environmental pressure of farmed chicken and salmon. *Current Biology*

28. Halpern, B.S., Frazier, M., Verstaen, J., Rayner, P.E., Clawson, S.G., Blanchard, J.L., Cottrell, R.S., Froehlich, H.E., Gephart, J.A., Jacobsen, N.S., Kuempel, C.D., McIntyre, P.B., Metian, M., Moran, D., Nash, K.L., Tobben, J., Williams, D.R. (in review). The cumulative environmental footprint of global food production. *Nature Sustainability*
27. Hicks, C.C. Gephart, J.A., Koehn, J.Z., Nakayama, S., Payne, H., Allison, E.H., Delhabib, D., Cao, L., Cohen, P.J., Fanzo, J., Fluet-Chouinard, E., Gelcich, S., Golden, C.D., Gorospe, K.D., Isaacs, M., Kuempel, C.D., Lee, K.N., MacNeil, M.A., Maire, E., Njuki, J., Rao, N., Sumaila, U.R., Selig, E.R., Thilsted, S.H., Wabnitz, C.C.C., Naylor, R.L. (in review). Towards Justice in Blue Food Systems. *Nature Food*
26. Klein, C.J., Kuempel, C.D., Watson, R.A., Teneva, L., Coll, M., Mora, C. (2022). Global fishing between jurisdictions with unequal fisheries management. *Environmental Research Letters*
25. Almaraz, M., Kuempel, C.D., Salter, A., Houlton, B.Z., Halpern, B.S. (2022). The impact of excessive protein consumption on human wastewater nitrogen loading of US waters. *Frontiers in Ecology and the Environment*
24. Clawson, S.G., Blasco, G., Kuempel, C.D., Froehlich, H.E., Cottrell, R.S., Metian, M., Tobben, J., Williams, D.R., Nash, K.L., Frazier, M., Verstaen, J., Halpern, B.S. (2022). Mapping the spatial distribution of global mariculture production. *Aquaculture*
23. Williams, B.A., Watson, J.E.M., Beyer, H.L., Klein, C.J., Montgomery, J., Runting, R.K., Roberson, L.A., Halpern, B.S., Grantham, H.S., Kuempel, C.D., Frazier, M., Venter, O., Wenger, A. (2021). The global rarity of intact coastal regions. *Conservation Biology*
22. Kuempel, C.D., Simmons, B.A., Davey, M. (2022) Assessing the status of existing and tentative marine natural World Heritage areas reveals opportunities to better achieve World Heritage Convention goals. *Journal of Environmental Management*
21. Kuempel, C.D., Tulloch, V.J.D., Giffin, A.L., Simmons, B.A., Hagger, V., Phua, C. and Hoegh-Guldberg, O. (2021). Identifying management opportunities to combat climate, land and marine threats across less climate exposed coral reefs. *Conservation Biology*
20. Roberson, L., Beyer, H.L., O'Hara, C., Watson, J.E.M., Dunn, Daniel, Klein, C.J., Frazier, M., Kuempel, C.D., Williams, B., Grantham, H., Montgomery, J., Kark, S., Runting, R.K. (2021). Multinational coordination required for conservation of at least 90% of marine species. *Global Change Biology*
19. Kuempel, C.D., Chauvenet, A.L.M., Symes, W.S., Possingham, H.P.P. (2021). Predicted protected area downsizing decreases habitat representation across terrestrial ecoregions in the tropics and subtropics. *Conservation Science and Practice*
18. Suarez-Castro, A.F., Beyer, H.L., Kuempel, C.D., Linke, S., Borelli, P., Hoegh-Guldberg, O. (2021). Global forest restoration opportunities to foster coral reef conservation. *Global Change Biology*
17. Cottrell, R.S., Metian, M., Froehlich, H.E., Blanchard, J.L., Jacobsen, N.S., McIntyre, P.B., Nash, K.L., Williams, D.R., Bouwman, L., Gephart, J.A., Kuempel, C.D., Moran, D.D., Troell, M., Halpern, B.S. (2021) Time to rethink trophic levels in aquaculture policy. *Reviews in Aquaculture*
16. Kuempel, C.D., Froehlich, H.E., Halpern, B.S. (2021) An informed though experiment exploring the potential for a paradigm shift in aquatic food production. *Ocean and Coastal Management*
15. Adams, V.M., Dimitrova, N., Possingham, H.P., Allan, J.R., Kuempel, C.D., Peterson, N., Kaiye, A. Keako, M., Tulloch, V.J.D. (2021) Scheduling incremental actions to build a comprehensive national protected area network for Papua New Guinea. *Conservation Science*

