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Education:

Ph.D. Fish and Wildlife Conservation, Virginia Tech, 2011
M.S. Biological Sciences, Virginia Tech, 2007
B.S. Biological Sciences, Clemson University, 2004

Fields of Interest:

coupled human-natural systems, urban dynamics, renewable energy, energy-water nexus, hydropower mitigation, ecohydrology, hydrography, environmental flow management, stream and river ecosystems, water policy, classification systems, biogeography, landscape ecology

Fellowships/Professional Society Memberships:

- American Geophysical Union
- Ecological Society of America
- American Fisheries Society
- Emerging Leaders in Environmental and Energy Policy Network Fellow http://eleep.eu/

Professional Experience:

2019-Curr	Assistant Professor, Department of Environmental Science, Baylor University, Waco, TX
2017-2019:	Energy-Water-Nexus Theme Lead, Urban Dynamics Institute, Oak Ridge Natl Lab, TN
2016-2019:	Team Lead, Integrated Water-Energy-Ecosystems, Oak Ridge Natl Lab, TN
2016-2019:	Joint Faculty, Bredesen Center, University of Tennessee Knoxville, TN
2016-2019:	Research Scientist, Oak Ridge National Lab, Oak Ridge, TN
2013-2016:	Research Associate, Oak Ridge National Lab, Oak Ridge, TN
2011- 2013:	Postdoctoral Research Associate, Oak Ridge National Lab, Oak Ridge, TN
2011	Environmental Flow Consultant, Contract with Southeastern Aquatic Resources Partnership (SARP), St. Marys, GA

2007 – 2011 Research Assistant, Fish and Wildlife Cons, Virginia Tech, Blacksburg, VA
2009 Sussman Fund Internship, US Fish and Wildlife Service, Asheville, NC
2006 – 2007 Research Assistant, Biological Sciences, Virginia Tech, Blacksburg, VA
2004 – 2005 Hemlock Wooly Adelgid Field & Lab Tech, Entomology, Clemson Univ., SC
2003 – 2004 Fish Ecology Field and Lab Tech, Biological Sciences, Clemson Univ., SC
2003 USDA Forest Service Technician, Stumphouse Ranger Station, SC

Editorial Service:

Baylor University Affiliation**

**2020 Guest Editor, Biological Conservation, *Special Issue on Renewable Energy and Biological Conservation in a Changing World,* Guest Editors: Henriette Jager, Rebecca Efroymson, R. McManamay. https://www.journals.elsevier.com/biological-conservation/call-for-papers/renewable-energy-and-biological-conservation

Guest Editor, Frontiers in Earth Science, Special Issue: Hydrological, Geomorphic, Ecological and Transdisciplinary Studies of Floodplains, Guest Editors: Fernando Nardi, Ryan Morrison, Paola Passalacqua, Ryan McManamay. https://www.frontiersin.org/research-topics/16415/understanding-human-fluvial-ecosystem-interactions-advances-in-hydrological-geomorphic-ecological-an

**2018-2021 Associate Editor, Transactions of the American Fisheries Society
Please see reviewer experience in later section

Teaching Experience:

Course Instructor & Curriculum Development

2022 *Watershed Assessment*, ENV 3333, Baylor University, Waco, TX (1 semester)
- The course includes three main components: 1) a foundation in understanding watershed processes, 2) conducting assessments of impaired processes, and 3) management approaches. The course provides a hybrid structure aimed at understanding the basis for watershed assessments while also providing a "how-to" guide in a series of lectures and labs. An optional certification training course is integrated in the course and provided as a way for students to augment their resumes.

2021 *Ecology in a Changing World*, ENV 2307, Baylor University, Waco, TX (1 semester)
- Expose students to the concepts and theories of ecology, being ecologically literate, thinking critically, and the basics of hypothesis development, scientific data analysis, interpretation.

2020-2021 *The Environment and Energy*, ENV 4365, Baylor University, Waco, TX (2 semesters)
- Approached from three dimensions: the fundamental concepts of energy from a quantitative and physics perspective (energy literacy and physical constraints to extract and harness energy), physical relationships with the environment, and the humanities side of energy

2020 *Field Techniques*, ENV 3210, Baylor University, Waco, TX (2 semesters)

- Provides significant experience with environmental field sampling methods and an introduction to sample processing, data collection, and data analysis

2008 *Stream Restoration Service Learning* (1 semester), Fisheries and Wildlife Sciences, Virginia Tech, Blacksburg, VA

- Provides background of stream restoration approaches, along with hands on field experience with restoration applications

Laboratories & Teaching Assistantships

2008 – 2010 Lab Instructor (3 semesters), *Ichthyology Lab*, Fisheries and Wildlife Sci, Virginia Tech, Blacksburg, VA

2007 Teaching Assistant (1 semester), *Fisheries Techniques*, Fisheries and Wildlife Sciences, Virginia Tech, Blacksburg, VA

2005 - 2007 Lab Instructor (4 semesters), *Majors Biology Lab*, Biological Sciences, Virginia Tech, Blacksburg, VA

Guest Lectures and Workshops

2018 Workshop Lead/Instructor, Advanced preparation for instream flow determination in Federal Energy Regulatory Commission hydropower licensing in light of future environmental uncertainty, FLOW 2018 Conference, Apr. 24, 2018

2018 Lecturer, US Forest Service Instream Flow Training Course, Fort Collins, CO. Jan 10-11, 2018

2017 Guest Lecturer (several): Northern Pike YOY recruitment, statistical analysis, Special Study. University of Wisconsin – Green Bay. Jan/Feb 2017. Instructor (Dr. Patrick Forsythe)

2016 Guest Lecture: "Biological Monitoring" in Watershed Monitoring Graduate Course, University of Tennessee Knoxville. October 2016. Instructor (Dr. Jon Hathaway)

2013 – Cur. Aquatic Ecology Laboratory Student Tours, Oak Ridge Natl Lab, Oak Ridge, TN

2013 Instructor, American Fisheries Society, Continuing Education Workshop, Instream Flow – what it is and why it matters

2009 Guest Lecture: "Regulated River Restoration". Stream Habitat Management, Virginia Tech, Blacksburg, VA. Instructor (Dr. Don Orth)

Total Career Publications (104 total)

Career Metrics:

Google Scholar

- Citations: 1746 total, 1563 for articles (1084 since 2019)
- H-index: 26

Scopus

- Citations: 1078 (702 since 2019)
- H-index: 20

Research Gate

- Research Interest Score: 1102, top 94th %'tile of all researchers on Research Gate
- Citations: 1,402
- H-index: 22

Peer-reviewed Journal and Book Chapter Publications (79 total)
Baylor University Affiliation (30 total)**
Student Mentee-led paper†, Post-doc Mentee-led paper §
Invited contribution‡

2022

79. **†Garrett, K., **R.A. McManamay**, A. Witt. 2022. Harnessing the power of environmental flows: sustaining river ecosystem integrity while increasing energy potential at hydropower dams. *Renewable and Sustainable Energy Reviews* 173: 113049
78. **Khan, Z., E. Abraham, S. Aggarwal, M. A. Khan, R. Arguello, et al. (**R. A. McManamay** 44th Author). 2022. Emerging themes and future directions of multi-sector nexus research and implementation. *Frontiers in Environmental Science* 10: 918085. doi: 10.3389/fenvs.2022.918085
77. **McManamay, R.A., R. George, R.R. Morrison, B. L. Ruddell. 2022. Mapping hydrologic alteration and ecological consequences in stream reaches of the conterminous United States. *Scientific Data* 9:450 | https://doi.org/10.1038/s41597-022-01566-1
76. **Pilla, R.M., N. A. Griffiths, L. Gu, S-C. Kao, **R. McManamay**, D.M. Ricciuto, X. Shi. 2022. Anthropogenically driven climate and landscape change effects on inland water carbon dynamics: What have we learned and where are we going? *Global Change Biology* DOI: 10.1111/gcb.16324
75. **McManamay, R.A., C. Brinkley, C.R. Vernon, S. Raj, J.S. Rice. 2022. Urban land teleconnections in the United States: A graphical network approach. *Computers, Environment and Urban Systems* 95 (2022) 101822 https://doi.org/10.1016/j.compenvurbsys.2022.101822
74. **†Sturtevant, J., **R.A. McManamay**, C.R. DeRolph. 2022. U.S. national water and energy land dataset for integrated multisector dynamics research. *Scientific Data*. 9:183 | https://doi.org/10.1038/s41597-022-01290-w
73. **†Fork, M.L., **R.A. McManamay**, J.B. Heffernan. 2022. Propagation of inflowing urban stormwater pulses through reservoir embayments. *Urban Ecosystems* https://doi.org/10.1007/s11252-022-01218-7
72. **‡McManamay, R.A. 2022. Hydrology and classification of rivers for management. In (Poff, L. ed), *Encyclopedia of Inland Waters, Reference Module in Earth Systems and Environmental Sciences*, Elsevier, ISBN 9780124095489, https://doi.org/10.1016/B978-0-12-819166-8.00080-3.
71. **Woodyard, M., B.A. Polidoro, C.W. Matson, **R.A. McManamay**, S. Saul, K.E. Carpenter, T.K. Collier, R. Di Giulio, R. Grubbs, C. Linardich, J.A. Moore, I.C. Romero, D. Schlenk, K. Strongin. 2022. A comprehensive petrochemical vulnerability index for marine fishes in the Gulf of Mexico. *Science of the Total Environment* 820: 152892.
70. **Surendran Nair, S., C. DeRolph, M.J. Peterson, **R.A. McManamay**, T. Mathews. 2022. Integrated watershed process model for evaluating mercury sources, transport, and future remediation scenarios in an industrially contaminated site. *Journal of Hazardous Mat*erials 423: 127049.

