

## Dr. Mark Buckley, Partner and Senior Economist

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Ph.D. Environmental Studies (Economics Focus), University of California, Santa Cruz  
B.A. Economics, Davidson College

Dr. Mark Buckley leads the natural resource practice at ECONorthwest, designing and managing economic analyses typically involving water resources and land management. Mark specializes in bringing an intuitive, strategic approach to understanding individual and group incentives to account for decision-making in policy design. He focuses on the context-specific scarcities to understand the real value of goods and services, whether they be market or non-market. The majority of his work focuses on improving efficiency of investments in watersheds and water resources, including integrated planning, restoration, conservation, and damage recovery. Mark works as part of interdisciplinary teams, typically for federal as well as state and local agencies, including USFS, USEPA, BLM, DOI, NOAA, Puget Sound Partnership, Oregon Department of Forestry, and Washington Department of Ecology. He has conducted cutting-edge research integrating restoration of ecosystem services within heavily-used areas including urban, and better understanding and designing systems to provide economic benefits from joint investments in natural and physical capital. His recent work includes leading benefit-cost analyses for water quality investments in San Diego and Orange counties, designing wildfire prevention efforts to maximize benefits and identify funding opportunities in the Sierra Nevada, long-range planning for stormwater and wastewater investments taking into account public and private objectives in Puget Sound, and improving outdoor recreation investments to provide economic benefits and business opportunities in Oregon. Mark serves as an expert witness on natural resource issues, and has served on city advisory committees. He has published research in peer-reviewed journals and has edited books, and served as an adjunct professor for environmental economics at Portland State University.

### Representative Projects

*Dr. Mark Buckley has served as Project Director on the following projects, unless otherwise noted:*

#### RESTORATION AND ALLOCATION OF WATER RESOURCES

- **Riparian Buffer Zone Analysis—Bristol, PA (2016).** For Delaware Riverkeeper, assessed the economic benefits associated with wider riparian buffer zone requirements in the Delaware River Basin.
- **San Diego TMDL Benefit-Cost Analyses—San Diego, CA (2016).** Led design and implementation of benefit-cost analyses for San Diego County, Orange County, the regional water quality control board, and other permittees involving implementation of bacteria TMDLs.

- **Clear Branch Dam NED—Parkdale, OR (2016).** Estimated benefits and costs of various upgrade and fish passage retrofits at Clear Branch Dam in the Hood River drainage for the National Resources Conservation Service (NRCS).
- **Yakima River Basin Integrated Water Resource Management Plan Economic Analyses—Yakima, WA.** Designed and managed all economic analyses for the Yakima Basin Integrated Water Resource Management Plan, for the Bureau of Reclamation and Washington Department of Ecology. Modeled economic benefits of agricultural water trading and non-market benefits of fish population improvements. Work was peer-reviewed by Reclamation economists and a team of economics professors commissioned by the State of Washington.
- **Communicating the Benefits of CWS’s Thermal Credit Trading Program—Washington County, OR (2014).** For Clean Water Services, identified benefits and economic impacts of the thermal trading program on the Tualatin River.
- **Puget Sound Partnership Environmental Funding Strategies—Olympia, WA (2013).** For the Puget Sound Partnership and the US Environmental Protection Agency (USEPA), estimated and evaluated the benefits and costs of long-range strategies for meeting stormwater and habitat goals, and developed funding strategies.
- **King County WTD Economics Support for CSO Management Costs—King County, WA (2012).** For King County, identified economic tradeoffs, risks, and uncertainties among combined sewer overflow investment alternatives.
- **Analysis of GSI Economic Benefits—Seattle, WA (2014; 2016).** For USEPA and in collaboration with Seattle Public Utilities, identified and estimated the value of benefits associated with current and potential use of green stormwater infrastructure in Seattle, Washington. Updated this study in 2016.
- **Review of Socioeconomic Determination for Clean Water Act Determinations by the State of Wisconsin—Madison, WI (2012).** For USEPA, evaluated estimates of economic impacts by the state of Wisconsin associated with heightened water quality standards.
- For USEPA, developed cost models, curves, tools, and guidance for estimating costs of compliance with ammonia water quality standards for the State of Kansas.
- For USEPA, developed cost models, curves, tools, and guidance for estimating costs and affordability of compliance with ammonia water quality standards for the states and tribes in EPA’s Region 8.
- **Wildfire Fuel Treatment and Downstream Beneficiary Financing—Mariposa, CA (2012).** Identified and estimated the economic value and job impacts associated with fuel treatment and watershed management in the Mokelumne River Basin, California for the US Forest Service, the Nature Conservancy, and the Sierra Nevada Conservancy. This includes downstream effects for utilities and communities.

