Ryan P. Kelly

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Education

J.D. 2011, University of California, Berkeley. School of Law (Boalt Hall).
Ph.D. 2006, Columbia University, New York. Ecology, Evolution, and Environmental Biology.
M.Phil. 2005, Columbia University, New York. Ecology, Evolution, and Environmental Biology.
M.A. 2003, Columbia University, New York. Ecology, Evolution, and Environmental Biology.
B.Sc. 2000, University of California, Los Angeles. Ecology and Evolution.

Employment History

September 2018 - Present: Associate Professor, University of Washington, School of Marine & Environmental Affairs.
March 2013 - September 2018: Assistant Professor, University of Washington, School of Marine & Environmental Affairs.
September 2011 - March 2013: Fellow, Center for Ocean Solutions, Stanford University.
August 2009 - May 2011: Graduate Student Instructor, UC Berkeley.
May - August 2009: Sierra Club Environmental Law Program, Summer Associate.
September 2006 - August 2008: Postdoctoral researcher, Stanford University.
August 2002 - May 2006: Graduate student and teaching assistant, Columbia University.
August 2003 - May 2005: Science enrichment teacher, 7th and 8th Grades, New York City.
Spring 2002: Staff Assistant, United States Senator Barbara Boxer, Washington, D.C.
September 2000 - June 2001: Graduate Teaching Fellow, UCLA.

Research Interests

My interests span the divide between hard scientific data and policymakers' use of those data. My research joins genetic and ecological research with real-world implementation in law and policy, particularly with respect to environmental monitoring, resource management, endangered species, and ocean acidification.

Research Experience

March 2013 - Present: Principal Investigator, University of Washington. Research focuses on environmental monitoring using environmental DNA, ocean acidification policy, environmental management using ecosystem thresholds, and related topics.
August 2008 - March 2013: Independent and collaborative work at Stanford University and U.C. Berkeley on ocean policy, marine genetics, and the intersection of scientific data and law.
September 2006 - August 2008: Postdoctoral work at Stanford University's Hopkins Marine Station in the laboratory of Stephen R. Palumbi. This work compared the genetic and ecological patterns of Pacific nearshore invertebrates.
August 2002 - May 2006: Doctoral research at Columbia University and the American Museum of Natural History in New York City, investigating the molecular phylogeny and population-level genetic structure of chitons (Poly-

placophora) and other marine invertebrates from the Pacific coast of North America. Dissertation Advisor: Rob Desalle. Dissertation Title: Genetics and Geography in Pacific Coast Chitons (Mollusca; Polyplacophora).

1998 - 2001: Molecular research in the laboratory of David K. Jacobs at UCLA.

Teaching Experience

2018 - Present: Associate Professor, University of Washington
Classes Designed and Taught: HONORS 223: Water and Society in Italy (Study Abroad; Summer 2018); SMEA 500 Coding in R for Natural and Social Sciences (Fall 2018); SMEA 515 Ocean and Coastal Law (Spring 2019); SMEA/OCEAN 591 Marine Science in the Coastal Zone (Winter 2019)

2013 - 2018: Assistant Professor, University of Washington
Classes Designed and Taught: SMEA 500 Introduction to Marine Affairs / Human Dimensions of Global Change in the Marine Environment (Fall 2016); Environmental Studies 250, Data Types and Methods (Fall 2013, 2014, 2015); SMEA 515 Ocean and Coastal Law (Winter 2014, Spring 2015, 2016, 2017, 2018); SMEA 550B Marine Biodiversity Science, Law, and Policy (Spring 2014, Fall 2017); SMEA/OCEAN 591 Marine Science in the Coastal Zone (Winter 2015, 2016, 2017, 2018); Coding in R for Natural and Social Sciences (Fall 2018).

2012: Instructor, Stanford University
Class Designed and Taught: Earth Systems 174/274, Marine Biodiversity Science, Law, and Policy (Fall 2012).

