

MICHAEL R. SPRINGBORN

Associate Professor – Department of Environmental Science & Policy
Chair – Masters of Science in Environmental Policy and Management
University of California, Davis
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ACADEMIC EXPERIENCE

University of California, Davis, Department of Environmental Science & Policy
Associate Professor (2015-present)
Assistant Professor (2008-2015)

EDUCATION

- Ph.D. Environmental Science and Management** (2008)
Economics and Environmental Science Training Program
Donald Bren School of Environmental Science and Management
University of California, Santa Barbara
- M.A. Economics**, University of California, Santa Barbara (2004)
- B.A. Psychology**, University of Colorado, Boulder (1999)

AREAS OF SPECIAL INTEREST

Environmental and resource economics, decision-making under uncertainty.

ARTICLES UNDER REVIEW

- Julie L. Lockwood, Dustin J. Welbourne, Christina Romagosa, Phillip Cassey, Nicholas E. Mandrak, Angela Strecker, Brian Leung, Oliver C. Stringham, Bradley Udell, Diane J. Episcopio-Sturgeon, Michael F. Tlusty, James Sinclair, Michael R. Springborn, Elizabeth F. Pienaar, Andrew Rhyne and Rueben Keller. When Pets Become Pests: The Role of the Exotic Pet Trade in Producing Invasive Vertebrate Animals. *Frontiers in Ecology and the Environment* (revise and resubmit).
- Pierce Donovan, Lucas Bair, Charles B. Yackulic, Michael R. Springborn. Safety in numbers: cost-effective endangered species. *Land Economics* (revise and resubmit).
- Michael Springborn and Amanda Faig. Moving forward: a simulation-based approach for solving dynamic resource management problems.
- Michael Springborn, Amanda Faig, Allison Dedrick, Marissa L. Baskett. Beyond biomass: valuing genetic diversity in natural resource management.

JOURNAL PUBLICATIONS

- [23] Lucas S. Bair, Charles B. Yackulic, Michael R. Springborn, Matthew N. Reimer, Craig A. Bond, and Lewis G. Coggins. Identifying cost-effective invasive species control to enhance endangered species populations in the Grand Canyon, USA. *Biological Conservation*, 220, 12-20, 2018.

- [22] Jacob LaRiviere, David Kling, James Sanchirico, Charles Sims and Michael R. Springborn. Characterizing Uncertainty and Learning in the Economics of Resource and Environmental Management. *Review of Economics and Environmental Policy*, 12(1), 92-112, 2018
- [21] Michael R. Springborn, Amanda R. Lindsay and Rebecca S. Epanchin-Niell. Harnessing enforcement leverage at the border to minimize biological risk from international live species trade. *Journal of Economic Behavior and Organization*, 132(B), 98-112, 2016.
- [20] Matthew MacLachlan, Michael R. Springborn and Paul Fackler. Learning about a moving target in resource management: Optimal Bayesian disease control. *American Journal of Agricultural Economics*, 99(1), 140-162, 2017.
- [19] Michael R. Springborn, Gerardo Chowell, Matthew MacLachlan, and Eli P. Fenichel. Accounting for Behavioral Responses during a Flu Epidemic Using Home Television Viewing. *BMC Infectious Diseases*, 15(21), 2015.
- [18] Michael R. Springborn, Reuben P. Keller, Peter Daszak, Sarah Elwood, Christina M. Romagosa, Carlos Zambrana-Torrel Integrating risk assessment for invasion and disease risk in live animal trade. *Diversity & Distributions*, 21(1), 101-110, 2015.
- [17] Charles Perrings, Carlos Castillo-Chavez, Gerardo Chowell, Peter Daszak, Eli P. Fenichel, David Finnoff, Richard D. Horan, A. Marm Kilpatrick, Ann Kinzig, Nicolai V. Kuminoff, Simon Levin, Benjamin Morin, Katherine F. Smith, Michael R. Springborn. Epidemiological economics is changing infectious disease management. *Ecohealth*, 11, 464-475, 2014.
- [16] Kerri Steenwerth, A.K. Hodson, Michael R. Springborn, L. Jarvis, L. Lipper, S. Vermeulen, L.E. Jackson, et al. Climate-Smart Agriculture Global Research Agenda: Science for Action. *Agriculture & Food Security Journal*, 3(11), 1-39, 2014.
- [15] Michael R. Springborn. Risk aversion and adaptive management: insights from a multi-armed bandit model of invasive species risk. *Journal of Environmental Economics and Management*, 68(2), 226-242, 2014.
- [14] Reuben Keller and Michael R. Springborn. Closing the Screen Door to New Invasions. *Conservation Letters*, 7(3), 285-292, 2014.
- [13] Brian Leung, Michael R. Springborn, James A. Turner, Eckehard G. Brockerhoff. Pathway-level risk analysis: the net present value of an invasive species policy in the US. *Frontiers in Ecology and the Environment*, 12(5), 273-279, 2014.
- [12] James N. Sanchirico, Michael R. Springborn, Mark W. Schwartz and Angela N. Doerr. Investment and the policy process in conservation monitoring. *Conservation Biology*, 28(2), 361-371, 2014.
- [11] Rolf Groeneveld, Michael R. Springborn and Christopher Costello. Repeated experimentation to learn about a flow-pollutant threshold. *Environmental and Resource Economics*, 58(4), 627-647, 2014.
- [10] Michael R. Springborn and James N. Sanchirico. A density projection approach for non-trivial information dynamics: Adaptive management of stochastic natural resources. *Journal of Environmental Economics and Management*, 66(3), 609-624, 2013.
- [9] Michael R. Springborn, Boon-Ling Yeo, Juhwan Lee and Johan Six. Crediting uncertain ecosystem services in a market. *Journal of Environmental Economics and Management*, 66(3), 554-572, 2013.
- [8] Robert P. Lieli and Michael R. Springborn. Closing the gap between risk estimation and decision-making: efficient management of trade-related invasive species risk. *The Review of Economics and Statistics*, 95(2), 632-645, 2013.
- [7] John Schmidt, Michael R. Springborn and John Drake. Bioeconomic forecasting of invasive species by ecological syndrome. *Ecosphere*, 3(5) 2012.

