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## EDUCATION

Ph.D., 2002, Department of Entomology, Cornell University, Ithaca, N.Y. Dissertation: *Metapopulation biology of the mayfly Callibaetis ferrugineus hageni in high-elevation beaver ponds*. Advisor: Barbara Peckarsky.

M.S., 1995, Department of Zoology, University of New Hampshire, Durham, N.H. Thesis: *Molecular evidence of population genetic differentiation and sibling species in Acartia tonsa (Copepoda: Calanoida)*. Advisor: Ann Bucklin.

B.S., 1991, General Biological Sciences, with Honors in Biology, University of Maryland, College Park.  
Advisor: Roger Newell.

## PROFESSIONAL POSITIONS

Associate Professor (2018-present), and Director/Lead Scientist, Fish Ecology Research Laboratory (FERL; 2008-present). Department of Fish and Wildlife Sciences, University of Idaho.

Assistant Professor (2013-2018), Department of Fish and Wildlife Sciences, University of Idaho.

Research Assistant Professor, (2009-2013). Department of Fish and Wildlife Sciences, University of Idaho.

Research Scientist, 2006-2009. Department of Fish and Wildlife Sciences, University of Idaho.

Research Associate, 2004-2006. Department of Fish and Wildlife Sciences, University of Idaho.

Postdoctoral Fellow, 2003-2004. Department of Fish and Wildlife Sciences, University of Idaho.

NSF-IGERT Postdoctoral Fellow and Instructor, 2002-2003. School of Biology, Georgia Institute of Technology, Project title: Susceptibility of chemically-defended aquatic insects to fish predators: determining the relative importance of predator versus prey traits in the outcome of predator-prey interactions. Advisor: Mark Hay.

Instructor, 2002. Rocky Mountain Biological Laboratory (RMBL), Gothic Colorado.

## TEACHING

Assistant/Associate Professor, University of Idaho, 2013-present

*Fish Ecology* (300-level undergraduate; 4 credit, Fall 2013);

*Animal Movement, Dispersal, and Migration* (Graduate; 2 credit, Fall 2014; 3 credit Fall 2016);

*Statistical Analysis of Ecological Data* (Graduate; 1 credit co-taught with M. Wiest, Spring 2015).

*Fish and Wildlife in a Changing World* (200-level undergraduate for non-majors, 3 credit co-taught with J. Rachlow, Fall 2015-2019)

*Climate Change and the Conservation and Management of Populations* (Graduate, 1 credit with on-line option, Fall 2015 [sole instructor]; Spring 2017, Fall 2018 [co-instructor])

*Ichthyology* (400-level undergraduate; 4 credit with lab, Spring 2016-2020)

*Ecology and conservation of Freshwater Invertebrates* (400-level undergraduate & graduate; 4 credit with lab, Spring 2019, 2021)

Instructor, University of Idaho, 2006-7.

*Fish and Wildlife Population Ecology* (upper-level undergraduate course co-taught with O. Garton and C. Peery, Fall 2007)

*Cumulative Watershed Processes* (graduate seminar co-taught with T. Link, Spring 2007).

*Limnology* (upper-level undergraduate/graduate course with lab co-taught with C. Peery Fall 2006).

*Models of Cause and Correlation in Biology: Structural Equation Modeling for Non-experimental Systems* (graduate seminar co-taught with O. Garton, Spring 2006).

Instructor, Georgia Institute of Technology, 2002-2003.

*Aquatic Chemical Ecology Laboratory* (graduate course co-taught with Mark Hay and Julia Kubanek, School of Biology, Fall 2002).

*Biological Applications of Fluid Dynamics* (graduate course co-taught with Phil Roberts, School of Civil Engineering, Spring 2003).

Instructor, Rocky Mountain Biological Laboratory, 2002.

*Ecology and Conservation of Freshwater Invertebrates* (upper-level undergraduate course).

## **MENTORING ACTIVITIES**

### Post-doctoral advisor:

Geoff Moret, 2009-2014. Project title: Developing long term monitoring protocols for aquatic resources in the Mojave Network of the NPS Inventory and Monitoring Program. Current position: Southern Nevada Projects Chief, USGS Nevada Water Science Center

Tracy Bowerman, 2013-2016. Project title: Prespawn mortality in Chinook salmon of the Columbia Basin. Current position: Independent Consultant.

Dana Weigel Sheedy, 2017-2019. Project title: Genetic evaluation of interactions between native ESA-listed winter steelhead and non-native hatchery summer steelhead in the Willamette Basin. Current position: Independent Consultant.

Jens Hegg, 2018-2019. Project title: Characterizing life history variation in Willamette Valley Chinook salmon. Current position: Research Scientist, University of Idaho.

Travis Seaborn, 2019-present (advised with L. Waits and P. Hohenlohe). Project title: Agent-based modeling of redband trout populations.

Huang (William) Wang, 2020-present (advised with Holly Wichman).

### Graduate committee chair, current:

Matthew Dunkle, Ph.D., Water Resources

Adam Wicks-Arshack, Ph.D., Water Resources

Anna Chase, M.S., Environmental Science

David Arthaud, Ph.D., Fish and Wildlife Sciences

Elaine Harvey, Ph.D., Natural Resources

Jon Masingale, Ph.D (co-advised with Brian Small), Fish and Wildlife Sciences

Zane Ketchen, Ph.D., Fish and Wildlife Sciences

### Graduated:

Sammy Matsaw (Ph.D., Water Resources, 2021)

Sarah Hanchett (M.S., Fish and Wildlife Resources, 2019)

Nathan Fuchs (M.S., Fish and Wildlife Sciences 2018)

Matthew Dunkle (M.S., Fisheries Resources, 2017)

Charles Erdman (M.S., Fisheries Resources, 2017)

James "Channing" Syms (M.S., 2016; Civil Engineering, co-advised w/ Daniele Tonina)

Mark Kirk (M.S. Fisheries Resources, 2015)

Samuel Bourret (M.S. 2013; co-advised with B.P. Kennedy)

Christopher Noyes (M.S., Fisheries Resources, 2013)  
Hattie Zobott (M.S. Civil Engineering 2013, co-advised with R. Budwig)  
Adrienne Roumasset (M.S., 2012; Water Resources)  
Brian McIlraith (M.S., 2011; co-advised with B.P. Kennedy)

Keith Kistler, M.S. (non-thesis), Environmental Science, 2020  
Keith Watson, M.S. (non-thesis), Environmental Science, 2020  
Kimberly Clark, M.S. (non-thesis), Environmental Science, 2019

Graduate committee member: Current: William Lubenau (M.S., Fish & Wildlife Sciences), Bernadette Johnson (Ph.D., U.I. Biology), Carlie Sharpes (M.S., Fish & Wildlife Science). Past: Laura Jenkins (Ph.D., 2018, U.I. Biology), Stacey Feeken, (M.S., 2018, U.I. Fish & Wildlife Sciences), Zachary Beard (M.S., 2017 U.I. Fish & Wildlife Sciences), Francine Mejia (Ph.D., 2016, U.I. Fish & Wildlife Sciences), Adrienne Zuckerman (M.S. 2015, U.I. Fish & Wildlife Sciences), Anthony Prisciandaro (M.S. 2015, U.I. Fish & Wildlife Sciences), K. Marius Myrvold (Ph.D. 2014, U.I. Fish & Wildlife Sciences), Karen Laitala (M.S. 2007, U. I. Plant Science)

Undergraduate research advisees: Tawa Giwa, 2021 (NSF Idaho EPSCoR SARE program); Autumn Herrington, 2021 (NSF Idaho EPSCoR SARE program); Hannah Kemp, 2021 (NSF Idaho EPSCoR SARE program); Breanna Graves, 2018-2020, Ecology and Conservation Biology (ECB) thesis advisor; Ryan Dunbeck, 2016-2019, UI-NSF MILES Summer Fellow, ECB thesis advisor; Kristin Hall, Environmental Science, 2017-2018; Alexis Litty, 2016-2017, Environmental Science; Keala Bush, supported by UI Office of Undergraduate Research, spring 2016; Robert Hogg, U.I. Environmental Sciences/NSF REU mentor, summer 2007; Eva Sebesta, U.I. McNair Scholar Program mentor (with Ed Galindo and Aaron Haines), summer 2007.