2009 - 2011: Graduate Student Instructor, UC Berkeley.
Classes Taught: Biology 1B Field Research Section (Fall 2009 and 2010); Earth and Planetary Sciences C51, Big History (Spring 2010 and 2011).

Fall 2005: Teaching Fellow, Columbia University.
Class Taught: Life Science and Evolution for undergraduate non-majors.

Fall 2003 - Spring 2006: Science Enrichment Teacher, 7th and 8th grades, New York City
Description: Taught weekly science lessons in two public junior high schools as part of the National Science Foundation's GK-12 teaching fellowship program, on topics ranging from human physiology to systematics.

Fall 2000 - Spring 2001: Teaching Assistant, UCLA.
Classes Taught: Evolution; Plant Physiology; Physiology of Marine Phytoplankton.

Recent Awards, Grants, and Fellowships

2017 - 2019: Washington Department of Natural Resources: Halo Effects of Eelgrass (*Zostera marina)* for Ocean Acidification Resilience in Puget Sound.

2016 - 2018: David & Lucile Packard Foundation: Assessing the Effects of Ocean Acidification in the Field Using Environmental DNA,

2017 - 2018: Renewal: National Marine Fisheries Service, Advanced Sampling Techniques Working Group: Estimating Abundances in Nearshore Habitats using Environmental DNA,

2016 - 2017: National Marine Fisheries Service, Advanced Sampling Techniques Working Group: Estimating Abundances in Nearshore Habitats using Environmental DNA,

2016: United States Geological Survey, Using eDNA to Assess Restored Elwha River Outflow,

2016: Resources Legacy Fund, Ocean Acidification Policymaking Processes in Washington and California,

2015 - 2016: University of Washington Royalty Research Fund, Making eDNA Quantitative,

2014 - 2015; 2015 - 2017; 2017 - 2019: University of Washington, College of the Environment Graduate Research Enhancement Opportunity (GROE) Program, 3 awards, each approx.

2013 - 2018: NASA grant NNX14AP62A to the Monterey Bay Aquarium Research Institute, National Marine Sanctuaries as Sentinel Sites for a Demonstration Marine Biodiversity Observation Network (MBON). (Subcontractor via Stanford University),

2012 - 2014: David & Lucile Packard Foundation: Environmental DNA as Next Generation Monitoring Tool,

2012 - 2017: Gordon and Betty Moore Foundation, Ocean Tipping Points. (Subcontractor via Stanford University),

PUBLICATIONS

2018

[1] *Tillotson, M.D.*, **R.P. Kelly**, J.J. Duda, M. Hoy, *J. Kralj*, and T.P. Quinn. 2018. Concentrations of Environmental DNA (eDNA) Reflect Spawning Salmon Abundance at Fine Spatial and Temporal Scales. Biological Conservation 220:1-11.

Kelly, R.P., R. Gallego Simón, and E. Jacobs-Palmer. 2018. The Effect of Tides on Nearshore Environmental DNA. PeerJ: 6:e4521.

Hart, C.J., **R.P. Kelly**, and S.F. Peterson. 2018. Will the California Current Lose its Nesting Tufted Puffins? PeerJ: 6:e4519.

Battista, W., **R.P. Kelly**, A. Erickson, and R. Fujita. 2018. Fisheries Governance Impacting Conservation Outcomes in the United States and European Union. (*In Press*, Coastal Management).

Lee, T.S., J.D. Toft, J. Cordell, M.N. Dethier, J. Adams, and **R.P. Kelly**. 2018. Quantifying the Effectiveness of Shoreline Armoring Removal on Coastal Biota of Puget Sound. PeerJ 6:e4275.

2017

O'Donnell, J.L., **R.P. Kelly**, A.O. Shelton, J.F. Samhouri, *N.C. Lowell*, G.D. Williams. 2017. Spatial Distribution of Environmental DNA in a Nearshore Marine Habitat. PeerJ 5:e3044.

