

Sean C. Anderson

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Professional experience

- 2017 Aquatic Science Biologist, Offshore Section, Aquatic Resource Research and Assessment Division, Pacific Biological Station, Fisheries and Oceans Canada, Nanaimo, BC, Canada
- 2015–17 David H. Smith Conservation Research Fellow, School of Aquatic and Fishery Sciences, University of Washington and Northwest Fisheries Science Center, Seattle, WA, USA
- 2015 Postdoctoral Fellow, School of Resource and Environmental Management, Simon Fraser University, Burnaby, BC, Canada
- 2011–15 Graduate Research Assistant, Department of Biological Sciences, Simon Fraser University, Burnaby, BC, Canada
- 2008–11 Graduate Research Assistant, Department of Biology, Dalhousie University, Halifax, NS, Canada

Education

- 2011–15 Ph.D. Biology, Simon Fraser University, Burnaby, Canada
Variance and extreme events in population ecology
Fulbright Scholar to the University of Washington in 2012–13
[Dean of Graduate Studies Convocation Medal](#)
- 2008–10 M.Sc. Biology, Dalhousie University, Halifax, Canada
Trends, drivers, and ecosystem effects of expanding global invertebrate fisheries
[Canadian Governor General's Academic Gold Medal](#)
- 2004–07 B.Sc. (Hons.) Environmental Science, Dalhousie University, Halifax, Canada
First Class Honours & Environmental Programmes Honour Society Medal
- 2001–03 B.Sc. Candidate (Hons.) Kinesiology, University of Waterloo, Waterloo, Canada; transferred to Dalhousie University in 2004.

Publications

- 2017 Rosenberg, A.A., K.M. Kleisner, J. Afflerbach, S.C. **Anderson**, M. Dickey-Collas, A.B. Cooper, M.J. Fogarty, E.A. Fulton, N.L. Gutiérrez, K.J.W. Hyde, E. Jardim, O.P. Jensen, T. Kristiansen, C. Longo, C.V. Minto-Vera, C. Minto, I. Mosqueira, G.C. Osio, D. Ovando, E.R. Selig, J.T. Thorson, J.C. Walsh, Y. Ye. Applying a new ensemble approach to estimating stock status of marine fisheries around the world. *Conservation Letters*. In press.
- 2017 **Anderson**, S.C., T.A. Branch, A.B. Cooper, N.K. Dulvy. Black-swan events in animal populations. *Proceedings of the National Academy of Sciences*. 114(12): 3252–3257. <http://doi.org/10.1073/pnas.1611525114> (Open access).
- 2017 **Anderson**, S.C., A.B. Cooper, O.P. Jensen, C. Minto, J.T. Thorson, J.C. Walsh, M. Dickey-Collas, K.M. Kleisner, C. Longo, G.C. Osio, D. Ovando, I. Mosqueira, A.A. Rosenberg, E.R. Selig. Improving estimates of population status and trend with superensemble models. *Fish and Fisheries*. In press. <http://doi.org/10.1111/faf.12200>.
- 2016 Trebilco, R., N.K. Dulvy, S.C. **Anderson**, A.K. Salomon. The paradox of inverted biomass pyramids in kelp forest fish communities. *Proceedings of the Royal Society B: Biological Sciences*. 283: 20160816. <http://doi.org/10.1098/rspb.2016.0816>.
- 2016 Artelle, K.A., S.C. **Anderson**, J.D. Reynolds, A.B. Cooper, P.C. Paquet, C.T. Darimont. Ecology of conflict: marine food supply affects human-wildlife interactions on land. *Scientific Reports*. 6: 25936. <http://doi.org/10.1038/srep25936> (PDF).