2021

69. **Turner, S.W.D., J.S. Rice, K.D. Nelson, C.R. Vernon, **R. McManamay**, K. Dickson, L. Marston. 2021. Comparison of potential drinking water source contamination across one hundred U.S. cities. *Nature Communications* 12:7254.
68. **Jager, H.I, R. A. Efroymson, **R.A. McManamay**. 2021. Renewable energy and biological conservation in a changing world. *Biological Conservation* 263: Nov 2021-109354
67. **†Garrett, K., **R. A. McManamay**, J. Wang. 2021. Global hydropower expansion without building new dams. *Environmental Research Letters* https://doi.org/10.1088/1748-9326/ac2f18
66. **§Troia, M.J., **R.A. McManamay**, S-C. Kao, P. O'Connor. 2021. A heuristic tool to assess regional impacts of renewable energy infrastructure on conservation areas. *Biological Conservation* 263: 109334
65. **McManamay, R.A., C.R. Vernon, H.I. Jager. 2021. Global biodiversity implications of alternative electrification strategies under the Shared Socioeconomic Pathways. *Biological Conservation* 260: 109234
64. **†‡George, R.N., M.B. Lueders, B.L. Ruddell, **R.A. McManamay**. 2021. Earth's Imperiled Rivers. *Reference Module in Earth Systems and Environmental Sciences*. DOI: 10.1016/B978-0-12-821139-7.00066-0.
63. **Major, J., D. Perry, C. Aslan, **R. McManamay**. 2021. Identifying gaps in protected areas to expand integrated riverine ecosystem conservation. *Conservation Science and Practice* DOI: 10.1111/csp2.470.
62. **‡Bhaduri, B., **R. McManamay**, O. Omitaomu, J. Sanyal, A. Rose. 2021. Urban energy systems: Research at Oak Ridge National Laboratory, pgs 281-308, *In* Shi, W., M.F. Goodchild, M. Batty, M-P. Kwan, A Zhang (Ed.) *Urban Informatics*, The Urban Book Series, Springer DOI: 10.1007/978-981-15-8983-6
61. **McManamay, R.A., B. KC, M.R. Allen-Dumas, S-C. Kao, C.M. Brelsford, J. Sanyal, R.N. Stewart, B.L. Bhaduri. 2021. Reanalysis of water withdrawal for agriculture, electric power, and public supply sectors in the conterminous United States, 1950 to 2016. *Water Resources Research* 57: e2020WR027751. https://doi.org/10.1029/2020WR027751
60. **†Absar, S.M., **R.A. McManamay**, B. Preston, A. Taylor. 2021. Bridging Global Socioeconomic Scenarios with Policy Adaptations to Examine Energy-Water Trade-offs. *Energy Policy* 111911. https://doi.org/10.1016/j.enpol.2020.111911

2020

60. **†George, R., **R.A. McManamay**, B.L. Ruddell, D. Perry, J. Sabo. 2020. Indicators of Hydro-Ecological Alteration for the Rivers of the United States. *Ecological Indicators* 106908. https://doi.org/10.1016/j.ecolind.2020.106908
58. **McManamay, R.A., E. Parish, C.R. DeRolph. 2020 A dataset of eco-evidence tools to inform early-stage environmental impact assessments of hydropower development. *Data in Brief* 30: 105629. DOI: doi.org/10.1016/j.dib.2020.105629
57. **McManamay, R.A., E. Parish, C.R. DeRolph, A. Witt, W. Graf, A. Burtner. 2020. Evidence-based indicator approach to guide preliminary environmental impact assessments of hydropower development. *Journal of Environmental Management* 265: 110489. DOI: 10.1016/j.jenvman.2020.110489

56. **Surendran Nair, S., A. King, J. Gulledge, B. Preston, **R.A. McManamay**, C. Clark. 2020. Economic losses from extreme weather in the U.S. Gulf Coast region: Spatially differential contributions of climate hazard and socioeconomic exposure and vulnerability. *Environmental Research Letters* DOI: 10.1088/1748-9326/ab7b9a
55. **Gangrade, S., S-C. Kao, **R.A. McManamay**. 2020. Multi-model and Multi-resolution Hydroclimate Projections for the Alabama-Coosa-Tallapoosa River Basin in the Southeastern United States. *Scientific Reports* 10:2870. DOI: 10.1038/s41598-020-59806-6
54. **Richter, B.D. et al. (**R.A. McManamay**, 9th author). 2020. Water scarcity and fish imperilment driven by beef production. *Nature Sustainability* https://doi.org/10.1038/s41893-020-0483-z
53. **Karpack, M.N., R.R. Morrison, **R.A. McManamay**. 2020. Quantitative assessment of floodplain functionality using an index of integrity. *Ecological Indicators* 111: https://doi.org/10.1016/j.ecolind.2019.106051

2019

52. Hecht, J.S., R.M. Vogel, **R.A. McManamay**, C.N. Kroll, J.M. Reed. 2019. Decision trees for incorporating hypothesis tests of hydrologic alteration into hydropower-ecosystem tradeoffs. *Journal of Water Resources Planning and Management* 146(5): 04020017. DOI: 10.1061/(ASCE)WR.1943-5452.0001184
51. **§Troia, M.J., **R.A. McManamay**. 2019. Biogeographic classification of streams using fish community- and trait-environment relationships. *Diversity and Distributions* https://doi.org/10.1111/ddi.13001
50. **‡McManamay, R.A., H.I. Jager. 2019. Stream Biomes of the World. Reference Module in Earth Systems and Environmental Sciences, Elsevier. ISBN 9780124095489, https://doi.org/10.1016/B978-0-12-409548-9.12047-0.
49. **Surendran Nair, S., **R.A. McManamay**, C.R. DeRolph, M. Dumas-Allen. 2019. Methods for integrating high-resolution land, climate, and infrastructure scenarios in a hydrologic simulation model. *Methods X* https://doi.org/10.1016/j.mex.2019.10.010
48. McManamay, R.A., C.R. DeRolph, S. Surendran Nair, M. Dumas-Allen. 2019. Spatially explicit land-energy-water future scenarios for cities: Guiding infrastructure transitions for urban sustainability. *Renewable and Sustainable Energy Reviews* 112: 880-900
47. Pracheil, B.M., **R.A. McManamay**, E.S. Parish, S.L. Curd, B.T. Smith, et al. A Checklist of River Function Indicators for Hydropower Ecological Assessment. *Science of the Total Environment* 687: 1245-1260.
46. DeRolph, C.R., **R.A. McManamay**, A.M. Morton, S. Surendran Nair. 2019. City energysheds and renewable energy in the United States. *Nature Sustainability* 2: 412–420
45. McManamay, R.A., C.R. DeRolph. 2019. A stream classification system for the conterminous United States. *Scientific Data* 6: 190017 (2019)
44. Parish, E., B.M. Pracheil, **R.A. McManamay**, S.L. Curd, C.R. DeRolph, B.T. Smith. 2019. Review of environmental metrics used across multiple sectors and geographies to evaluate the effects of hydropower development. *Applied Energy* 238:101-118. https://doi.org/10.1016/j.apenergy.2019.01.038
43. McManamay, R.A., J.S. Perkin, H.I. Jager. 2019. Commonalities in stream connectivity restoration alternatives: An attempt to simplify barrier removal optimization. *Ecosphere* 10(2):e02596. 10.1002/ecs2.2596

42. McManamay, R.A., F. Linam, T. J. Mathews, M.J. Peterson. 2019. Scaling mercury biodynamics from individuals to populations: implications of an herbivorous fish on mercury cycles in streams. *Freshwater Biology* DOI: 10.1111/fwb.13265

2018

41. Zaidi, S.M.A., V. Chandola, M.R. Allen, **R.A. McManamay**, J. Sanyal, R.N. Stewart, B.L. Bhaduri. 2018. Machine learning for the Energy-Water Nexus: Challenges and Opportunities. *Big Earth Data* DOI: 10.1080/20964471.2018.1526057
40. Allen, M.R., S.M.A. Zaidi, V. Chandola, A.M. Morton, C.M. Brelsford, **R.A. McManamay**, B. KC, J. Sanyal, R.N. Stewart, B.L. Bhaduri. 2018. A survey of methods for Energy-Water Nexus knowledge discovery. *Big Earth Data*. DOI: 10.1080/20964471.2018.1524344.
39. McManamay R.A., M.J. Troia, C.R. DeRolph, A. Sheldon Olivero, A.R. Barnett, S-C. Kao, M.G. Anderson. 2018. A stream classification system to explore the physical habitat diversity and anthropogenic impacts in riverscapes of the eastern United States. *PLoS ONE* 13(6): e0198439. https://doi.org/10.1371/journal.pone.0198439
38. Tran, L., **R.A. McManamay**, H. Kim. 2018. A non-parametric distance-based method using all available indicators for integrated environmental assessment – A case study of the Mid-Atlantic Region, USA. *Journal of Environmental Planning and Management* DOI: 10.1080/09640568.2018.1441812
37. Brewer, S.K., T.A. Worthington, R. Mollenhauer, D.R. Stewart, **R.A. McManamay**, L. Geurtault, D. Moore. 2018. Synthesizing models useful for ecohydrology and ecohydraulic approaches: An emphasis on integrating models to address complex research questions. *Ecohydrology* https://doi.org/10.1002/eco.1966
36. McManamay, R.A, J.G. Smith, R.T. Jett, T.J. Mathews, M.J. Peterson. 2018. Identifying non-reference sites to guide restoration and long-term monitoring. *Science of the Total Environment* DOI: 10.1016/j.scitotenv.2017.10.107