- **Watershed Decision Support Tool—Hawaii Island, HI (2010).** Estimated the value of various long-term land management strategies for adaptation of water resources, in coordination with native Hawaiian groups, on Hawaii Island, Hawaii.
- **Economic Contribution of Irrigated Agriculture to the Walla Walla River Basin—Various, OR & WA (2010).** For the Confederated Tribes of the Umatilla Indian Reservation, quantified the current and historic value of irrigated agriculture in the Walla Walla Basin on a local and state level in Oregon and Washington.
- **Economic Value of Ecosystem Services Provided by the Green River—King County, WA (2010).** Identified and estimated the benefits of levee setback and riparian restoration for the Green River in an urban setting for King County, Washington. Developed monetization of values based on measures of local demand for specific ecosystem services. Analyzed and described the environmental and social justice implications across scenarios.
- **Analysis of the Value of Ecosystem Services Produced by Beavers—Southern UT (2009).** Quantified potential impacts on water resources of watershed-scale restoration of the Escalante River, Utah, via beaver restoration. Estimated the associated economic benefits, including habitat effects.
- **Programmatic Economic Impact Statement for the Yakima River Basin Integrated Water Resource Management Plan—Yakima, WA (2009).** Analyzed feasibility and developed mechanism characteristics for water quantity trading in the Yakima River Basin, Washington.
- **Homeowner and Business Stormwater Control Incentives Survey and Design—Portland, OR (2008).** Designed and implemented interviews and surveys to identify obstacles and opportunities for participation in stormwater incentive programs and identified the costs and benefits to individuals that encourage or discourage participation for Portland’s Bureau of Environmental Services.
- **Economic Benefits and Costs of Reclaimed Water—King County, WA (2008).** Estimated the costs and benefits of various options for use of reclaimed water for King County, Washington.
- Analyzed the costs and benefits of various options for restoring Puget Sound, including low-impact development projects, and assessed the feasibility of various market-based mechanisms for project evaluation and implementation.
- **Analysis of the Relationship Between Irrigation and Montana’s Economy—Helena, MT (2007).** Analyzed the potential economic consequences of public investments in existing and proposed irrigation systems for the Montana Department of Natural Resources.
- **Socioeconomic Effects of Changes in Lake Roosevelt Drawdown—Seattle, WA (2007). Position.** Assessed impacts of lower levels for Lake Roosevelt and increased downstream flows in the Columbia River.

- Compiled and analyzed costs and benefits of pollutant reduction opportunities for Lake Tahoe clarity restoration efforts.
- Surveyed and interviewed farmers and restoration project managers in the Sacramento River Conservation Area. Built decision and behavior models to identify strategies and outcomes for collaboration on landscape scale ecological restoration.
- Designed tools and techniques to help coastal communities compare the costs and benefits of water supply options, including desalination and water recycling and compared the equity and distribution of options.
- Estimated costs and benefits influencing individual decisions by farmers to participate or not in watershed-scale water quality management.

#### ENVIRONMENTAL MARKETS

- **Programmatic Economic Impact Statement for the Yakima River Basin Integrated Water Resource Management Plan – Yakima, WA (2009).** Position. Estimated the volume of water potentially traded and the impact on net earnings of various water quantity trading schemes for the Yakima River Basin.
- **Economic Indicators of Agriculture’s Future in Skagit County, WA – Skagit County, WA (2009).** Analyzed options for farmers to sell ecosystem services in the Skagit River watershed.
- **Economic Analysis of Clackamas County Forest Certification Strategy – Clackamas County, OR (2009).** Estimated revenue potential from carbon and other ecosystem service markets for public forests in Clackamas County, Oregon.
- **Economic Analysis of Action Agenda to Restore Puget Sound – Olympia, WA (2008).** Analyzed market-based mechanisms and opportunities for disaggregated and behavioral approaches to restoring Puget Sound.
- Conducted feasibility study, case study comparisons, and program design for water quality crediting and trading to support the Lake Tahoe TMDL.
- Assessed financial opportunities for multi-credit sales of single-site conservation efforts addressing wetland, water quality, habitat, and coverage markets.
- Assessed potential for farmers participate in ecosystem service-based markets in Skagit County, Washington.

