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James R. Watson

Education and Academic Positions

from 2017 **College of Earth, Ocean and Atmospheric Sciences, Oregon State University**, *USA*, Assistant Professor.

2014–2017 **Stockholm Resilience Centre, Stockholm University**, *Sweden.*
Research Scientist
and Princeton University, *USA*.
Department of Ecology and Evolutionary Biology: Visiting Research Scholar

2011–2013 **Princeton University**, *USA*.
Department of Ecology and Evolutionary Biology; Atmospheric and Ocean Sciences Program: Post-doctoral Research Scholar
Mentors: Jorge Sarmiento, Charles Stock, Simon Levin

2006–2011 **University of California Santa Barbara**, *USA*.
Ph.D., Marine Sciences

2003–2004 **National Oceanography Center, Southampton**, *UK*.
M.Sc., Oceanography (1st class Honors)
Advisor: Debora. M. Iglesias-Rodriguez

1998–2001 **University of Bristol**, *UK*.
B.Sc., Biochemistry and Molecular Genetics

Awards and Funding

2017-2019 **Principal Investigator**, *Comparing Micro-Macro Dynamics and Control Across Social-like Systems Using Equation Free Modeling*, Defense Advanced Research Projects Agency (DARPA) Young Faculty Award ($500,000).

2016 **Principal Investigator**, *SCOOP - Scaling-up Cooperation through Insurance web application*, Stockholm University Innovations Program ($13,000).

2014–2017 **Principal Investigator**, *Social-Environmental Research Network (SEReNe)*, Stockholm University, Princeton University, University of Oslo, Ca'Foscari University of Venice ($150,000).

2012–2017 **Lead Investigator***, *NSF: Dynamics of Coupled Natural-Human Systems*, Social-Ecological Adaptation and Complexity in Marine Systems, Princeton University ($1,500,000).
*I was the principal author of the proposal, and led the group, but at the time of funding I was too junior to be given a Principal Investigator title.

2011-2013 **Nippon Foundation Post-doctoral Fellowship**, *The Nereus Program in Climate and Fisheries Modeling*, Princeton University ($180,000).

2008-2011 **NASA PhD Fellowship**, *Integrating Satellite Observations into Fisheries Science: Quantifying abiotic and in-flight biotic larval from ocean color*, University of California, Santa Barbara ($200,000).

2007-2009 **Luce Environmental Science to Solutions Fellowship**, *University of California, Santa Barbara*, $6000.

2007 **Best use of Technology in Fisheries Science**, *American Fisheries Society*.

Publications

In review Villarino E., **Watson JR** et al. *Large-scale ocean connectivity and planktonic body size*. Nature Communications.

- **Watson JR**, Fuller EF, Castruccio F, Samhouri J. *Fishermen Follow Fine-scale Physical Ocean Features for Finance*. ICES Journal of Marine Science.
- Kininmonth S, Blenckner T, Niiranen S, **Watson JR**, Orio A, Casini M, Neuenfeldt S, Bartolino V, Hansson M. *Is biotope information the missing link in coastal fisheries management?* Fish and Fisheries.
- Burgess MG, Drexler M, Axtell RL, Bailey RM, **Watson JR**, et al. *The role of agent-based modeling in systems-based fishery management*. Fish and Fisheries.
- McManus LC, **Watson JR**, Vasconcelos VV, & Levin SA. *Nonlinear Dynamics of Coral-Algae Systems and Their Recruitment Dependent Resilience*. Theoretical Ecology.
- Siegel DA, **Watson JR**, Simons RD, Mitarai S & McWilliams JC. *Characterizing Particle Transit Time Metrics in a Coastal Ocean Network*. Journal of Geophysical Research.
- Thompson D, Kleypas J, Castruccio F, Curchitser E, Pinsky ML, Jonsson B, **Watson JR**. *Variability in physical barriers to coral larval dispersal: do currents shape biodiversity*? Progress in Oceanography.
- Tittensor DP, et al. (including **Watson JR**) *A protocol for the intercomparison of marine fishery and ecosystem models: FishMIP v1.0*. Geoscientific Model Development.