- [6] Michael R. Springborn, Michael Bliss Singer, Thomas Dunne. Sediment-adsorbed total mercury flux through Yolo Bypass, the primary floodway and wetland in the Sacramento Valley, California. *Science of the Total Environment* 412, 203-213, 2011.
- [5] James N. Sanchirico and Michael R. Springborn. “How to get there from here: Ecological and economic dynamics of ecosystem service provision.” *Environmental and Resource Economics* 48(2) 243-267, 2011.
- [4] Eli P. Fenichel, Carlos Castillo-Chavez, M. G. Ceddia, Gerardo Chowell, Paula A. Gonzalez Parra, Graham J. Hickling, Garth Holloway, Richard Horan, Benjamin Morin, Charles Perrings, Michael R. Springborn, Leticia Velazquez, and Cristina Villalobosi. Adaptive human behavior in epidemiological models. *Proceedings of the National Academy of Sciences* 108(15), 6306-6311, 2011.
- [3] Michael R. Springborn, Reuben Keller and Christina Romagosa. The value of nonindigenous species risk assessment in international trade. *Ecological Economics* 70(11), 2011, 2145-2153.
- [2] Carolyn Fischer and Michael R. Springborn. “Emissions Targets and the Real Business Cycle: Intensity Targets versus Caps or Taxes.” *Journal of Environmental Economics and Management* 62(3), 2011, 352-366.
- [1] Christopher J. Costello, Michael R. Springborn, Carol McAusland, and Andy Solow. “Unintended biological invasions: Does risk vary by trading partner?” *Journal of Environmental Economics and Management* 54(3), 262-276, 2007.

BOOK CHAPTERS

- [2] Michael R. Springborn. “Rationalizing international species trade through invasion risk assessment.” *Invasive Species in a Globalized World*, ed. R.P. Keller, M. Cadotte & G. Sandiford. University of Chicago Press, Chicago, 163-181, 2015.
- [1] Michael R. Springborn, Christopher J. Costello, and Peyton Ferrier. “Optimal random exploration for trade-related non-indigenous species risk.” *Bioinvasions and Globalization: Ecology, Economics, Management, and Policy*, ed. C. Perrings, H. Mooney and M. Williamson, Oxford University Press, Oxford, 127-144, 2010.