#### FOREST MANAGEMENT

- **San Juan-Chama Wildfire Effects – Santa Fe, NM (2016).** For the Nature Conservancy, worked on benefits and costs of wildfire fuel treatments in the Rio Grande Basin to the San Juan-Chama region of southern Colorado and northwest New Mexico.
- **Clackamas County Pilot Urban Lumber Program – Portland, OR (2016).** Analyzed and developed strategies based on the economic feasibility of urban timber industry in Clackamas County, Oregon.

- **Taos County Wildfire Investment—Taos, NM (2015).** For the Nature Conservancy, calculated the costs and benefits of wildfire fuel treatments in the Rio Grande Basin for the Rio Grande Water Fund.
- **BLM Western Oregon Recreation Demand Analysis—Various, OR (2014).** For the Bureau of Land Management (BLM), conducted valuation of baseline and alternative-specific goods and services provided by BLM-administered land in Oregon as part of the updated resource management plan. Conducted stakeholder outreach workshops for communities on management plan impacts. Directed development of outreach materials.
- **Oregon State Forests Assessment of Alternative Revenue Sources—Salem, OR (2013).** Assessed alternative revenue opportunities for Oregon Department of Forestry in its management of state trust lands. Evaluated the potential revenue, costs, and liabilities for increasing revenue through recreation fees, donation programs, public-private partnerships, corporate sponsorships, telecommunication, and right-of-way fees.
- **Pew Trust Forest Bill Costs—Portland, OR (2013).** Evaluated the costs and revenues likely associated with HR 1526 under consideration in Congress to increase timber harvests on all federal forests. Evaluated implications for sale preparation costs, road maintenance and construction, distances to mills, market demand conditions, impacts on other public and private timber operations, and implications for specific legislative requirements on harvests in Alaska.
- Estimated economic values and job impacts of alternatives for management of BLM lands in western Oregon. Addressed market and non-market values, including timber, recreation, carbon, wildlife habitat, and ecosystem services.
- Assessed the public and private costs and benefits for public forest sustainable certification and ecosystem market participation for Clackamas County, Oregon.
- **Independent Large Cost Wildfire Review Panel—Boise, ID (2009).** Assembled and lead the Secretary of Agriculture’s Large Wildfire Independent Review on cost and risk, investigating tools, behaviors, and incentives for improving federal fire suppression efforts.
- Identified market and non-market costs and benefits for possible logging strategies on publicly owned watershed forest for city of Santa Cruz, California.

#### ENDANGERED FISH AND WILDLIFE

- **USACE Double-Crested Cormorant Management Plan Review—Portland, OR (2014).** For the Army Corps of Engineers, peer-reviewed efforts to evaluate the tradeoffs associated with alternatives for managing cormorant predation on salmon in the Columbia River.
- **Socioeconomic Benefits of a Tidal Marsh Restoration Project—Conway, WA (2011).** Identified and estimated the benefits to the local community of salmon habitat restoration activities in Fisher Slough of the Skagit River for the National Oceanic and Atmospheric Administration and the Nature Conservancy. Focused on benefits specific

to the agricultural community, particularly associated with flood protection, drainage, irrigation, and social capital.

- **Economic Value of Wildlife in Alaska—Various, AK (2011). Position.** Estimated economic value and economic job impacts associated with wildlife in Alaska for the Alaska Department of Fish and Game. Designed and implemented revealed and stated preference valuation techniques via a series of surveys of Alaska residents and non-residents addressing hunting, trapping, wildlife viewing, and existence values.
- **Estimates of Groundfish Production—Vancouver, BC (2010).** Developed econometric models to understand the cross-species effects of harvest limits of fish populations for Canada’s Department of Fisheries and Oceans.
- **Analysis of the Value of Ecosystem Services Produced by Beavers—Various, UT (2009).** Identified and quantified benefits of beaver restoration for water quality, water quantity, and habitat provision in the Escalante watershed, Utah.
- **Hawaiian Monk Seal Designation Economic Impacts—Honolulu, HI (2009). Position.** Estimated the economic impacts of critical habitat designation for Hawaiian monk seals in Hawaii.
- Estimated cost of offsetting impact of once-through cooling operations for power plants on California’s central coast. Target habitats include estuaries and near-shore marine with endangered bird and marine mammal species.
- Identified types of impacts of potential endangered species establishment on private lands. Provided strategies for species restoration compatible with private land use.