2017 Klinger D, Levin SA & **Watson JR**. *The Growth of Finfish Globally in Open Ocean Aquaculture under Climate Change*. Proc. Roy. Soc. B. Accepted

- Pena TS, **Watson JR**, Gonzalez-Guzman LI, Keitt TG. *Step-wise drops in modularity and the fragmentation of exploited marine metapopulations*. Landscape Ecology, DOI 10.1007/s10980-017-0532-9.
- Fuller EF, Samhouri J, Stoll J, Levin SA & **Watson JR**. Characterizing Fisheries Connectivity in Marine Social-Ecological Systems. ICES Journal of Marine Science. DOI:10.1093/icesjms/fsx128.
- Klein ES, Barbier M & **Watson JR**. *The Dual Impact of Ecology and Management on the Social Incentives in Marine Systems*. Proceedings of the Royal Society: Open Science. 4: 170740. http://dx.doi.org/10.1098/rsos.170740.

2014-2016 Jonnson B. & **Watson JR*** *The Timescales of Global Surface-Ocean Connectivity*. Nature Communications, 2016, 7, 1-6. *co-lead author.

- Tilman, AR & **Watson, JR** & Levin, SA. Maintaining cooperation in social-ecological systems: Effective bottom-up management often requires sub-optimal resource use. Theoretical Ecology, 2016, doi:10.1007/s12080-016-0318-8
- Barbier M and **Watson JR***. *The Spatial Dynamics of Predators and the Benefits and Costs of Information Sharing*, PLoS Computational Biology, 2016. *co-lead author.
- Kleypas JA, Thompson DM, Castruccio FS, Curchitser EN, Pinsky M, & **Watson JR**, *Larval connectivity across temperature gradients, and its potential effect on heat tolerance in coral populations.* Global Change Biology, DOI: 10.1111/gcb.13347
- Cheung WWL., et al., and **Watson JR**. *Building confidence in projections of the responses of living marine resources to climate change*. 2015. ICES Journal of Marine Science doi:10.1093/icesjms/fsv250.

– **Watson JR**, Stock C, Sarmiento J. *Exploring the role of movement in determining the global distribution of marine biomass using a coupled hydrodynamic – size-based ecosystem model*. Progress in Oceanography, 2014, 138, 521?532

2012-2013 Osterblöm H, Merrie A, Metian M, Boonstra W, Blenckner T, **Watson JR**, et al. *Modeling social-ecological scenarios in marine systems. BioScience, 2013, 63(9):735-744.*

– **Watson JR**, BE Kendall, DA Siegel, S Mitarai. *Changing seascapes, stochastic connectivity and marine metapopulation dynamics. The American Naturalist, 2012, 180 (1) 990-112. Noted by the Faculty 1000: http://f1000.com/717948573.*

2010-2011 Alberto F, Raimond P, Reed D, **Watson JR**, et al. *Isolation by oceanographic distance accounts for high proportion of genetic differentiation for Macrocystis pyrifera in the Santa Barbara Channel*. Molecular Ecology, 2011, 20(12), 2543-2554.

– **Watson JR**, Siegel D, Kendall B, Mitarai S, Rassweiller A, Gaines S. *Identifying critical regions in small-world marine metapopulations*. PNAS, 2011, 108(43) E907-E913.

– **Watson JR**, Hays C, Raimondi P, Siegel D, Mitarai S, Dong C, McWilliams J, Blanchette C. *Currents connecting communities: a study of nearshore marine species in the Southern California Bight*. Ecology, 2011, 92(6), 1193-1200.

– **Watson JR**, Mitarai S, Siegel D, Caselle J, Dong C, McWilliams J. *Realized and potential larval connectivity in the Southern California Bight*. Marine Ecology Progress Series, 2010, 401, 31-48.