## **PUBLICATIONS**

### **Peer-Reviewed Publications (\*indicates student author)**

88. Dunkle, M.\*, R. Dunbeck\*, and C. C. Caudill. Fish carcasses alter subyearling Chinook salmon dispersal behavior and density but not growth in experimental mesocosms. Submitted to Ecosphere (April 2021)
87. Keefer, M.L., M.A. Jepson, T.S. Clabough, and C.C. Caudill. Technical fishway passage structures provide high passage efficiency and effective passage for adult Pacific salmonids at eight large dams. Accepted, PLOS ONE (August 2021)
86. Wang, H., T. Seaborn, Z. Wang, C.C. Caudill, and T.E. Link. 2021. Modeling tree canopy height using machine learning over mixed vegetation landscapes. International Journal of Applied Earth Observations and Geoinformation 101 (2021) 102353. <https://doi.org/10.1016/j.jag.2021.102353>
85. Seaborn, T., D. Griffith, A. Kliskey, and C.C. Caudill. 2021. Building a Bridge Between Definitions and Concepts of Adaptive Capacity and Adaptive Potential. Global Change Biology; 00:1-13. <https://doi.org/10.1111/gcb.15579>
84. Fuchs, N.T.\*, C.C. Caudill, A.R. Murdoch, and B.L. Truscott. 2021. Overwintering distribution and post-spawn survival of Steelhead in the upper Columbia River Basin. North American Journal of Fisheries Management. <https://doi.org/10.1002/nafm.10585>
83. Bowerman, T., M.L. Keefer, and C.C. Caudill. 2021. Elevated stream temperature and individual traits influence Chinook salmon prespawn mortality across the Columbia River Basin. Fisheries Research. 237: 105874. <https://doi.org/10.1016/j.fishres.2021.105874>

82. Syms, J.C.\*, M.A. Kirk\*, C.C. Caudill, and D. Tonina. 2020. A biologically based measure of turbulence intensity for predicting Pacific lamprey passage behaviors. Journal of Ecohydraulics. DOI: 10.1080/24705357.2020.1856007
81. Hess, J. S. Jeramiah, N. Timoshevskaya, C. Baker, C.C. Caudill, D. Graves, M.L. Keefer, M. Moser, L. Porter, G. Silver, S. Whitlock, and S. Narum. 2020. Genomic islands of divergence infer a phenotypic landscape in Pacific lamprey. Molecular Ecology. **29** (20): 3841-3856. <https://doi.org/10.1111/mec.15605>
80. Zobott, H.\*, R. Budwig, C.C. Caudill, M.L. Keefer, and W. Basham. 2020. Pacific Lamprey drag force modeling to optimize fishway design. Journal of Ecohydraulics. <https://doi.org/10.1080/24705357.2020.1768911>
79. Dunkle\*, M.R., R.T. Lampman, A.D. Jackson, and C.C. Caudill. 2020. Factors affecting fate of Pacific lamprey carcasses and resource transport to riparian and stream macrohabitats. Freshwater Biology. **65**(8): 1429-1439. <https://doi.org/10.1111/fwb.13510>.
78. Keefer, M.L., C.J. Noyes\*, T.S. Clabough, D.C. Joosten, and C.C. Caudill. 2020. Rapid migration and high survival of adult Pacific Lamprey in reservoirs. North American Journal of Fisheries Management **40**: 354-367. DOI: 10.1002/nafm.10413
77. Jenkins, L.E., A.L. Pierce, C.C. Caudill, N.D. Graham, L.R. Medeiros, D.R. Hatch, J.J. Nagler. 2020. Effects of physiological condition on aspects of repeat spawning in female Steelhead Trout reconditioned in captivity. Transactions of the American Fisheries Society. **149**(2): 213-224. <https://doi.org/10.1002/tafs.10224>
76. Keefer, M.L., G.P. Naughton, T.S. Clabough, M.J. Knoff, T.J. Blubaugh, M.R. Morasch, P.G. Green, and C.C. Caudill. 2020. Tissue toxins and prespawm mortality in Willamette River Chinook Salmon. Environmental Biology of Fishes **103**: 175–183. 10.1007/s10641-019-00944-w.
75. Fuchs, N.T.\*, and C.C. Caudill. 2019. Classifying and Inferring Behaviors Using Real-time Acceleration Biotelemetry in Reproductive Steelhead Trout (*Oncorhynchus mykiss*). Ecology and Evolution **9**:11329–11343. DOI: 10.1002/ece3.5634
74. Weigel, I. Koch, F. Monzyk, C. Sharpe, S. Narum, and C.C. Caudill. 2019. Effectiveness of a Trap and Transport Program to Boost a Threatened Population of Steelhead (*Oncorhynchus mykiss*). Conservation Genetics [doi.org/10.1007/s10592-019-01200-5](https://doi.org/10.1007/s10592-019-01200-5)
73. Keefe, R., A. Wempe, R. Becker, E. Zimbelman, E. Nagler, S. Gilbert, and C.C. Caudill. 2019. Positioning methods and the use of location and activity data in forests. Forests **10**(5): 458. <https://doi.org/10.3390/f10050458>.
72. Moser, M.L., S.C. Corbett, M.L. Keefer, K.E. Frick, S. Lopez-Johnston, and C.C. Caudill. 2019. Novel fishway entrance modifications for Pacific lamprey. Journal of Ecohydraulics. <https://doi.org/10.1080/24705357.2019.1604090>
71. Moser, M.L., M.L. Keefer, S.C. Corbett, K.E. Frick, C.C. Caudill, and S.C. Tackley. 2019. Providing refuges for adult Pacific lamprey (*Entosphenus tridentatus*) inside fishways. Journal of Aquaculture and Fisheries <https://doi.org/10.1016/j.aaf.2019.03.003>.