- 2016 Kuriyama, P.T., K. Ono, F. Hurtado-Ferro, A.C. Hicks, I.G. Taylor, R.R. Licandeo, K.F. Johnson, S.C. **Anderson**, C.C. Monnahan, M.B. Rudd, C.C. Stawitz, J.L. Valero. An empirical weight-at-age approach reduces estimation bias compared to modeling parametric growth in integrated, statistical stock assessment models when growth is time varying. *Fisheries Research*. 180: 119–127. <http://doi.org/10.1016/j.fishres.2015.09.007> (PDF).
- 2016 Monnahan, C.C., K. Ono, S.C. **Anderson**, M.B. Rudd, A.C. Hicks, F. Hurtado-Ferro, K.F. Johnson, P.T. Kuriyama, R.R. Licandeo, C.C. Stawitz, I.G. Taylor, J.L. Valero. The effect of length bin width on growth estimation in integrated age-structured stock assessments. *Fisheries Research*. 180: 103–112. <http://doi.org/10.1016/j.fishres.2015.11.002> (PDF).
- 2015 Boudreau, S.A., S.C. **Anderson**, B. Worm. Top-down and bottom-up forces interact at thermal range extremes on American lobster. *Journal of Animal Ecology*. 84(3): 840–850. <http://doi.org/10.1111/1365-2656.12322> (PDF).
- 2015 **Anderson**, S.C., J.W. Moore, M.M. McClure, N.K. Dulvy, A.B. Cooper. Portfolio conservation of metapopulations under climate change. *Ecological Applications*. 25(2): 559–572. <http://doi.org/10.1890/14-0266.1> (PDF).
- 2015 Orzechowski, E.A., R. Lockwood, J.E.K. Byrnes, S.C. **Anderson**, S. Finnegan, Z.V. Finkel, P.G. Harnik, D.R. Lindberg, L.H. Liow, H.K. Lotze, C.R. McClain, J.L. McGuire, A. O’Dea, J.M. Pandolfi, C. Simpson, D.P. Tittensor. Marine extinction risk shaped by trait-environment interactions over 500 million years. *Global Change Biology*. 21(10): 3595–3607. <http://doi.org/10.1111/gcb.12963> (PDF).
- 2015 Finnegan, S*, S.C. **Anderson***, P.G. Harnik*, C. Simpson, D.P. Tittensor, J.E. Byrnes, Z.V. Finkel, D.R. Lindberg, L.H. Liow, R. Lockwood, H.K. Lotze, C.R. McClain, J.L. McGuire, A. O’Dea, J.M. Pandolfi. Paleontological baselines for evaluating extinction risk in the modern oceans. *Science*. 348(6234): 567–570. <http://doi.org/10.1126/science.aaa6635> (*Authors contributed equally).
- 2015 Hurtado-Ferro, F., C.S. Szuwalski, J.L. Valero, S.C. **Anderson**, C.J. Cunningham, K.F. Johnson, R.R. Licandeo, C.R. McGilliard, C.C. Monnahan, M.L. Muradian, K. Ono, K.A. Vert-Pre, A.R. Whitten, A.E. Punt. Looking in the rear-view mirror: bias and retrospective patterns in integrated, age-structured stock assessment models. *ICES Journal of Marine Sciences*. 72(1): 99–110. <http://doi.org/10.1093/icesjms/fsu198> (PDF).
- 2015 Johnson, K.F., C.C. Monnahan, C.R. McGilliard, K.A. Vert-pre, S.C. **Anderson**, C.J. Cunningham, F. Hurtado-Ferro, R.R. Licandeo, M.L. Muradian, K. Ono, C.S. Szuwalski, J.L. Valero, A.R. Whitten, A.E. Punt. Time-varying natural mortality in fisheries stock assessment models: identifying a default approach. *ICES Journal of Marine Science*. 72(1): 137–150. <http://doi.org/10.1093/icesjms/fsuo55> (PDF).
- 2015 Ono, K., R. Licandeo, M.L. Muradian, C.J. Cunningham, S.C. **Anderson**, F. Hurtado-Ferro, K.F. Johnson, C.R. McGilliard, C.C. Monnahan, C.S. Szuwalski, J.L. Valero, K.A. Vert-Pre, A.R. Whitten, A.E. Punt. The importance of length and age composition data in statistical age-structured models for marine species. *ICES Journal of Marine Science*. 72(1): 31–43. <http://doi.org/10.1093/icesjms/fsuo07> (PDF).
- 2014 Farmer, R.G., M.L. Leonard, J.E. Mills Flemming, S.C. **Anderson**. Observer aging and long-term avian survey data quality. *Ecology and Evolution*. 4(12): 2563–2576. <http://doi.org/10.1002/ece3.1101> (PDF). [National Geographic news story](#).
- 2014 **Anderson**, S.C., C.C. Monnahan, K.F. Johnson, K. Ono, J.L. Valero. ss3sim: An R package for fisheries stock assessment simulation with Stock Synthesis. *PLOS ONE*. 9(4): e92725. <http://doi.org/10.1371/journal.pone.0092725> (PDF). (R package, code, vignette).
- 2014 O’Regan, S.M., W.J. Palen, S.C. **Anderson**. Climate warming mediates negative impacts of rapid pond drying for three amphibian species. *Ecology*. 95(4): 845–855. <http://doi.org/10.1890/13-0916.1> (PDF).
- 2013 Favaro, B., D.C. Braun, **Earth2Ocean Research Derby**. Research Derby: A pressure cooker for creative collaborative science. *Ideas in Ecology and Evolution*. *Ideas in Ecology and Evolution*. 6: 40–46. <http://doi.org/10.4033/iee.2013.6.9.n> (PDF).
- 2013 **Anderson**, S.C., A.B. Cooper, N.K. Dulvy. Ecological prophets: Quantifying metapopulation portfolio

