

# Carl Boettiger

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## employment

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2015-current Assistant Professor, Department of Environmental Science, Policy and Management, **University of California, Berkeley**.

2013-2015 NSF Post-doctoral Scholar in the Department of Applied Mathematics and Statistics, **University of California, Santa Cruz**. Mentors: Marc Mangel, Stephan Munch

## education

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2012 Ph.D Population Biology, **University of California, Davis**. Mentor: Alan Hastings

2007 A.B in Physics, **Princeton University**, with honors and certificates in *biophysics* and *applied and computational mathematics*.

## publications

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24. Milad Memarzadeh, **Carl Boettiger** (2018). Adaptive management of ecological systems under partial observability. *Biological Conservation*. 224, 9-15. doi:10.1016/j.biocon.2018.05.009. (software)
23. **Carl Boettiger** (2018). From noise to knowledge: how randomness generates novel phenomena and reveals information. *Ecology Letters*. doi:10.1111/ele.13085 (oa, code, data)
22. **Carl Boettiger**, Dirk Eddelbuettel (2018). An Introduction to Rocker: Docker Containers for R. *The R Journal*. <https://journal.r-project.org/archive/2017/RJ-2017-065/index.html>.
21. **Carl Boettiger** (2017). Generating Codemeta Metadata for R Packages. *The Journal of Open Source Software* 2 (19), 454, doi:10.21105/joss.00454
20. Getz, Marshall, Carlson, Giuggioli, Ryan, Romañach, **Boettiger**, Chamberlain, Larsen, D'Odorico, O'Sullivan, D. (2017). Making ecological models adequate. *Ecology Letters*. doi:10.1111/ele.12893
19. Ben Marwick, **Carl Boettiger**, Lincoln Mullen (2017). Packaging data analytical work reproducibly using R (and friends). *The American Statistician*. doi:10.1080/00031305.2017.1375986. (oa)
18. Hampton, Jones, Wasser, Schuldhauser, Supp, Brun, Hernandez, **Boettiger**, Collins, Gross, Fernandez, Budden, White, Teal, Labou & Aukema. (2017) Skills and Knowledge for Data Intensive Research. *BioScience*. doi:10.1093/biosci/bix025. (oa)
17. T Alex Perkins, **Carl Boettiger**, Benjamin L. Philips. (2016) After the games are over: life-history trade-offs drive dispersal attenuation following range expansion. *Ecology and Evolution* 6 (18) 6425-6434. doi:10.1002/ece3.2314. (oa, code)
16. **Carl Boettiger**, Michael Bode, James N. Sanchirico, Jacob LaRiviere, Alan Hastings, and Paul Robert Armsworth. (2016) Optimal management of a stochastically varying population when policy adjustment is costly. *Ecological Applications* 26 (3) 808-817. doi:10.1890/15-0236. (oa, code)