2017

35. §Troia, M.J., **R.A. McManamay**. 2017. Completeness and coverage of open-access freshwater fish distribution data in the United States. *Diversity and Distributions* DOI: 10.1111/ddi.12637
34. McManamay, R.A., S. Surendran Nair, C.R. DeRolph, B.L. Ruddell, A.M. Morton, R.N. Stewart, M.J. Troia, L. Tran, H. Kim, B.L. Bhaduri. 2017. US cities can manage national hydrology and biodiversity using local infrastructure policy. *Proceedings of the National Academy of Sciences* 114: 9581–9586. doi: 10.1073/pnas.1706201114
33. McManamay, R.A., N. Griffiths, C.R. DeRolph, B.M Pracheil. 2017. A synopsis of global mapping of freshwater habitats and biodiversity: Implications for conservation, in Hufnagel, L. (ed) *Pure and Applied Biogeography*, InTechOpen, Rijeka, Croatia. ISBN 978-953-51-5222-4.
32. Vanni, M., P.B. McIntyre, et al. (66 authors, **R.A. McManamay** 42nd author). *2017*. A global database of nitrogen and phosphorus excretion rates of aquatic animals. *Ecology – Data Paper*. DOI: 10.1002/ecy.1792
31. Morton, A., N. Nagle, J. Piburn, R. N. Stewart, and **R. McManamay**. 2017. A hybrid dasymetric and machine learning approach to high-resolution residential electricity consumption modeling in Griffith, D.A., C. Yongwan, D.J. Dean (eds). *Advances in Geocomputation: Geocomputation 2015--The 13th International Conference*. Springer, pp. 47-58. DOI: 10.1007/978-3-319-22786-3_5

30. Buchanan, B., D. Auerbach, **R.A. McManamay,** J. Taylor, A. Flecker, J. Archibald, D. Fuka, M. Walter. 2017. Environmental flows in the context of unconventional natural gas development in the Marcellus Shale. *Ecological Applications* 27: 37–55.

2016

29. Pracheil, B.M., **R.A. McManamay**, M.S. Bevelhimer, C.R. DeRolph, G.F. Cada. 2016. A Traits-based approach for prioritizing species for monitoring and surrogacy selection. *Endangered Species Research* 31: 243–258.
28. McManamay, R.A., S.K. Brewer, H. Jager, M. Troia. 2016. Organizing environmental flow frameworks to meet US Hydropower mitigation needs. *Environmental Management* 58: 365-385.
27. Brewer, S.K., **R.A. McManamay**, A.D. Miller, R. Mollenhauer, T.A. Worthington, T. Arsuffi. 2016. Advancing environmental flow science: developing frameworks for altered landscapes and integrating efforts across disciplines. *Environmental Management DOI 10.1007/s00267-016-0703-5*
26. §Troia, MJ, **R.A. McManamay**. 2016. Filling in the Gaps: characterizing spatial, environmental, and temporal coverage of open-access biodiversity data. *Ecology and Evolution DOI: 10.1002/ece3.2225*
25. McManamay, R.A., R.T. Jett, M.G. Ryon, S.M. Gregory, S.H. Stratton, M.J. Peterson, 2016. Dispersal limitations on fish community recovery following long-term water quality remediation. *Hydrobiologia* DOI: 10.1007/s10750-015-2612-7
24. McManamay, R.A., C. Oigbokie, S-C. Kao, M.S. Bevelhimer. 2016. A classification of US hydropower dams by their modes of operation. *River Research and Applications* DOI: 10.1002/rra.3004
23. Auerbach, D.A., B.P. Buchanan, A.V. Alexiades, E.P. Anderson, A.C. Encalada, E.I. Larson, **R.A. McManamay**, G.L. Poe, M.T. Walter, A.S. Flecker. 2016. Towards catchment classification in data-scarce regions. *Ecohydrology* DOI: 10.1002/eco.1721.

2015

22. McManamay, R.A., B.K. Peoples, D.J. Orth, C.A. Dolloff, and D.C. Matthews. 2015. Isolating causal pathways between flow and fish in the regulated river hierarchy. *Canadian Journal of Fisheries and Aquatic Sciences* 72: 1731-1748.
21. McManamay, R.A., and E.A. Frimpong. 2015. Hydrologic filtering of fish life history strategies across the US: Implications of streamflow alteration on fish assemblages. *Ecological Applications 25: 243-263. http://dx.doi.org/10.1890/14-0247.1*
20. McManamay, R.A., N. Samu, S-C. Kao, M.S. Bevelhimer, and S.C. Hetrick. 2015. A multi-scale spatial approach to address environmental effects of small hydropower development. *Environmental Management* 55: 217-243.
19. McManamay, R.A., M.S. Bevelhimer, E.A. Frimpong. 2015. Associations among hydrologic classifications and fish traits to support environmental flow standards. *Ecohydrology* 8, 460–479

2014

18. McManamay, R.A., M.S. Bevelhimer. 2014. Sustainable solutions to benefit fisheries and hydropower at a basin scale in B. Beard (ed.) Québec City Meeting Wrap Up. *Fisheries* 39(12): 602.

17. McManamay, R.A., R.M. Utz. 2014. Open-access databases as unprecedented resources and drivers of cultural change in fisheries science. *Fisheries* 39: 417-425.
16. McManamay, R.A. 2014. Quantifying and Generalizing Hydrologic Responses to Dam Regulation using a Statistical Modeling Approach. *Journal of Hydrology* 519: 1278-1296.
15. Bevelhimer, M.S., **R.A. McManamay**, B. O'Conner. 2014. Characterizing sub-daily flow regimes: implications of hydrologic resolution on ecohydrology studies. *River Research and Applications DOI: 10.1002/rra.2781*
14. Jager, H.I., and **R.A. McManamay**. 2014. Comment on "Cumulative biophysical impact of small and large hydropower development in Nu River, China" by Kelly Kibler and Desiree Tullos. *Water Resources Research* 49: 1–2.
13. McManamay, R.A., D.J. Orth, H.I. Jager. 2014. Accounting for variation in species detection in fish community monitoring. *Fisheries Management and Ecology* 21: 96–112.
12. McManamay, R.A., M.S. Bevelhimer, S. Kao. 2014. Updating the US hydrologic classification: an approach to clustering and stratifying ecohydrologic data. *Ecohydrology* 7: 903–926

2013

11. McManamay, R.A., D.J. Orth, C.A. Dolloff. 2013. Macroinvertebrate community responses to gravel augmentation in a Southeastern regulated river. *Southeastern Naturalist* 12: 599-618.
10. Peoples, B.K., **R.A. McManamay**, D.J. Orth, E.A. Frimpong. 2013. Nesting habitat use by river chubs in a hydrologically variable Appalachian tailwater. *Ecology of Freshwater Fish* DOI: 10.1111/eff.12078
9. McManamay, R.A., D.J. Orth, C.A. Dolloff. 2013. Application of the ELOHA framework to regulated rivers in the Upper Tennessee River basin. *Environmental Management* 51:1210–1235.
    - Cover photo of Journal Issue: https://link.springer.com/journal/267/51/6/page/1
8. McManamay, R.A., D.J. Orth, J. Kauffman, M.D. Davis. 2013. A database and meta-analysis of ecological responses to flow in the South Atlantic Region. *Southeastern Naturalist* 12 (Monograph 5): 1-36.

2012

7. McManamay, R.A., J.T. Young, D.J. Orth. 2012. Spawning of white sucker (*Catostomus Commersoni*) in a stormwater pond inlet. *American Midland Naturalist* 168: 466-476.
6. McManamay, R.A., D.J. Orth, C.A. Dolloff. 2012. Revisiting the homogenization of dammed rivers in the Southeastern US. *Journal of Hydrology* 424-425: 217-237.
5. McManamay, R. A., D. J. Orth, C. A. Dolloff, and E. A. Frimpong. 2012. Regional frameworks applied to hydrology: can landscape-based frameworks capture the hydrologic variability? *River Research and Applications* 28: 1325-1339.
4. McManamay, R. A., D. J. Orth, C. A. Dolloff, and E. A. Frimpong. 2012. A regional classification of unregulated streamflows: spatial resolution and hierarchical frameworks. *River Research and Applications* 28: 1019–1033.

2011

3. McManamay, R.A., J.R. Webster, H.M. Valett, C.A. Dolloff. 2011. Does diet influence consumer nutrient cycling? Macroinvertebrate and fish excretion in streams. *Journal of the North American Benthological Society* 30: 84-102.

2. McManamay, R.H., L.M. Resler, J.B. Campbell, and **R.A. McManamay**. 2011. Assessing the impact of balsam woolly adelgid (*Adelges piceae* Ratz.) and anthropogenic disturbance on the stand structure and mortality of Fraser fir (*Abies fraseri* (Pursh) Poir.) in the Black Mountains of North Carolina. *Castanea* 76: 1-19.

2010

1. McManamay, R. A., D. J. Orth, C. A. Dolloff, and M. A. Cantrell. 2010. Gravel addition as a habitat restoration technique for tailwaters. *North American Journal of Fisheries Management* 30:1238-1257.

