

## CURRICULUM VITAE

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### I. Education

- B.S.** 1986 (with honors, Phi Beta Kappa), Earth Science, University of California, Santa Cruz.  
**Ph.D.** 1997 Environmental and Ecological Economics, University of Maryland, College Park.

### II. Professional Background

- 1995–1998 *Assistant Research Scientist/Project Manager*, University of Maryland, Institute for Ecological Economics, Center for Environmental Science  
1998–2004 *Assistant Research Scientist*, University of Maryland, Ctr for Environmental Science  
2004–2006 *Associate Research Scientist*, Univ. of Maryland, Ctr for Environmental Science  
2006–2013 *Research Associate Professor*, Univ. of Maryland, Ctr for Environmental Science  
2008–2013 *Economics Advisor*, US EPA, ORD, Ecosystem Services Research Program  
2013–present *Research Professor*, University of Maryland, Center for Environmental Science

### III. Research

#### A. Areas of Professional Expertise

- Integrated ecological and economic evaluation of policy/management options
- Ecosystem service trading, mitigation & offsets
- Decision support tools for maximizing net economic benefits of restoration
- Performance-based metrics for environmental restoration targeting
- Invasive species risk assessment
- GIS and spatial data statistical modeling

#### B. Peer-Review Publications

##### Papers & Book Chapters

- Kleinman, P.J.A., Fanelli, R.M., Hirsch, R.M., Buda, A.R., Easton, Z.M., Wainger, L.A., Brosch, C., Lowenfish, M., Collick, A.S., Shirmohammadi, A., Boomer, K., Hubbart, J.A., Bryant, R.B., Shenk, G.W., 2019. Phosphorus and the Chesapeake Bay: Lingering Issues and Emerging Concerns for Agriculture. *Journal of Environmental Quality*. <https://doi.org/10.2134/jeq2019.03.0112>
- Lookingbill, T.R., Minor, E.S., Wainger, L.A., 2019. Chapter 6: The Ecosystem Service Impacts from Invasive Plants in Antietam National Battlefield, in: Lookingbill, T.R., Smallwood, P.D. (Eds.), *Collateral Values*, Landscape Series. Springer Nature, Switzerland.
- Wainger, L.A., Helcoski, R., Farge, K.W., Espinola, B.A., Green, G.T., 2018. Evidence of a Shared Value for Nature. *Ecological Economics* 154, 107–116. <https://doi.org/10.1016/j.ecolecon.2018.07.025>