OTHER PUBLICATIONS

- Michael R. Springborn, Amanda R. Lindsay, and Rebecca S. Epanchin-Niell. 2018. Risk-based Inspection: Setting policy parameters to harness enforcement leverage. Pp. 48-53. Appearing in: *Proceedings International Symposium for Risk Based Sampling*, Baltimore, Maryland, June 26-30, 2017. North American Plant Protection Organization.
- Rebecca Epanchin-Niell, Michael Springborn, and Amanda Lindsay. “Protecting against Invasive Species: A Risk-Based Approach to Live Plant Inspection.” *Resources* 193, Resources for the Future, Sept., 2016.
- Amanda R. Lindsay, Michael R. Springborn, and Rebecca S. Epanchin-Niell. “Reducing Nonnative Species Introductions with Risk-based Inspection of International Trade.” *ARE Update*, University of California Giannini Foundation, Sept., 2016.
- Michael R. Springborn. “Crediting Uncertain Ecosystem Services from Working Landscapes: Balancing Program Integrity and Cost-effectiveness.” *ARE Update*, University of California Giannini Foundation, April, 2014.
- Michael R. Springborn, J.P. Schmidt and John M. Drake. “Cost-Sensitive Risk Assessment for Invasive Plants in the United States.” *Proceedings of the California Invasive Plant Council Symposium*. 15:1. Cal-IPC, Berkeley, CA, 51-53, 2011.

- Reuben Keller and Michael R. Springborn. Letter to the Editor: “Long-term correlations in European socioeconomic conditions create a bias towards conclusion that an invasion debt occurs.” *Proceedings of the National Academy of Sciences* 108(25 E220), 2011.
- Peyton Ferrier and Mike Springborn. "Random Inspection Reveal Import Risks." *Amber Waves* 7(3), September, 2009.
- Michael R. Springborn, Christopher J. Costello and Carol McAusland. “Policy and risk processes of trade-related biological invasions.” U.S. Department of Agriculture, *Economics Research Report*, June 2008.

GRANTS

- [11] *Sustainable Oceans: From Policy to Science to Decisions*. National Science Foundation Research Traineeship, 2017-2024, (\$3,000,000), Senior personnel.
- [10] *Global Socioeconomic Drivers of Insect Invasions*, National Socio-Environmental Synthesis Center (SESYNC) Pursuit (working group), 2018-2020 (approx.. \$120,000), co-PI.
- [9] *Global Socioeconomic Drivers of Insect Invasions*, USDA, Forest Service International Programs, 2018-2020 (\$146,312), PI
- [8] *Risk-based sampling of imports: policy design for minimizing entry of pests and pathogens*, United States Department of Agriculture, 2014-2015 (\$125,684), PI.
- [7] *Applied Decision Methods for the Glen Canyon Dam Adaptive Management Program*. United States Geological Survey, 2015-2019 (\$517,700), co-PI.
- **[6] Risks of Animal and Plant Infectious Diseases Through Trade (RAPID Trade). National Science Foundation, 2014-2018 (\$1,450,000), co-PI.**
- [5] *Managing Natural Resources for Adaptive Capacity: the Central Valley Chinook Salmon Portfolio*. CALFED Bay-Delta Program (NOAA/US Fish & Wildlife Service/California Department of Fish & Game), 2014-2017 (\$489,343), co-PI.
- [4] *Economic analysis of aquaculture and mangrove conservation in Southeast Asia*. Wageningen UR and UC Davis, College of Agriculture & Environmental Science collaboration grant, 2012-2013 (\$5,000), co-PI.
- [3] *Modeling Anthropogenic Effects in the Spread of Infectious Disease*. National Institutes of Health, 2011-2014 (\$1,600,000).
- [2] *Comparative analysis of monitoring frameworks for adaptive ecosystem management*. Packard Foundation, 2011 (\$75,846), co-PI.
- [1] *California Nitroscapes: An Environmental, Social, and Economic Evaluation of the Fate and Consequence of Excess N*. Agricultural Sustainability Institute of UC Davis and Packard Foundation, 2009 (\$86,986), co-PI.