Mossler, M.V., A. Bostrom, **R.P. Kelly**, K.M. Crosman, and P. Moy. 2017. How Does Framing Affect Policy Support for Emissions Mitigation? Testing the Effect of Ocean Acidification and Other Frames. Global Environmental Change 45:63-78.

Kelly, R.P., C.J. Closek, J.L. O'Donnell, J.E. Kralj, A.O. Shelton, and J.F. Samhouri. 2017. Genetic and Manual Survey Methods Yield Different and Complementary Views of an Ecosystem. Frontiers in Marine Science 3:283, doi=10.3389/fmars.2016.00283.

Kelly, R.P. 2017. Ocean Acidification Policy: Applying the Lessons of Washington to California and Beyond. 7 Washington Journal of Environmental Law and Policy 1-34.

Kelly, R.P., P. Levin, and K.N. Lee. 2017. Science, Policy, and Data-Driven Decisions in a Data Vacuum. 44 Ecology Law Quarterly 7.

Cooley, S.R., J.E. Cheney, **R.P. Kelly**, and E.H. Allison. Ocean Acidification and Pacific Oyster Larval Failures in the Pacific Northwest United States. Chapter 2: 40-53. *In*: Guillotreau, P., A. Bundy, & R.I. Perry (Eds.), Societal and Governing Responses to Global Change in Marine Systems (2017, Routledge).

2016

Hillier, A., **R.P. Kelly**, and T. Klinger. 2016. Narrative Style Influences Citation Frequency in Climate Change Science. PLoS One 11(12): e0167983.

Kelly, R.P., J.L. O'Donnell, *N.C. Lowell*, A.O. Shelton, J.F. Samhouri, S.M. Hennessey, B.E. Feist, and G.D. Williams. 2016. Genetic Signatures of Ecological Diversity Along an Urbanization Gradient. PeerJ 4:e2444.

Freeman, M.C., L. Whiting, and **R.P. Kelly**. 2016. Assessing Potential Spatial and Temporal Conflicts in Washington's Marine Waters. Marine Policy 70: 137-144.

Kelly, R.P. 2016. Making Environmental DNA Count. Molecular Ecology Resources 16: 10-12.

Battista, W., **R.P. Kelly**, A. Erickson, and R. Fujita. 2016. A Comprehensive Method for Assessing Marine Resource Governance: Case study in Kāne'ohe Bay, Hawai'i. Coastal Management 44: 295-332.

Lowell, N. and **R.P. Kelly.** 2016. Evaluating Agency Use of "Best Available Science" Under the United States Endangered Species Act. Biological Conservation 196:53-59.

[1] Postdocs underlined, students *italicized*.

Port, J.A., J.L. O'Donnell, O.C. Romero-Maraccini, P.R. Leary, S.Y. Litvin, K.J. Nickols, and **R.P. Kelly**. 2016. Assessing the Vertebrate Community of a Kelp Forest Ecosystem using Environmental DNA. Molecular Ecology 25(2):527-541.

O'Donnell, J.L., **R.P. Kelly**, *N. Lowell*, and J.A. Port. 2016. Indexed PCR Primers Induce Template-Specific Bias in Large-Scale DNA Sequencing Studies. PLoS One 11(3): e0148698.

Shelton, A.O., J.L. O'Donnell, J.F. Samhouri, *N. Lowell*, G.D. Williams, and **R.P. Kelly**. 2016. A Framework for Inferring Biological Communities from Environmental DNA. Ecological Applications 26(6): 1645-1659.

Albright, R., D. Alongi, K. Anthony, M. Baird, M. Byrne, C. Collier, S. Dove, K. Fabricius, T. Fyffe, K. Gale, C. Hanratty, O. Hoegh-Guldberg, **R.P. Kelly**, J. Lough, M. Mongin, J. Monks, P. Munday, J.K. Oliver, R. Pears, M. Rodgers, B. Russell, B. Tilbrook, E. Abal. 2016. Ocean Acidification: Linking Science to Adaptive Management Solutions. Journal of Environmental Management 182: 641-650.