- Wainger, L. A., N. E. Harms, C. Magen, D. Liang, G. M. Nessler, A. M. McMurray, and A. F. Cofrancesco. 2018. Evidence-based economic analysis demonstrates that ecosystem service benefits of water hyacinth management greatly exceed research and control costs. e26617v1. PeerJ Inc. doi:10.7287/peerj.preprints.26617v1
- Olander, L.P., Johnston, R.J., Tallis, H., Kagan, J., Maguire, L.A., Polasky, S., Urban, D., Boyd, J., Wainger, L., Palmer, M., 2018. Benefit relevant indicators: Ecosystem services measures that link ecological and social outcomes. *Ecological Indicators* 85, 1262–1272. <https://doi.org/10.1016/j.ecolind.2017.12.001>
- Wainger LA, Secor D, Gurbisz C, Kemp M, Glibert PM, Richkus J, Barber M. 2017. Resilience indicators support valuation of estuarine ecosystem restoration under climate change. *Ecosystem Health and Sustainability*. <http://onlinelibrary.wiley.com/doi/10.1002/ehs2.1268/full>
- Wainger, L., A. McMurray, M. Paolisso, K. J. Johnson, and B. Needelman. 2017. Coastal Community Values for Marsh-Dependent Socioecological Services Revealed through a Systematic Qualitative Approach. *Agricultural and Resource Economics Review* 46: 1–27.
- Olander, L., S. Polasky, J. S. Kagan, R. J. Johnston, L. Wainger, D. Saah, L. Maguire, J. Boyd, D. Yoskowitz. 2017. So you want your research to be relevant? Building the bridge between ecosystem services research and practice. *Ecosystem Services* 26: 170–182.
- Wainger L, Yu H, Gazenski K, Boynton W. 2016. The relative influence of local and regional environmental drivers of algal biomass (chlorophyll-a) varies by estuarine location. *Estuarine, Coastal and Shelf Science* 178:65–76.
- Nessler GM, Wainger LA, Harms NE, Cofrancesco AF. 2016. Quantifying the population response of invasive water hyacinth, *Eichhornia crassipes*. *Biological Invasions* 18:2107–2115.
- O’Leary CA, Perry E, Bayard A, Wainger L, Boynton WR. 2016. Linking innovative measurement technologies (ConMon and Dataflow© systems) for high-resolution temporal and spatial dissolved oxygen criteria assessment. *Environmental Monitoring and Assessment* 188:543.
- Richkus J, Wainger LA, Barber MC. 2016. Pathogen reduction co-benefits of nutrient best management practices. *PeerJ* 4:e2713.
- Johnston, R. and L. Wainger. 2015. Benefit Transfer for Ecosystem Service Valuation: An Introduction to Theory and Methods. Chapter 12 In: *Handbook of Environmental Benefit Transfer* (R. Johnston, J. Rolfe, R. Rosenberger, and R. Brouwer, eds.). Springer.
- Mazzotta, M., L. Wainger, S. Sifleet, J. T. Petty, and B. Rashleigh. 2015. Benefit transfer with limited data: An application to recreational fishing losses from surface mining. *Ecological Economics* 119:384–398. UMCES Technical Report # TS-728-15.
- Munns, W. R., A. W. Rea, M. J. Mazzotta, L. A. Wainger, and K. Saterson. 2015. Toward a standard lexicon for ecosystem services. *Integrated Environmental Assessment and Management* 11:666–673.
- Costanza, R. K. Chichakly, V. Dale, S. Farber, D. Finnigan, K. Grigg, and 12 co-authors. 2014. Simulation games that integrate research, entertainment, and learning around ecosystem services. *Ecosystem Services* 10:195–201.
- Koch, B. J., C. M. Febria, M. Gevrey, L. A. Wainger, and M. A. Palmer. 2014. Nitrogen Removal by Stormwater Management Structures: A Data Synthesis. *JAWRA Journal of the American Water Resources Association* 50:1594–1607.
- Lookingbill, T. R., E. S. Minor, J. R. Ferrari, N. Bukach & L. A. Wainger. 2014. Using Risk of Reinvasion to Prioritize Invasive Plant Species Management. *Natural Areas Journal*. 34(3):268-281.
- Wainger, L. A., and Shortle, J.S. 2013. Local Innovations in Water Protection: Experiments with Economic Incentives. *Choices: The Magazine of Food, Farm & Resource Issues* 28.

- Wainger, L. A., G. Van Houtven, R. Loomis, J. Messer, R. Beach, and M. Deerhake. 2013. Tradeoffs among Ecosystem Services, Performance Certainty, and Cost-efficiency in Implementation of the Chesapeake Bay Total Maximum Daily Load. *Agricultural and Resource Economics Review* 42:196–224.
- Boynton, W. R., C. L. S. Hodgkins, C. A. O’Leary, E. M. Bailey, A. R. Bayard, and L. A. Wainger. 2013. Multi-decade Responses of a Tidal Creek System to Nutrient Load Reductions: Mattawoman Creek, Maryland USA. *Estuaries and Coasts*:1–17.
- Setterfield, S. A., N. A. Rossiter-Rachor, M. M. Douglas, L. Wainger, A. M. Petty, P. Barrow, I. J. Shepherd, and K. B. Ferdinands. 2013. Adding Fuel to the Fire: The Impacts of Non-Native Grass Invasion on Fire Management at a Regional Scale. *PLoS ONE* 8:e59144.
- Wainger, L. A. 2012. Opportunities for Reducing Total Maximum Daily Load (TMDL) Compliance Costs: Lessons from the Chesapeake Bay. *Environmental Science & Technology* 46:9256–9265.
- Suarez-Rubio, M., T. Lookingbill, and L. Wainger. 2012. Modeling exurban development near Washington, DC, USA: comparison of a pattern-based model and a spatially-explicit econometric model. *Landscape Ecology* 27:1045–1061.
- Tallis, H., S. Lester, M. Ruckelshaus, M. Plummer, K. McLeod, A. Guerry, S. Andelman, M.R Caldwell, M. Conte, S. Copps, D. Fox, R. Fujita, S. D Gaines, G. Gelfenbaum, B. Gold, P. Kareiva, C. Kim, K. Lee, M. Papenfus, S. Redman, B. Silliman, L. Wainger, C. White. 2012. New Metrics for Managing and Sustaining the Ocean’s Bounty. *Marine Policy* 36:303-306.