70. Weigel, D., J. Adams, M.A. Jepson, L. Waits, and C.C. Caudill. 2019. Introgressive hybridization between native and artificially propagated non-native Steelhead (*Oncorhynchus mykiss* spp.). *Aquatic Conservation: Marine and Freshwater Ecosystems* **29**: 292-302. DOI: 10.1002/aqc.3028
69. Keefer, M.L., T. Clabough, T. Bowerman, M.A. Jepson, and C.C. Caudill. 2019. Temperature and depth profiles of Chinook salmon and the energetic costs of their long-distance homing migrations. *Journal of Thermal Biology* **79**: 155-165. DOI: 10.1016/j.jtherbio.2018.12.011
68. Keefer, M.L., T.S. Clabough, M.A. Jepson, E.L. Johnson, C.A. Peery, and C.C. Caudill. 2018. Thermal exposure of adult Chinook salmon and steelhead: Diverse behavioral strategies in a large and warming river system. *PLOS ONE* **13**(9): e0204274 <https://doi.org/10.1371/journal.pone.0204274>
67. Keefer, M.L., T.J. Blubaugh, T.S. Clabough, M.A. Jepson, G.P. Naughton, and C.C. Caudill. 2018. Successful introduction or undesirable invasion? Status of Coho Salmon in Oregon's upper Willamette River. *Transactions of the American Fisheries Society*: **147**: 115-1166. <https://doi.org/10.1002/tafs.10112>
66. Naughton, G.P., M.L. Keefer, T.S. Clabough, M. Knoff, T. Blubaugh, C. Sharpe, and C.C. Caudill. 2018. Reservoir provides cool-water refuge for adult Chinook salmon in a trap-and-haul reintroduction program. *Marine and Freshwater Research* **69**(12): 1997-2005 <https://doi.org/10.1071/MF18124>
65. Erdman\*, C., C. C. Caudill, G.P. Naughton, and M. Jepson. 2018. Release of hatchery-origin steelhead for angler opportunity increases potential for interactions with endemic steelhead. *Ecosphere* **9**(10): e02448. <https://doi.org/10.1002/ecs2.2448>
64. Wicks-Arshack\*, A. B., M.R. Dunkle\*, S.L. Matsaw\*, and C. C. Caudill. An Ecological, Cultural and Legal Review of Pacific Lamprey in the Columbia River Basin. 2018. *Idaho Law Review* **54**(1): 45-99. March 2018. <https://digitalcommons.law.uidaho.edu/idaho-law-review/vol54/iss1/2>
63. Bowerman, T., A.R. Roumasset\*, M.L. Keefer, C.S. Sharpe, and C.C. Caudill. 2018. Chinook Salmon prespaw mortality increases with water temperature and percent hatchery origin. *Transactions of the American Fisheries Society* **147**: 31-42. DOI: 10.1002/tafs.10022
62. Naughton, G.P., M.L. Keefer, T.S. Clabough, M.J. Knoff, T.J. Blubaugh, and C.C. Caudill. 2017. Tag effects on prespaw mortality of Chinook Salmon: A field experiment using PIT tags, radio transmitters, and untagged controls. *The North American Journal of Fisheries Management*. DOI: 10.1080/02755947.2017.1396269
61. Crozier, L.G., T. Bowerman, B.J. Burke, M.L. Keefer, and C.C. Caudill. 2017. High stakes steeplechase: a behavior-based model to predict individual travel time through diverse migration segments. *Ecosphere* **8**(10): 1-25. DOI: 10.1002/ecs2.1965
60. Kirk\*, M.A., C.C. Caudill, J.C. Syms\*, and D. Tonina. 2017. Context-dependent responses to turbulence for an anguilliform swimming fish, Pacific lamprey, during passage of an experimental fishway weir. *Ecological Engineering*. **106**: 296-307. <http://dx.doi.org/10.1016/j.ecoleng.2017.05.046>
59. Keefer, M.L., M.A. Jepson, T.S. Clabough, E.L. Johnson, S.R. Narum, J.E. Hess, and C.C. Caudill. 2017. Sea-to-sea survival of late-run adult steelhead (*Oncorhynchus mykiss*) from the Columbia and Snake rivers. *Canadian Journal of Fisheries and Aquatic Sciences*. DOI: [10.1139/cjfas-2016-0430](https://doi.org/10.1139/cjfas-2016-0430)

58. Keefer, M.L., M.A. Jepson, T.S. Clabough, E.L. Johnson, C.C. Caudill, B.J. Burke, and K. Frick. 2017. Condition-dependent en route migration mortality of adult Chinook Salmon in the main stem Willamette River. North American Journal of Fisheries Management. **37**: 370-379. DOI: 10.1080/02755947.2016.1269032
57. Bowerman, T.E., A. Pinson-Dumm, C.A. Peery, and C.C. Caudill. 2017. Effects of body size and migration rate on reproductive energy expenditure in a population of Chinook salmon with a long distance migration. Journal of Fish Ecology. DOI: 10.1111/jfb.13274
56. Keefer, M. L, C.C. Caudill, E.L. Johnson, T.S. Clabough, C.T. Boggs, P.N. Johnson, and W.T. Nagy. 2017. Inter-observer bias in fish classification and enumeration using dual-frequency identification sonar (DIDSON): a Pacific lamprey case study. Northwest Science. **91**(1): 41-53. DOI:[10.3955/046.091.0106](https://doi.org/10.3955/046.091.0106)
55. Kirk\*, M.A., and C.C. Caudill. 2017. Network analyses reveal intra- and interspecific differences in behaviour when passing a complex migration barrier. Journal of Applied Ecology. **54**: 836-845. DOI 10.1111/1365-2664.12786
54. Bowerman, T.E., M.L. Keefer, and C.C. Caudill. 2016. Pacific salmon prespawm mortality: patterns, methods, and study design considerations. Fisheries. **41**(12): 738-749. DOI 10.1080/03632415.2016.1245993
53. Bourret, S.L, C.C. Caudill, and M.L. Keefer. 2016. Diversity of juvenile Chinook salmon life history pathways. Reviews in Fish Biology and Fisheries. **26**: 375-403. DOI 10.1007/s11160-016-9432-3
52. Kirk, M.A\*, C.C. Caudill, D. Tonina, and J. Syms\*. 2016. Effects of water velocity, turbulence, and obstacle length on the swimming capabilities of adult Pacific lampreys. Fisheries Management and Ecology. **23**: 356-366. DOI 10.1111/fme.12179
51. Keefer, M.L., C.C. Caudill. 2016. Estimating thermal exposure of adult summer steelhead and fall Chinook salmon migrating in a warm impounded river. Ecology of Freshwater Fish **25**: 599-611. DOI 10.1111/eff.12238.
50. Benda\*, S.E., M.L. Kent, C.C. Caudill, C.B. Schreck, and G.P. Naughton. 2015. Cool, pathogen free refuge lowers pathogen associated prespawm mortality of Willamette River Chinook Salmon *Oncorhynchus tshawytscha*. Transactions of the American Fisheries Society. **144**(6): 1159-1172. DOI 10.1080/00028487.2015.1073621
49. Kirk\*, M.A., C.C. Caudill, E.L. Johnson, M.L. Keefer, and T.S. Clabough. 2015. Characterization of adult Pacific Lamprey swimming behavior in relation to environmental conditions within large dam fishways. Transactions of the American Fisheries Society **144**:998–1012. DOI 10.1080/00028487.2015.1059368.
48. Keefer, M.L., T.S. Clabough, M.A. Jepson, G.P. Naughton, T.J. Blubaugh, D.C. Joosten, and C.C. Caudill. 2015. Thermal exposure of adult Chinook salmon in the Willamette River basin. Journal of Thermal Biology **48**: 11-20. DOI 10.1016/j.jtherbio.2014.12.002
47. McIlraith\*, B.J., C.C. Caudill, B.P. Kennedy, C.A. Peery, and M.L. Keefer. 2015. Seasonal migration behaviors and distribution of adult Pacific Lamprey in unimpounded reaches of the Snake River basin. North American Journal of Fisheries Management **35**: 123-134. DOI 10.1080/02755947.2014.986344