Peer-Reviewed Proceedings (6):

6. Morton, A.M., N.N. Nagle, J.O. Piburn, R.N. Stewart. **R.A. McManamay**. 2017. A High-Resolution Spatially-Explicit Statistical Framework for Estimating Residential Electricity Consumption. Proceedings of the 2017 Grace Hopper Celebration of Women in Computing. Orlando, FL. October 4, 2017.
5. Morton, A.M., J.O. Piburn, **R.A. McManamay**, N.N. Nagle, R.N. Stewart. 2016. A Dasymetric-Based Monte Carlo Simulation Approach to the Probabilistic Analysis of Spatial Variables. GIScience 2016 Proceedings. Montreal, Canada. September 27, 2016.
4. Hecht, J.S., **R.A. McManamay**, R.M. Vogel. 2015. Testing Hypotheses of Hydropower-Induced Hydrologic Alteration beyond Ecological Thresholds. Hydrovision International 2015 Annual Meeting Proceedings. Portland, OR. July 14-17, 2015. Available at: http://s36.a2zinc.net/clients/pennwell/HVI2015/Custom/Handout/Speaker53379_Session11881_1.pdf
3. Morton, A., N. Nagle, J. Piburn, R.N. Stewart, **R.A. McManamay**. 2015. A hybrid dasymetric and machine learning approach to high-resolution residential electricity consumption modeling. Proceedings of the 13th International Conference on GeoComputation. Dallas, TX. p286-291. http://www.geocomputation.org/2015/index.html
2. Johnson G.E., M.S. Bevelhimer, K.B. Larson, J.D. Tagestad, J.W. Saulsbury, **R.A. McManamay**, C.A. Duberstein, C.R. DeRolph, S.L. Hetrick, B.T. Smith, S.H. Geerlof. 2014. The Basin-Scale Opportunity Assessment Initiative: Synopsis of the Preliminary Scoping Assessments for the Connecticut and Roanoke River Basins. Hydrovision International 2014 Annual Meeting Proceedings. Nashville, Tn. July 22-25, 2014. Available at: http://s36.a2zinc.net/clients/pennwell/HVI2014/Public/SessionDetails.aspx?FromPage=Calendar.aspx&SessionID=8554
1. Bevelhimer, M.S, and **R. A. McManamay**. 2012. Minimizing the environmental impact of variable flow regimes while maintaining the value of hydropower peaking. *Hydrovision International 2012 Annual Meeting Proceedings*. Louisville, KY. July, 2012. Available at: http://s36.a2zinc.net/clients/pennwell/HVI2012/Custom/Handout/Speaker9395_Session2511_1.pdf

High-profile Technical Reports (20):

20. Bhaduri, B., A.J. Simon, M.R. Allen, J. Sanyal, R.N. Stewart, **R.A. McManamay**. 2018. Energy-Water Nexus Knowledge Discovery Framework, Experts' Meeting. Oak Ridge National Laboratory. ORNL/TM-2017/753. January 2018. DOI:10.2172/1426570.
19. Peterson, M.J., et al. (17 authors, **R.A. McManamay** 14th author).2017. Mercury remediation technology development for Lower Easter Fork Poplar Creek – FY 2016 Progress Report. Oak Ridge National Laboratory, ORNL/TM-2017/366. July 2017.
18. Peterson, M.J., M.S. Greeley, R.T. Jett, T.J. Mathews, J.G. Smith, **R.A. McManamay,** N.J. Jones, N. Griffiths, S.C. Brooks. 2017. Y-12 National Security Complex Biological Monitoring and Abatement Program 2016 Calendar Year Report. Oak Ridge National Laboratory. ORNL/SPR-2017/331. July 2017.
17. Smith, B.T. et al. (22 authors, **R.A. McManamay** 22th author). 2016. A multi-year plan for research, development, and prototype testing of standard modular hydropower technology. Oak Ridge National Laboratory, ORNL/TM-2016/102. November 2016.
16. Hydropower Vision: A new chapter for American's 1st renewable electricity source. (300 authors). 2016. US Department of Energy. http://energy.gov/eere/water/new-vision-united-states-hydropower
15. Peterson, M.J., M.S. Greeley, R.T. Jett, T.J. Mathews, J.G. Smith, **R.A. McManamay**. 2016. Y-12 National Security Complex Biological Monitoring and Abatement Program 2015 Calendar Year Report. Oak Ridge National Laboratory. ORNL/TM-2016/200. September 2016.
14. Witt, A.M., B.T. Smith, A.Tsakiris, et al. (**R.A. McManamay** 12th author). 2016. Exemplary Design Envelope Specification for Standard Modular Hydropower Technology. Oak Ridge National Laboratory. ORNL/TM-2016/298. July 2016
13. McManamay, R.A., M.J. Troia, C.R. DeRolph, N.M. Samu. 2016. Stream Classification Tool User Manual: For Use in Applications in Hydropower-related environmental mitigation. Oak Ridge National Laboratory ORNL/TM-2015/670. January 2016.
12. Buchanan, B., **R.A. McManamay**, D. Auerbach, D. Fuka, M.T. Walter. 2015. Environmental Flow Analysis for the Marcellus Shale Region: A technical report submitted to the Appalachian Landscape Conservation Cooperative in completion of grant# 2012-03. Final Report. August 2015. DOI: 10.13140/RG.2.1.4328.9687
11. McManamay, R.A., M.J. Troia, C.R. DeRolph, M.S. Bevelhimer, M. P. Schramm, K.B. Larson, J.D. Tagestad, G.E. Johnson, H.I. Jager. 2015. Identifying Environmental Opportunities outside the Hydropower Project Boundary: An Updated Methodology of the Basin Scale Opportunity Assessment. ORNL TM-2014-540. January 2015.
10. Larson, K.B., G.E. Johnson, J.D. Tagestad, C.A. Duberstein, M.S. Bevelhimer, **R.A. McManamay**, C.R. DeRolph, and S.H. Geerlofs. 2014. The Integrated Basin-Scale Opportunity Assessment Initiative: Scoping Assessment for the Connecticut River Basin. Final Report. *Pacific Northwest National Laboratory Report PNNL-23778.* October 2014.
9. Olivero Sheldon, A., **R.A. McManamay**. 2014. Literature review of freshwater classification frameworks. Prepared for the Appalachian LCC as part of the Grant, "A Stream Classification System for the Appalachian Landscape Conservation Cooperative." May 2014.
8. Kao, S.-C., **R. A. McManamay**, K. M. Stewart, N. M. Samu, B. Hadjerioua, S. T. DeNeale, D. Yeasmin, M. F. K. Pasha, A. A. Oubeidillah, and B. T. Smith. 2014. New Stream-reach Development: A Comprehensive Assessment of Hydropower Energy Potential in the United States, GPO DOE/EE-1063, Wind and Water Power Program, Department of Energy, Washington, DC.

7. Jager, H.I., B.A. Elrod, N.Samu, **R.A. McManamay**, and B.T. Smith. 2013. ESA Protection for the American Eel: Implications for U.S. Hydropower. Oak Ridge National Laboratory. ORNL/TM-2013/361. November 2013.
6. McManamay, R.A., P.W. Bonsall, S.C. Hetrick, J.Harn, J. Duncan, and B.T. Smith. 2013. Digital mapping and environmental characterization of National Wild and Scenic River Systems. Oak Ridge National Laboratory 2013 Final Report. ORNL/TM-2013/356. September 2013.
5. Johnson G.E., M.S. Bevelhimer, K.B. Larson, J.D. Tagestad, J.W. Saulsbury, **R.A. McManamay**, C.A. Duberstein, C.R. DeRolph, S.L. Hetrick, B.T. Smith, and S.H. Geerlofs. 2013. The Integrated Basin Scale Opportunity Assessment Initiative: Phase 1 methodology and preliminary scoping assessments for the Connecticut River and Roanoke River Basins. Pacific Northwest National Laboratory Annual Report 2013. PNNL 22807. September 2013.
4. McManamay, R.A., and M.S. Bevelhimer. 2013. A holistic framework for environmental flows determination in hydropower contexts. Oak Ridge National Laboratory, 2013 Project Report. ORNL/TM-2013/159. April 2013.
3. Vernon, C.R., E.V. Arntzen, M.C. Richmond, **R.A. McManamay**, T.P. Hanrahan C.L. Rakowski. 2013. GIS Framework for Large River Classification to Aid in the Evaluation of Flow-Ecology Relationships. *Pacific Northwest National Laboratory Report PNNL-22296.* February 2013.
2. Hadjerioua, B., S-C Kao*, **R.A. McManamay**, M.D. Fayzul, K. Pasha, D. Yeasmin, A.A. Oubeidillah, N.M. Samu, K.M. Stewart, M.S. Bevelhimer, S.L. Hetrick, Y. Wei, and B.T. Smith. 2012. An assessment of energy potential from new small hydro development in the United States. Initial Report on Methodology. *Report by Oak Ridge National Laboratory to the Department of Energy*. August, 2012. http://nhaap.ornl.gov/sites/default/files/NSD_Methodology_Report.pdf
1. McManamay, R.A., D.J. Orth, J. Kauffman. 2011. Ecological responses to flow alteration in the South Atlantic Region: A literature review and meta-analysis. *Report to the Southeastern Aquatic Resources Partnership*. November 2011. Available at: http://filebox.vt.edu/users/dorth/

Other Publications (2):

2. McManamay, R.A. 2008. Stream restoration service learning class-Fall 2008. *College of Natural Resources Engagement Matters* 1(4): 4-5. December 2008.
1. Lowe, K., and **R.A. McManamay**. 2009. Restoring stream habitat for native trout. *New River Valley Magazine*. May/June: 36-38.