### Peer-Reviewed Technical Reports

- Shenk, G.W., Wainger, L.A., Wu, C., Capel, P., Friedrichs, M., Hubbard, J.A., Iho, A., Kleinman, P.J.A., Sellner, K., Stephenson, K., 2020. Assessing the Environment in Outcome Units (AEIOU): Using Eutrophying Units for Management (No. STAC Publication 20-003; TS-751-20; UMCES-CBL # 2020-065). Edgewater, MD.
- Wainger, L.A. and M.A. Weber, 2019. Nutrient Credit Trading Could Expand Maryland Oyster Aquaculture. Maryland Sea Grant Fact Sheet. FS-1103.  
<https://extension.umd.edu/learn/publications/nutrient-credit-trading-could-expand-maryland-oyster-aquaculture>
- Hood, R.R., Shenk, G.W., Dixon, R., Ball, W.P., Bash, J., Cerco, C.F., Claggett, P., Harris, L., Ihde, T., Linker, L.C., Sherwood, C., Wainger, L.A., 2019. *Chesapeake Bay Program Modeling in 2025 and Beyond*. STAC Publication 19-001, Edgewater, MD.
- Price, E, Hollady, T, Wainger, L, 2019. Cost Analysis of Stormwater and Agricultural Practices for Reducing Nitrogen and Phosphorus Runoff in Maryland. UMCES Technical Report # TS-730-19. [https://www.researchgate.net/publication/332275400\\_Cost\\_Analysis\\_of\\_Stormwater\\_and\\_Agricultural\\_Practices\\_for\\_Reducing\\_Nitrogen\\_and\\_Phosphorus\\_Runoff\\_in\\_Maryland](https://www.researchgate.net/publication/332275400_Cost_Analysis_of_Stormwater_and_Agricultural_Practices_for_Reducing_Nitrogen_and_Phosphorus_Runoff_in_Maryland)
- McGee, B., M. Bryer, J. Davis-Martin, L. Wainger, R. Batiuk, J. Greiner, S. Newbold, K. Saunders, S. Phillips, R. Dixon. 2017. *Quantifying Ecosystem Services and Co-Benefits of Nutrient and Sediment Pollutant Reducing BMPs*. STAC Publication Number 17-008, Edgewater, MD. 37 p.
- Wainger, L., and D. Ervin. 2017. *Synthesis Chapter-The Valuation of Ecosystem Services from Farms and Forests: Informing a Systematic Approach to Quantifying Benefits of Conservation Programs*. The Council on Food, Agriculture & Resource Economics and USDA Office of Ecosystem Markets. <http://www.cfare.org/UserFiles/file/SynthesisChapter-TheValuationofEcosystemServicesfromFarmsandForests.pdf>.
- Wainger, L., Loomis, J., Johnston, R.J., Hansen, L., Carlisle, D., Lawrence, D., Gollehon, N., Duriancik, L., Schwarz, G., Ribaldo, M., Gala, C., 2017. *Chapter 2: Ecosystem Service Benefits Generated by Improved Water Quality from Conservation Practices*. The Council on Food, Agriculture & Resource Economics and USDA OEM, Washington, DC. Available online.