- effects. *Methods in Ecology and Evolution*. 4(10): 971–981. <http://doi.org/10.1111/2041-210X.12093> (PDF, [GitHub R package](#)).
- 2013 Artelle, K.A., S.C. **Anderson**, A.B. Cooper, P.C. Paquet, J.D. Reynolds, C.T. Darimont. Confronting uncertainty in wildlife management: performance of grizzly bear management. *PLOS ONE*. 8(11): e78041. <http://doi.org/10.1371/journal.pone.0078041> (PDF).
- 2013 Phillis*, C.C., S.M. O'Regan*, S.J. Green*, J.E. Bruce*, S.C. **Anderson**, J.N. Linton, Earth2Ocean Research Derby, B. Favaro. Multiple pathways to conservation success. *Conservation Letters*. 6(2): 98–106. <http://doi.org/10.1111/j.1755-263X.2012.00294.x> (PDF, [GitHub repository](#)). (*Authors contributed equally, listed in reverse alphabetical order).
- 2012 Harnik, P.G., H.K. Lotze, S.C. **Anderson**, Z.V. Finkel, S. Finnegan, D.R. Lindberg, L.H. Liow, R. Lockwood, C.R. McClain, J.L. McGuire, A. O'Dea, J.M. Pandolfi, C. Simpson, D.P. Tittensor. Extinctions in ancient and modern seas. *Trends in Ecology and Evolution*. 27(11): 608–617. <http://doi.org/10.1016/j.tree.2012.07.010> (PDF).
- 2012 **Anderson**, S.C., T.A. Branch, D. Ricard, H.K. Lotze. Assessing global marine fishery status with a revised dynamic catch-based method and stock-assessment reference points. *ICES Journal of Marine Science*. 69(8): 1491–1500. <http://doi.org/10.1093/icesjms/fss105> (PDF).
- 2011 **Anderson**, S.C., R.G. Farmer, F. Ferretti, A.L.S. Houde, J.A. Hutchings. Correlates of vertebrate extinction risk in Canada. *BioScience*. 61(7): 538–549. <http://doi.org/10.1525/bio.2011.61.7.8> (PDF).
- 2011 **Anderson**, S.C., J.E. Mills Flemming, R. Watson, H.K. Lotze. Serial exploitation of global sea cucumber fisheries. *Fish and Fisheries*. 12(3): 317–339. <http://doi.org/10.1111/j.1467-2979.2010.00397.x> (PDF). [Featured in Science](#).
- 2011 Boudreau, S.A., S.C. **Anderson**, B. Worm. Top-down interactions and temperature control of snow crab abundance in the northwest Atlantic Ocean. *Marine Ecology Progress Series*. 429: 169–183. <http://doi.org/10.3354/meps09081> (PDF).
- 2011 **Anderson**, S.C., J.E. Mills Flemming, R. Watson, H.K. Lotze. Rapid global expansion of invertebrate fisheries: trends, drivers, and ecosystem effects. *PLOS ONE*. 6(3): e14735. <http://doi.org/10.1371/journal.pone.0014735> (PDF).
- 2008 **Anderson**, S.C., H.K. Lotze, N.L. Shackell. Evaluating the knowledge base for expanding low-trophic-level fisheries in Atlantic Canada. *Canadian Journal of Fisheries and Aquatic Sciences*. 65(12): 2553–2571. <http://doi.org/10.1139/Fo8-156> (PDF). Eighth most-read CJFAS article in 2008.