#### OUTDOOR RECREATION

- **Chehalem Ridge Recreation Demand Analysis—Portland, OR (2016).** For Portland Metro, assessed the demand for the various outdoor recreation and tourism services potentially offered by the Chehalem Ridge Natural Area near Gaston.
- **Bend Parks Scoping—Bend, OR (2016).** Designed an analysis of Bend Parks and Recreation’s economic contribution to the community.
- **Wenatchee Outdoor Recreation Economic Analysis—Wenatchee, WA (2016).** For Chelan and Douglas counties in Washington State, conducted economic analyses and surveys to develop outdoor recreation economic development strategies for the region, including Wenatchee, Leavenworth, Lake Chelan, and surroundings.
- **Travel Oregon Recreation Analysis—Portland, OR (2016).** For Travel Oregon, designed and implemented a study of outdoor recreation economic activity for the Columbia River Gorge.
- **Whitewater Play Park at the Willamette Falls—Portland, OR (2015). Project Manager.** Forecasted the uses, the economic benefits, and the market job and income impacts of a proposed whitewater park at Willamette Falls.

- **BLM Western Oregon Recreation Demand Analysis— Various, OR (2014).** For the Bureau of Land Management, identified outdoor recreation supply and demand in western Oregon in order to identify relative and absolute scarcities by recreation type in order to prioritize recreation investments that would provide the most value.
- **Wasatch Summit Program Study— Wasatch County, UT (2013).** Evaluated recreation effects of public transportation proposals for the Wasatch Mountains.
- Identified funding strategies for outdoor recreation investments and maintenance for the Oregon Department of Forestry.
- Estimated the recreation benefits and market impacts associated with a change in reservoir management and levels.
- Estimated the economic costs via recreation and property value effects of a change in reservoir levels in Washington.

#### SUSTAINABLE MANAGEMENT OF ECOSYSTEMS AND COMMUNITIES

- **Ecosystem Service Resiliency Value Mapping— Suva, Fiji (2016).** Assisted ecologists identifying and mapping important natural resources and associated ecosystem services in Fiji in terms of long-term climate change resiliency investment prioritization.
- **Financial Plan for Invasive Species Program in Lake Tahoe Region— Lake Tahoe, CA (2012).** Estimated the economic benefits and associated incentives associated with aquatic invasive species control alternatives for Lake Tahoe.
- **Review of Socioeconomic Determination for Clean Water Act Determinations by the State of Wisconsin— Various, WI (2012).** Reviewed the economic guidelines for implementing antidegradation Clean Water Act standards for Wisconsin.
- **Framework for Incorporating Ecosystem Services into Environmental Impact Assessment in Jamaica— Kingston, Jamaica (2011).** Developed guidelines and approaches to evaluating economic values of natural resource tradeoffs associated with resource development proposals in Jamaica. Funded by Jamaica's National Environment and Planning Agency and the United Nations Development Programme.
- **Economic Value of Wildlife in Alaska— Various, AK (2011).** For the Alaska Department of Fish and Game, analyzed the economic importance of hunting trapping, wildlife-based recreation, subsistence and traditional use, and other wildlife-related activities to the Alaskan communities and the economy statewide.
- **Idaho Conservation Market Rent Study— Boise, ID (2011).** For the Idaho Department of Lands, evaluated potential mechanisms for generating revenue from state trust lands including: (1) leasing land for conservation management, (2) receiving payments for environmental services, and (3) constructing conservation asset arrangements such as game preserves.
- Estimated the economic benefits of existing and potential green infrastructure for the Great Lakes Basin and the Chesapeake Bay Basin.