- Davis-Martin, J., Devereux, O., Batiuk, R., Hobbs, B., Wainger, L., Dixon, R., 2017. *Cracking the WIP: Designing an Optimization Engine to Guide Efficient Bay Implementation*. STAC Publication Number 17-004. STAC, Edgewater, MD.
- Wainger, L. A., A. McMurray, H. R. Griscom, E. O. Murray, J. A. Cushing, C. Theiling and S. Komlos. (in press). *A Proposed Ecosystem Services Analysis Framework for the US Army Corps of Engineers*. USACE ERDC Technical Report.
- Murray, E. O., G. F. Mendoza, L. Wainger, H. Griscom, and J. Cushing. (in press). *Ecosystem Goods and Services (EGS) Models and Tools: A Synthesis Report of information in the EGS Model and Tools Catalog*. US Army Corps of Engineers, Engineer Research and Development Center.
- Olander, Lydia, Robert J. Johnston, Heather Tallis, Jimmy Kagan, Lynn Maguire, Steve Polasky, Dean Urban, James Boyd, Lisa Wainger, and Margaret Palmer. 2015. *Best Practices for Integrating Ecosystem Services into Federal Decision Making*. Durham: National Ecosystem Services Partnership, Duke University. doi:10.13016/M2CH07.
- Wainger, L. A., and C. Magen. 2015. *EnviroAtlas Use Case: Opportunities for improving water quality and related ecosystem services from cost-effective targeting of manure transportation subsidies*. For US EPA Office of Research and Development. <http://www.epa.gov/enviroatlas/enviroatlas-use-cases>.
- Wainger, L. A., R. J. Johnston, K. J. Bagstad, C. F. Casey, and T. Vegh. 2014. *Social Impact Analysis: Monetary Valuation*. In: *The Federal Resource Management and Ecosystem Services Guidebook* (Olander, L. et al. eds.). National Ecosystem Services Partnership, Nicholas School of the Environment, Duke University. <https://nespguidebook.com/assessment-framework/monetary-valuation/>.
- Olander, L. et al. 2015. *The Federal Resource Management and Ecosystem Services Guidebook*. (revised in 2015). <https://nespguidebook.com>
- Ribaudo, M., C. Abdalla, K. Stephenson, and L. Wainger. 2014. *Critical Issues in Implementing Nutrient Trading Programs in the Chesapeake Bay Watershed*. STAC Workshop Report. Chesapeake Research Consortium, Annapolis, MD.
- Murray, E., J. Cushing, L. Wainger, and D. Tazik. 2013a. *Incorporating Ecosystem Goods and Services in Environmental Planning – Definitions, Classification and Operational Approaches*. Technical Report, USACE ERDC.
- Murray, E., J. Cushing, L. Wainger, and D. Tazik. 2013b. *Incorporating Ecosystem Goods and Services in Environmental Planning – Definitions, Classification and Operational Approaches*. Technical Note, USACE ERDC.
- Tazik, D., E. Murray, J. Cushing, and L. Wainger. 2013. *Incorporating Ecosystem Goods and Services in Environmental Planning: A Literature Review of Definitions, Classification and Operational Approaches*. Technical Report, USACE ERDC.
- Wainger, L.A., T. Lookingbill, and E. Minor. 2012. *To Weed or Not to Weed? An Economic Decision Support Tool for National Capital Region Parks*. Prepared for: National Park Service, Center for Urban Ecology. Cooperative agreement #: NPS: H399060006, UMCES 075-25595. UMCES Technical Report # TS-734-19.
- Wainger, Lisa A., Jay J. Messer, Mary C. Barber, Robert M. Wolcott and Andrew L. Almeter. 2012. *Lowering Barriers to Achieving Multiple Environmental Goals in the Chesapeake Bay*. U.S. Environmental Protection Agency (US EPA) Ecosystem Services Research Program (ESRP). <https://www.epa.gov/eco-research/ecosystem-services>
- Wainger, L.A. and A.R. Bayard. 2012. *Spatial Analysis of Water Quality Conditions and Drivers*, Chapter 4, in Ecosystem Processes Component (EPC). Maryland Chesapeake Bay Water Quality Monitoring Program, Level 1 report No. 29. In draft.