2015

Gattuso, J.-P., A. Magnan, R. Billé, W.W.L. Cheung, E.L. Howes, F. Joos, D. Allemand, L. Bopp, S. Cooley, C.M. Eakin, O. Hoegh-Guldberg, **R.P. Kelly**, H.-O. Pörtner, A.D. Rogers, J.M. Baxter, D. Laffoley, D. Osborn, A. Rankovic, J. Rochette, U.R. Sumaila, S. Treyer, C. Turley. 2015. Contrasting Futures for Ocean and Society from Different CO_2 Emissions Scenarios. Science 349 (6243): aac4722.

Marshall, K., A. Stier, J. Samhouri, **R.P. Kelly**, E. Ward. 2015. Conservation Challenges of Predator Recovery. Conservation Letters 9(1):70-78.

Selkoe, K.A., T. Blenckner, M.R. Caldwell, L. Crowder, A. Erickson, T. Essington, J. Estes, R. Fujita, B.S. Halpern, M. Hunsicker, C.V. Kappel, **R.P. Kelly**, J.N. Kittinger, P.S. Levin, J. Lynham, M. Mach, R. Martone, L. Mease, A. Salomon, J. Samhouri, C. Scarborough, A. Stier, C. White, J. Zedler. 2015. Principles for Managing Marine Ecosystems Prone to Tipping Points. Ecosystem Health and Sustainability 1(5):17.

Kelly, R.P., A.L. Erickson, and L.A. Mease. 2015. How Not to Fall Off a Cliff, or, Using Tipping Points to Improve Environmental Management. 41 Ecology Law Quarterly 843.

Kelly, R.P. 2015. Will More, Better, Cheaper, and Faster Monitoring Improve Environmental Management? 44 Environmental Law 1111-1147.

2014

Kelly, R.P., J.A. Port, K.M. Yamahara, R.G. Martone, *N. Lowell*, P.F. Thomsen, M.E. Mach, E. Prahler, M.R. Caldwell, and L.B. Crowder. 2014. Harnessing DNA to Improve Environmental Management, Science 344 (6191): 1455-1456. doi:10.1126/science.1251156.

Kelly, R.P., J.A. Port, K.M. Yamahara, and L. Crowder. 2014. Using Environmental DNA to Census Marine Fishes in a Large Mesocosm. PLoS One 9(1): e86175. doi:10.1371/journal.pone.0086175.

Strong, A.L., K.J. Kroeker, L.T. Teneva, L.A. Mease, and **R.P. Kelly**. 2014. Ocean Acidification 2.0: Managing Our Changing Coastal Ocean Chemistry. BioScience: doi: 10.1093/biosci/biu072.

Kelly, R.P., A. Erickson, L. Mease, W. Battista, J. Kittinger, R. Fujita. 2014. Embracing Thresholds for Better Environmental Management. Philosophical Transactions of the Royal Society B 370: 20130276.

2013

Kelly, R.P., S.R. Cooley, T. Klinger. 2013. Narratives Can Motivate Environmental Action: The Whiskey Creek Ocean Acidification Story. Ambio 43(5): 592-599.

Billé, R., **R.P. Kelly**, A. Biastoch, E. Harrould-Kolieb, D. Herr, F. Joos, K. Kroeker, D. Laffoley, A. Oschlies, and J.-P. Gattuso. 2013. Taking Action Against Ocean Acidification: A Review of Management and Policy Options. Environmental Management 52(4): 761-779.**Kelly, R.P.**, and M. Caldwell. 2013. "Not Supported by Current Science" : The National Forest Management Act and the Lessons of Environmental Monitoring for the Future of Public Resources Management. 32 Stanford Environmental Law Journal 151.