News Highlights

Baylor University Affiliation**

General:

- **2021 - Ecological Society of America Honors Baylor Environmental Science Researcher with Sustainability Science Award. Baylor University Media and Public Relations (Front page): https://www.baylor.edu/mediacommunications/news.php?action=story&story=222875
- **2021 - Ecological Society of America announces 2021 award recipients. https://www.esa.org/blog/2021/04/06/ecological-society-of-america-announces-2021-award-recipients/
- **2020 – Expert comment on Nature Communications article, related to Solar and Wind Energy: https://thehill.com/changing-america/sustainability/energy/470280-solar-and-wind-energy-a-secret-weapon-for-keeping
- 2017 – "Ryan McManamay: An Aquatic Outlook on Future Energy": https://www.ornl.gov/blog/eesd-review/ryan-mcmanamay-aquatic-outlook-future-energy
- 2010 – "Fisheries and wildlife sciences student receives Outstanding Student Achievement Award": https://vtnews.vt.edu/articles/ds2010/03/2010-168.html

Papers and Products:

- **Mapping hydrologic alteration (McManamay et al. 2022, Scientific Data)
  - 9 News outlets
  - https://www.nature.com/articles/s41597-022-01566-1/metrics
  - *Researchers map streamflow alterations to gauge human impact on ecosystems.* Colorado State University's Civil and Environmental Engineering media coverage: https://engr.source.colostate.edu/researchers-map-streamflow-alterations-to-gauge-human-impact-on-ecosystems/
  - *Phys.*org, Mirage News, Science Daily, Verve times, Sift Telecast, Latestly, The Statesman, Smart Water Magazine
- **Anthropogenically driven climate and landscape change effects on inland water carbon dynamics (Pilla et al. 2022, Global Change Biology)
  - 7 outlets: https://wiley.altmetric.com/details/132885396/news
  - Phys.org: *Study finds inland water carbon emissions are being undercounted.* https://phys.org/news/2022-09-inland-carbon-emissions-undercounted.html
- **Key Findings about potential drinking water contamination (Turner et al. 2021, Nature Communications)
  - 3 News Outlets: https://www.nature.com/articles/s41467-021-27509-9/metrics
  - A watershed moment: Key Findings about potential drinking water contamination: https://phys.org/news/2022-04-watershed-moment-key-potential-contamination.html
- **Global hydropower expansion without building new dams (Garrett et al. 2021, Environmental Research Letters)
  - 4 news outlets: https://iop.altmetric.com/details/115489378/news
  - Forbes: *Significant Global Potential To Increase Generation From Hydropower Projects Without Adding New Dams*: https://www.forbes.com/sites/jeffopperman/2022/10/06/significant-global-potential-to-increase-generation-from-hydropower-projects-without-adding-new-dams/?sh=546bc8854a0d
  - Wired: *Retrofitting dams for Green Energy*: https://www.wired.com/story/retrofitting-dams-green-energy/

- **Biodiversity impacts of alternative energy strategies (McManamay et al., Biological Conservation)
    - 3 News Outlets (including Science Daily, Newswise, and Phys.org): https://www.sciencedaily.com/releases/2021/07/210713184401.htm
    - KXXV interview: https://app.criticalmention.com/app/#/report/8ab88c0f-5da1-421f-b081-61afe52662ca
- **Water Scarcity and Beef Production (Richter et al, Nature Sustainability):
    - Nature Highlight: https://www.nature.com/articles/d41586-020-00607-2
    - 24 News Outlets: https://www.nature.com/articles/s41893-020-0483-z/metrics
- "Hydropower—A river of data" (2018): https://www.ornl.gov/news/hydropower-river-data-0
- McManamay et al. 2018 (PLoS ONE): "ORNL develops new capability to evaluate human-driven change in Eastern U.S. streams": https://www.ornl.gov/news/ornl-develops-new-capability-evaluate-human-driven-change-eastern-us-streams
- McManamay et al. 2017 (PNAS): 8 News Highlights (Physorg.com, Science Daily, Science Newsline, Health Medicine Network, ENN, newswise, Long Room, ORNL news, EurekAlert!): https://pnas.altmetric.com/details/24225782/news
    - High-resolution modeling assesses impact of cities on river ecosystems: https://www.ornl.gov/news/high-resolution-modeling-assesses-impact-cities-river-ecosystems
- McManamay et al. 2016 (Hydrobiologia): 3 News Highlights –
    - EurekAlert! - https://www.eurekalert.org/pub_releases/2016-04/drnl-stf040516.php
    - "Aquatic Obstacles"- ORNL news desk: https://www.ornl.gov/news/environment-%E2%80%93-aquatic-obstacles
    - "Reviving fish population at White Oak Creek faces barriers" - Knoxville news sentinel - http://archive.knoxnews.com/news/columnists/frank-munger/reviving-fish-population-at-white-oak-creek-faces-barriers--2fe61b83-e087-792b-e053-0100007f4aad-374956671.html

Conservation Work/Outreach:

- "Clearwater revival" (Roanoke Times) 2006: https://www.roanoke.com/sports/outdoors/clearwater-revival/article_0df1b1f0-4361-5f6c-94de-24763086c350.html
- "Trout group focuses on conservation" (Roanoke Times, February 5, 2008, Mark Taylor)

Students/STEM outreach:

- "Recent graduate promotes aquatic environmental restoration" (Oak Ridge Institute for Science and Education) 2016: https://orise.orau.gov/stem/success-stories/archive/eisinger.html
- "SULI Program: Joseph Famularo - Recent graduate contributes to aquatic habitat restoration efforts" 2017 - https://orise.orau.gov/ornl/experiences/recent-bachelors-associates/famularo.html

Grants and Research Projects (as PI, Co-PI, or Co-I)

Baylor University Affiliation**

Career Total Acquired and Managed Funds ($6,168,919):

Funds to Baylor ($1,331,919):

**McManamay, R.A., Benjamin Ryan, Jean Dixon. Collaborative Research: RAPID: The 2022 Yellowstone Flood: Evaluating national parks as critical infrastructures to the US ecotourism economy. National Science Foundation, Humans, Disasters, and the Built Environment (HDBE) PD 19-1638. Award ID 2241213. CMMI Research and Development Award

**McManamay, R.A. Integrated Coastal Modeling. Department of Energy, Office of Science. Subaward through Pacific Northwest National Laboratory. PNNL Contract/Proposal No. 677716. Baylor Contract 102770. Jan. 2022.

**McManamay, R.A., C. Matson. Bullhide Creek Monitoring Fund. Donation from Clean Water Alliance, Lorena, TX.

Arnold, W. et al. (OceanSpace LLC), **R.A. McManamay (Co-I). Advancing Optical Imaging and Classification to Enhance Biodiversity Monitoring. Department of Energy, Office of Efficiency and Renewable Energy. Small Business Innovation Research. DE-FOA-0002381. Contract/Order No. DOE-20144.

**Hamerly, G., R.A. McManamay (Co-PI), J. Brubacher. Near real-time detection and monitoring of invasive mussel species in Texas waterways. Texas Parks and Wildlife Department Aquatic Invasive Research (AIS) Proposals. TPWD Contract No. CA – 0000707. Sept 2021-August 2023.

**McManamay, R.A. Dynamic land modeling for the COMPASS Project. Department of Energy, Office of Science. Subaward through Pacific Northwest National Laboratory (PNNL). October 2021-Sept 2023. Contract No. 592713.

**McManamay, R.A., K. Mayes, D. Young. Geospatial analysis identifying environmental flow thresholds for fish species and communities in Texas. Texas Parks and Wildlife State Wildlife Grant. TPWD Contract No. CA-0002585. July 2021 to August 2023.

**McManamay, R.A. Integrated Multisector, Multiscale Modeling (IM3) Science Focus Area, Phase 2. Department of Energy, Office of Science. Subaward through Pacific Northwest National Laboratory (PNNL). October 2020 – Sept 2024. PNNL Contract No. 540765. Baylor Contract 102610.

Arnold, B., M. Dean, E. Steimle, **R.A. McManamay (Co-I). Advancing optical imaging and classification to enhance biodiversity monitoring. Department of Energy, Office of Science. Small Business Innovation Research Grant. Award No. DE-SC0020881.

**McManamay, R.A., D. Young, K. Mayes, R. Smith. Literature Review of Flow-ecology Relationships for SGCN Fishes in Texas. June 2020. Texas Parks and Wildlife State Wildlife Grant, US Fish and Wildlife Service. TPWD Contract No. CA – 0000707.

**McManamay, R.A. Urban Dynamics for Integrated Multi-Sector Multi-Scale Modeling. Department of Energy, Office of Science. Subaward through Pacific Northwest National Laboratory. September 2019. Contract No. 490320

Prior to Baylor ($4,837,000):

Dumas-Allen, M., **R.A. McManamay**, C. Brelsford. Urban Scale Modeling for Integrated Multi-Sector Multi-Scale Modeling. Pacific Northwest National Laboratory. March 2019.

McManamay, R.A., T.J. Mathews, P. Bingham. Autonomous Benthic Macroinvertebrate and Fish Imaging and Identification System. Department of Energy, Office of Technology Transitions, Technology Commercialization Fund, July 2019. TCF-19-17761.

Peterson, M.J., **R.A. McManamay** (Co-PI). Biological Monitoring and Abatement Program, Instream Communities and Limnological Studies. Y12 National Security Complex, East Tennessee Technology Park, and UCOR. October 2018.

Levine, A., **R.A. McManamay** (Co-PI). A Holistic Examination of the FERC Hydropower Licensing Process to Enable Regulatory Optimization. Department of Energy Water Power Program. FY19 Annual Operating Program. October 2018.

McManamay,R.A. Biological Monitoring and Abatement Program, Invertebrate Community Monitoring. UCOR. October 2017.

McManamay, R.A. Uptake and Distribution of Potential Fly Ash Contaminants in Emory River Invertebrates. Tennessee Valley Authority. September 2017.