INVITED PRESENTATIONS

- **UC Davis Center for Population Biology Seminar Series**, Davis, CA, March 2018. “Safety in numbers: cost-effective endangered species management for viable populations.”
- **International Symposium for Risk-Based Sampling**, Baltimore, MD, June 2017. “Harnessing enforcement leverage at the border to minimize biological risk from international live species trade”.
- **Arizona State University**, RAPID Trade Workshop, Tempe, AZ, October 2017. “Invasive pests and pathogens in international trade”.

- **University of Tennessee, Knoxville, TN**, July 2015, Workshop on: Thresholds, Tipping Points, and Random Events in Dynamic Economic Systems, “Harnessing enforcement leverage at the border to minimize biological risk from international live species trade.”
- **National Oceanic and Atmospheric Administration, Southwest Fisheries Science Center**, Santa Cruz, CA, November 2015. “Managing natural resources for adaptive capacity: the Central Valley Chinook salmon portfolio.”
- **University of California, Irvine**, CA, November 2015, “Environmental Policy Under Uncertainty and Global Change.”
- **Wageningen University**, Wageningen, Netherlands, March 2013, “Crediting Uncertain Ecosystem Services in a Market.”
- **Yale University**, New Haven, CT, January 2012, “Adaptive management of ecosystem service provision in an uncertain world.”
- **International Forum of Ecosystem Adaptability Science III**, Sendai, Japan, November 2011. “Learning in a noisy environment: Adaptive management for inconvenient models.”
- **The California Roundtable on Agriculture and the Environment**, Davis, CA, October 2011. “Payments for Ecosystem Services.”
- **Duke University/North Carolina State University/RTI International: Triangle Resource and Environmental Economics Seminar Series**, Research Triangle Park, NC, September 2011, “Learning in a Noisy Environment: Adaptive Management for Inconvenient Models.”
- **Arizona State University workshop on Macro Economics and the Environment: Climate Change, Policy Design and Sustainability**, Tempe, AZ, May 2011, “Emissions Targets and the Real Business Cycle: Intensity Targets versus Caps or Taxes.”
- **Invasive Species in a Globalized World (conference)**, Program on the Global Environment, University of Chicago, Chicago, IL, May 2011, “Rationalizing international species trade through invasion risk assessment.”
- **Continental Dialogue on Non-Native Forest Insects & Diseases**, Boston, MA, October 2010. “Golden Imports and the Three Borers: A Balance Between the Benefits and Unintended Consequences of International Trade.”
- **University of California, Berkeley**, Environmental and Resource Economics Seminar Series, Berkeley, California, March 2010, “Closing the gap between risk estimation and decision-making: efficient management of trade-related invasive species risk.”
- **2009 Second DIVERSITAS Open Science Conference**, Cape Town, South Africa, October 2009. “Closing the gap between risk estimation and decision-making: efficient management of trade-related invasive species risk.”
- **International Symposium on New Developments in Environmental Economics**, Tokyo, Japan, November, 2008. “Bayesian adaptive management with learning.”

PRESENTATIONS

- **6th AERE Summer Conference**, Breckenridge, CO, June 2016. “The hitchhiker’s guide to the greenery: estimating dynamics of 150 years of trade-driven non-native species introductions via plant material.”
- **CU Environmental and Resource Economics Workshop**, Vail, CO, September 2018. “Loss of ecosystem services and incidence of malaria in Central America.”
- **6th World Congress of Environmental and Resource Economists**, Gothenburg, Sweden, June 2018. “Beyond Biomass: Valuing Genetic Diversity in Natural Resource Management”.
- **27th Annual meeting of the Canadian Resource and Environmental Economists (CREE) Study Group**, Western University, London, Ontario, September 2017. “Beyond Biomass:

Valuing Genetic Diversity in Natural Resource Management”; and “Translating Population Viability Analysis into a Dynamic Programming Framework to Facilitate Economic Intuition and Adaptive Management.”

