AIMEE H. FULLERTON

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EDUCATION

Ph.D., University of Washington, Seattle, WA, 2016
M.S., University of Notre Dame, Notre Dame, IN, 1998
B.S., Ohio State University, Columbus, OH, 1994

PROFESSIONAL EXPERIENCE

Research Fish Biologist. 2002 to present. Ecosystem Analysis Program, Fish Ecology Division, Northwest Fisheries Science Center, NOAA Fisheries, Seattle, WA

Aquatic Biologist. 1998 to 2002. Nongame and Endangered Wildlife Program, North Carolina Wildlife Resources Commission, Raleigh, NC

RESEARCH INTERESTS

My research interests include thermal diversity in streams and the effect of climate change on Pacific salmon and aquatic systems; the spatial structure of aquatic populations, especially those living in stream networks; the relationship between spatio-temporal scale and ecological patterns and processes; the influence of nonindigenous species on native aquatic fauna; and ways that science can contribute to improved decision-making.

PEER-REVIEWED PUBLICATIONS

Fullerton, A.H., C.E. Torgersen, J.J. Lawler, E.A. Steel, J.L. Ebersole, and S.Y. Lee. 2018. Longitudinal thermal heterogeneity in rivers and refugia for coldwater species: effects of scale and climate change. *Aquatic Sciences* 80(3): 1-15.

Fullerton, A.H., B.J. Burke, J.J. Lawler, C.E. Torgersen, J.L. Ebersole, and S.G. Leibowitz. 2017, in press. Simulated juvenile salmon growth and phenology respond to altered thermal regimes and stream network shape. *Ecosphere* 8(12):e02052.

Steel, E.A., T.J. Beechie, C.E. Torgersen, and **A.H. Fullerton**. 2017. Envisioning, quantifying, and managing thermal regimes on river networks. *BioScience* 67: 506-522.

Marsha, A., E.A. Steel, **A.H. Fullerton**, and C. Sowder. 2018. Monitoring riverine thermal regimes on stream networks: insights into spatial sampling designs from the Snoqualmie River, WA. *Ecological Indicators* 84: 11-26.

Fullerton, A.H., S. Anzalone, P. Moran, D. Van Doornik, T. Copeland, and R. Zabel. 2016. Setting spatial conservation priorities despite incomplete data for characterizing metapopulations. *Ecological Applications* 26:2560-2580.

Fullerton, A.H., C.E. Torgersen, J.J. Lawler, R.N. Faux, E.A. Steel, T.J. Beechie, J.L. Ebersole and S.G. Leibowitz. 2015. Rethinking the longitudinal stream temperature paradigm: region-wide comparison of thermal infrared imagery reveals unexpected complexity of river temperatures. *Hydrological Processes* 29: 4719-4737. Highlights: depts.washington.edu/sefsblog/tag/aimee-fullerton/ & www.cbbulletin.com/433795.aspp.

Steel, E.A., A. Tillotson, D.A. Larsen, **A.H. Fullerton**, K.P. Denton, and B.R. Beckman. 2012. Beyond the mean: The role of variability in predicting ecological effects of stream temperature on salmon. *Ecosphere* 3(11):104.

Fullerton, A.H., S.T. Lindley, G.R Pess, B.E. Feist, E.A. Steel, and P. McElhany. 2011. Human influence on the spatial structure of threatened Pacific salmon metapopulations. *Conservation Biology* 25:932-944.

Fullerton, A.H., K.M. Burnett, E.A. Steel, R.L. Flitcroft, G.R. Pess, B.E. Feist, C.E. Torgerson, D.J. Miller, and B.L. Sanderson. 2010. Hydrological connectivity for riverine fishes: measurement challenges and research opportunities. *Freshwater Biology* 55:2215-2237.