## Other Reports, Discussion Papers, Online Products, and Draft Manuscripts

- Weber, M.A., Wainger, L.A., Harms, N.E., Nessler, G.M., (submitted). Planning for Unpredictability: Value of Invasive Species Management Research. *J. of Lake and Reservoir Management*.
- Wainger, L., Woodland, R., Hollady, T. 2019. Evaluating Costs and Benefits of the Department of Defense Legacy Resource Management Program. UMCES Technical Report # TS-747-19 and Ref. No. [UMCES]CBL 2020-030.
- Weber, M.A., Wainger, L.A., Parker, M., Hollady, T., 2018. The potential for nutrient credit trading or economic incentives to expand Maryland oyster aquaculture. Report to Maryland Sea Grant, Award#NA14OAR4170090. UMCES Technical Report # TS-718-19, University of Maryland Center for Environmental Science, Solomons, MD.
- Hychka, K., Wainger, L.A., Murray, E.O., Filoso, S., 2018. Nontidal Wetlands and Flood Attenuation USACE Technical Report (Draft submitted). ERDC-EL, Vicksburg, MS.
- Hollady, T., Wainger, L. A., Bhaskaran, H., and O'Neil, J., 2018. You've Got Kale: A Game Teaching Farm Economics & Environmental Stewardship in a Changing Climate. Poster presented at the A Community on Ecosystem Services (ACES), Washington, DC, December 5.
- Wainger LA, Gazenski K, Waldrop A, Basenback N, Filoso S, Siskey M. 2017. A systematic review of reviews to support the Biodiversity Metric Advancement Workgroup (BMAW). UMCES Tech Report. DOI: 10.13140/RG.2.2.20262.73284. UMCES Technical Report # TS-701-17.
- US EPA Chesapeake Bay Program. Environmental Finance Symposium Report Action Team. 2017. *The Path Forward: Chesapeake Bay Program Response to Chesapeake Bay Environmental Finance Symposium Recommendations and Final Report*.  
[https://www.chesapeakebay.net/who/group/environmental\\_finance\\_symposium\\_report\\_action\\_team](https://www.chesapeakebay.net/who/group/environmental_finance_symposium_report_action_team)
- EcoScarcity Database. Data and tools relevant to assessing the scarcity of ecosystem goods and services that are derived from biodiversity and high quality habitat  
<http://waingerlab.cbl.umces.edu/ecoscarcity/>
- Needelman B, Paolisso M, Land S, Leisnham P, Baldwin A, Johnson K, Wainger L, McMurray A, Dindinger J. 2015. Integrating Socio -Ecological Research and Collaborative Learning to Promote Marsh and Community Resilience A Final Report Submitted to the National Estuarine Research Reserve System Science Collaborative. Available from <http://www.nerra.org/projects/enhancing-resilience-on-marylands-deal-island/>.
- Mazzotta, M. J., and L. A. Wainger. 2014. *Economic theory and methods for developing non-monetary ecosystem service benefit indicators*. US EPA ORD.
- Palmer, M., Wainger, L., Craig, L., Febria, C., Hosen, J., Politano, K. 2011. Promoting Successful Restoration through Effective Monitoring in the Chesapeake Bay Watershed. Prepared for the National Fish and Wildlife Foundation. NFWF Grant 2008-0901-009. UMCES Technical Report # TS-750-20. UMCES CBL 2020-039.

## C. Current Contracts and Grants

- Thriving Agricultural Systems in Urbanized Landscapes. USDA AFRI Sustainable Agricultural Systems. (Co-PI; D. Abler, PSU, lead PI). 2019-2023.
- Habitat and driver-specific controls on coupled oxygen-carbonate thresholds in eutrophic and acidifying estuarine ecosystems. NOAA NOS NCCOS. (Co-Investigator, J. Testa PI).
- Alternative Nutrient Reduction Strategy Option Analysis. Maryland Department of the Environment. (PI). 2017-2019.

Ecosystem Based Management: An Analysis of National Needs and Opportunities by the Cooperative Institute for the North Atlantic Region. (Co-Investigator; M. Roman PI) 2017-2019.

Economic Studies of Harbor Dredging. Maryland Port Administration. (PI) 2018-2023.

Developing Benefit Indicators and Valuation Approaches for Ecosystem Service Evaluation. U.S. Army Corps of Engineers Environmental lab. (PI) 2015-2019.