- **Economic Benefits of GSI in the Clinton River Watershed—Various, MI (2011).** Estimated the economic costs, benefits, and impacts for green infrastructure in central Michigan.
- Estimated the economic benefits of water quality antidegradation for communities in Kentucky.
- **Economic Impacts of a Wind Farm—Union, OR (2010).** Identified and estimated the economic effects and impacts of a nearby wind project for the city of Union, Oregon.
- **Economic Value of Portland Metro Intertwine—Portland, OR (2010).** Estimated the value of ecosystem services and impact on property values provided by the Portland Metro Intertwine park system.
- **Socioeconomic Analysis of a Proposed Transmission Line, Montana and Idaho—Various (2010).** Analyzed the economic impacts of the effects of a proposed energy transmission line through Montana and Idaho.
- **Economic Indicators of Agriculture’s Future in Skagit County, WA—Skagit County, WA (2009).** Assessed the drivers for sustainability of agriculture and developed indicators in Skagit County, Washington.
- **Economic Analysis of Action Agenda to Restore Puget Sound—Olympia, WA (2008).** For the Puget Sound Partnership, identified costs and long-term funding strategies for the Action Agenda’s Strategic Initiatives concerning salmon habitat, urban stormwater, and shellfish beds.
- Designed database tool for estimating costs of monitoring activities for indicators and desired conditions in the Lake Tahoe Basin.
- Analyzed costs and benefits influencing cooperation decisions for private landowners for invasive plant control programs.

#### ECONOMICS OF REGULATIONS

- **CWA Penalty Economic Analysis—Eugene, OR (2016).** Estimated national costs of Clean Water Act compliance net of state and local water quality requirements.
- **Economic Benefits of Managing Stormwater Runoff Using Green Infrastructure—Los Angeles, CA (2015).** Identified and estimated potential economic benefits of use of green infrastructure for stormwater regulation compliance.
- **Benefits and Costs of Closed-Cycle Cooling Technology—Various, NJ (2013).** Developed framework for identifying economic values and activity provided by maintaining water quality antidegradation for pollution discharge permitting.
- **Economics of Financing and Incentives for Green Infrastructure—National (2011).** Developed cost-effective planning guidelines for national reports on green infrastructure in communities.
- Operated simulation models and conducted econometric analyses to estimate firm-specific impacts of Clean Air Act regulations on the iron and steel industry.

- Estimated the costs of a business-as-usual approach to climate change for Washington, Oregon, and New Mexico.
- Operated simulation models and conducted econometric analyses to estimate firm-specific impacts of Clean Air Act regulations on the reinforced plastics industry.

#### ENERGY

- **NRDC Habitat Mitigation Costs—San Francisco, CA (2012).** Developed models for habitat avoidance and mitigation benefits and costs for energy transmission route-planning in the western United States for the Western Electricity Coordinating Council.
- **NRDC/Eastern Interconnection Transmission System Planning—Various (2010).** **Position.** Identified means for incorporating economic effects via ecosystem services for energy transmission planning on the East coast via the Eastern Interconnection Planning Collaborative.
- **Estimating Embedded Energy Savings from Water Conservation Programs—San Francisco, CA (2008).** **Position.** Described embedded energy benefits from water conservation efforts in California.
- Developed price elasticity models of energy consumption in response to tiered and time-of-use pricing in California.

#### COMPLEX SYSTEM ANALYSIS

- **Skagit County Forecasts and Fiscal Indicators—Skagit County, WA (2010).** **Position.** Developed indicators and model mechanisms for Alternative Futures model of Skagit County, Washington.
- Created agent-based models of restoration activities in agricultural landscapes to identify successful spatial strategies for project site selection.
- Developed agent-based models to simulate learning and criminal behavior based on nearby activity.
- Collaborated on spatially-explicit agent-based models of cooperation and competition for limited resources.

### Expert Testimony and Litigation Support

#### ECONOMIC DAMAGES TO NATURAL RESOURCES

- Participated in development and implementation of tribal listening sessions and led economic method review and design to support Department of Interior in improvement of natural resource damage assessment and restoration methods involving lost tribal cultural services.
- Estimated recreation and property value effects of lake contamination from sediment runoff in Hawaii.
- Estimated the economic value of habitat and wildlife benefits associated with converting from once-through to closed-cycle cooling for the Mercer coal-fired power plant in Trenton, New Jersey.

- Estimated the economic value of habitat and wildlife benefits associated with converting from once-through to closed-cycle cooling for the Bridgeport Harbor Station coal-fired power plant in Bridgeport, Connecticut.
- Estimated the economic costs of a large wildfire for a private client.
- Estimated the costs and benefits of cooling technology upgrades for the Salem Nuclear Power Plant on Delaware Bay.
- Estimated the recreation benefits of a mountain valley restoration.
- Estimated the damages to water resources and associated ecosystem services of a pollution spill in an urban area for a confidential client.
- Estimated value of damages to ecosystem services via Habitat Equivalency Analysis for a Superfund mining site.
- Estimated the costs of damages to fisheries and estuary ecosystem from coastal power plant expansion in Moss Landing, California.
- Conducted economic analyses to compare damages of proposed power plant expansion to benefits of proposed restoration activities for Morro Bay, California including use and improvement of standard Habitat Equivalency Analysis techniques.