15. **Carl Boettiger**, Scott Chamberlain, Rutger Vos and Hilmar Lapp. (2016) RNeXML: a package for reading and writing richly annotated phylogenetic, character, and trait data in R. *Methods in Ecology and Evolution*. doi:10.1111/2041-210X.12469. (oa, code, software)
14. **Carl Boettiger**, Scott Chamberlain, Edmund Hart, Karthik Ram. (2015) Building Software, Building Community: Lessons from the rOpenSci Project. *Journal of Open Research Software* 3: e8, doi:10.5334/jors.bu.
13. **Carl Boettiger**. (2015) An introduction to Docker for reproducible research. ACM SIGOPS Operating Systems Review, Special Issue on Repeatability and Sharing of Experimental Artifacts. 49(1), 71-79. doi:10.1145/2723872.2723882. (oa)
12. **Carl Boettiger**, Marc Mangel, Stephan Munch. (2015) Avoiding tipping points in fisheries management through Gaussian process dynamic programming. *Proceedings of the Royal Society B* 282(1801), 8–11. doi:10.1098/rspb.2014.1631. (oa, code, data)
11. **Carl Boettiger**, Alan Hastings. (2013) No early warning signals for stochastic transitions: insights from large deviation theory. *Proceedings of the Royal Society B*. doi:10.1098/rspb.2013.1372. (oa, code)
10. **Carl Boettiger\***, Noam Ross\*, Alan Hastings. (2013) Early warning signals: The charted and uncharted territories. *Theoretical Ecology* doi:10.1007/s12080-013-0192-6. (oa, code)
9. **Carl Boettiger**, Alan Hastings (2013). Tipping points: From patterns to predictions, *Nature* 493, 157–158. doi:10.1038/493157a.
8. **Carl Boettiger**, Alan Hastings (2012). Early Warning Signals and the Prosecutor's Fallacy, *Proceedings of the Royal Society B* 279 (1748) 4734-4739. doi:10.1098/rspb.2012.2085. (oa, code, data)
7. **Carl Boettiger**, Duncan Temple Lang, Peter Wainwright (2012). rfishbase: exploring, manipulating and visualizing FishBase data from R, *Journal of Fish Biology*. 81 (6) 2030–2039. doi:10.1111/j.1095-8649.2012.03464.x. (oa, code, software)
6. **Carl Boettiger**, Duncan Temple Lang (2012). Treebase: An R package for discovery, access and manipulation of online phylogenies, *Methods in Ecology and Evolution* 3 (6) 1060–1066. doi:10.1111/j.2041-210X.2012.00247x. (oa, code, software)
5. **Carl Boettiger** and Alan Hastings (2012). Quantifying Limits to Detection of Early Warning for Critical Transitions, *Journal of the Royal Society: Interface* 9 (75) 2527-2539. doi:10.1098/rsif.2012.0125. (oa, code)
4. Jeremy M. Beaulieu, Dwueng-Chwuan Jhwueng, **Carl Boettiger** and Brian O'Meara, (2012). Modeling Stabilizing Selection: Expanding the Ornstein-Uhlenbeck Model of Adaptive Evolution, *Evolution* 66 (8) 2369-2383. doi:10.1111/j.1558-5646.2012.01619.x (software)
3. **Carl Boettiger**, Graham Coop, Peter Ralph (2012) Is your phylogeny informative? Measuring the power of comparative methods, *Evolution* 66 (7) 2240-51. doi:10.1111/j.1558-5646.2011.01574.x, (oa, code, data)
2. **Carl Boettiger**, Jonathan Dushoff, Joshua S Weitz (2010) Fluctuation domains in adaptive evolution, *Theoretical Population Biology* 77 (1) 6-13. doi:10.1016/j.tpb.2009.10.003. (oa, code, data)
1. James J. Wray, Neta A. Bahcall, Paul Bode, **Carl Boettiger**, Phillip Hopkins. (2006) The Shape, Multiplicity, and Evolution of Superclusters in Lambda-CDM Cosmology, *The Astrophysical Journal* 652 (2) 907-916. doi:10.1086/50860. (oa)

## grants

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Berkeley Collegium Award for Excellence in Undergraduate Education. (2018-2019) 16,867.50 USD

Managing ecosystems under extreme uncertainty. (2016-03 - 2018-09) NSF XSEDE TG-DEB160003. NSF Estimated value *16,690 USD*

Reproducible and Collaborative Data Science. NSF XSEDE TG-DEB160021. NSF Estimated value *20,028 USD*

The rOpenSci Project (2015-2018, Co-PI). Helmsley Trust *2,900,000 USD*.

The Codemeta project (2015). National Science Foundation #ACI-1549758 *165,782 USD*. (proposal)

The rOpenSci Project, Phase II funding (2014, Co-PI). Alfred P. Sloan Foundation *300,000 USD*.

NSF Biology Post-doc (2013-2015). National Science Foundation #DBI-1306697, *138,000 USD*. (proposal)

The rOpenSci Project Phase I funding (2013, Co-PI). Alfred P. Sloan Foundation *180,000 USD*.

IIASA YSSP fellowship (2009). National Academy of Sciences, OISE-0738129, *8,000 USD*. (proposal)

Computational Science Graduate Fellowship (2008). Department of Energy, #DE-FG02-97ER25308, *149,000 USD*. (proposal)

## book chapters

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Carl Boettiger (2017). A Reproducible R Notebook Using Docker. In J. Kitzes, D. Turek, & F. Deniz (Eds.), *The Practice of Reproducible Research: Case Studies and Lessons from the Data-Intensive Sciences* (1st ed., pp. 109–117). Oakland, CA: UC Press. <https://www.ucpress.edu/book.php?isbn=9780520294752>

## invited talks & workshops

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### 2018

NSF SI2 PIs Meeting, Washington, DC  
rOpenSci unconference, Seattle, WA  
Faculty Learning Program Fellows Workshop Berkeley, CA  
GraphXD, Berkeley, CA  
Digital Data in Biodiversity UC Berkeley. (co-organizer)

### 2017

CROSS Symposium Speaker UC Santa Cruz.  
Imagining Tomorrow's University Chicago, IL.  
rOpenSci unconference, Los Angeles, CA  
Prov-a-thon: Practical Tools for Reproducible Science, Tamaya, NM.  
NSF Translational Data Science Workshop, Berkeley Institute for Data Science, Berkeley, CA.