– White C, Selkoe K, **Watson JR**, Siegel D, Zacherl D, Toonen R. *Ocean currents help explain population genetic structure*. Proc. R. Soc. B, 2010, 277, 1685-1694.

– Selkoe K, **Watson JR**, et al. *Taking the chaos out of genetic patchiness: revealing ecological and oceanographic drivers of seascape genetics in Southern California kelp forests*. Molecular Ecology, 2010, 19, 3708-3726.

2008-2009 Mitarai S, Siegel D, **Watson JR**, et al. *Quantifying connectivity in the coastal ocean with application to the Southern California Bight*. Journal of Geophysical Research, 2009, 114, C10026, doi:10.1029/2008JC005166.

Preprint **Watson JR**, B Favetta, C Stock. *On Modeling the Macroecology of Baleen Whale Migration*, in preprint here: http://biorxiv.org/content/early/2014/09/28/009753.

Selected Presentations

2017 *Managing the complexity and dynamics of marine social-ecological systems*, **Scripps Institution of Oceanography** Ecology Seminar (invited).

2016 *Cooperation in coupled natural-human systems: its emergence and importance*, **The Society for Mathematical Biology** annual meeting, part of the "Modelling socio-economic aspects of resource management" symposium (invited).

– *Complex Adaptive Marine Systems*, **Oregon State University**, College of Earth, Ocean and Atmospheric Sciences (invited).

– *Understanding the Complexity and Adaptive Nature of Marine Systems*, **University of California Santa Barbara**, Interdepartmental Marine Sciences Seminar (invited).

2015 *The Effect of Turbulence on the Spatial Dynamics of Fish Populations*, **The Radcliffe Institute for Advanced Study, Harvard University**, Life in a Turbulent Environment: How the dynamic ocean shapes the distribution, diversity and growth of microorganisms workshop (invited).

– *Complex Adaptive Marine Systems*, **Danish Technical University** Aqua (DTU) (invited).

– *Understanding the Emergence of Cooperation in Coupled Natural-Human Systems*, The Centennial **Ecological Society of America** meeting, keynote talk at the Coupled Natural and Human Systems Science: The Need, Challenges and Rewards symposium (invited).

– *The Timescales of Global Surface Ocean Connectivity*, **The American Society of Limnology and Oceanography** annual meeting.

2014 *Complex Adaptive Problems in Nature and Society*, **The Woodrow Wilson School of Public and International Affairs at Princeton University**, The David Bradford Seminars in Science, Technology and Environmental Policy (invited).

– *Complexity and Adaptation in Phytoplankton, Fish and Fishers*, **Stockholm University**, Department of Ecology, Environmental and Plant Sciences (invited).

2013 *Phytoplankton, Fish and Fishing; An analysis of the links between physics, ecology and human behavior in marine systems*, **Massachusetts Institute of Technology**, Department of Earth, Atmospheric and Planetary Sciences (invited).

– *Analyzing the links between physics, ecology and human behavior in marine systems: three examples*, **Rutgers University**, Institute of Marine and Coastal Science (invited).

– *Currents Connecting Communities*, **Rutgers University**, Haskin Shellfish Research Laboratory (invited).

2012 *Flow, Fish and Fishing; An analysis of the links between physics, ecology and human behavior in marine systems*, **McGill University**, Earth and Planetary Sciences (invited).

– *Earth System Modeling and Global Marine Food-security*, **American Fisheries Society**, St. Paul, Minnesota.

– *Changing Seascapes, Stochastic Connectivity and Marine Metapopulation Dynamics*, **Ecological Society of America**, Portland, Oregon.

– *Quantifying the distribution and dynamics of forage fish using a size-based ecosystem model*, **PICES annual meeting**, Yeosu, Korea.

– *Modeling the Spatial Dynamics of Baleen Whales and Forage Fish*, American Association for the Advancement of Science (**AAAS**), Vancouver, CA.

2008-2010 *Evidence for dispersal at the community level*, **Ocean Sciences Annual Meeting**, Portland, Oregon.