McManamay, R.A., M. J. Peterson. Mercury Technology Development. Water Resources Restoration Program. Department of Energy, Office of Environmental Management. UCOR|RSI.

McManamay, R.A., B. Preston. Regional Integrated Assessment Modeling (RIAM) Program. Department of Energy, Office of Science, Biological and Environmental Research.

McManamay, R.A. US Stream Classification System. Department of Energy Water Power Program. FY14 Annual Operating Program. October 2016.

Tran, L.T., H. Kim, **R.A. McManamay** (Co-PI). Examining the Energy-Water Nexus through the Lens of the Super-Network: Combining Water Routing Networks with Energy Production-Consumption Networks. Joint Directed Research and Development Program. University of Tennessee Knoxville. January 2016.

McManamay, R.A., S. Surendran Nair, R.N. Stewart, S-C Kao, B.T. Smith. Fine-resolution Modeling of Urban-Energy Systems' Water Footprint in River Networks. Oak Ridge National Laboratory Director's Research and Development Proposal. October 2015-2016.

McManamay, R.A., M. Doyle, M. Fork, J. Heffernan. Enriching the spatial and temporal resolution of water quality sensor networks in urban environments. Oak Ridge National Laboratory GO! Program Supplemental Funding. November 2014.

McManamay, R.A., S. Surendran Nair, R.N. Stewart, S-C Kao, B.T. Smith. Fine-resolution Modeling of Urban-Energy Systems' Water Footprint in River Networks. Oak Ridge National Laboratory Director's Research and Development Proposal. October 2014-2015.

McManamay, R.A. Stream Classification Tool. Department of Energy Water Power Program. FY14 Annual Operating Program. October 2014.

McManamay, R.A. Stream Classification Tool. Department of Energy Water Power Program. FY14 Annual Operating Program. October 2013.

Anderson, M. G., A. Olivero, **R. A. McManamay**. A stream classification system for the Appalachian Landscape Conservation Cooperative. Appalachian Landscape Conservation Cooperative RFP. November 2012. http://applcc.org/projects/stream-classification.

Orth, D.J., **R.A. McManamay**, and J. Kauffman. Ecological responses to flow alteration in the South Atlantic Region: Literature review. Southeastern Aquatic Resources Partnership, May 2011.

Orth, D. J., **R. A. McManamay**, J. Henriksen, and J. Heasley. Stream flow classification for environmental flow standards and analysis. Virginia Department of Game and Inland Fisheries. 2010.

McManamay, R.A., T. Lowe, J. Williams, and B. Pierce. Riparian restoration of Wright Branch, an extirpated headwaters stream, for reintroduction of Eastern brook trout through the Trout in the Classroom program. (Embrace-A-Stream Grants, Trout Unlimited, 2010).

Lowe, T., **R.A. McManamay**, D. Kirk, J. Williams, and J. Ross. Stony Creek within the Glen Alton Tract (Giles County, VA): Stream and Riparian Habitat Restoration, Stabilization, and Reconnection. Awarded (Embrace-A-Stream Grants, Trout Unlimited; Southeastern Aquatic Resources Partnership; National Forest Foundation). February 2008.

McManamay, R.A. The effect of morphological restoration of the fish and macroinvertebrate assemblage structure in a fragmented river system.Sigma Xi, Scientific Research Society, January 2008.

Synergistic Activities – Project Advisement & Collaboration

Baylor University Affiliation**

***MultiSector Urban Interactions: Fundamental Science Needs to Inform Pathways to More Resilient Communities in a Changing Climate.* **Workshop Break-out Facilitator.** July 21-23, 2021.

***From Watershed to Energysheds*: **Workshop Advisor and Participant.** Department of Energy, Energy Efficiency and Renewable Energy. 132 attendees. July 13-214, 2021. Workshop and Background information.

** *Energyshed Management System*, **Concept Origination for Congressional Funding Allocation.** Congress directed **$10 Million** (Jan 2021) to the Department of Energy (DOE), Efficiency and Renewable Energy (EERE) for: "the development and demonstration of an "energyshed" management system....". McManamay was PI of a large research project resulting in seminal work on defining energysheds (see DeRolph et al. 2019, McManamay et al. 2017; 2019). Energysheds was a relatively new concept to DOE, therefore McManamay was requested to advise EERE (via two sessions) in 2021 to inform the scope, and focus of a >100-participant workshop and research needs for an FOA: Energsyhed-Exploring Place-Based Generation.

** *Integrated Coastal Modeling* (ICoM). **Team Member, Baylor Lead.** Ian Kraucunas (PI), Pacific Northwest National Lab, Department of Energy, Office of Science – Biological and Environmental Research, 2021-Current. https://climatemodeling.science.energy.gov/projects/integrated-coastal-modeling-icom

***Coastal Observations, Mechanisms, and Predictions Across Systems and Scales* (COMPASS). Great Lakes Modeling – **Team Member, Baylor Lead**

Robert Hetland (PI), Pacific Northwest National Lab, Department of Energy, Office of Science – Biological and Environmental Research, 2021-Current. https://compass.pnnl.gov/GLM/Team

US Geological Survey, Powell Research Group – Water Reanalysis – **Participant (2021-Current)
Reanalyzing and Predicting U.S. Water Use using Economic History and Forecast Data; an experiment in short-range national hydro-economic data synthesis. Ruddell, B., Marston, L., Maupin, M., Bagstad, K. (PIs). https://www.usgs.gov/centers/powell-ctr/science/reanalyzing-and-predicting-us-water-use-using-economic-history-and?qt-science_center_objects=0#qt-science_center_objects

***Integrated Multisector Multiscale Modeling* (IM3)– Team Member, Baylor Lead**
Jennie Rice (PI), Pacific Northwest National Lab, Department of Energy, Office of Science – Biological and Environmental Research 2019-Current. https://im3.pnnl.gov/people

FEWSION Project Advisory Board Member
FEWSION: Mesoscale Data Fusion to Map and Model the U.S. Food, Energy and Water (FEW) System. Ruddell, B. (PI). National Science Foundation ACI-1639529. (Project Advisory Board Member): http://fewsion.us/team/

Energy-Water Nexus Knowledge Discovery Team - Collaborator
Energy-Water-Nexus Knowledge Discovery Framework, Bhaduri, B. (PI). Department of Energy, Office of Science - Biological and Environmental Research. 2017-2019

Department of Energy Water Power Environmental Summit, Workshop Presenter
Water Management: Laboratory Response. Department of Energy Hydropower Environmental Summit, Washington DC, April 2018.

Hydropower Environmental Metrics - Collaborator and Team Member
Environmental Metrics for Hydropower, Smith, B.T. (PI). Department of Energy Water Power Program. 2016-2018

Mentored Students, Post-Docs, and Graduate Committees:

Baylor University Affiliation**
Completed degree §

Mentored Post-Docs:

**2022-Curr: Ali Raufi, Baylor University (co-advised with Stephen Powers)
- Nighttime light and reservoir analysis
- Urban land scenario modeling

**2020-2022: Diane Le Bouille, Baylor University (co-advised with Stephen Powers, Baylor)
- Environmental Flow Metanalyses
- Current Position: Postdoc, Texas Tech University, Lubbock

2014-2015: Matthew J. Troia, Oak Ridge National Laboratory

- Stream Classifications, Macroecology, Fish Life-History Traits
- Current Position: Assistant Professor, University of Texas San Antonio

Mentored Technicians and Post-Masters:

Baylor University

**2021-Current: Jay Oliver, M.S., Data Specialist, Baylor University

- Geospatial analysis, hydrogeography, land use modeling

**2022: Ava Corry-Roberts, B.A., GIS and Data Technician, Baylor University

- Energy land footprint analysis, Water infrastructure mapping

Primary Advisor, Graduate Students:

Baylor University

**2022-Current: Mikaela Sako, Ph.D. Student, Dept of Environmental Science, Baylor U. TX

**2021-Current: Jordan Jatko, Ph.D. Student, Dept of Environmental Science, Baylor U. TX

- Ecosystem service tradeoff of wastewater treatment and stormwater runoff

Micah Bowman, Ph.D. Student, Dept of Environmental Science, Baylor U. TX

- Autonomous biological monitoring using artificial intelligence

**2020-Current: Mark Lueders, Ph.D. Student, Dept of Environmental Science, Baylor U. TX

- Environmental flows for protecting fish of conservation need

Jillian Sturtevant, Ph.D. Student, Dept of Environmental Science, Baylor U., TX

- Socio-economic land use mapping and relations to land-energy-water dynamics

**2019-Current: Kayla Garrett, Ph.D. Candidate, Dept of Environmental Science, Baylor U., TX

- Increasing renewable energy while protecting the environment

§2019-2021: Lydia Roush, M.E.S. Student, Dept of Environmental Science, Baylor U., TX

- Water quality implications of waste-water treatment facility
- Completed December 2021

University of Tennessee-Knoxville

2018-2019: Diliya Murtazina, Ph.D. student, Bredesen Center, University of Tennessee Knoxville

- Global hydropower assessment and impacts to biodiversity

§2016- 2017: Mariya Absar, Ph.D., Bredesen Center, University of Tennessee Knoxville

- Coupling Life Cycle Assessment and Socioeconomic Scenarios for Climate Change Adaptation of the Energy-Water Nexus
- Current position: ERG (Eastern Research Group), Life Cycle Services, Boston, MA

Mentored Graduate Student Interns:

2015-2017: Megan L. Fork (PhD Candidate, Duke University), Oak Ridge National Lab

- Urban-generated sources of DOC in reservoirs. Graduate Advisor – Dr. Jim Heffernan