Steel, A., R. Hughes, **A. Fullerton**, S. Schmutz, J. Young, M. Fukushima, S. Muhar, M. Poppe, B. Feist, C. Trautwein, H. Shimazaki, and B. Sanderson. 2010. Are we meeting the challenges of landscape scale riverine research? A review. *Living Reviews in Landscape Ecology*. http://landscaperesearch.livingreviews.org/Articles/lrlr-2010-1/.

Fullerton, A.H., A. Steel, Y. Caras, and I. Lange. 2010. Effects of spatial pattern and economic uncertainties on freshwater habitat restoration planning: a simulation exercise. *Restoration Ecology* 18(S2):354-369.

Fullerton, A.H., D. Jensen, A. Steel, D. Miller, and P. McElhany. 2010. How certain are salmon recovery forecasts? A watershed-scale sensitivity analysis. *Environmental Modeling & Assessment* 15:13-26.

Fullerton, A.H., A. Steel, Y. Caras, M. Sheer, P. Olson, and J. Kaje. 2009. Putting watershed restoration in context: Alternative future scenarios influence management outcomes. *Ecological Applications* 19(1):218-235.

Jensen, D., A. Steel, **A. Fullerton**, and G. Pess. 2009. Impact of fine sediment on egg-to-fry survival of Pacific salmon: A meta-analysis of published studies. *Reviews in Fisheries Science* 17(3):348-359.

Steel, E.A., T.J. Beechie, M. Ruckelshaus, **A.H. Fullerton**, P. McElhany, and P. Roni. 2009. Mind the gap: Uncertainty and model communication between managers and scientists. H. Michael, C. Steward, and E. Knudsen, eds. *American Fisheries Society Symposium* 71:357-372.

Steel, A., **A. Fullerton**, Y. Caras, M. Sheer, P. Olson, D. Jensen, J. Burke, M. Maher, and P. McElhany. 2008. A spatially explicit decision support system for managing wide ranging species. *Ecology and Society* 13(2):50. http://www.ecologyandsociety.org/vol13/iss2/art50/.

Fullerton, A.H., T.J. Beechie, S.E. Baker, J.E. Hall, and K.A. Barnas. 2006. Regional patterns of riparian characteristics in the interior Columbia River Basin, Northwestern USA: applications for restoration planning. *Landscape Ecology* 21:1347-1360.

Beechie, T., E. Buhle, M. Ruckelshaus, **A. Fullerton**, and L. Holsinger. 2006. Hydrologic regime and the conservation of salmon life history diversity. *Biological Conservation* 130:560-572.

Fullerton, A.H. and G.A. Lamberti. 2006. A comparison of habitat use and habitat-specific feeding efficiency by Eurasian ruffe (*Gymnocephalus cernuus*) and yellow perch (*Perca flavescens*). *Ecology of Freshwater Fish* 15(1):1-9.

Kolar, C.S., **A.H. Fullerton**, K.M. Martin, and G.A. Lamberti. 2002. Interactions among zebra mussel shells, invertebrate prey, and Eurasian ruffe or yellow perch. *Journal of Great Lakes Research* 28(4): 664-673.

Fullerton, A.H., and B.T. Watson. 2001. New distributional records for two nonindigenous and one native crayfish in North Carolina. *The Journal of the Elisha Mitchell Scientific Society* 117: 66-70.

Fullerton, A.H., G.A. Lamberti, D.M. Lodge, and F.W. Goetz. 2000. Potential for resource competition between Eurasian ruffe (*Gymnocephalus cernuus*) and yellow perch (*Perca*

flavescens): growth and RNA responses in laboratory experiments. *Transactions of the American Fisheries Society* 129:1387-1395.

Fullerton, A.H., J.E. Garvey, R.A. Wright, and R.A. Stein. 2000. Overwinter growth and survival of largemouth bass: interactions among size, food, origin, and winter severity. *Transactions of the American Fisheries Society* 129:1-12.