### Peer-Reviewed Publications

- Hanson, D.A., A.W. Wolfson, M.C. Buckley, and D.R. Reimer. Incorporating Landscape Connectivity and Uncertainty into Ecosystem Restoration Scaling of Environmental Damages. 2016. Volume 203 of WIT Transactions on Ecology and Environment (ISSN: 1746-448X Digital ISSN: 1743-3541).
- Buckley, M., S. Brown, S. Detwiler, and J. Odefey. 2012. Green Infrastructure Alternatives. Water Utility Infrastructure Management Journal. Optimizing Water Performance. October. 26-28.
- Odefey, J., R. Blackwell, S. Brown, M. Buckley, S. Detwiler, K. O'Hara, K. Rousseau, P. Raviprakash, T. Souhlas, and A. Trice. 2012. Banking on Green: A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits Community-Wide. American Rivers, WEF, ASLA, and ECONorthwest. April.
- Buckley, M. and E. Niemi. 2011. "Climate Change Implications for Ecological Restoration Planning." *Social Dimensions of Ecological Restoration*, D. Egan, E. Hjerpe, J. Abrams (eds). Island Press. 177-187.
- Buckley, M. and K. Holl. 2011. "Game Theory Tools for Improving Ecological Restoration Outcomes." *Human Dimensions of Ecological Restoration*, D. Egan, E. Hjerpe, J. Abrams (eds). Island Press. 239-254.
- Buckley, M. and E. Crone. 2008. "Negative Off-Site Impacts of Ecological Restoration: Understanding and Addressing the Conflict." *Conservation Biology*. 22(5): 1118-1124.

- Buckley, M. 2008. "Ecosystem Service Trading Markets: An Important Conservation Tool." *Conservation Science Institute Quarterly*.
- Buckley, M. 2007. "The Problem of Restoring Natural Systems Among Social Systems: Strategic Considerations and the Sacramento River." Ph.D. Dissertation. University of California, Santa Cruz.
- Buckley, M. 2007. Encyclopedia entries for Cost-Benefit Analysis, Efficiency, Riparian Rights, and Nash Equilibrium. *Encyclopedia of Environment and Society*. P. Robbins (ed). Sage: Thousand Oaks, CA.
- Langridge, S.M., M. Buckley, K. D. Holl. 2007. "Strategies for overcoming obstacles to restoring natural capital: Large-scale restoration on the Sacramento River". *Restoring Natural Capital*, J. Aronsen, S. Milton, J. Blignaut (eds). Island Press.
- Buckley, M. and B. Haddad. 2006. "Socially Strategic Restoration: A Game-Theoretic Analysis of River Restoration." *Environmental Management* 38(1): 48-61.

### **Presentations**

- Buckley, M., 2016. Benefits and Incentives for Fuels Treatment in the Mokelumne Basin, CA. 5<sup>th</sup> International Fire Behavior and Fuels Conference. International Association of Wildfire. Portland, OR.
- 2016. Outdoor Recreation Economic Potential on Public Lands. Pacific Northwest Regional Economics Conference. Vancouver, WA.
  - 2016. Benefits and Costs of the Yakima Integrated Plan. Pacific Northwest Regional Economics Conference. Vancouver, WA.
  - 2016. Incorporating Landscape Connectivity and Uncertainty into Ecosystem Restoration Scaling of Environmental Damages. DOI NRDAR National Workshop. Phoenix, AZ.
  - 2015. Outdoor Recreation Economic Benefits for Restoration Planning. USFS Shasta-Agness Planning Workshop. Gold Beach, OR.
  - 2014. Economic Scarcities and Tradeoffs for Ecosystem Services. USFS-India Outreach Workshop.
  - 2014. Beaver Effects and Climate-Induced Scarcities. National Fish, Wildlife and Plants Climate Adaptation Strategy. Invited.
  - 2014. Economic Implications of Climate Change for Oregon. Association of Oregon Industries. Portland, OR. Invited.
  - 2014. Natural Resource Economic Scarcities and Tradeoffs in the Rogue Basin. USFS Rogue Basin Planning Workshop, Medford, OR.