14. Chauvenet, A.L.M., Watson, J.E.M., Adams, V.M., Di Marco, M., Venter, O., Davis, K.J., Mapping, B., Klein, C.J., Kuempel, C.D., Possingham, H.P. (2020). To achieve big wins for conservation, prioritise protection of ecoregions closest to meeting targets. *One Earth*
13. Kuempel, C.D., Frazier, M., Nash, K.L., Sand Jacobsen, N., Williams, D.R., Blanchard, J.L., Cottrell, R.S., McIntyre, P.B., Moran, D., Bouwman, L., Froehlich, H.E., Gephart, J.A., Metian, M., Tobben, J., Halpern, B.S. (2020). Integrating life-cycle and impact assessments to map food's cumulative environmental footprint. *One Earth*
12. Daigle, R., Metaxas, A., Balbar, A., McGowan, J., Trembl, E., Kuempel, C.D., Possingham, H., Beger, M. (2020). Operationalizing ecological connectivity to identify spatial conservation priorities with Marxan Connect. *Methods in Ecology and Evolution*, Top cited paper 2022
11. Kuempel, C.D., Chauvenet, A.L.M., Possingham, H.P., Adams, V.M. (2020). Evidence-based guidelines for prioritizing investments to meet international conservation objectives. *One Earth*
10. Halpern, B.S., Blanchard, J.L., Bouwman, L., Cottrell, R.S., Froehlich, H.E., Gephart, J.A., Sand Jacobson, N., Kuempel, C.D., McIntyre, P.B., Metian, M., Moran, D., Nash, K.L., Tobben, J., Williams, D.R. (2019). Opinion: Putting all food on the same table: Achieving sustainable food systems requires full accounting. *Proceedings of the National Academy of Sciences*
9. Kuempel, C.D., Jones, K.J., Watson J.E.M., Possingham, H.P. (2019). Quantifying biases in placement of marine protected areas relative to abatable biodiversity threats. *Conservation Biology* Top cited paper 2019
8. Jantke, K., Kuempel, C.D., McGowan, J.M., Chauvenet, A.L.M., Possingham, H.P. (2018). Metrics for evaluating representation target achievement in protected area networks. *Diversity and Distributions*
7. Jones, K.J., Klein, C.J., Halpern, B.S., Venter, O., Grantham, H., Kuempel, C.D., Shumway, N., Friedlander, A.M., Possingham, H.P., Watson, J.E.M. (2018). The location and protection status of Earth's diminishing marine wilderness. *Current Biology*
6. Kuempel, C.D. Adams, V.M., Possingham H.P., Bode M. (2018) Bigger or better: the relative benefits of protected area network expansion and enforcement for the conservation of an exploited species. *Conservation Letters*
5. Campbell, J.E., Altieri, A.H., Johnston, L., Kuempel, C.D., Paperno, R., Paul, V.J., Duffy, J.E. (2018) Herbivore community determines the magnitude and mechanism of nutrient effects on subtropical and tropical seagrass. *Journal of Ecology*
4. Chauvenet, A.L.M., Kuempel C.D., McGowan J., Beger, M., Possingham, H.P. (2017). Methods for calculating Protection Equality for conservation planning. *PloS one*
3. Kuempel, C.D. and Altieri A. H. (2017). The emergent role of small-bodied herbivores in pre-empting phase shifts on degraded coral reefs. *Scientific Reports*
2. Kuempel, C.D., Chauvenet, A.L.M., and Possingham H.P. (2016). Equitable representation of ecoregions is slowly improving despite strategic planning shortfalls. *Conservation Letters*
1. Nelson, H.R., Kuempel, C.D., and Altieri, A.H. (2016). The resilience of reef invertebrate biodiversity to coral mortality. *Ecosphere*

Other Publications

Kuempel, C.D. (2023) Sedimentation sifted out of global pollution priorities. *Science*

Kuempel C.D. and Alyssa Giffin (2021) Resilient reefs, resilient communities: how can we get there? *Catchment to Coast* <https://catchmentto coast.org/2021/12/14/resilient-reefs-and-resilient-communities-how-can-we-get-there/>

Kuempel C.D., McGowan J., Estradivari, Handaynai C., Daniel D., Possingham H., Ahmadi, G. (2017) Conservation priority gaps in the Sunda Banda Seascape, Indonesia

Kuempel C.D., Di Marco M., Watson J., Possingham H. (2017). Achieving the targets of global conventions. *Decision Point* <http://decision-point.com.au/article/achieving-the-targets-of-global-conventions/>

Presentations

* oral presentation, † invited presentation

Kuempel C† (2022) Mapping a path for conservation in a developing world. *Griffith University, Brisbane, Australia*

Kuempel C† (2022) Conservation nature in a developing world. *Linn-Mar High School, Marion, IA, USA*