Kelly, R.P., and M. Caldwell. 2013. Ten Ways States Can Fight Ocean Acidification (and Why They Should). 37 Harvard Environmental Law Review 57. [ALSO REPRINTED in: 6 Washington Journal of Law and Policy 288 (2016)].

Caldwell, M. R., Hartge, E. H., Ewing, L. C., Griggs, G., **Kelly, R. P.**, Moser, S. C., Newkirk, S. G., Smyth, R. A., & Woodson, C.B. 2013. Chapter 9: Coastal Issues. *In*: Garfin, G., Jardine, A., Merideth, R., Black, M., & LeRoy, S. (Eds.), Assessment of Climate Change in the Southwest United States: a Report Prepared for the National Climate Assessment. A report by the Southwest Climate Alliance. Washington, DC: Island Press.

PRIOR

Kelly, R.P., and M.R. Caldwell. 2012. The Limits of Water Quality Criteria. The Environmental Forum 29(6): 34-38.

Kelly, R.P., and J. Grote Stoutenburg. 2012. Washington State's Legal and Policy Options for Combating Ocean Acidification in State Waters. Center for Ocean Solutions. (Available at: http://www.ecy.wa.gov).

Kelly, R.P., and M. Caldwell. 2012. Why Ocean Acidification Matters to California, and What California Can Do About It. Center for Ocean Solutions. (Available at: http://www.centerforoceansolutions.org).

Kelly, R.P., M.M. Foley, W. Fisher, R. Feely, B.S. Halpern, G.G. Waldbusser, and M.R. Caldwell. 2011. Mitigating Local Causes of Ocean Acidification with Existing Laws. Science 332: 1036-1037.

Kelly, R.P. 2011. Spineless Wonders: How Listing Marine Invertebrates and their Larvae Challenges the US Endangered Species Act. 19 Penn State Environmental Law Review 1-53.

Barshis, D.J., E.E. Sokta, **R.P. Kelly**, A. Sivasundar, B.A. Menge, J. Barth, and S.R. Palumbi. 2011. Coastal Upwelling May Drive Sweepstakes Recruitment in the Acorn Barnacle *Balanus glandula* Marine Ecology Progress Series 439: 139-150.

Kelly, R.P. 2010. The Use of Population Genetics in Endangered Species Act Listing Decisions. 37 Ecology Law Quarterly 1107-1159.

Kelly, R.P., and S.R. Palumbi. 2010. Genetic Structure Among 50 Species of the Northeastern Pacific Rocky Intertidal Community. PLoS One 5(1): e8594. doi:10.1371/journal.pone.0008594.

Kelly, R.P., T.A. Oliver, A. Sivasundar, and S.R. Palumbi. 2010. A Method for Detecting Population Genetic Structure in Diverse, High Gene-Flow Species. Journal of Heredity 101(4): 423-436.

Kelly, R.P., and S.R. Palumbi. 2009. General-use polymerase chain reaction primers for amplification and direct sequencing of enolase, a single-copy nuclear gene, from different animal phyla. Molecular Ecology Resources 9: 144-147.

Kelly, R.P., and D.J. Eernisse. 2008. Reconstructing a Radiation: The Chiton Genus *Mopalia* in the North Pacific. Invertebrate Systematics 22: 17-28.

Kelly, R.P., and D.J. Eernisse. 2007. Southern Hospitality: A Latitudinal Gradient in Gene Flow in the Marine Environment. Evolution 61(3): 700-707.

Kelly, R.P., I.N. Sarkar, D.J. Eernisse, and R. Desalle. 2007. DNA Barcoding Using Chitons (genus *Mopalia*). Molecular Ecology Notes 7: 177-183.

PROFESSIONAL AFFILIATIONS

Editor, *Conservation Letters* (2016 - present)

California Bar Association (number 278958; admitted 2011)

Articles Editor, Ecology Law Quarterly (2010 - 2011)

Western Society of Naturalists