Awards and scholarships

- 2017 Canadian Society for Ecology and Evolution (CSEE) Early Career Award ([URL](#))
- 2015 David H. Smith Conservation Postdoctoral Research Fellowship ([URL](#))
- 2015 Simon Fraser University Dean of Graduate Studies Convocation Medal ([URL](#))
- 2014 Garfield Weston Foundation / BC Packers Ltd. Graduate Fellowship in Marine Sciences
- 2014 Graduate Fellowship (two semesters), Simon Fraser University
- 2012–13 Canadian Fulbright Scholar award to the University of Washington
- 2011 Canadian [Governor General's Academic Gold Medal](#) for the top-ranked Master's Natural Sciences and Engineering thesis at Dalhousie University in 2010
- 2011–14 Provost Prize of Distinction, Simon Fraser University
- 2011–14 Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship (Doctoral)
- 2007–10 Faculty Research Grant Scholarship, Dalhousie University
- 2007–09 Graduate Studies Scholarship, Dalhousie University
- 2007 Environmental Programmes Honour Society Medal, Dalhousie University

Software

- 2017 rrfields: Robust random fields for spatiotemporal modelling. <https://github.com/seananderson/rrfields>
- 2017 datalimited: Stock assessment methods for data-limited fisheries. <https://github.com/datalimited/datalimited>
- 2014 **Anderson, S.C.**, J.W. Moore, M.M McClure, N.K. Dulvy, A.B. Cooper.
metafolio: Metapopulation simulations for conserving salmon through portfolio optimization. <http://cran.r-project.org/package=metafolio>
- 2013 **Anderson, S.C.**, C.C. Monnahan, K.F. Johnson, K. Ono, J.L. Valero, C.J Cunningham, F. Hurtado-Ferro, R. Licandeo, C.R. McGilliard, C.S. Szuwalski, K.A. Vert-pre, A.R. Whitten. ss3sim: Fisheries stock assessment simulation testing with Stock Synthesis. <http://cran.r-project.org/package=ss3sim>
- 2013 **Anderson, S.C.**, A.B. Cooper, N.K. Dulvy. ecofolio: Tools to quantify metapopulation portfolio effects. <https://github.com/seananderson/ecofolio>