Mentored Undergraduates and Post-Bachelor Interns and Researchers:

**2022: Petyon Abney (Environmental Science, Baylor University, TX)

- 3V9R Research: Invertebrate and larval fish biomonitoring

Mariam Eid (Biology, Baylor University, TX)

- 3V9R Research: Yellowstone National Park Flood Impact Monitoring

Hannah Fisher (Biology, Baylor University, TX)

- Internship: Yellowstone National Park Flood Impact Monitoring

Josh Godwin (Environmental Science, Baylor University, TX)

- Paid Intern: Invertebrate and larval fish biomonitoring

Zuzu Hileman (Biology, Baylor University, TX)

- Internship: Environmental flows and fish imperilment

Guilia Ishi (Biology, Baylor University, TX)

- Internship: Renewable energy in cities

Dylan Kim (Biology, Baylor University, TX)

- Internship: Environmental flows and fish imperilment

Jiaqi Ma (Biology, Baylor University, TX)

- 3V9R Research: Invertebrate and larval fish biomonitoring

Hanna (Nhu) Mai (Biology, Baylor University, TX)

- 3V9R Research: Invertebrate and larval fish biomonitoring

Skylar Nguyen (Biology, Baylor University, TX)

- 3V9R Research: Yellowstone National Park Flood Impact Monitoring

Gabriela Perales (Biology, Baylor University, TX)

- 3V9R Research: Invertebrate and larval fish biomonitoring

Leighton Petty (Biology, Baylor University, TX)

- 3V9R Research: Invertebrate and larval fish biomonitoring

Thu Pham (Biology, Baylor University, TX)

- 3V9R Research: Invertebrate and larval fish biomonitoring

Swetha Ravisankar (Biology, Baylor University, TX)

- 3V9R Research: Invertebrate and larval fish biomonitoring

Shahrez Shaban (Biology, Baylor University, TX)

- Paid Intern: Invertebrate and larval fish biomonitoring

Ben Trotter (Biology, Baylor University, TX)

- 3V9R Research: Invertebrate and larval fish biomonitoring

Alyssa Vasquez (Biology, Baylor University, TX)

- Internship: Environmental flows and fish imperilment

Megha Yengoti (Biology, Baylor University, TX)

- Internship: Yellowstone National Park Flood Impact Monitoring

Emily York (Biology, Baylor University, TX)

- Internship: Invertebrate and larval fish biomonitoring

**2021-22: Jack Charles (Environmental Science, Baylor University, TX)

- 3V90 Research: Autonomous biological monitoring applications

Christian Schultz (Environmental Science, Baylor University, TX)

- 3V90 Research: Autonomous biological monitoring applications

Kyra Rose (General Engineering, Baylor University, TX)

- 2V99 Research: City renewable energy goals

**2020-22: Ava Corry-Roberts (Environmental Studies, Baylor University, TX)

- 3V90 Research: GIS applications in the land-energy-water nexus

**2020: Raegan Turner (Environmental Science, Baylor University, TX).

- 3V90 Research: Water Quality Dynamics in Bullhide Creek, Lorena, TX

2019: Jillian Sturtevant (Biology and Mathematics, Lee University, TN). SULI internships (ORNL)

- Land socioeconomic sector mapping

Molly Landon (University of Tennessee-Knoxville). SULI internships (ORNL)

- Identification of invertebrate taxa using imaging and artificial intelligence

2018: Elizabeth Prior (Auburn University). SULI internships (ORNL)

- US dam fish passage database

Charles Cianciolo (University of Tennessee-Knoxville). SULI internships (ORNL)

- Synthesis of restoration and remediation activities on the Oak Ridge Reservation

2017: Joseph Famularo (Virginia Tech). SULI internships (ORNL)

- High-resolution stream habitat mapping

Franklin Linam (Texas A&M). SULI internships (ORNL)

- Mercury contamination in fish populations

Xiomara Correa (University of Puerto Rico at Arecibo, PR). SULI internships (ORNL)

- Visualizing future energy and water scenarios for cities

2016: Joseph Eisinger (Purdue University). SULI internships (ORNL)

- High-resolution stream habitat mapping

2013-14: Clement O. Oigbokie II. (HERE program). HERE internships (ORNL)

- Building Hydropower Dam and Operation Database.

2013 Peter Bonsall (National Park Service Intern). Visiting student (ORNL)

- Digital mapping and environmental characterization of Wild and Scenic Rivers

2012 Evan B. Robinson (Morris College, SC), HERE internships (ORNL)

- Instream Flow Requirements for Hydropower Developments.

2010 James T. Young (Virginia Tech).

- Observations of White Sucker Spawning.
- Journal article: See McManamay et al. (2013) Am Midl Nat

Graduate committees:

**2022-Curr: Malcom Barnard (Ph.D. Student), Baylor University, Biology, Advisor, Dr. Stephen Powers

- Nutrient biogeochemistry of Texas reservoirs

**2022-Curr: Kevin Strosky (Ph.D. Student), Baylor University, Environmental Science. Advisor, Dr. Bryan Brooks

- Mycrocystins related to anthropogenic impacts on the environment

**2022-Curr: Lacy Miller (Ph.D. Student), Baylor University, Biology. Advisor, Dr. Stephen Powers

- Farm pond biogeochemistry and hydrology

**2022-Curr: Malcom Macleod (Ph.D. Student), Baylor University, Biology. Advisor. Dr. Stephen Powers

- Dissolved oxygen and dissolved organic carbon in Texas reservoirs

**2022-Curr: Ariel Leahy (Ph.D. Student), Baylor University, Biology. Advisor, Dr. Sarah Kienle

- Seal flipper biomechanics and adaptation pressures

**2021-Curr: Alix Fournier (Ph.D. Student), Baylor University, GeoSciences. Advisor, Dr. Steve Forman

- Quaternary geomorphic and hydrologic processes for the evolution of dune fields

**2020-2021: Lauren Lubianski (M.S.), Baylor University, GeoSciences

- Contribution of tributaries to alluvium aquifer recharge. Advisor, Dr. Joe Yelderman

**2018-2021: Ryan Saylor (Ph.D.), University of Tennessee Bredesen Center

- Biological design criteria for hydropower turbines. Graduate Advisor – Dr. Mark S. Bevelhimer

**2019-2020: James Major (M.S.), Northern Arizona University, Geography

- River conservation under the Wild and Scenic River System. Graduate Advisor, Dr. Denielle M. Perry

**2017-2019: Rob George (M.S.), Northern Arizona University

- Examining flow-ecology relationships and building hydrologic alteration models. Graduate Advisor – Dr. Benjamin L. Ruddell
- Current Position: Research Associate, NAU

2017-2019: Sudershan Grangrade, Ph.D., University of Tennessee Bredesen Center

- Comparing Hydrologic Models under Climate Change. Advisor – Dr. Shih-Chieh Kao
- Current Position: Research Scientist, Oak Ridge National Laboratory

2013- 2015: Ryan Hathaway (M.S.) Virginia Tech National Capital Region

- Temperature Regimes in Regulated Rivers. Advisor - Dr. Donald J. Orth
- Current Position: Bureau of Reclamation

Presentations (†† invited) – Lead Author Only

Baylor University affiliation**

2022

**††Global biodiversity implications of alternative electrification strategies. Texas Christian University Department of Biology Fall Seminar Series. Fort Worth, TX. November 4, 2022.

**Machine Learning Applications to Understand Human Impacts on Water Resources. American Statistical Association ENVR workstop. Provo, Utah. October 2022

** Moving Towards Autonomous Biomonitoring for Small Aquatic Organisms Using Artificial Intelligence and Novel Collection Designs. *Joint Aquatic Sciences Meeting*. Grand Rapids, MI. May 2022.

**Finding convergent solutions between global sustainability objectives and reality in energy futures. *Baylor Department of Environmental Science Seminar Series*. Jan 2022

2021

**Global decarbonization-biodiversity tradeoffs of future alternative electrification strategies. *Ecological Society of America*. Virtual. July 2021.

**A meta-analysis of environmental flow standards and thresholds in Texas rivers. *Southern Division American Fisheries Society*. Virtual. April 2021.

2020

**Urban-rural land teleconnections in the United States. *American Geophysical Union*. December 2020.

**Application of a Hierarchical Spatial Framework to Prioritize Stream Restoration for an Endemic Fish. *Texas Chapter of the American Fisheries Society*. Waco, TX. Jan 2020.

2019

**††Designing sustainable future land-energy-water infrastructures for cities. *American Geophysical Union*. December 2019.

**††U.S. Department of Energy (DOE) Programs and Tools to Support Sustainable Hydropower. *US Fish and Wildlife Service Hydrology and Aquatic Resources Conservation Webinar Series*. November 2019.

**††A new water use dataset for the United States. *Pacific Northwest National Laboratory Land Use and Land Cover Change Seminar Series*. October 2019.

**††The Carbon-Energy-Water Nexus in Texas: From Texas to Lancaster: Challenges with Food, Water, and Fracking". *Ecology and Religion in 19th Century Studies*. Armstrong Library, Baylor University. September 2019.

2018

††Water Management: Laboratory Response. *Department of Energy Hydropower Environmental Summit*, Washington DC, April 2018.

The Current and Future US Energy Profile and Implications for Fisheries. *Southern Division American Fisheries Society*, San Juan Puerto Rico, March 2018.

A US Stream Classification to Support Habitat Restoration for Fisheries. *Southern Division American Fisheries Society*, San Juan Puerto Rico, March 2018.

Does somatic growth dilution lead to less methylmercury flux in fish populations? *Southern Division American Fisheries Society*, San Juan Puerto Rico, March 2018.