Kuempel C (2021) Informing management across less-climate exposed coral reefs. *International Congress on Conservation Biology*, on-line*

Kuempel C† (2021) Coral Reef Rescue Initiative: A climate-centric approach for managing coral reefs for nature and people. *Coral Reef Rehabilitation and Management Program - Coral Triangle Initiative*, on-line*

Kuempel C† (2020) The basics of protected area design and evaluation. *University of Queensland Twilight Talk Series*, on-line*

Kuempel C† (Nov. 2020) Getting Started with GitHub in R. *Pete Mumby lab group meeting, UQ**

Kuempel C† (Oct. 2020) Workflows and best practices for collaborative coding. *RLadies Brisbane*, online*

Kuempel C† (Sept. 2020) Getting Started with GitHub in R. *RLadies Brisbane*, online*

Kuempel C† (2020) Coral Reef Rescue Initiative: A climate-centric approach for management coral reefs for nature and people. *International Marine Conservation Congress*, on-line*

Kuempel C† (2019) Conserving nature in a developing world. *NCEAS Roundtable, Santa Barbara, CA, USA**

Kuempel C, Adams V, Possingham H, Bode M (2018) Bigger or better: the relative benefits of MPA expansion and enforcement. *Society for Conservation Biology Oceania Conference, Wellington, New Zealand**

Kuempel C, Jones K, Watson J.E., Possingham H (2018) Global marine protected area establishment largely avoids abatable threats to biodiversity. *International Marine Conservation Congress, Kuching, Malaysia**

Kuempel C† (2018) Evaluating trade-offs between quantitative and qualitative protected area objectives. *Centre for Biodiversity and Conservation Science Seminar, University of Queensland**

Kuempel C, Adams V, Possingham H, Bode M (2017) Bigger or better: the relative benefits of MPA expansion and enforcement. *4th International Marine Protected Areas Congress, La Serena, Chile**

Kuempel C, Jones K, Watson J.E., Possingham H (2017) Are marine protected areas tackling threats? *International Congress on Conservation Biology, Cartagena, Colombia**

Kuempel C, Chauvenet A, Possingham H (2016) Does rapid protected area expansion impact the ecological representation of reserve networks? *Society for Conservation 4th Oceania Congress, Brisbane, Australia**

Kuempel C, Bode M, Adams V, Possingham H (2016) Balancing area and effectiveness: MPA expansion vs. management enforcement in meeting global conservation targets. *International Coral Reef Symposium, Honolulu, HI**

Kuempel C† (2016) Balancing area and effectiveness: Investigating trade-offs in the Convention on Biological Diversity Aichi Target 11. *Environmental Science Seminar, University of Iowa**

Kuempel C, Chauvenet A, Possingham H (2016) Does rapid protected area expansion compromise ecological representation? *Student Conference on Conservation Science, University of Cambridge, UK*

Kuempel C and Altieri A (2014) The role of consumers in mediating coral-algal phase shifts. *43rd Annual Benthic Ecology Meeting*, Jacksonville, FL, USA*

Teaching Experience

3606ENV Conservation Biology - 2023 course convener

3804ENV Marine Ecosystem Modelling - 2023 course convener

ENVM2002/7002 Marine and Coastal Environmental Protection, University of Queensland, August 2021

Developed and delivered three lectures and two practical assessment over three weeks related to anthropogenic impacts on marine and coastal ecosystems. Received teaching evaluation scores of 4.5/5, with feedback that I am “helpful and available to help and deal with my ton of questions”.

ENVM3220/7202 Conservation Planning and Management, University of Queensland, March 2021

Developed and delivered two lectures and one practical assessment over two weeks related to spatial planning and project prioritisation in a mixed virtual/in-person format. Received teaching evaluation scores of 4.82/5, with two students commenting that I have “clear and detailed explanations” and “am good at explaining things”.

WWF Structured Decision Making Training, online, April-May 2021

Facilitated a 6-week structured decision making course developed for government and NGO practitioners, lead by Queensland Chief Scientist Hugh Possingham

ENVM2002/7002 Marine and Coastal Environmental Protection, University of Queensland, August 2020

Developed and delivered a guest lecture on Cumulative Impact Analysis

Software Carpentries Instructor Sept. 2020

Certified Software Carpentries Instructor, specialising in introductory to advanced R programming skills and version control (e.g., GitHub).