46. Hess, J.E., C.C. Caudill, M.L. Keefer, B.J. McIlraith, M.L. Moser, and S.R. Narum. 2014. Genes predict long distance migration and large body size in a migratory fish, Pacific lamprey. Evolutionary Applications **7**: 1192-1208. DOI 10.1111/eva.12203
45. Bourret\*, S.L., B.P. Kennedy, C.C. Caudill, and P.M. Chittaro. 2014. Assessing the Feasibility of Geochemical Signatures to Distinguish Early Freshwater Movement, Habitat Use, and Life History of Chinook Salmon (*Oncorhynchus tshawytscha*). Journal of Fish Biology **85**: 1507-1525. DOI 10.1111/jfb.12505
44. Keefer, M.L., C.C. Caudill, and M.L. Moser. 2014. Bottleneck relief models: prioritizing fishway passage improvements for Pacific lamprey. Transactions of the American Fisheries Society **143(4)**: 1049-1060. DOI 10.1080/00028487.2014.911210
43. Caudill, C.C., M.A. Jepson, S.R. Lee, T.L. Dick, G.P. Naughton, and M.L. Keefer. 2014. A field test of eugenol-based anesthesia versus fish restraint in migrating adult Chinook salmon and steelhead. Transactions of the American Fisheries Society **143(4)**: 856-863. DOI 10.1080/00028487.2014.892533
42. Zabel, R.W., B.J. Burke, M.L. Moser, and C.C. Caudill. 2014. Modeling temporal phenomena in variable environments with parametric models: an application to migrating salmon. Ecological Modeling **273**: 23-30. DOI 10.1016/j.ecolmodel.2013.10.020
41. Keefer, M.L., C.C. Caudill. 2014. Homing and straying by anadromous salmonids: a review of mechanisms and rates. Reviews in Fish Biology and Fisheries. **24(1)**: 333-368. DOI 10.1007/s11160-013-9334-6
40. Caudill, C. C., M. L. Keefer, T. S. Clabough, G. P. Naughton, B. J. Burke and C. A. Peery. 2013. Indirect effects of impoundment on migrating Fish: Temperature gradients in fish ladders slow dam passage by adult chinook salmon and steelhead. PLOS One **8(12)**: 1-13; e85586. DOI 10.1371/journal.pone.0085586
39. Moser, M. L., M. L. Keefer, C. C. Caudill, and B. J. Burke. 2013. Migratory behavior of adult Pacific lamprey and evidence for effects of individual temperament on migration rate. Pages 132-151 in H. Ueda and K. Tsukamoto, editors. *Physiology and Ecology of Fish Migration*. CRC Press, Boca Raton.
38. Keefer, M.L., C.C. Caudill, T.S. Clabough, M.A. Jepson, E.L. Johnson, M. Higgs, and M. Moser. 2013. Fishway passage bottleneck identification and prioritization: a case study of Pacific lamprey at Bonneville Dam. Canadian Journal of Fisheries and Aquatic Sciences **70(10)**: 1551-1565. DOI 10.1139/cjfas-2013-0164
37. Keefer, M.L., C.C. Caudill, C.A. Peery, and M.L. Moser. 2013. Context-dependent diel behavior of upstream-migrating anadromous fishes. Environmental Biology of Fishes **96**: 691-700. DOI 10.1007/s10641-012-0059-5
36. Keefer, M. L., G. A. Taylor, D. F. Garletts, C. Helms, G. A. Gauthier, T. M. Pierce, and C. C. Caudill. 2013. High-head dams affect downstream fish passage timing and survival in the Middle Fork Willamette River. River Research and Applications **29**: 483-492. DOI 10.1002/rra.1613
35. Keefer, M.L., C.T. Boggs, C.A. Peery, and C.C. Caudill. 2013. Factors affecting dam passage and upstream distribution of adult Pacific lamprey in the interior Columbia River basin. Ecology of Freshwater Fish **22**: 1-10. DOI 10.1111/j.1600-0633.2012.00586.x

34. Laitala, K. L., T. S. Prather, D. Thill, B. Kennedy and C. Caudill. 2012. Efficacy of Benthic Barriers as a Control Measure for Eurasian Watermilfoil (*Myriophyllum spicatum*). Invasive Plant Science and Management **5(2)**: 170-177. DOI 10.1614/IPSM-D-09-00006.1
33. Clabough, T.S., M.L. Keefer, C.C. Caudill, E.L. Johnson, and C.A. Peery. 2012. Use of night video to enumerate adult Pacific lamprey passage at hydroelectric dams: challenges and opportunities to improve escapement estimate. North American Journal of Fisheries Management **32(4)**: 687-695. DOI 10.1080/02755947.2012.690820
32. Keefer, M. L., G. A. Taylor, D. F. Garletts, C. K. Helms, G. A. Gauthier, T. M. Pierce and C. C. Caudill. 2012. Reservoir entrapment and dam passage mortality of juvenile Chinook salmon in the Middle Fork Willamette River. Ecology of Freshwater Fish **21(2)**: 222-234. DOI 10.1111/j.1600-0633.2011.00540.x
31. Keefer, M.L., R.J. Stansell, S.C. Tackley, W.T. Nagy, K.M. Gibbons, C.A. Peery, and C.C. Caudill. 2012. Use of radiotelemetry and direct observation to evaluate sea lion predation on adult Pacific salmonids at Bonneville Dam. Transactions of the American Fisheries Society **141(5)**: 1236-1251. DOI 10.1080/00028487.2012.688918
30. Hyun, S-Y, M.L. Keefer, M.A. Jepson, C.C. Caudill, J.K. Fryer, R. Sharma, J.M. Whiteaker, and G.P. Naughton. 2012. Population-specific escapement of Columbia River fall Chinook salmon: tradeoffs among estimation techniques. Fisheries Research **129-130**: 82-93. DOI 10.1016/j.fishres.2012.06.013 (30)
29. Johnson, E.L., C.C. Caudill, M.L. Keefer, T.S. Clabough, C.A. Peery, M.A. Jepson, and M.L. Moser. 2012. Movement of radio-tagged adult Pacific lampreys during a large-scale fishway velocity experiment. Transactions of the American Fisheries Society **141(3)**: 571-579 DOI 10.1080/00028487.2012.683468
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**PRESENTATIONS AT SCIENTIFIC MEETINGS, 2008-present.** *First author was presenter unless noted, \* indicates student researcher.*

### 2021

Seaborn, T., C. Caudill. Adaptive Capacity of Redband Trout Across Ecotypes. Western Division of the American Fisheries Society. May 2021. Symposium: Climate Change Effects on Fish and Fisheries in a Changing World. Virtual.

Seaborn, T., and C.C. Caudill. Developing a framework for assessing adaptive capacity in stream networks using agent-based models for redband trout. Idaho Chapter of the American Fisheries Society. March 2021. Virtual.

Caudill, C.C., T.E. Bowerman, and M.L. Keefer. 2021. Elevated stream temperature, origin, and individual size influence Chinook salmon prespawn mortality across the Columbia River Basin. Idaho Chapter of the American Fisheries Society. March 2021. Virtual.

Caudill, C.C., N.T. Fuchs, and S.A. Hanchett. 2021. Using acceleration biotelemetry to characterize Steelhead Trout reproductive behavior in a spawning stream and adult Pacific Lamprey migration at a fishway bottleneck. Invited seminar, Lotek Biotelemetry

### 2020

Chen, Z., J. Masingale\*, S. Narum, R. Hardy, and C.C. Caudill. 2020. Phenotypic plasticity in thermal tolerance and performance within and among redband trout population. Idaho NSF-EPSCoR Genes by Environment: Modeling, Mechanisms, Mapping (GEM3) Annual Meeting (virtual poster presentation).

Masingale, J.\* , Z. Chen, B. Small, and C.C. Caudill. 2020. Do redband trout (*Oncorhynchus mykiss gairdneri*) inter-population differences in plasticity contribute to adaptive capacity? Idaho NSF-EPSCoR Genes by Environment: Modeling, Mechanisms, Mapping (GEM3) Annual Meeting (virtual poster presentation).

Seaborn, T., and C.C. Caudil. 2020. Evaluating the roles of plasticity, local adaptation, and dispersal to understand adaptive capacity by using new simulation software. Idaho NSF-EPSCoR Genes by Environment: Modeling, Mechanisms, Mapping (GEM3) Annual Meeting (virtual poster presentation).

Sharpes, C.\* , Z. Chen, J. Masingale, C.C. Caudill, S. Narum, and B. Small. 2020. The combination of hypoxia and temperature stress on redband trout (*Oncorhynchus mykiss gairdneri*) ecotypes: Which is the greatest stress? Idaho NSF-EPSCoR Genes by Environment: Modeling, Mechanisms, Mapping (GEM3) Annual Meeting (virtual poster presentation).