### 2016

Force16 Codemeta Workshop, Portland OR (organizer)  
CodeMeta NSF Workshop Portland, OR (organizer)  
rOpenSci unconference, San Francisco, CA

### 2015

Invited Speaker, Empirical Dynamical Modeling and Forecasting in Nonlinear Systems, NTU, Taiwan.  
Moore-Sloan Data Science Environments: Second Annual Data Science Summit  
Data Intensive Training Workshop, NCEAS, Santa Barbara, CA  
NSF Big Data Hubs Design Charette, Western Region.

rOpenSci unconference, San Francisco CA.  
Pretty Darn Good Control Working group, NIMBIOS, Knoxville TN

## 2014

Invited speaker, Berkeley Initiative for Global Change Biology Workshop (student organized), UC Berkeley, CA.  
Invited speaker, DIMACS Global Change, Berkeley CA.  
Invited speaker, Zoology Seminar, University of Wisconsin, Madison, WI.  
Invited speaker, ESPM Seminar, UC Berkeley, CA.  
rOpenSci unconference, San Francisco CA.  
Reproducible Science: Curriculum & Workflow Workshop, NESCent, Durham, NC.  
WSSSPE 2.0 Meeting. New Orleans, LA.  
Workflows Working Group, NCEAS, Santa Barbara, CA.

## 2013 & prior

invited speaker, MBI, Sustainable Management of Living Natural Resources, Columbus, OH.  
invited seminar speaker, WHOI, Woods Hole, MA.  
invited seminar speaker, UC Davis Dept of Environmental Resources and Economics; Davis, CA.  
invited speaker, SSB Symposium, Evolution Conference, Ottawa, CAN.  
Sustainable Management of Living Natural Resources Workshop, MBI Columbus, OH.  
Academic software & workforce development Workshop, ISEES. Oakland, CA.  
Software Lifecycle Workshop, ISEES, Santa Barbara, CA.  
Pretty Darn Good Control Working group, NIMBIOS, Knoxville, TN  
Stochastic spatial modeling in population dynamics Workshop, AIM, Palo Alto, CA.

## awards

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2011 *Volterra Award* (Best student talk, ESA Theory Section)  
2007 Elected to Membership in the Society of *Sigma Xi*  
2007 Allen G. Shenstone Prize in Physics, Princeton University  
2007 The Class of 1870 Old English Prize, Princeton University  
2006 Kusaka Memorial Prize in Physics, Princeton University  
2006 Plasma Physics Fellow, PPPL

## service

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### campus.....

2018 - current. Governance Committee for Data Science Programs  
2017 - 2018. ESPM Remote Sensing Faculty Search, committee member & equity liaison  
2017 - 2018. ad hoc Data Science Degree Proposal Committee  
2015 - current. Berkeley Research Computing Advisory Committee

### extra-campus.....

NCEAS Scientific Advisory Board  
rOpenSci Leadership Team  
Jetstream Cloud Computing Stakeholder Advisory Board, XSEDE.

## selected software projects

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2012 - current: The rOpenSci Project, co-founder. <https://ropensci.org>  
2014 - current: Carl Boettiger, Dirk Eddelbuettel. The Rocker Project: Docker images for the R environment.  
<https://rocker-project.org>

2015 - current: Carl Boettiger, Matt Jones, et al. The CodeMeta Project: Software Metadata Exchange  
<https://codemeta.github.io>

My software impact is also measured relative to other academics by [depsy.org](https://depsy.org)

## theses

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- Carl Boettiger, David Huse (2006) Clonal Interference Models in Population Genetics. *Princeton Physics Dept.* doi:10.6084/m9.figshare.678305.
- Carl Boettiger, Joshua Weitz, Simon Levin (2007) Adaptive Dynamics: Branching Phenomena and the Canonical Equation *Princeton Physics Dept.* doi:10.6084/m9.figshare.678306.
- Carl Boettiger, Stephen Pacala, David Huse (2007) Ensemble Behavior from Individual Dynamics in Multispecies Forest Populations. *Princeton Physics Dept.* doi:10.6084/m9.figshare.678304.
- Carl Boettiger (2012). Regime shifts in ecology and evolution (PhD Dissertation). doi:10.6084/m9.figshare.97218.

## media interviews

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- Seltenrich, N. (2016). "Scaling the Heights of Data Science." *Breakthroughs Magazine*. <https://nature.berkeley.edu/breakthroughs/opensci-data>
- Tachibana, C. (2014). "The paperless lab" *Science* 345(6195) pp. 468-470. doi:10.1126/science.opms.p1400087
- Mascarelli, A. (2014) "Research tools: Jump off the page." *Nature* 507, 523–525. doi:10.1038/nj7493-523a
- Check Hayden E (2013). "Mozilla Plan Seeks to Debug Scientific Code." *Nature*, 501, pp. 472-472. doi:10.1038/501472a
- Van Noorden R (2013). "Data-Sharing: Everything on Display." *Nature*, 500, pp. 243-245. doi:10.1038/nj7461-243a
- Gewin, Virginia (2013). "Turning Point: Carl Boettiger" *Nature*, 493 p 711 doi:10.1038/nj7434-711a
- Wald, Chelsea (2010). "Scientists Embrace Openness" *Science*. doi:10.1126/science.caredit.a1000036