Wright, R.A., J.E. Garvey, **A.H. Fullerton**, and R.A. Stein. 1999. Predicting how winter affects energetics of age-0 largemouth bass: how do current models fare? *Transactions of the American Fisheries Society* 128:603-612.

Fullerton, A.H., G.A. Lamberti, D.M. Lodge, and M.B. Berg. 1998. Prey preferences of Eurasian ruffe and yellow perch: comparison of laboratory results with composition of Great Lakes benthos. *Journal of Great Lakes Research* 24:319-328.

CONFERENCE PRESENTATIONS (first author, most recent 5 years)

Incorporating spatial heterogeneity in temperature into climate vulnerability assessments for coastal Pacific rivers. North Pacific Landscape Conservation Cooperative. Webinar, November 2017.

Assessing longitudinal thermal connectivity for Pacific salmonids, Invited talk, specialty conference of the American Water Resources Association, Snowbird, UT, May 2017. Also co-chaired a different special session at the same conference: "Stream networks: climate and biological connectivity in four dimensions".

Managing (cold) water for salmon and people. University of Oregon, Water Science Seminar, Corvallis, OR, November 2016.

Spatiotemporally variable thermal landscapes and implications for Pacific salmon in a changing climate. MtnClim Conference, Leavenworth, WA, October 2016.

Perspectives on the riverscape concept. Riverscape Ecology workshop, Antony, France, June 2016.

Network shape influences the strength of growth and phenology responses to climate change in juvenile salmon. International Statistical Ecology Conference, Seattle, June 2016.

Spatio-temporal complexity of stream temperature and potential consequences for salmon. Monster Seminar JAM, Northwest Fisheries Science Center, Seattle, WA, October 2015.

Spatio-temporal complexity of stream temperature and potential consequences for salmon. Seminar, Southwest Fisheries Science Center, Santa Cruz, CA, July 2015.

Assessing vulnerability of Pacific salmon to climate-driven changes in riverine thermal heterogeneity. California-Nevada Chapter of the American Fisheries Society, Santa Cruz, CA, April 2015.

Thermal imagery reveals diverse spatial patterns in water temperature within and across rivers. Joint Aquatic Sciences Meeting, Portland, OR, May 2014. Also co-chaired this special session, titled: "Rapid Changes in Water Temperature: Quantifying, Understanding, and Managing Heterogeneity in Freshwater Thermal Regimes over Space and Time".

Landscape drivers of spatial patterns in stream temperature. International Association of Landscape Ecology, Austin, TX, April 2013.

Numerous presentations at smaller venues (typically ~ 1 per month) and coauthored talks.

OTHER PUBLICATIONS

Steel, E.A. and **A.H. Fullerton**. 2017. Thermal networks – do you really mean it? USDA Forest Service StreamNotes newsletter, November 2017, pp 1:6. www.fs.fed.us/biology/nsaec/assets/streamnotes2017-11.pdf.

Fullerton, A.H., J.J. Lawler, S-Y Lee, and C.E. Torgersen. 2017. Final report to the North Pacific Landscape Conservation Cooperative on "Incorporating spatial heterogeneity in temperature into climate vulnerability assessments for coastal Pacific streams."

Fullerton, A. C. Jordan, T. Cooney, R. Zabel, and M. Ford. 2017. Assessing salmon spatial structure and metapopulation dynamics. Chapter 10 in Zabel, R., ed. Life Cycle Modeling, Federal Columbia River Power System Adaptive Management Implementation Plan. Report to the Independent Scientific Advisory Board, May 2017.

Greene, C., K. Andrews, T. Beechie, D. Bottom, R. Brodeur, L. Crozier, **A. Fullerton**, L. Johnson, E. Hazen, N. Mantua, C. Menza, M. Sheer, W. Wakefield, C. Whitmire, M. Yoklavich, J. Zwolinski. 2014. Selecting and evaluating indicators for habitats within the California Current Large Marine Ecosystem. ftp://ftp.pcouncil.org/pub/SSC%20IEA%20indicator%20review/Background%20Docs/Day2_PM/Habitat_2013.pdf.