Wang, H., T. Seaborn, Z. Wang, C.C. Caudill, and T.E. Link. 2020. Modeling tree canopy height using machine learning over mixed vegetation landscapes. Idaho NSF-EPSCoR Genes by Environment: Modeling, Mechanisms, Mapping (GEM3) Annual Meeting (virtual poster presentation).

- Caudill, C.C. and T. Seaborn. 2020. Developing a framework for assessing adaptive capacity in Redband Trout using agent-based models. Pacific Northwest Chapter of the Society for Freshwater Science Annual Meeting (Virtual presentation).
- Seaborn, T., E. Landguth, and C.C. Caudill. 2020. Developing a framework for assessing adaptive capacity in Redband Trout using agent-based models. 2020 Annual meeting of the International Association for Landscape Ecology (Remote Virtual Conference) <https://2020toronto-ialena.ipostersessions.com/default.aspx?s=4B-B4-2A-EA-04-A1-62-D5-85-1A-8C-BB-80-8D-F0-2F&guestview=true>
- Dunkle, M.R.\*, Bellmore, J.R., Fellman, J.B., Hood, E.W., Caudill, C.C. Riverscape Heterogeneity and Food Web Diversity in Southeast Alaska. December 2020 Alaska Climate Adaptation Science Center All Hands Meeting.
- Dunkle, M.R. \*, Bellmore, J.R., Fellman, J.B., Hood, E.W., Caudill, C.C. Stream Physico-chemical heterogeneity creates asynchronous food web dynamics across glacial landscapes. Society for Freshwater Science Annual Meeting. 2020. Madison, Wisconsin. Abstract accepted and published in conference proceedings; conference canceled due to COVID-19 pandemic.
- Caudill, C.C. and T. Seaborn. 2020. Developing a framework for assessing adaptive capacity in Redband Trout using agent-based models. Society for Freshwater Science Annual Meeting. 2020. Madison, Wisconsin. Abstract accepted and published in conference proceedings; conference canceled due to COVID-19 pandemic.
- Caudill, C.C., N.T. Fuchs\*, and S.A. Hanchett\*. 2020. Fit-bits for fish: Using acceleration biotelemetry to characterize Steelhead Trout reproductive behavior in a spawning stream and adult Pacific Lamprey migration at a fishway bottleneck. 2020 Annual Meeting of the Idaho Chapter of the American Fisheries Society, Coeur d'Alene, ID.
- Graves, B\*, S.A. Hanchett\*, and C.C. Caudill. 2020. Assessment of social interactions on upstream movement of adult Pacific Lamprey (*Entosphenus Tridontatus*) on the Lower Columbia River. 2020 Annual Meeting of the Idaho Chapter of the American Fisheries Society, Coeur d'Alene, ID. (Poster).
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- Dunkle, M.\*, J.R. Bellmore, J.B. Fellman, E.W. Hood, and C.C. Caudill. 2019. Resource waves for juvenile fish in stream food webs results from abiotic heterogeneity on a complex landscape. 2019 Joint Annual Conference of the American Fisheries Society and the Wildlife Society, Reno, NV.
- Syms, J.C.\*, M.A. Kirk\*, D. Tonina, and C.C. Caudill. 2019. A biological turbulence intensity index for Pacific lamprey passage of artificial fishways. 38<sup>th</sup> International Association for Hydro-Environmental Engineering and Research, Panama City, Panama.
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- Dunbeck, R.A.\*, M.R. Dunkle\*, and C.C. Caudill. 2019. Movement response of juvenile Chinook Salmon (*Oncorhynchus tshawytscha*) to carcasses of Rainbow Trout (*O. mykiss*) and Pacific Lamprey (*Entophenus tridentatus*). Annual meeting of the Northwest Scientific Association, Lewiston, ID.
- Hanchett, S.\*, B. Graves\*, C.T. Boggs, T. Blubaugh, T. Clabough, and C.C. Caudill. 2019. Evaluating the influence of past experience on swimming behavior and passage success in adult Pacific lamprey. Annual meeting of the Northwest Scientific Association, Lewiston, ID.
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- 2018
- Caudill, C.C., G.P. Naughton, T. Blubaugh, T. Clabough, M.L. Keefer, M. Jepson, C.T. Boggs, G. Brink. 2018. Cooling water temperature gradient in a fishway are associated with poor passage and increased potential for interactions between hatchery and wild salmon. International Conference on River Connectivity (Fish Passage 2018), Albury, NSW Australia.
- Moser, M.L., S.C. Corbett, M.L. Keefer, K.E. Frick, S. Lopez-Johnston\*, C.C. Caudill (presenter). 2018. Novel fishway entrance modifications to improve passage for native fish. International Conference on River Connectivity (Fish Passage 2018), Albury, NSW Australia.
- Keefer, M.L., G.P. Naughton, T.S. Clabough, M.J. Knoff, T.J. Blubaugh, C. Sharpe, and C.C. Caudill. 2018. Reservoir provides cool-water refuge for adult Chinook salmon in a trap-and-haul reintroduction program. International Conference on River Connectivity (Fish Passage 2018), Albury, NSW Australia.
- Moser, M.L., M.L. Keefer, S.C. Corbett, K.E. Frick, C.C. Caudill, and S.C. Tackley. 2018. Providing refuges for adult Pacific lamprey inside fishways. International Conference on River Connectivity (Fish Passage 2018), Albury, NSW Australia. (Poster).

- Fuchs, N.\*, A. Murdoch, C.C. Caudill. 2018. Evaluating the distribution and survival of adult Upper Columbia River summer steelhead using radio telemetry. Upper Columbia River Salmon Recovery Board Upper Columbia Science Conference, Wenatchee, WA.
- Weigel, D., J. Adams, I. Koch, L. Waits, S. Narum, M. Jepson, and C.C. Caudill. 2018. Hatchery introgression associated with altered run timing in native, winter-run steelhead. Evolutionary Genomics, 2018 University of Montana Flathead Lake Biological Station, Poulson, MT.
- Caudill, C.C., G.P. Naughton, T. Blubaugh, T. Clabough, M.L. Keefer, M. Jepson, C.T. Boggs, and G. Brink. 2017. Evaluation of adult Chinook Salmon behavior at the Foster Dam Adult Fish Facility and in Foster Dam Reservoir on the South Santiam River, 2017. 2018 USACE Willamette Fisheries Science Review, Corvallis, OR.
- Weigel-Sheedy, D., I. Koch, S.R. Narum, C. Sharpe, F. Monzyk, J. Nagler, and C.C. Caudill. 2017. Evaluation of adult winter steelhead outplanting above Foster Dam on the S. Santiam River using genetic parentage analysis, 2016-2017. 2018 USACE Willamette Fisheries Science Review, Corvallis, OR.
- Dunbeck, R.A.\*, M.R. Dunkle\*, and C.C. Caudill. 2018. Movement response of juvenile Chinook Salmon *Oncorhynchus tshawytscha* to carcasses of Rainbow Trout *O. mykiss* and Pacific Lamprey *E. tridentatus*. Annual meeting of the Western Division of the American Fisheries Society, Anchorage, AK.
- Bellmore, J.R., J.B. Fellman, E. Hood, R.T. Edwards, M.R. Dunkle\* and C.C. Caudill. 2018. Glaciers and Salmon in Southeast Alaska: Can landscape complexity and mobility influence energy pathways to aquatic consumers? Annual meeting of the Western Division of the American Fisheries Society, Anchorage, AK.
- Caudill, C.C., D.E. Weigel, J.R. Adams, M.A. Jepson, L.P. Waits, I. Koch, and S. Narum. 2018. Evaluating introgressive hybridization between native and artificially propagated non-native steelhead *Oncorhynchus mykiss* and potential use of high head dams as wild fish sanctuaries. Annual meeting of the Western Division of the American Fisheries Society, Anchorage, AK.
- Hess, J.E., S. Micheletti, A. Matala, M.L. Keefer, C.C. Caudill, and S.R. Narum. 2018. Genomics predict the temporal and spatial distribution of life history diversity for a Western native lamprey (Pacific Lamprey, *Entosphenus tridentatus*). Annual meeting of the Western Division of the American Fisheries Society, Anchorage, AK.
- Dunkle, M.R\*., J.R. Bellmore, J.B. Fellman, E.W. Hood, R.T. Edwards, and C.C. Caudill. 2018. Hydrologic heterogeneity drives asynchronous food web dynamics in Southeast Alaskan rivers. Annual meeting of the American Geophysical Union, Washington, D.C. (Poster).
- Caudill, C.C. 2018. Migration in the modern world: a review of UI Fish Ecology Research Lab results. 2018 Idaho Department of Fish and Game Anadromous Section Meeting, Boise, ID. Invited, 1-hour presentation for ~100 IDFG Biologists.
- 2017
- Keefer, M.L., T.C. Clabough, M. Jepson, S. Hanchett\*, and C.C. Caudill. 2017. Adult salmonid interactions with two new lamprey passage structures at Bonneville Dam. USACE 2017 Anadromous Fish Evaluation Program Research Review, Richland, WA.