2017

Using dynamic time warping and data forensics to examine tradeoffs among land-energy-water networks across the conterminous United States. Poster. *American Geophysical Union*, New Orleans, LA. December 2017.

A Stream Classification System for the Conterminous US. *American Fisheries Society Annual Meeting*, Tampa, FL. August 24, 2017.

††Cities can choose their future water sustainability. *Friends of Oak Ridge National Laboratory*, Oak Ridge, TN. September 12, 2017.

††Using Stream Networks to Address Conservation Challenges in Aquatic Systems. Clemson University. Clemson University Natural Resources *Graduate Student Association Seminar Series*. March 2, 2017.

A simple optimization tool to prioritize barrier removal in streams: implications for convergence among divergent conservation objectives. *Southern Division American Fisheries Society Annual Meeting,* Oklahoma City, OK. February 2017.

††The Role of Spatial Analytics in the Energy-Water-Nexus. *University of Tennessee, Knoxville, Bredesen Center Seminar*. February 2, 2017.

2015

Fine-resolution Modeling of Urban-Energy Systems' Water Footprint in River Networks. *American Geophysical Union*, San Franciso, CA. December 2015.

Prioritzing Streams as Hydrologic Reserves in the Eastern US. *Southern Division American Fisheries Society Annual Meeting*, Savannah, GA. January 2015.

2014

Optimizing Win-Win Scenarios Between Hydropower Development and Environmental Improvements by Thinking Outside the Project Boundary. *American Fisheries Society Annual Meeting*, Quebec, Canada. August 20, 2014

The Basin Scale Opportunity Assessment: Finding win/win scenarios in improving the environment while increasing hydropower energy. *Western Division American Fisheries Society Annual Meeting*, Mazatlan, Mexico. April 10, 2014.

Hydrologic structuring of fish life history strategies across the US: Implications of losses in flow variation on fish assemblages. *Southern Division American Fisheries Society Annual Meeting*, Charleston, SC. January 2014.

2013

††The complicated nature of dams: Is a general framework for ecologically sustainable instream flow protection possible? *Virginia Chapter American Fisheries Society Annual Meeting, Continuing Education Workshop, Instream Flow – What it is and why it matters, Virginia* February 27, 2013.

††US hydrologic classification applied to fish traits: A framework for developing flow-ecology hypotheses. *Virginia Chapter American Fisheries Society Annual Meeting, Continuing Education Workshop,Instream Flow – What it is and why it matters, Virginia* February 27, 2013.

2012

Environmental attribution for the National Hydropower Assess Assessment Program. 2012. *American Fisheries Society, Annual Meeting*, St. Paul, MN. August, 2012.

††Methodology Review: Environmental attribution for the National Hydropower Assess Assessment Program. *Department of Energy Peer Review Panel*, Washington D.C., June 18-19, 2012.

Sampling considerations: difficulties detecting fish responses to flow restoration. *Tennessee Chapter American Fisheries Society Annual Meeting*. March 13, 2012. Fall Creek Falls State Park, TN.

††Ecological responses to flow alteration in the South Atlantic region: a literature review and meta-analysis. *Southern Division American Fisheries Society Annual Meeting*, Biloxi, MS. January 2012.

2011

A tail of two tailwaters: Constraints to effective mitigation with environmental flow restoration. *EcologicalSociety of America Annual Meeting*, Austin, TX. August, 2011.

Do dams affect streams the same? A step towards generalizing regulated stream flow patterns." *North American Benthological Society Annual Meeting*, Providence, RI, May, 2011.

††Providing a restoration template for regulated rivers. 2011. *Seminar, Oak Ridge National Laboratory*, Oak Ridge, TN. March 2011.

2010

Fish Community Restoration in a Regulated River. When Reality Hurts. 2010 *Southeastern Fishes Council Annual Meeting*, Athens, GA, November, 2010.

Classifying flow regimes in seven states: Implications for regional environmental flow standards and management. *American Fisheries Society Annual Meeting*, Pittsburg, PA, September, 2010.

Classifying flow regimes: Implications for regional environmental flow standards and management. *Virginia Chapter American Fisheries Society Annual Meeting*, Pittsburg, PA, September, 2010.

Investigating Fish Responses to Flow Restoration in the Cheoah River: Implications of Detection Probability on Conclusions. *Southern Division of the American Fisheries Society Annual Meeting*, Asheville, NC. February 2010.

2009

Stony Creek Restoration Project: A Collaboration and Success. Poster. *Virginia Chapter American Fisheries Society Annual Meeting*, Lexington, VA. March, 2009.

2008

Cheoah River Flow Restoration and Gravel Addition. *Stream Restoration Conference*, Asheville, NC. November 2008.

2007

The Effects of Nutrient Availability on Fish Nutrient Excretion. *North American Benthological Society Annual Meeting,* Columbia, SC. June 2007.

The Effects of Stream Resources on Macroinvertebrate and Fish Composition and Nutrient Cycling. *Virginia and North Carolina Joint Chapter American Fisheries Society Meeting*. February 2007.

Professional Service and Outreach:

Baylor University affiliation**

**2021-22: Facilitator and Organizer, Baylor University Department of Environmental Science Fall Seminar Series

**2020: Assistant Professor Climate Science Search Committee Member, Baylor University

**2018-2021: Associate Editor, Transactions of the American Fisheries Society

2018: Laboratory Tours and Outreach, Oak Ridge National Laboratory, June 8, 2018

2016: Mentor at Career Link: Oak Ridge National Lab – Event to support networking, recruiting, and mentoring of students at HBCU and MIE institutions

2013-2019: Aquatic Ecology Laboratory Tours (Elementary – College Age)

2014: Symposium Organization (Chair) – Sustainable solutions to benefit fisheries and hydropower at a basin scale. American Fisheries Society 2014 Annual Meeting, Quebec, Canada. August 2014.

2014: Student Oral Presentation Judge, Southern Division American Fisheries Society Meeting 2014 Annual Meeting, Charleston, SC

2013: Professional Meeting Organization and Planning - Southern Division American Fisheries Society Meeting 2013 Annual Meeting, Nashville, TN

2012: Symposium organization (with Ryan Utz) – Open Access Databases to Benefit Fisheries - American Fisheries Society 2012 Annual Meeting St. Paul, MN

2010: Trout Stream Sensitivity Study Director, New River Valley Chapter, Trout Unlimited, VA

2009: Southern Instream Flow Network Research Agenda Development, Nashville, TN

2009-2010: Vice President, Fisheries and Wildlife Graduate Student Association, Virginia Tech, Blacksburg, VA

2008-2010: Conservation Director, New River Valley Chapter, Trout Unlimited, VA

2007-2008: Outreach Committee, American Fisheries Society, VA chapter

2006-2008: President New River Valley Chapter, Trout Unlimited, VA

Reviewer for Journals (28):

- Nature Communications Earth and Environment; Earth's Future; Bioscience; Global Change Biology; Ecological Applications; Ecological Indicators; PloS ONE; Climate Policy; Environmental Management; Environmental Science & Technology; Scientific Data; Science of the Total Environment; Scientific Reports; Springer Plus; Water; Water Resources Research; Freshwater Biology; Canadian Journal of Fisheries and Aquatic Sciences; Data in Brief; Ecohydrology; Journal of Fish and Wildlife Management; Journal of Fish Biology; Journal of Hydrology; Marine and Coastal Fisheries; North American Journal of Fisheries Management; River Research and Applications; Transactions of the American Fisheries Society

Honors and Awards:

Baylor University affiliation**

**2021: Ecological Society of America, Sustainability Science Award (Virtual meeting) August 2021
  - Awarded for contribution: McManamay et al. (2017) US cities can manage national hydrology and biodiversity using local infrastructure policy. *PNAS* 114: 9581–9586.

2017: Distinguished Contribution Performance, Oak Ridge National Laboratory, Jan 2017
2016: Stanley I. Auerbach Award for Excellence in Environmental Sciences, Environmental Sciences Division, Oak Ridge National Laboratory, May 2016
2015: Emerging Leaders in Environmental and Energy Policy Network Fellow, Sep 2015
2015-2016: Outstanding Contribution Performance, Oak Ridge National Laboratory, Jan 2015
2014: Incentive Performance Award, Oak Ridge National Laboratory, December 2014
2014: Oak Ridge National Laboratory Significant Event Award (SEA)--Team Award, April 2014
2010: Jimmie Pigg Outstanding Student Achievement Award, Southern Division of the American Fisheries Society, Annual Meeting, Asheville, NC, Feb. 26, 2010.
2009: Sussman Fund Internship, US Fish and Wildlife Service, May – August 2009.
2007: American Fisheries Society Student Presentation Award: Virginia Chapter Meeting, Danville, VA, February 2007.
2006: VA Council of Trout Unlimited Certificate of Appreciation for New River Valley Chapter, Graves Mountain Lodge, Syria, VA, November 2006.

Software Applications, Websites, Data Products:

2018: US Stream Classification System: https://nhaap.ornl.gov/us-sct
  - Web App

2015: Stream Classification Tool for Use in Hydropower Mitigation. http://nhaap.ornl.gov/sct
2013: Environmental Attribution for National Hydorpower Asset Assessment Program.
HydroGIS http://nhaap.ornl.gov/content/hydrogis-0
New Stream-Reach Potential http://nhaap.ornl.gov/nsd

- Developed web-accessible GIS layers of environmental information to inform conservation planning for fisheries protection

2011 Virginia Environmental-flow Software

- Developed classification of stream flows and statistics for streams across Southeastern US
- Assisted E-flow Specialists in multivariate analyses within backdrop of software