Fullerton, A., J. Jorgensen, E. Ward, M. Scheuerell, R. Zabel, E. Buhle, P. Westley, and G. Bal. 2013. Quantifying spatial structure of Interior Columbia Basin salmon populations. Chapter 8 *in* R. Zabel et al. Life-Cycle Models of Salmonid Populations in the Interior Columbia River Basin. Technical Report for the Columbia River Adaptive Management Implementation Plan, Draft January 18, 2013.

Fullerton A., D. Miller, T. Cooney, M. Sheer, D. Rawding, J. Rodgers, and D. Price. 2010. Habitat Analyses to Support Tule Chinook Life Cycle Modeling. *In* T. Cooney et al. Lower Columbia River Chinook Life Cycle Modeling. Final Report to NOAA Fisheries Regional Office, for use in the Multiyear Harvest Planning Biological Opinion for tule Chinook salmon in the Lower Columbia River, February 11, 2010.

Steel, E. A., **A. Fullerton**, Y. Caras, M. B. Sheer, P. Olson, D. Jensen, J. Burke, M. Maher and P. McElhany. 2007. The Lewis River Case Study: Final Report. Northwest Fisheries Science Center, Seattle, WA. Available at: http://www.nwfsc.noaa.gov/research/divisions/fed/wpg/documents/lrcs/LewisRiverCaseStudyFinalReport.pdf

Fullerton, A.H. 2002. The Crayfishes of North Carolina – a web atlas. http://216.27.39.101/wildlife_species_con/nccrayfishes/nc_crayfishes.html.

Fullerton, A.H. 2002. Status of significantly rare crayfishes in the Savannah, French Broad, Lumber, and Waccamaw River Basins, North Carolina: results from 2001 surveys. Year 1 Final Report, Nongame & Endangered Wildlife Program, North Carolina Wildlife Resources Commission, 73 pp.

Fullerton, A.H., B.T. Watson, and J.A. Johnson. 1998-2002. **Nineteen** Technical Aquatic Inventory Reports from surveys conducted throughout North Carolina. Nongame & Endangered Wildlife Program, North Carolina Wildlife Resources Commission.

FUNDING PROCURED

McHenry, M., G. Pess, et al. 2017. Elwha floodplain and fisheries monitoring support. Bureau of Indian Affairs. $184,100.

Yang, Z., A. Copping, N. Voisin, G. Mauger, I. Miller, J. Apple, and **A. Fullerton**. 2016. Competing water use in the face of climate change: integrated analysis to support water resource planning for extreme events. NOAA Sectoral Applications Research Program; $299,154

Fullerton, A.H., J.J. Lawler, S.Y. Lee, and C.E. Torgersen. 2014. Incorporating spatial heterogeneity in temperature into climate vulnerability assessments for coastal Pacific rivers. North Pacific Landscape Conservation Cooperative. $72,772.

Fullerton, A.H. 2009. Using measures of freshwater habitat connectivity for conservation planning. NWFSC Internal Grants Program; $27,900.

Steel, A., B. Beckman, **A. Fullerton**, K. Bartz, B. Letcher, and M. Angilletta. 2009. From experiments to landscapes: physiological, behavioral, and ecological consequences of anthropogenically altered thermal regimes during Chinook salmon incubation. NWFSC Internal Grants Program; $44,716.

Fullerton, A.H. 2005. Testing tools for science-based recovery planning: sensitivity analyses of a decision support system and application to restoration of watersheds containing ESA-listed Pacific salmonids. NWFSC Internal Grants Program; $20,600.

Steel, A., **A. Fullerton**, and P. McElhany. 2006. Lewis River Decision Support System. Federal Columbia River Power System BiOp Remand funding to NWFSC; $77,000.