- Keefer, M.L., Migration of adult salmonids in the Federal Columbia River Power System: radiotelemetry metadata and synthesis, USACE 2017 Anadromous Fish Evaluation Program Research Review, Richland, WA.
- Dunkle, Matthew R. and Christopher C. Caudill. Can a specifically-timed resource lessen early life-history density dependence? Exploring the response of juvenile salmon to a historic marine-derived nutrient subsidy. 2017 Annual Meeting Ecological Society of America, Portland, Oregon
- Caudill, C.C., T. Bowerman, M. Keefer, L. Crozier. 2017. Prespawm mortality in Pacific salmon: Patterns, methods, mechanisms, and potential consequences. 2017 Annual Meeting of the Idaho Chapter of the American Fisheries Society, Boise, ID.
- Dunkle, M.R.\*, C.C. Caudill, R.T. Lampman, A. Jackson, and B.J. McIlraith. 2017. Missing nutrients from Pacific Lamprey: insights from translocation into historic spawning reaches. 2017 Annual Meeting of the Idaho Chapter of the American Fisheries Society, Boise, ID.
- Fuchs, N\*. A. Murdoch, B. Truscott, M. Jepson, and C.C. Caudill. 2017. Evaluation of migration behavior survival and distribution of adult upper Columbia summer steelhead using radiotelemetry. 2017 Annual Meeting of the Idaho Chapter of the American Fisheries Society, Boise, ID.
- Dunbeck, R.\*, M.R. Dunkle\*, C.C. Caudill, and R.T. Lampman. 2017. Quantifying the response of benthic macroinvertebrates to post-spawn Pacific Lamprey carcasses in an interior Columbia Basin stream. 2017 Annual Meeting of the Idaho Chapter of the American Fisheries Society, Boise, ID. (Poster).
- Matsaw, S.\*, T. Copeland, C.C. Caudill. 2017. Local status of a traditional First Food: patterns of distribution in native freshwater mussels in the Salmon and Clearwater river basins. 2017 Annual Meeting of the Idaho Chapter of the American Fisheries Society, Boise, ID. (Poster).
- Wicks-Arshack, A.\*, M. Dunkle\*, S. Matsaw\*, and C.C. Caudill. 2017. An ecological, cultural, and legal review of Pacific Lamprey in the Columbia River Basin. 2017 Annual Meeting of the Idaho Chapter of the American Fisheries Society, Boise, ID. (Poster).
- Matsaw, S\*, Wicks-Arshack, A.\*, and C.C. Caudill. 2017. Honoring the culture and science of native freshwater mussels, salmon, and Indigenous Peoples. 2017 Annual Meeting of the Oregon Chapter of the American Fisheries Society, Bend, OR.
- Caudill, C.C., D. Thompson, T. Blubaugh, T. Clabough, G. Naughton, and M. Keefer. 2017. Evaluation of adult Chinook Salmon behavior at the Foster Dam Adult Fish Facility on the South Santiam River, 2016. 2017 USACE Willamette Fisheries Science Review, Corvallis, OR.
- Bowerman, T., M.L. Keefer, C.C. Caudill, and L. Crozier. 2017. Processes affecting prespawm mortality in Chinook Salmon throughout the Columbia River Basin. 2017 USACE Willamette Fisheries Science Review, Corvallis, OR.
- Keefer, M.L., T.C. Clabough, M.A. Jepson, and C.C. Caudill. 2017. The value of 'big data': Insights from two decades of Columbia River fish passage research. 2017 International Conference on Engineering and Ecohydraulics for Fish Passage, Corvallis Oregon.
- Keefer, M.L., C.C. Caudill, L. Crozier, T. Bowerman, and B. Burke. 2017. High stakes steeplechase in a changing climate: predicting travel time and prespawm mortality in spring/summer Chinook salmon in

the Columbia-Snake hydrosystem and Salmon River Basin. 2017 International Conference on Engineering and Ecohydraulics for Fish Passage, Corvallis Oregon.

Keefer, M.L., C.C. Caudill, and T. Bowerman. 2017. Prespawn mortality of Chinook salmon and impacts of warming rivers on adult salmon and steelhead. NOAA-Fisheries 2017 Snake River Basin Research, Monitoring and Evaluation Workshop, Boise, ID, 18 April 2017.

Keefer, M.L., and C.C. Caudill. Cold water refuges: critical temporary habitats for migrating salmon and steelhead. Columbia River Federal Caucus Meeting, Portland, OR, 21 March 2017.

## 2016

Keefer, M.L. C.C. Caudill, T. Clabough, K. Collis, A. Evans, C. Fitzgerald, M. Jepson, G. Naughton, R. O'Connor, and Q. Payton. 2016. Summary of adult steelhead behavior and survival in the Federal Columbia River Power System. USACE 2016 Anadromous Fish Evaluation Program Research Review, Portland, OR.

Moser, M., S. Corbett, K. Frick, M. Keefer, C. Caudill, and S. Tackley. 2016. Providing refuges for Pacific Lamprey in Lower Columbia River fishways. Fish Passage 2016 International Conference on River Connectivity, Amherst, MA.

Erdman, C.S\*. and Caudill, C.C. 2016. Steelhead seasonal marine growth and variability in age at return. Annual meeting of the Idaho Chapter of the American Fisheries Society. Coeur d'Alene, ID.

Erdman, C.S\*, Caudill, C.C., Naughton, G.P., Jepson, M.A. 2016. Movement and fate of recycled hatchery-origin summer steelhead in the Willamette River, Oregon. Annual meeting of the Idaho Chapter of the American Fisheries Society. Coeur d'Alene, ID.

Bush, K\*, Erdman, C.S.\*, and Caudill, C.C. 2016. Evaluating the consistency of scale-derived steelhead *Oncorhynchus mykiss* seasonal growth estimations across multiple readers. Annual meeting of the Idaho Chapter of the American Fisheries Society. Coeur d'Alene, ID. (Poster).

Bowerman, T.E., C.C. Caudill, M.L. Keefer, and L. Crozier. 2016. Chinook salmon pre-spawn mortality patterns and process in the Columbia River Basin. 2016 Upper Columbia Science Conference, Wenatchee, WA.