CONS7021 Masters conservation decision-making course, University of Queensland June 2017, 2018

Lead exercises on the principles and basic use of Marxan spatial conservation planning software, including giving lectures, overseeing laboratory practicals and grading reports

Moreton Bay Research Station Science Camp, University of Queensland Oct. 2017-June 2018

Helped run two-day introductory course for primary school and international students to explore terrestrial and marine habitats and the flora and fauna of Stradbroke Island

BIOL3000 Third year conservation course, University of Queensland Aug. 2017

Facilitated learning exercises on the principles and basic use of Marxan spatial conservation planning software and helped grade reports

Spatial planning and decision-science workshop, Bogota, Colombia July 2017

Facilitated a workshop on decision science and practical exercises for using Marxan in spatial conservation planning

Stanford University Bing Overseas Program, University of Queensland Nov. 2017

Facilitated field exercises on seagrass, dugongs and coral reefs in Moreton Bay for Stanford exchange students and helped design individual research projects

R for beginners, WWF Indonesia Jakarta office Oct. 2016

Lead a two day course on the basics of programming in R for conservation practitioners

Spatial planning for marine protected area design, Bali, Indonesia Oct. 2016

Helped deliver training materials on using Marxan for spatial planning in Indonesia to government and NGO participants

MARS2005 Australia's Marine Environments second year course, University of Queensland May 2016

Led learning exercises centred around the unique ecosystems found on Stradbroke Island, Australia and helped students design, implement, analyse and report on group research projects

Service Roles

Academic

Centre for Biodiversity and Conservation Science Management Committee (2021-Present)

Early Career Researcher Education Lead

UNEP MPA Toolbox and Learning Platform

Academic Associate, Content editor/coordinator/contributor

NCEAS Diversity Team representative (2018-2019)

Reviewer for international publications

Nature Sustainability, the Journal of Environmental Management, Biological Conservation, Marine Biology, PLoS One, Global Ecology and Conservation, Coral Reefs, Conservation Letters, Conservation Biology, Diversity and Distributions, Marine Policy, Conservation Science and Practice and PeerJ.

Society for Conservation Biology University of Queensland/Brisbane Chapter

Member (2014-2018) Board Member/Treasurer (2015-2017)

Reef Life Survey

Survey Volunteer (2017)

PhD seminar series, The University of Queensland, St. Lucia, QLD, Australia

Organiser (2014-2015)

Queensland Catch a Rising Star Program, Queensland National Science Week

Participant (August 2016)

Community

RLadies Brisbane - promoting women in programming

Organiser/Host (2020-present)

Professional Membership

Reef Life Survey

Australian Coral Reef Society

Society for Conservation Biology

International Society for Reef Studies

World Commission on Protected Areas Young Professionals Group

Working Groups

Organiser/Participant Australia's sustainable seafood future , UQ Heron Island Research Station, April 2022

Organiser/Participant Centre for Biodiversity and Conservation Science HDR/ECR Writing workshop , Moreton Bay Research Station, Dec. 2021

Participant Science for Nature and People Partnership (SNAPP) Coastal Health working group , NCEAS (on-line), Nov. 2021

Organiser/Participant CBCS Integrated Watershed Management Workshop , University of Queensland, Oct. 2021

Panel Participant Working with "big data" in the biological sciences , University of Queensland, July 2021

Organiser/Participant Coral Reef Rescue Initiative Near Real-Time Monitoring Workshop , WWF online, Sept. 2021

Participant Strengthening coastal communities resilience by supporting community enterprises , WWF online, Oct. 2020

Participant What's the catch? Social and environmental sustainability of seafood, Heron Island, University of Queensland Jan 2021

Post-doctoral Fellow Comparing the environmental impacts of global food systems, NCEAS, UC Santa Barbara Sept. 2018-2020

Participant Sustainable seafood and marine conservation, Heron Island, University of Queensland June 2019

Participant Incorporating connectivity into spatial conservation planning, The Nature Conservancy, Washington D.C. 2017

Participant/Coordinator Land-sea conservation planning in Papua New Guinea, Port Moresby, Papua New Guinea 2017

Participant/Coordinator Marine spatial planning in the Sunda Banda Seascape, Bali, Indonesia 2016

Organizer/Participant Global Marine Conservation. Lady Elliot Island, Australia 2016

Supervision

Jackson Stockbridge, Post-doctoral fellow (2023-present, Griffith University)

Developing a framework for blue economy marine spatial planning in Australia

Marina Christofidis, PhD Student (2023-present, Griffith University)

Climate risk to aquaculture production in Australia (international scholarship recipient)

Sophie Petrie, Capstone project, (2023 Griffith University)

Emma Arnett, Master's Student (2020-2021, University of Queensland)

Quantifying like-for-like global seafood trade supervised by Carissa Klein and myself

Ella Sinclair, Volunteer (2020, University of Queensland)

Primary supervisor for conducting literature review of monitoring and evaluation indicators for focal WWF Coral Reef Rescue Initiative countries

Skills

Programming: = R (*advanced*), Matlab (*basic*) *Software:* = Marxan (*advanced*), Arc/QGIS, Adobe Illustrator, Microsoft Office