Coastal SEES Collaborative Research: Integrating stakeholder objectives with natural system models to promote sustainable natural resource policy. NSF. (Co-investigator; Elizabeth North PI). 2015-2020.

Impacts of Climate Change on Phenology on Linked Agriculture-Water. NSF Water Sustainability and Climate (WSC). (Co-PI with Bill Ball and Mike Kemp). 2014 -2018.

Flexible Buffer Systems: Enhancing Ecosystem Services and Expanding Agricultural Options In Riparian Areas. USDA NIFA. (Co-investigator; H. Gall, PSU, lead PI). (consulting)

#### **D. Invited Seminars and Presentations**

November 14, 2019. Keynote speaker. *Nutrient Credit Trading Opportunities in Maryland*. Agricultural and Environmental Law Conference. UM Agriculture Law Education Initiative. Annapolis, MD.

November 12, 2019. *Evaluating the efficiency of water body restoration: Evidence from the Chesapeake Bay*. Penn State University, Water Insights Seminar Series.

November 12, 2019. *Costs and Cost-Effectiveness of Stormwater and Agricultural BMPs in Maryland*. Webinar presentation to the Chesapeake Bay Program Water Quality Goal Implementation Team.

September 10, 2019. *What have we learned about using economic incentives to address the NPS problem?* Presentation to the Chesapeake Bay Program Scientific and Technical Advisory Committee.

July 22, 2019. *Social science integration in Chesapeake Bay restoration*. UC Davis and Delta Social Science Working Group workshop on Human Dimensions Research in Delta Environments. Sacramento, CA.

June 11, 2019. *Recommendations to the Chesapeake Bay Partnership from the Scientific and Technical Advisory Board* (US EPA Chesapeake Bay Program). Meeting with Governor Hogan, Annapolis, MD.

June 3, 2019. *Costs and Cost-Effectiveness of Stormwater and Agricultural BMPs in Maryland*. Maryland Department of the Environment. Baltimore, MD.

May 20, 2019. *Evaluating the efficiency of Chesapeake Bay restoration*. Center for Natural Resource Economics & Policy, 6th National Forum on Socioeconomic Research in Coastal Systems. New Orleans, LA.

April 24, 2019. *Oyster Aquaculture Profitability & Potential Economic Tipping Points with Ocean Acidification*. Maryland Department of the Environment. Baltimore, MD.

December 4, 2018. *Evaluating the ecosystem service benefits & social efficiency of Chesapeake Bay restoration*. Meeting of ACES: A Community on Ecosystem Services. Arlington, VA.

December 3, 2018. *Measuring Benefit Relevant Indicators (BRIs) Using Ecological & Social Context*. Part of short course taught at ACES. Arlington, VA.

November 15, 2018. *Evaluating the efficiency of Chesapeake Bay restoration*. Clark University Seminar Series. Worcester, MA.

November 30, 2018. *Enhancing Incentives for Creating Sustainable Healthy Urban Waterfronts*. UMCES Environmental Summit. Baltimore, MD.

October 31, 2018. *Economic Assessment of Benefits Associated with Invasive Plant Management*. USACE ERDC. Aquatic Plant Control Research Program Review. Vicksburg, MS.