Caudill, C.C., M. Jepson, M.L. Keefer, C. Erdman\*, J. Adams, S. Lee, T. Blubaugh, G. Naughton, T. Clabough, M. Knoff, M. Morasch, L. Waits, and C. Sharpe. 2016. Multi-year summary of Chinook salmon and steelhead migration in the Willamette River with emphasis on reach-specific survival, genetic stock identification of steelhead, and fate of recycled steelhead. 2016 Willamette Fisheries Science Review, Corvallis, OR.

Keefer, M.L., G. Naughton, C.C. Caudill, T. Clabough, G. Taylor, T. Blubaugh, M. Morasch, and C. Sharpe. 2016. Spawning success of spring Chinook salmon in Fall Creek, North Fork Middle Fork Willamette, and South Santiam Rivers, 2008-2015. 2016 Willamette Fisheries Science Review, Corvallis, OR.

Caudill, C.C., S.L. Bourret, M.L. Keefer, B.J. Clemens, B.P. Kennedy, G.A. Taylor, C. Sharpe. 2016. Identifying life history variation to inform recovery planning for upper Willamette River Chinook salmon. 2016 Willamette Fisheries Science Review, Corvallis, OR.

## 2015

- Caudill, C.C., M.L. Keefer, M. Jepson, T. Clabough, E. Johnson, S. Lee, B. Burke, and K. Frick. 2015. Conversion of radio-tagged adult salmon and steelhead through the lower Federal Columbia River Power System (FCRPS): 2013-2014. USACE 2015 Anadromous Fish Evaluation Program Research Review, Walla Wall, WA.
- Keefer, M.L., T. Clabough, M. Jepson, C.C. Caudill, B. Burke, and K. Frick. 2015. Overwintering distribution and behavior of adult steelhead in the Federal Columbia River Power System (FCRPS): migration years 2013-2014 and 2014-2015. USACE 2015 Anadromous Fish Evaluation Program Research Review, Walla Wall, WA.
- Bowerman, T.E., M.L. Keefer, C.C. Caudill, and L. Crozier. 2015. Patterns and process in prespawn mortality of Columbia River Basin spring and summer Chinook Salmon. USACE 2015 Anadromous Fish Evaluation Program Research Review, Walla Wall, WA.
- Stevens, P.M., C.A. Peery, I. Courter, T. Clabough, D. Joosten, C.C. Caudill, and S. Juhnke. 2015. Evaluation of upstream migration and dam passage by adult Pacific lamprey in the lower Snake River, 2015. USACE 2015 Anadromous Fish Evaluation Program Research Review, Walla Wall, WA.
- Thompson, D., C. Negrea, F. Loge, C. Boggs, C.C. Caudill, and A.E. Evans. 2015. Evaluation of adult fish ladder modifications to improve Pacific Lamprey at McNary Dam, 2015. USACE 2015 Anadromous Fish Evaluation Program Research Review, Walla Wall, WA.
- Zobott\*, H., R. Budwig, C.C. Caudill, M.L. Keefer, and W. Basham. 2015. Drag force physical modeling for use in design of Lamprey Passage Structures (LPSs). 145th Annual Meeting of the American Fisheries Society, Portland, OR.
- Kirk, M.A.\*, and C.C. Caudill. 2015. Network analyses reveal differences in the behavior of Pacific lamprey and Chinook salmon at a complex migration barrier. 145th Annual Meeting of the American Fisheries Society, Portland, OR.
- Caudill, C.C., S.L. Bourret, M.L. Keefer, B.J. Clemens, B.P. Kennedy, G.A. Taylor, and C.S. Sharpe. 2015. Identifying life history variation to inform recovery planning for upper Willamette River Chinook Salmon. 145th Annual Meeting of the American Fisheries Society, Portland, OR. (Poster).
- Caudill, C.C., M.L. Keefer, M. Moser, K. Frick. 2015. Upstream migration of adult Pacific Lamprey in the Columbia and Snake rivers. 145th Annual Meeting of the American Fisheries Society, Portland, OR.
- Syms, J\*, M.A. Kirk, C.C. Caudill, D. Tonina, and R. Budwig. 2015. The effect of turbulence in hydropower dam fish passageways on Pacific Lamprey passage. 145th Annual Meeting of the American Fisheries Society, Portland, OR (nominated for best student talk).
- Dunkle, M\*. C.C. Caudill, A.S. Fremier, J.R. Bellmore. 2015. Using a food web model to explore the ecosystem response to Pacific Lamprey restoration. 145th Annual Meeting of the American Fisheries Society, Portland, OR. (Poster).
- Bowerman, T., C.C. Caudill, M.L. Keefer, and L. Crozier. 2015. Effects of stream temperature on Chinook Salmon bioenergetics and prespawn mortality in the Columbia River Basin. 145th Annual Meeting of the American Fisheries Society, Portland, OR.
- Frick, K., S. Corbett, M. Hanks, M. Moser, and C.C. Caudill. 2015. Passage options for climbing lamprey: if you build it, they will come. 145th Annual Meeting of the American Fisheries Society, Portland, OR.

- Erdman, C.S.\*, and C.C. Caudill. 2015. What a long strange trip it's been: growth history and variability in age at return of steelhead. 145th Annual Meeting of the American Fisheries Society, Portland, OR. (Poster).
- Zobott, H.\*, C.C. Caudill, M.L. Keefer, R. Budwig, K. Frick, and M. Moser. 2015. Design guidelines for Pacific Lamprey passage structures. 2015. 145th Annual Meeting of the American Fisheries Society, Portland, OR. (Poster).
- Erdman, C.S.\*, C.C. Caudill, G.P. Naughton, M.A. Jepson, M. Knoff, and M. Morasch. 2015. Steelhead 'recycling' to improve angler opportunity: how can we alter these programs to maximize harvest and minimize impacts to native populations? 145th Annual Meeting of the American Fisheries Society, Portland, OR.
- Keefer, M.L. M.A. Jepson, G.P. Naughton, T.S. Clabough, T.J. Blubaugh, and C.C. Caudill. 2015. Adult salmon and steelhead in hot water: insights from individual-based biotelemetry and archival temperature loggers. 145th Annual Meeting of the American Fisheries Society, Portland, OR. (Poster).
- Keefer, M.L., C.T. Boggs, B.J. Burke, T.S. Clabough, T. Dick, K. Frick, M.A. Jepson, D.C. Joosten, S.R. Lee, G.P. Naughton, and C.C. Caudill. 2015. Upstream migration in the Columbia River basin: lessons learned from two decades of adult salmon and steelhead radiotelemetry projects. 145th Annual Meeting of the American Fisheries Society, Portland, OR.
- McIlraith, B., C.A. Peery, D. Statler, J.E. Hess, C.C. Caudill, B.P. Kennedy, and E. Crow Jr. 2015. Distribution and behavior of adult Pacific Lamprey (*Entosphenus tridentatus*) translocated into tributaries of the Snake and Clearwater rivers, ID. 145th Annual Meeting of the American Fisheries Society, Portland, OR.
- Stevens, P. C.A. Peery, T.S. Clabough, D.C. Joosten, I. Courter, and C.C. Caudill. 2015. Evaluation of upstream migration and dam passage by adult Pacific Lamprey in the lower Snake River, 2014. 145th Annual Meeting of the American Fisheries Society, Portland, OR.
- Zobott\*, H., R. Budwig, C.C. Caudill, M.L. Keefer, and W. Basham. 2015. Drag force physical modeling for use in design of Lamprey Passage Structures (LPSs). Annual Meeting of the Idaho Chapter of the American Fisheries Society, Boise, ID.
- Syms, J\*., M.A. Kirk, C.C. Caudill, D. Tonina, and R. Budwig. 2015. The effect of turbulence in hydropower dam fish passageways on Pacific Lamprey passage. Annual Meeting of the Idaho Chapter of the American Fisheries Society, Boise, ID.
- Keefer, M.L., S.L. Bourret, C.C. Caudill, B.P. Kennedy, G.A. Taylor, B.J. Clemens, and C.S. Sharpe. 2015. Towards reconstructing life history variation, composition and fitness differences among subbasin populations of Upper Willamette River Chinook Salmon. USACE Willamette Fisheries Science Review, Portland, OR.
- Keefer, M.L., G.P. Naughton, C.C. Caudill, T. Clabough, G.A. Taylor, M. Knoff, M. Morasch, and C.S. Sharpe. 2015. Spawning success of spring Chinook salmon in Fall Creek, North Fork Middle Fork Willamette, and South Santiam rivers, 2008-2014. USACE Willamette Fisheries Science Review, Portland, OR.
- Erdman, C\*, Keefer, M.L., C.C. Caudill, M.A. Jepson, S.R. Lee, M. Knoff, M. Morasch, and C.S. Sharpe. 2015. Migration behavior and distribution of adult winter and summer steelhead radio-tagged at Willamette

Falls and of 'recycled' summer steelhead at Foster and Dexter dams in 2012-2014. USACE Willamette Fisheries Science Review, Portland, OR.