Invited talks and conference presentations

- 2017 **Anderson, S.C.** Data-driven approaches to quantifying population status and extremes. Early Career Award keynote lecture at the Canadian Society for Ecology and Evolution (CSEE), Victoria, BC, Canada.
- 2016 **Anderson, S.C.**, T.A. Branch, A.B. Cooper, N.K. Dulvy. Black-swan events in animal populations. North America Congress for Conservation Biology, Madison, WI, United States.
- 2016 **Anderson, S.C.**, A.B. Cooper, O.P. Jensen, C. Minto, J.T. Thorson, J.C. Walsh, M. Dickey-Collas, K.M. Kleisner, C. Longo, G.C. Osio, D. Ovando, I. Mosqueira, A.A. Rosenberg, E.R. Selig. Improving estimates of population status and trend with superensemble models. World Fisheries Conference, Busan, South Korea. (Presented *in absentia* by J.T. Thorson.)
- 2015 **Anderson, S.C.**, A.B. Cooper, O.P. Jensen, C. Minto, J.T. Thorson, J.C. Walsh, M. Dickey-Collas, K.M. Kleisner, C. Longo, G.C. Osio, D. Ovando, I. Mosqueira, A.A. Rosenberg, E.R. Selig. Improving estimates of population status and trend with superensemble models. American Fisheries Society Annual Meeting, Portland, OR, United States.
- 2013 **Anderson, S.C.**, A.B. Cooper, N.K. Dulvy. False prophets: The challenges of quantifying ecological portfolios ([slides](#)), Quantitative Seminar, School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA, United States.
- 2012 **Anderson, S.C.**, A.B. Cooper, N.K. Dulvy. False prophets: The ecological portfolio effect overestimates the benefit of diversity. Branch Lab, School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA, United States.
- 2012 **Anderson, S.C.**, A.B. Cooper, N.K. Dulvy. Metapopulation dynamics and the generality of the ecological portfolio effect. Les Ecologistes Departmental Seminar, Simon Fraser University, Burnaby, BC, Canada.
- 2010 **Anderson, S.C.** The rise of invertebrates, the fall of sea cucumbers, and the risk of maturing late. Earth2Ocean Research Group, Simon Fraser University, Burnaby, BC, Canada.
- 2009 **Anderson, S.C.**, J.E. Mills Flemming, R. Watson, H.K. Lotze. Ecosystem impacts of the global expansion of invertebrate fisheries. International Oceans Past II Conference *Multidisciplinary Perspectives on the History and Future of Marine Animal Populations*. Vancouver, BC, Canada.
- 2009 **Anderson, S.C.**, J.E. Mills Flemming, R. Watson, H.K. Lotze. Global invertebrate fisheries: trends and consequences. NCEAS (National Center for Ecological Analysis and Synthesis) Working Group *Finding Common Ground in Marine Conservation and Management*. Santa Barbara, CA, USA.
- 2009 **Anderson, S.C.**, H.K. Lotze, N.L. Shackell. Evaluating the knowledge base for expanding low-trophic level fisheries in Atlantic Canada. Harvest Fisheries Seminar Series. Bedford Institute of Oceanography, Fisheries and Oceans, Dartmouth, NS, Canada.
- 2008 **Anderson, S.C.**, H.K. Lotze, N.L. Shackell. Evaluating the knowledge base for expanding low-trophic level fisheries in Atlantic Canada. Departmental Seminar, Biology Department, Dalhousie University, Canada.

Teaching

- 2017 Half-day workshop on generalized linear modeling in R for the David H. Smith Conservation Postdoctoral Research Fellows. <https://github.com/seananderson/glmm-course>
- 2017 One-day workshop on linear mixed-effects modeling in R for the David H. Smith Conservation Postdoctoral Research Fellows. <https://github.com/seananderson/glmm-course>
- 2016 Two two-day (14 hour) workshops on advanced generalized linear mixed-effects modeling in R for the Simon Fraser University Library Research Commons. <https://github.com/seananderson/glmm-course>
- 2014–16 Developed self-directed lecture and exercises on ggplot2 for FISH 554: Beautiful graphics in R, School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA, United States. <http://seananderson.ca/ggplot2-FISH554/>
- 2013–14 Organizer of Stats Beerz — a statistical help group attended by graduate students and postdocs primarily in the Earth to Oceans research group, but also the wider SFU Biology and Geography Departments, and the School of Resource and Environmental Management (REM).
- 2013 Two-part workshop on data manipulation for Stats Beerz and Earth to Oceans groups at Simon Fraser University with approximately 25 participants. An introduction to plyr, advanced concepts with plyr and function debugging, and an introduction to dplyr. <https://github.com/seananderson/plyr-statsbeerz>
- 2013 Instructor for BISC-888-1: Data Wrangling and Visualization in R, a graduate-level course at Simon Fraser University, Burnaby, BC, Canada with approximately 20 participants. Co-developed curriculum and developed/delivered lectures, exercises, notes, and assignments for three of six two-hour classes. <https://github.com/seananderson/datawranglR> (see classes o3, o4, o5)
- 2012 Introduction to ggplot2. ([notes](#), [slides](#)) Lecture for FISH 507H: Beautiful Graphics in R, School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA, United States
- 2012 Workshop on the R package plyr. ([notes](#), [slides](#), [examples](#)) Branch Lab, School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA, United States
- 2011 Multipanel plotting in R with base graphics. ([notes](#), [slides](#)). Earth2Ocean Research Group, Simon Fraser University, Burnaby, BC, Canada.
- 2011 A brief introduction to R. ([notes](#), [workshop code](#)). Earth2Ocean Research Group, Simon Fraser University, Burnaby, BC, Canada.
- 2011 Workshop on the R package plyr ([notes](#), [slides](#)). Earth2Ocean Research Group, Simon Fraser University, Burnaby, BC, Canada.
- 2007–08 Teaching Assistant, Organismal Biology and Ecology, Dalhousie University, two semesters (BIOL 1021).
- 2007–08 Teaching Assistant, Marine Mammology, Dalhousie University (BIOL 4060).

