
CURRICULUM VITAE
COLE C. MONNAHAN

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EDUCATION

University of Washington, Ph.D., Quantitative Ecology and Resource Management Advancing Bayesian methods for fisheries stock assessment	Seattle, WA 2013–2016
University of Washington, M.S., Quantitative Ecology and Resource Management Population trends of the eastern North Pacific blue whale	Seattle, WA 2011–2013
Western Washington University, B.S., Mathematics & B.A, German Language	Bellingham, WA 2001–2006

EMPLOYMENT

School of Aquatic and Fishery Sciences, University of Washington <i>Research Scientist</i>	Seattle, WA 2017–present
Department of Oceanography, University of Concepción <i>Research Scientist</i>	Concepción, Chile 2017–2018
Quantitative Ecology and Resource Management, University of Washington <i>Research Assistant</i>	Seattle, WA 2010–2017
U.S. Department of Agriculture <i>Agricultural Statistician</i>	Bothell, WA 2006–2010

CORE RESEARCH INTERESTS

Marine resource management, quantitative fisheries science, Bayesian statistics, population dynamics, spatial statistics, computer programming

PEER-REVIEWED PUBLICATIONS

Summary: 319 citations | h-index 10 | [Google Scholar](#)

Published and in press

15. **Monnahan, C. C.**, Branch, T. A., Thorson, J. T., Stewart, I. J., and Szuwalski, C. S. 2019. Overcoming long Bayesian run times in integrated fisheries stock assessments. *ICES Journal of Marine Science*. 10.1093/icesjms/fsz059. **Methods for speeding Bayesian stock assessment convergence by a factor of 50-500.**
14. **Monnahan, C. C.**, Acevedo, J., Noble Hendrix, A., Gende, S., Aguayo-Lobo, A., and Martinez, F. 2019. Population trends for humpback whales (*Megaptera novaeangliae*) foraging in the Francisco Coloane Coastal-Marine Protected Area, Magellan Strait, Chile. *Marine Mammal Science*, doi:10.1111/mms.12582.
13. **Monnahan, C. C.** and K. Kristensen. 2018. No-U-turn sampling for fast Bayesian inference in ADMB and TMB: Introducing the adnuts and tmbstan R packages. *PLOS One* 13:e0197954.
12. **Monnahan, C. C.** and I. J. Stewart. 2018. The effect of hook spacing on longline catch rates: Implications for catch rate standardization. *Fisheries Research* 198:150-158.
11. **Monnahan, C. C.**, J. T. Thorson, and T. A. Branch. 2017. Faster estimation of Bayesian models in ecology using Hamiltonian Monte Carlo. *Methods in Ecology and Evolution* 8:339-348. **38 citations.**
10. Stewart, I. J. and C. C. **Monnahan**. 2017. Implications of process error in selectivity for approaches to weighting compositional data in fisheries stock assessments. *Fisheries Research* 192:126-134.

PUBLICATIONS (CONT'D)

Published and in press (cont'd):

9. 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, and J. L. Valero. 2016. 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.
8. **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, and J. L. Valero. 2016. The effect of length bin width on growth estimation in integrated age-structured stock assessments. *Fisheries Research* 180:103-112.
7. **Monnahan**, C. C., T. A. Branch, and A. E. Punt. 2015. Do ship strikes threaten the recovery of endangered eastern North Pacific blue whales? *Marine Mammal Science* 31:279-297.
6. Thorson, J. T., C. C. **Monnahan**, and J. M. Cope. 2015. The potential impact of time-variation in vital rates on fisheries management targets for marine fishes. *Fisheries Research* 169:8-17.
5. Anderson, S. C., C. C. **Monnahan**, K. F. Johnson, K. Ono, and J. L. Valero. 2014. ss3sim: an R package for fisheries Stock Assessment simulation with stock synthesis. *PLOS One* 9:e92725.
4. Hurtado-Ferro, F., C. S. Szuwalski, J. L. Valero, S. C. Anderson, C. J. Cunningham, K. F. Johnson, R. Licandeo, C. R. McGilliard, C. C. **Monnahan**, M. L. Muradian, K. Ono, K. A. Vert-Pre, A. R. Whitten, and A. E. Punt. 2014. Looking in the rear-view mirror: bias and retrospective patterns in integrated, age-structured stock assessment models. *ICES Journal of Marine Science* 72:99-110.
3. 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, and A. E. Punt. 2014. Time-varying natural mortality in fisheries stock assessment models: identifying a default approach. *ICES Journal of Marine Science* 72:137-150.
2. **Monnahan**, C. C., T. A. Branch, K. M. Stafford, Y. V. Ivashchenko, and E. M. Oleson. 2014. Estimating historical eastern North Pacific blue whale catches using spatial calling patterns. *PLOS One* 9:e98974.
1. 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, and A. E. Punt. 2014. The importance of length and age composition data in statistical age-structured models for marine species. *ICES Journal of Marine Science* 72:31-43.