Fullerton, A.H. 2001-2003. Inventory of status of significantly rare crayfishes throughout North Carolina. North Carolina Natural Heritage Program; $21,000.

Alderman, J.A., J.A. Johnson, **A.H. Fullerton**, and B.T. Watson. 1999-2001. Aquatic inventories of Montgomery, Johnston, Cumberland, and Richmond counties, North Carolina. North Carolina Natural Heritage Program; $28,000.

Alderman, J.A., B.T. Watson, and **A.H. Fullerton**. 1998-2000. Aquatic inventory of state-owned game lands. North Carolina Natural Heritage Program; $88,000.

AWARDS & HONORS

- Western Division AFS, Eugene Maughan Graduate Student Scholarship, 2013
- NOAA Advanced Studies Program Fellowship, 2010-2012
- Best PhD proposal, School of Environ. & Forestry Sciences, U. Washington, 2010
- Spot awards from NOAA for work related to salmon recovery planning, 2002-2011
- NSF Graduate Research Traineeship, University of Notre Dame, 1995-1998
- NSF Research Experience for Undergraduates, Ohio State University, 1994-1995

RECENT SERVICE

- Review panel member for NOAA Northwest Fisheries Science Center's Internal Grants Program, 2016-2019
- Research planning team member, Fish Ecology Division, Northwest Fisheries Science Center, 2017-2018
- Alternate Division representative, NOAA Western Regional (Climate) Action Plan Implementation Team, 2017-2018
- Ad hoc support to local, state, regional, and federal natural resource managers
- Co-organized a special session at a topical conference of the American Water Resources Association (connectivity) entitled "Stream networks: climate and biological connectivity in four dimensions", Snowbird, UT, spring 2017
- Co-organized a special session entitled "Rapid changes in water temperature: quantifying, understanding, and managing heterogeneity in freshwater thermal regimes over space and time" at the Joint Aquatic Sciences Meeting (Portland), spring 2013
- Participated in a career panel for students considering alternative career pathways, Joint Aquatic Sciences Meeting, Portland, spring 2014
- Member of a technical advisory group on riparian science for Washington Department of Fish & Wildlife's Priority Habitat and Species Program, 2015

- Organized special sessions on the influence of humans on aquatic connectivity for the 2011 annual meetings of (1) the US Chapter of the International Association for Landscape Ecology (Portland), and (2) the American Fisheries Society (Seattle)
- Co-chair for the seminar series at the Northwest Fisheries Science Center, spring 2011
- American Fisheries Society Service: (1) member of annual planning committee for Seattle 2011; (2) WA-BC ad-hoc committee, (3) session moderator at annual conferences
- Guest lectures to regional universities on landscape ecology and salmon recovery
- Hosted two visiting scientists from Austria, 2011
- Mentored interns via the NOAA Hollings Scholar program, University of Washington, and Western Washington University, 2007-present
- Outreach activities to promote science education in the general public (especially kids)
- Review of manuscripts for peer-reviewed scientific journals (approximately 1 per quarter) *Aquatic Conservation: Marine and Freshwater Ecosystems, Biological Invasions; BioScience; Canadian Journal of Fisheries and Aquatic Sciences; Conservation Biology; Conservation Letters; Ecology; Ecology of Freshwater Fish; Ecological Indicators, Endangered Species Research; Environmental Management; Environmental Society and Policy; Fisheries, Freshwater Biology; Geomorphology; Hydrobiologia; Journal of the American Water Resources Association; Journal of Applied Ecology; Journal of Environmental Management; Journal of Freshwater Ecology; Landscape Ecology; North American Journal of Fisheries Management; Northwest Science; Oikos; PLoS One; River Research and Applications; Science Signalling; Transactions of the American Fisheries Society, WATER*

PROFESSIONAL SOCIETIES

Society for Freshwater Science; American Fisheries Society; International Association of Landscape Ecologists, US Chapter; Society for Conservation Biology; AAAS