Contract employment

- 2014–15 Data analysis in R and C++ for Ecoscape Environmental Consultants Ltd.
- 2013 Co-developed global fisheries status maps for the [RAM Legacy Stock Assessment Database](#) for R. Hilborn
- 2010 Assessment of Arctic surfclam on Banquereau Bank using industry-collected data for Clearwater Seafoods, Bedford, NS, Canada.
- 2010 Modelling length-frequency distribution changes of Atlantic halibut for NAFO Divisions 4VWX5Z and 3NOP for Dr. K. Trzcinski, Population Ecology Division, Bedford Institute of Oceanography, Fisheries and Oceans, Dartmouth, NS, Canada.

Working groups and workshops

- 2015–16 NCEAS (National Center for Ecological Analysis and Synthesis, Santa Barbara, CA) *Applying portfolio effects to the Gulf of Alaska ecosystem: Did multi-scale diversity buffer against the Exxon Valdez oil spill?*

- ([URL](#))
- 2015-16 Gordon and Betty Moore Foundation funded working group *Applying data-limited stock status models and developing management guidance for unassessed fish stocks*.
 - 2011-13 NESCent (National Evolutionary Synthesis Center, Durham, NC) Working Group *Determinants of Extinction in Ancient and Modern Seas* led by Paul Harnik, Seth Finnegan, and Rowan Lockwood. ([URL](#))
 - 2010 Atlantic Halibut Assessment Science Peer Review Meeting, Fisheries and Oceans, Dartmouth, NS, Canada.
 - 2007-09 NCEAS (National Center for Ecological Analysis and Synthesis, Santa Barbara, CA) Distributed Graduate Seminar, in association with the Working Group *Finding Common Ground in Marine Conservation and Management* led by Ray Hilborn and Boris Worm. ([URL](#))
 - 2008 Workshop on Canadian Science and Management Strategies for Sea Cucumber (*Cucumaria frondosa*), Fisheries and Oceans, Dartmouth, NS, Canada (work presented *in absentia*).
 - 2007 Workshop on Canadian Science and Management Strategies for Atlantic Hagfish, Fisheries and Oceans, Dartmouth, NS, Canada. ([URL](#))

Selected courses and training

- Present Proficient in statistical analyses and data management using R, Stan, JAGS, Sweave, knitr, Shiny, LaTeX, Git, TMB, SQL. Familiar with ADMB.
- 2016 Diversity in Conservation Biology, facilitated by Yolanda L. Comedy, Director of the American Association for the Advancement of Science (AAAS) Center for Advancing Science & Engineering Capacity
- 2015-16 Powerful Presentation Skills and Media Training with Teresa Erickson and Tim Ward of Intermedia Communications, authors of *The Master Communicator's Handbook*
- 2013 Quantitative Modelling in Ecosystem Based Management. R. Hilborn, School of Aquatic and Fishery Sciences, University of Washington (audited).
- 2013 Applied Time Series Analysis. E. Holmes, M. Scheuerell, and E. Ward; School of Aquatic and Fishery Sciences, University of Washington (audited).
- 2012 Numerical Computing for the Natural Resources. A.E. Punt, School of Aquatic and Fishery Sciences, University of Washington (audited).
- 2012 Risk Assessment and Decision Analysis for Management of Natural Resources. R.M. Peterman, School of Resource and Environmental Management, Simon Fraser University.
- 2011 Presenting Data and Information. Edward Tufte, Seattle, WA, United States.

Reviews

Reviewer for Science, Ecology, Ecological Applications, Conservation Biology, Fish and Fisheries, Marine Policy, Population Ecology, Journal of Applied Ecology, International Journal of Tropical Biology and Conservation, Journal of Environmental Management, Endangered Species Research, Aquatic Conservation