Technical Reports (n=7):

- Branch, T. A., **Monnahan**, C. C., and Sirovic, A. 2018. Separating pygmy blue whale catches by population. Scientific Committee of the International Whaling Commission, SC/67b/SH/23.
- Branch, T. A., D. M. Palacios, and C. C. **Monnahan**. 2016. Overview of the North Pacific blue whale distribution, and the need for an assessment of the western and central Pacific. Scientific Committee of the International Whaling Commission. SC/66b/IA/15.
- Stewart, I. J. and C. C. **Monnahan**. 2016. Overview of data sources for the Pacific halibut stock assessment and related analyses. IPHC Report of Assessment and Research Activities. http://www.iphc.int/publications/rara/2015/RARA2015_11Assessmenddatasources.pdf.
- Stewart, I. J., C. C. **Monnahan**, and S. Martell. 2016. Assessment of the Pacific halibut stock at the end of 2015. IPHC Report of Assessment and Research Activities. http://www.iphc.int/publications/rara/2015/RARA2015_12Assessment.pdf.
- Monnahan**, C. C. and T. A. Branch. 2015. Sensitivity analyses for the eastern North Pacific blue whale assessment. Scientific Committee of the International Whaling Commission. SC/66a/IA/15.
- Monnahan**, C. C., M. L. Muradian, and P. T. Kuriyama. 2014. A guide for Bayesian analysis in AD Model Builder. <http://www.admb-project.org/developers/mcmc/mcmc-guide-for-admb.pdf>.
- Monnahan**, C. C. and I. J. Stewart. 2014. Evaluation of commercial logbook records: 1991-2013. IPHC Report of Assessment and Research Activities. http://www.iphc.int/publications/rara/2014/rara2014_14commlog_revision.pdf.

QUANTITATIVE SKILLS

Software: Proficient in R, ADMB, TMB, Stock Synthesis, VAST, ss3sim, Stan, JAGS, and git

Statistical modeling: Experience with non-linear, GLM, GAM, mixed effects, and spatiotemporal models in frequentist and Bayesian paradigms

Fisheries modeling: Coauthor on Pacific halibut assessment; integrated stock assessment with Stock Synthesis, CPUE standardization; simulation testing

R package development: adnuts (creator), ss3sim (developer), r4ss (contributor)

ADMB and TMB development: Created code for new Bayesian algorithms and added these to the source code to speed up Bayesian convergence of models, including 50-50000 fold faster convergence for Stock Synthesis models; created user manuals documenting new and existing Bayesian features

TEACHING

Instruction

- 2019 **Modelos Bayesianos con aplicaciones ecológicas.** [*Bayesian models with ecological applications*]. Week-long summer workshop at the University of Concepción, Chile (taught in Spanish)
- 2018 **Fitting hierarchical models in Template Model Builder.** Week-long summer workshop at the University of Concepción, Chile (taught in English and Spanish)
- 2016 Lead instructor for **Introduction to R programming for natural scientists.** FISH 552, University of Washington
- 2016 Lead instructor for **Advanced R programming for natural scientists.** FISH 553, University of Washington
- 2014 Co-created and co-taught **Super-advanced R programming.** FISH 512, University of Washington

Guest Instruction Lectures

- 2016 Non-linear function minimization. Modeling and Estimation in Conservation and Resource Management (FISH 458), University of Washington
- 2015 Mixed effects models. Data Analysis and Modeling in R (Prof. & Continuing Ed.), University of Washington
- 2014 Non-parametric, additive, and generalized additive models. Analysis of Ecological and Environmental Data (QERM 514), University of Washington
- 2014 Object-oriented programming in R: S3, S4 and reference classes. Super-Advanced R Programming (FISH 512), University of Washington
- 2012 Generalized additive models in R. Analysis of Ecological and Environmental Data (QERM 514), University of Washington