– *Currents connecting communities*, **Western Society of Naturalists**, Monterey, California.

– *Spatial connections amongst nearshore marine species*, The California Current Ecosystem Long Term Ecological Research site meeting (**LTER**), San Diego, California (invited).

– *Simulating the impact of El Niño on the gene flow of marine species in the Southern California Bight*, **Ocean Sciences Annual Meeting**, Orlando, Florida.

– *Simulating the dispersal of nearshore marine species larvae*, Department of Atmospheric and Oceanic Sciences, University of California Los Angeles (**UCLA**), Los Angeles, California (invited).

Teaching and Mentorship

Course organizer and principal teacher: Quantitative Methods for Social-Ecological Scientists. Graduate course run at the Stockholm Resilience Centre (Spring 2015, 2017).

– *Class organizer and principle teacher*: Communicating Complexity. Workshop Graduate students on science communication at the Stockholm Resilience Centre (Fall 2014).

- *Teaching assistant*, The Geography of the World's Oceans, Department of Geography, University of California Santa Barbara (2009).
- *English Teacher*, The Japan Exchange and Teaching (JET) program, Moritake, Akita, Japan (2001-2002).

Mentorship

Undergraduate: Alexander Ahn (Swarthmore Col.); Christina Healy, Bruna Favetta, Jennifer Zhao, Angela Zhou (all at Princeton Uni.)

- **Masters**: Roweena Patel, Laura Elsler (both Stockholm Uni.)
- **Ph.D.**: Steven Johnson (Oregon State University)
- **Post-doc**: Matthieu Barbier and Emily Klein (both Princeton Uni.); Susa Niiranen (Stockholm Uni.); Mat Titus and Zach Gelbaum (Oregon State Uni.)

Service

Editor

ICES Journal of Marine Science

Journal Reviewer

Ecology, Molecular Ecology, Limnology and Oceanography, Conservation Letters,
The American Naturalist, Ecology Letters, Journal of Theoretical Biology,
Marine Ecology Progress Series, Ecography, PloS ONE, The Royal Society Biology Letters.

Proposal Reviewer

The UK's Natural Environment Research Council,
The Natural Sciences and Engineering Research Council of Canada,
The EUR-OCEANS Consortium.

Conference session organization

The Centennial Ecological Society of America meeting, Coupled Natural and Human Systems Science: The Need, Challenges and Rewards, Baltimore, USA. Session organizer and chair (to be in August 2015).

- *The Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)* annual meeting, Approaches to predicting fish from physics: strengths, weaknesses and ways forward, Bergen, Norway. Session organizer and chair (2014).
- *American Fisheries Society* annual meeting, Climate and Fisheries: Responses of a Socio-Ecological System to Global Change, Minneapolis, Minnesota, USA. Session organizer and chair (2012)
- *Ecological Society of America's* annual meeting, Population Dynamics: Modeling, Portland, Oregon USA. Session chair (2012).
- *Ocean Sciences* annual meeting, Spatial Dynamics of Species Abundance and Interactions Across Trophic Levels, Portland, Oregon, USA. Session chair (2011).

Workshop participation

The Radcliffe Institute for Advanced Study, Harvard University, Life in a Turbulent Environment: How the dynamic ocean shapes the distribution, diversity and growth of microorganisms, Harvard, USA (invited; to be in Feb 2015).

- *The National Socio-Environmental Synthesis Center (SESYNC)*, Managing Recreational Fisheries as Complex Adaptive Socio-Ecological Systems, SESYNC, Maryland, USA (invited; 2014).
- *Kellogg Biological Station Summer Educational Program*, Enhancing Linkages between Mathematics and Ecology: Adaptive Dynamics, Kalamazoo, Michigan, USA (2012).
- *The Abdus Salam International Centre for Theoretical Physics*, Advanced school on complexity, adaptation and emergence in marine ecosystems, Trieste, Italy (2011)