- **UC Davis Natural Resource Policy working group**, Davis, CA, December 2017. “Beyond biomass: Valuing genetic diversity in natural resource management”.
- **National Socio-Environmental Synthesis Center (SESYNC)** workshop, Annapolis, MD, September, 2015. “Harnessing enforcement leverage at the border to minimize biological risk from international live species trade.”
- **Occasional California Workshop on Environmental and Resource Economics**, Santa Barbara, CA, October 2015. “Learning about a moving target in resource management: Optimal Bayesian disease control.”
- **5th AERE Summer Conference**, San Diego, CA, June 2015. “Beyond Biomass: Valuing Genetic Diversity in Natural Resource Management.”
- **Modeling Anthropogenic Effects in the Spread of Infectious Diseases**, Arizona State University workshop, Tempe, AZ, March 2015. “Harnessing enforcement leverage at the border to minimize biological risk from international live species trade” and “Spatial and temporal dynamics of pest and pathogen risk across 150 years of live plant trade.”
- **2nd International Congress on Biological Invasions**, Qingdao, China, October 2013. “Integrating Risk Assessment for Invasion and Disease Risk in Live Animal Trade”
- **11th Meeting of the International Forestry Quarantine Research Group**, Qingdao, China, October 2013. “Cost-sensitive risk assessment for invasive plants in the US” and “Pathway analysis of trade policy for invasive species risk: the net benefits of ISPM-15 in the US”
- **3rd AERE Summer Conference**, Banff, Alberta, Canada, June 2013 (session chair) “Crediting Uncertain Ecosystem Services in a Market.”
- **Canadian Resource and Environmental Economics Study Group Annual Conference**, Vancouver, Canada, September 2012. “Adaptive management of ecosystem service provision: a methodology for non-trivial ecological dynamics.”
- **Occasional California Workshop on Environmental and Resource Economics**, Santa Barbara, CA, February 2012. “Crediting uncertain ecosystem services: behavior, aggregation and the uncertainty discount.”
- **20th Annual California Invasive Plant Council Symposium**, Tahoe, CA, October 2011, “Cost-sensitive risk assessment for invasive plants in the United States.”
- **1st AERE Summer Conference**, Seattle, WA, June 2011, “Learning in a noisy environment: Adaptive management for inconvenient models.”
- **12th Occasional California Workshop on Environmental and Resource Economics**, Santa Barbara, CA, November 2010. “Learning in a noisy environment: Adaptive management for inconvenient models.”
- **UC Davis Nitrogen Science Symposium**, Davis, CA, October 2010, “The implications of space and fate-specific management of N: California as a policy lab.”
- **4th World Congress of Environmental and Resource Economists**, Montreal, Canada, July 2010. “Environmental Externalities of International Trade and Transport.”
- **Report to California Department of Transportation**, Sacramento, CA, May 2010. “Valuation in Decision Making.”
- **11th Occasional California Workshop on Environmental and Resource Economics**, Santa Barbara, California, October 2009. “Closing the gap between risk estimation and decision-making: efficient management of trade-related invasive species risk.”

- **2009 AAEA & ACCI Joint Annual Meeting**, Milwaukee, Wisconsin, July 2009. "Closing the gap between risk estimation and decision-making: efficient management of trade-related invasive species risk."
- **2009 WEAI Annual Conference**, Vancouver, B.C., Canada, July 2009. "Closing the gap between risk estimation and decision-making: efficient management of trade-related invasive species risk."
- **2008 AAEA & ACCI Joint Annual Meeting**, Orlando, Florida, July 2008. "Policies and processes of environmental risk."
- **16th EAERE Annual Conference**, Gothenburg, Sweden, June 2008. "Bayesian adaptive management with learning."
- **UC Davis Department of Economics, Econometrics Seminar Series**, Davis, CA, May 2009, "Estimating the value of information for Bayesian adaptive management."
- **Economic and Ecological Science and Management of Invasive Species**, Tempe, Arizona, October 2007. "Bayesian profiling with learning."
- **University of Colorado Environmental and Resource Economics Workshop**, Vail, Colorado, September 2007. "Bayesian profiling with learning."
- **European Summer School in Resource and Environmental Economics**, Venice, Italy, June 2007. "Unintended biological invasions: Does risk vary by trading partner?"
- **15th EAERE Annual Conference**, Thessaloniki, Greece, June 2007. "Optimal mitigation and R&D policy for stochastic environmental threats"
- **15th EAERE Annual Conference**, Thessaloniki, Greece, June 2007. "Unintended biological invasions: Does risk vary by trading partner?"
- **9th Biennial Conference of International Society for Ecological Economics**, New Delhi, India, December 2006. "Research versus development: optimal policy for stochastic environmental threats."
- **9th Biennial Conference of International Society for Ecological Economics**, New Delhi, India, December 2006. "Unintended biological invasions: Does risk vary by trading partner?"
- **8th Occasional California Workshop on Environmental and Resource Economics**, October 2005. "Unintended biological invasions: Does risk vary by trading partner?"
- **Association of Environmental and Resource Economists**, Natural Resources at Risk workshop, June 2005. "International trade and exotic species introductions: impacts by region of origin."
- **National Science Foundation**, IGERT Program workshop, May 2005 (poster session). "International trade and exotic species introductions: impacts by region of origin."
- **American Geophysical Union**, Joint Assembly Meeting, May 2005 (poster session). "A mass balance analysis of total mercury flux through a large, managed floodplain."