SCIENTIFIC PRESENTATIONS

- 2019 School of Aquatic and Fishery Sciences Think Tank Seminar Series, Seattle, WA. Seminar: *Overcoming long Bayesian run times in integrated fisheries stock assessments.*
- 2017 International Pacific Halibut Commission, Seattle, WA. Seminar: *Revisiting the effect of hook spacing on halibut catch rates and the implications of catch per unit effort (CPUE) standardization in the central Gulf of Alaska.*
- 2017 School of Aquatic and Fishery Sciences Fisheries Think Tank Series, Seattle, WA. Seminar: *Introducing the no-U-turn MCMC sampler in ADMB and TMB: faster run times for large, complex fisheries models.*
- 2015 School of Aquatic and Fishery Sciences Quantitative Seminar Series, Seattle, WA. Seminar: *Advantages of gradient-based MCMC algorithms for difficult-to-fit Bayesian models in fisheries and ecology.*
- 2015 Center for the Advancement of Population Assessment Methodology, La Jolla, CA. Workshop on data conflict and weighting, likelihood functions, and process error. *Hands-on workshop for ss3sim.*
- 2015 Scientific Committee of the International Whaling Commission. San Diego, CA. Invited participant: *Sensitivity analyses for the eastern North Pacific blue whale assessment.*
- 2014 Center for the Advancement of Population Assessment Methodology, La Jolla, CA. Workshop on growth: theory, estimation, and application in fishery stock assessment models. *An evaluation of alternative binning approaches for composition data in integrated stock assessments.*
- 2014 Marine Mammal Laboratory, Alaska Fishery Science Center, NOAA. Seattle, WA. Invited speaker: *Do ship strikes threaten the recovery of endangered eastern North Pacific blue whales?*
- 2013 School of Aquatic and Fishery Sciences Fisheries Think Tank Series, Seattle, WA. Seminar: *ss3sim: An R package for stock assessment simulation with SS3.*
- 2013 Northwest Fishery Science Center, NOAA, Seattle, WA. Stock synthesis development workshop: *ss3sim: An R package for stock assessment simulation with SS3.*
- 2013 Northwest Student Chapter of the Society for Marine Mammalogy, Seattle, WA. *Population trends of the eastern North Pacific blue whale.*

- 2013 School of Aquatic and Fishery Sciences Fisheries Think Tank Series, Seattle, WA. Seminar: *Next-generation MCMC: theory, options, and practice for Bayesian inference in ADMB*.
- 2012 School of Aquatic and Fishery Sciences Quantitative Seminar Series, Seattle, WA. Seminar: *Splitting historical blue whale catches using spatial GAMs*.
- 2012 Northwest Student Chapter of the Society for Marine Mammalogy, British Columbia, Canada. *Utilizing historical data to infer cetacean biology*.
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SCHOLARSHIPS AND AWARDS

National Marine Fisheries Service/Washington Sea Grant Fellowship in Population dynamics: *Optimizing Bayesian analysis in data-rich stock assessments and management resources in data-limited fisheries* (2013)

SERVICE

Reviewed the *Draft Revised Recovery Plan for the Blue Whale* for the National Marine Fisheries Service (NOAA), 2018.

Started and led reading group on Bayesian statistics for graduate students in Biology and Oceanography (in Spanish), at the University of Concepcion, Chile, 2017.

English tutoring and thesis advice for Chilean graduate students, 2017-18.

PEER REVIEWS (N=19)

Behavioral Ecology and Sociobiology ($n=1$) | Diversity and Distributions (1) | Endangered Species Research (1) | Fisheries Research (6) | Journal of Experimental Marine Biology and Ecology (1) | Marine Ecology Progress Series (1) | Methods in Ecology and Evolution (2) | Natural Resource Monitoring (1) | North American Journal of Fisheries Management (1) | PeerJ (1) | PLOS One (1) | Proceedings of the Royal Irish Academy (1) | Theoretical Population Biology (1)