- 2014. Stormwater Costs and Funding for Puget Sound Basin. Association of Washington Cities, Annual Conference. Spokane, WA. Invited.
- 2014 Demands and Scarcities for Avoided Wildfire in the Mokelumne Basin. U.S. Forest Service Planning for Growth and Open Space Conservation Series. Invited.
- 2014. Opportunities and Constraints for Forest Management in the Pacific Northwest. Pacific Northwest Regional Economics Conference. Portland, OR.
- 2014. Valuing Ecosystem Services of Forests for Policy Design and Funding. Oregon Association of Environmental Professionals. Invited. Portland, OR. Invited.
- 2013. Valuing Natural Resources and Resiliency in Urban and Rural Contexts. Louisiana Resiliency Assistance Program. Invited. Louisiana State University.
- 2013. Valuing Natural Resources in Urban and Rural Contexts. American Society of Landscape Architects Annual Conference. Boston, MA.
- 2013. Identifying Real Avoided Costs to Stakeholders. Ecosystem Services Valuation Workshop. Invited. Cascadia Ecosystem Services Partnership. Portland, OR.
- 2013. Integrating Ecological Function into Floodplain Economies. Floodplain State of the Science Meeting. Invited. Puget Sound Partnership. Tacoma, WA.
- 2013. Common Ground of Fisher Slough: Long-Term Socioeconomic Benefits from a Freshwater Marsh Restoration. Salmon Recovery Conference. Vancouver, WA.
- 2012. Developing Natural Resource Valuation Methods for Jamaica. Invited. National Environment and Planning Agency. Kingston, Jamaica.
- 2012. Economics of Green Infrastructure. Invited. Valuing Green Infrastructure Symposium. University of Washington, Seattle, WA.
- 2012. Economic Evaluation of Ecosystem Services for Policy: Theory and Case Studies. Invited Keynote. Nebraska Water Law Conference. Omaha, NE.
- 2012. Economics of Green Infrastructure. Invited Keynote. Nebraska Water Conference. Omaha, NE.
- 2012. Ecosystem Services and Economic Benefits of Beaver Restoration in the Escalante River Basin, UT. Nebraska Water Conference. Omaha, NE.
- 2012. Economics of Green Infrastructure. River Network River Rally. Portland, OR.
- 2012. Economic Challenges for No Net Loss of Ecosystem Service Mitigation, with a Portland Case Study. A Community on Ecosystem Services (ACES). Portland, OR.

- 2012. Webinar Series on Green Infrastructure Economics, Great Lakes and Chesapeake Basins. American Rivers.
- 2012. The Economics of Water Resource Allocation. Public Interest Environmental Law Conference. Eugene, OR.
- 2012. Discounting Future Costs and Benefits of Natural Resource Policy. Public Interest Environmental Law Conference. Eugene, OR.
- 2011. Moving Closer to Meaningful Water Markets: A Closer Look at the Yakima River Basin. Columbia Basin Water Conference. Stevenson, WA.
- 2011. The Economics of Watershed Costs and Benefits. Kenai River Symposium. Invited. Soldotna, AK.
- 2011. Green Infrastructure Economics for Rivers. River Network River Rally. Charleston, SC.
- 2011. Identifying and Estimating Economic Benefits for Antidegradation. River Network River Rally. Charleston, SC.
- 2011. "Economic Implications of Climate Change on Watershed Restoration Projects with a Beaver Case Study." Oregon Water Conference. Corvallis, OR.
- 2010. "Getting Demand Right for Valuing Urban Ecosystem Services in the Pacific Northwest." A Community on Ecosystem Services (ACES) Conference. Phoenix, AZ.
- 2010. "Building Risk and Uncertainty from Climate Change into Economic Valuation of Ecosystem Services." A Community on Ecosystem Services (ACES) Conference. Phoenix, AZ.
- 2010. "Identifying and Estimating Economic Benefits from Antidegradation – the Clean Water Act." Invited. River Network Annual Conference. Snowbird, UT.
- 2010. "Economics and Uncertainty for Restoring Ecosystem Services in Puget Sound." Society for Ecological Restoration - Northwest. Tukwila, WA.
- 2009. "Markets and Incentives for Restoring Water Quality in Puget Sound." 2009 Annual Water Resources Conference. American Water Resources Association. Seattle, WA.
- 2009. "Potential Economic Costs of a Business-as-Usual Approach to Climate Change: Implications for Water Resources in Three Western States." 2009 Annual Water Resources Conference. American Water Resources Association. Seattle, WA.
- 2009. "Water Quality Trading as a Tool for Puget Sound Recovery: Lessons, Obstacles and Opportunities." 2009 Puget Sound Georgia Basin Science Conference.