AWARDS AND HONORS

- Nominated for Associated Students, UC Davis (ASUCD) Excellence in Education Award (2009)
- Biodiversity and Ecosystem Services Training Network (BESTNet) fellow (2007)
- Selected participant and best student paper honor at the European Summer School in Resource and Environmental Economics, Venice International University (2007)
- Selected National Science Foundation IGERT fellow, U.C. Santa Barbara (2003-2008)

TEACHING EXPERIENCE

Courses developed and taught:

- *Climate Policy*. Undergraduate level. Spring, annually 2013-2018.
- *Environmental Policy*. Undergraduate level. Winter, annually 2009-2018.
- *Environmental Policy Analysis*. Ph.D. level. Spring, biannually 2010-2016.
- *Interdisciplinary approaches: Responding to rapid environmental change* (NSF-IGERT training course). Ph.D. level. Winter 2011.

OTHER PROFESSIONAL ACTIVITIES

Editorial council member

Journal of Environmental Economics and Management (2015-present).

Journal of the Association of Environmental and Resource Economists (2014-present).

Journal of Agricultural and Resource Economics (2012-present).

NSF graduate trainer

Sustainable Oceans: From Policy to Science to Decisions NRT (2017-present)

Climate Change, Water and Society (CCWAS) IGERT (2011-2015)

Responding to rapid environmental change (REACH) IGERT (2011-2012)

Project adviser

UC Davis planning study, "Economic Valuation Method for Environmental Resources" for California Department of Transportation (2009-2010).

Academic Service

Co-lead, working group on "Global Socioeconomic Drivers of Insect Invasions." supported by the National Socio-Environmental Synthesis Center (SESYNC) (2018-present).

Member, working group on "Ecosystem Federalism: Building theoretical and data-analytic foundations for designing adaptive regulatory institutions for the provision of ecosystem services." supported by the National Institute for Mathematical and Biological Synthesis (NIMBioS) (2017-present).

Member, working group on "Linking Trade, Biology, and Pet Owner Decisions to the Risk of Vertebrate Invasions in the US" supported by the National Socio-Environmental Synthesis Center (SESYNC) (2017-present).

Member, working group on "Globalization of the Live Plant Trade: Informing efficient strategies for reducing non-native pest invasion risk" supported by the National Socio-Environmental Synthesis Center (SESYNC) (2013-2016).

Member, working group on "Synthesizing and Predicting Infectious Disease while accounting for Endogenous Risk (SPIDER)" supported by the National Institute for Mathematical and Biological Synthesis (NIMBioS) (2009-2011).

Member, UC Davis Agricultural Sustainability Institute, working group on "Nitrogen science, climate change and agriculture" (2009-2011).

Member, working group on "Effects of trade policy on management of non-native forest pests and pathogens" supported by National Center for Ecological Analysis and Synthesis (NCEAS) (2008-2010).

Recent referee activity

Proceedings of the National Academy of Sciences, Journal of Environmental Economics and Management; Journal of the Association of Environmental and Resource Economists American Journal of Agricultural Economics; Journal of Economic Dynamics and Control;

updated 10/25/18

Canadian Journal of Agricultural Economics; Ecological Economics; Environmental and Resource Economics; Mathematical Biosciences; Conservation Biology; Journal of Environmental Management.

Reviewer

U.S. Department of Agriculture, Economic Research Service contractor report (2007); U.S. Geological Survey, review of economic analysis of a state quarantine rule (2011); National Academies of Science report (2017).