- August 14, 2018. *Closing the innovation-practice gap to sustain social welfare under a changing climate*. Research Agenda for Ecological Economics. University of VT. Burlington, VT.
- June 12, 2018. *Overcoming behavioral biases in climate change planning*. SESYNC Boundary Spanning Symposium 2018. Annapolis, MD.
- May 28, 2018. *Integrated Models to Support Decision Makers: Towards a modeling sandbox for biophysical & social scientists*. ChesRMS 2018. Annapolis, MD.
- May 22, 2018. *Applying economic principles to promote community well-being*. State of the Coasts. Cambridge, MD.
- April 19, 2018. *Valuation of ecosystem services available from farms and forests: Reliable measurement and developing incentives for private action*. World Resources Institute Brown Bag Seminar Series. Washington, DC.
- February 1, 2018. *Spatial economic information needs of decision makers*. University of Copenhagen, Dept of Food and Resource Economics.
- January 5, 2018. *Promoting joint ecological and economic modeling*. Preparatory talk for STAC workshop Modeling Beyond 2025. <https://youtu.be/AufCZlmff-Y>
- November 6, 2017. Resilience indicators support valuation of estuarine ecosystem restoration under climate change. Coastal and Estuarine Research Foundation, Newport, RI.
- June 29, 2017. *Valuation of ecosystem services available from farms and forests: Developing reliable approaches for federal agencies*. National Ecosystem Service Partnership webinar (national audience).
- March 28, 2017. *Setting the Context: Ecosystem Service Analysis*. Ecosystem Services Valuation workshop (STAC).
- March 23, 2017. Valuation of ecosystem services available from farms and forests: A valuation framework based on the best available science. Council on Food, Agriculture and Resource Economics webinar.
- March 20, 2017. Effective Use of Economic Valuation. Capitol Hill briefing sponsored by the Agricultural & Applied Economics Association.
- Feb 23, 2017. *Valuation of ecosystem services available from farms and forests: Developing reliable approaches for federal agencies*. W3133 Economics workshop Benefits and Costs of Natural Resources Policies Affecting Ecosystem Services on Public and Private Lands. Carlsbad, CA.

## **E. Symposia Organized/Chaired for Professional Meetings**

- June 2020 (expected). Session organizer and moderator. *What makes economic analysis useful for large water body restoration? A comparison of the Chesapeake Bay and Baltic Sea contexts*. European Association of Environmental and Resource Economists. Berlin, Germany.
- May 2020 (expected). Workshop organizer (as NOAA ESMWG member). *Exploring Decision Support Tools that are Robust to Deep Uncertainty for Potential Use by NOAA in Fisheries and Coastal Management Applications*. Boulder, CO.
- May 2019. Session organizer. *Policy-relevant economic valuation of research & restoration in large water bodies*. Center for Natural Resource Economics & Policy bi-annual meeting. New Orleans, LA.
- March 2019. Co-Leader with Gary Shenk. AEIOU – *Assessing Environmental Impacts in Outcome Units*. Chesapeake Bay Scientific and Technical Advisory Committee (STAC) workshop. Annapolis, MD
- January 2019. Steering Committee Member. *Use of Dredged Material to Protect Low-Lying Areas of the Chesapeake Bay*. UMCES & Maryland Port Administration hosting. Annapolis, MD.
- December 2018. Session Organizer. *Freshwater Wetland Restoration Effects on Flood Risk: What Do We Know?* ACES: A Community on Ecosystem Services. Arlington, VA.

August 2018. Session Organizer. *Using restorability and resilience concepts in evaluating and valuing ecosystem service benefits of restoration*. National Conference on Ecosystem Restoration. New Orleans, LA.

January 2018. Steering Committee Member. *Chesapeake Bay Program Modeling in 2025 and Beyond: A Proactive Visioning Workshop*. Chesapeake Bay STAC Workshop.

#### **IV. Outreach and Service**

##### **C. Federal/State/Local Government and Non-Governmental Organizations**

**Ecosystem Sciences and Management Working Group (ESMWG)** of the NOAA Scientific Advisory Board. 2018-present.

**Advancing Agricultural Assistance**. Steering Committee member, MD DNR, 2020

**Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC)**, 2007-2019  
Chair September 2015-2017

**National Academies of Sciences**. Invited speaker/participant.

*Rising to Coastal Challenges: Social Science Perspectives on Research Needs for Responding to Rising Seas*. December 6, 2017.

*Workshop on landscape approaches and multi-resource analysis for sustainable natural resource management*. June 2, 2015.

**Council on Food, Agricultural and Resource Economics (C-FARE), 2015-2017**

Invited Co-Lead Editor of multi-investigator program that produced a report on the topic of:  
Valuation of prioritized ecosystem services that are enhanced by USDA programs.

**BayStat Program Scientific Advisory Panel, 2015-2017**.

**National Ecosystem Services Partnership – FRMES, 2012-2016**. Co-organizer of economics section of guidebook for federal agencies on using ecosystem services in decision-making, in collaboration with faculty from Duke Nicholas School of the Environment.

**White House Council on Environmental Quality**.

Ecosystem Services in NEPA. Invited Presenter. May 12, 2016