- 2009. "Water Resources and Markets for Ecosystem Services." Invited. Oregon State University.
- 2009. "Valuing Ecosystem Services from Beaver Restoration." Invited. Working Beavers Conference. Liberty Lake, WA.
- 2008. "Restoring Puget Sound with an Incremental Market-Based Approach." A Conference on Ecosystem Services. Naples, FL.
- 2008. "Instream Value Considerations for Watershed Restoration." Invited. Instream Values Symposium, Washington State Department of Ecology. Lacey, WA.
- 2007. "Addressing Risk, Uncertainty, and Behavioral Effects to Inform the Viability and Design of a Water Quality Trading Program for Lake Tahoe." Truckee River Headwaters Symposium: Headwaters to Terminus. Reno, NV.
- 2007. "Strategic Interactions Across Property Boundaries in Invasive Plant Control and Implications for Cooperation." Invited Plenary. California Invasive Plant Council Meeting. San Diego, CA.
- 2007. "Restoring Natural Systems Among Social Systems: Strategic Considerations from the Sacramento River." Ecological Society of America Meeting. San Jose, California.
- 2007. "Increasing the Ecological Gains from Water Quality Crediting and Trading: Disaggregated Strategic Responses and an Application to the Lake Tahoe Basin." U.S. Society for Ecological Economics Biannual Conference, New York, NY.
- 2007. "Ecological Restoration and Local Landowner Responses: a Survey and Game Theory Simulations From the Sacramento River." 7th Meeting on Game Theory and Practice Dedicated to Energy, Environment and Natural Resources. GERAD, University of Montreal, Montreal, QC.
- 2007. "Negative Off-Site Impacts of Ecological Restoration: Understanding and Avoiding Conflict." The Nature Conservancy Sacramento River Science Conference, Sacramento, CA.
- 2006. "Local Scale Game-Theoretic and Landscape Scale Agent-Based Models of Social Conflict for Restoration of the Sacramento River." CALFED Science Conference, Sacramento, CA.
- 2006. "A Comprehensive Economic and Environmental Framework Tool to Fully Assess the Benefits and Costs of Desalination." CALFED Science Conference, Sacramento, CA.
- 2005. "Local Strategic Interactive Models and Landscape Scale Agent-Based Simulation for Conservation and Restoration Planning." American Water Resources Association Conference. Seattle, WA.

- 2005. "Extending local interactive models to the landscape scale using agent-based simulation for the Sacramento River Conservation Area." U.S. Society for Ecological Economics Biannual Conference, Tacoma, WA.
- 2005. Socially Strategic Restoration: Survey Data and Decision Models for the Sacramento River Conservation Area." Sacramento River Conservation Area Technical Advisory Committee. Invited.
- 2005. "Distribution of Weeds in an Agricultural-Natural Landscape Mosaic: Are Restored Forests Bad for Farmers?" U.S. Department of Agriculture Managed Ecosystems Conference. Washington, DC. Invited.
- 2004. "Farmers and Restoration: Strategic Decision Models Using Survey Data for the Sacramento River Conservation Area." CALFED Science Conference, Sacramento, CA.
- 2004. "Strategic Restoration." Northern California Environmental Economics Conference, CSU-Chico. Invited.
- 2004. "Economics, Games, and Policy Implementation." PrecipNet Climate Change Conference. Santa Cruz, CA. Invited.
- 2004. "Contingent Decision-Making and River Restoration." International Society for Ecological Economics Biannual Conference, Montreal, QC.
- 2004. "Strategic Restoration: Applying Game Theory to Conflict over Restoration on the Sacramento River." International Society for Ecological Restoration, Victoria, BC.
- 2003. "A Game-Theoretic Model of the Sacramento River Restoration." U.S. Society for Ecological Economics Biannual Conference, Saratoga Springs, NY.