Keefer, M.L., M.A. Jepson, C.C. Caudill, S.R. Lee, T. Blubaugh, M. Knoff, and M. Morasch. 2015. Migration behaviors and distribution of adult spring Chinook salmon radio-tagged at Willamette Falls in 2011-2014. USACE Willamette Fisheries Science Review, Portland, OR.

#### 2014

M. Keefer, C.C. Caudill, M. Jepson, T. Clabough, E.L. Johnson, S.R. Lee, B.J. Burke & K. Frick. 2014. Conversion of radio-tagged adult Chinook salmon and steelhead through the Federal Columbia River Power System (FCRPS), 2013-2014. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR. 10-11 December, 2014.

Caudill, C.C., E. Johnson, T. Clabough, M. Jepson, M. Keefer, S. Lee, J. Garnett, L. Layng, T. Dick, B. Burke, and K. Frick. 2014. Evaluation of adult salmon and steelhead passage behavior and success in relation to fishway modifications at Bonneville Dam. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.

Frick, K.E., Burke, B.J., C.C. Caudill, E. Johnson, T. Clabough, M. Jepson, M. Keefer, S. Lee, J. Garnett, L. Layng, and T. Dick. 2014. Evaluation of adult salmon and steelhead passage behavior in relation to fishway modifications at The Dalles and John Day dams, 2013-2014. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.

Keefer, M., T. Clabough, M. Jepson, and C.C. Caudill. 2014. Overwintering distribution and behavior of adult steelhead in the Federal Columbia River Power System (FCRPS): 2013-2014. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.

Keefer, M., C.C. Caudill, M. Jepson, T. Clabough, E.L. Johnson, C. Noyes, S. Corbett, and K. Frick. 2014. The 2014 adult Pacific lamprey migration: HD-PIT and radiotelemetry summaries. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.

Noyes, C., C.C. Caudill, D. Joosten, T. Clabough, and E. Johnson. 2014. Using the Juvenile Salmon Acoustic Telemetry (JSATS) system to evaluate adult Pacific lamprey movements and fate in Columbia River reservoirs, 2011-2014. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.

Corbett, S., K.E. Frick, and C.C. Caudill. 2014. Modification and evaluation of lamprey passage structures (LPSs) at Bonneville Dam and the John Day south fishway collection trap, 2014. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.

Caudill, C.C., H. Zobott, J. Syms, R. Budwig, M. Kirk, C. Noyes, E. Johnson, and S. Lee. 2014. Development and use of lamprey passage structures at the Bonneville Dam Lamprey Flume System and John Day Dam North Fishway Entrance, 2013-2014. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.

Frick, K.E., S. Corbett, M. Hanks, and C.C. Caudill. 2014. If you build it they will come: an experimental vertical climbing wall. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.

Kirk, M. and C.C. Caudill. 2014. Use of network theory to evaluate fish passage behavior at Bonneville Dam. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.

- Kirk, M. A., C. C. Caudill, J. Syms, D. Tonina, and N. Hubbard. 2014. Pacific Lamprey swimming behavior and performance in relation to passage barrier velocity, distance and turbulence in an experimental flume, 2014. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.
- Loge, F., D. Thompson, and C.C. Caudill. Evaluation of adult fish ladder modifications to improve Pacific lamprey passage at McNary and Ice Harbor dams. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.
- Peery, C.A., P. Stevens, T. Clabough, D. Joosten, I. Courter, and C.C. Caudill. 2014. Evaluation of upstream migration and dam passage by adult Pacific lamprey in the lower Snake River, 2014. USACE 2014 Anadromous Fish Evaluation Program Research Review, Portland, OR.
- Caudill, C.C., 2014. Pattern and process in upstream migration of steelhead in the Columbia and Snake rivers. Mid-Columbia Adult Steelhead Bypass Workshop, Walla Walla, WA 19 Nov 2014.  
[http://www.dfw.state.or.us/fish/CRP/mid\\_columbia\\_river\\_plan\\_WASTB\\_workshop.asp](http://www.dfw.state.or.us/fish/CRP/mid_columbia_river_plan_WASTB_workshop.asp)
- Caudill, C.C., 2014. Potential demographic consequences of straying on donor and recipient populations in the Columbia-Snake Basin: case studies from the John Day and Deschutes basins. Mid-Columbia Adult Steelhead Bypass Workshop, Walla Walla, WA 19 Nov 2014.  
[http://www.dfw.state.or.us/fish/CRP/mid\\_columbia\\_river\\_plan\\_WASTB\\_workshop.asp](http://www.dfw.state.or.us/fish/CRP/mid_columbia_river_plan_WASTB_workshop.asp)
- Bowerman, T., M.L. Keefer, and C.C. Caudill. 2014. Patterns of spring Chinook prespaw mortality within the Columbia River Basin. Ecological Society of America Annual Meeting, Sacramento, CA.  
<http://eco.confex.com/eco/2014/webprogram/Paper48643.html>
- Syms, J.C.\*, M.A. Kirk\*, D. Tonina, C.C. Caudill. 2014. The effect of turbulence in hydropower dam fish passageways on Pacific lamprey passage. International Conference on Engineering and Ecohydrology for Fish Passage, Madison, WI.
- Keefer, M.L., and C.C. Caudill. 2014. Metrics to identify fishway passage bottlenecks in the multi-species Columbia River. International Conference on Engineering and Ecohydrology for Fish Passage, Madison, WI.
- Kirk, M.A.\*, and C.C. Caudill. 2014. Using network theory to formulate behavioral inferences from differences in the movement patterns of Chinook salmon and Pacific lamprey at Bonneville Dam, USA. International Conference on Engineering and Ecohydrology for Fish Passage, Madison, WI.
- Caudill, C.C., M.L. Keefer, T.S. Clabough, G.P. Naughton, B.J. Burke, and C.A. Peery. 2014. Indirect effects of impoundment on migrating fish: temperature gradients in fish ladders slow dam passage by adult Chinook salmon and steelhead. International Conference on Engineering and Ecohydrology for Fish Passage, Madison, WI.
- Herron, C.\*, M. Colvin, M. Kent, C.C. Caudill, C.S. Schreck. 2014. *Nanophyetus salminocola* burdens in Chinook salmon (*Oncorhynchus tshawytscha*) prior to spawning in the Willamette Basin. Ecological and Evolutionary Ethology of Fishes, Corvallis, OR.
- Hess, J.E., C.C. Caudill, D. Close, M.L. Keefer, B. McIlraith, M.L. Moser, and S.R. Narum. 2014. Genes That Predict Large-Bodied Pacific Lamprey Go the Distance: An Adaptive Context for Conservation Management Applications. American Fisheries Society Annual Meeting, Quebec City, Quebec.

- Moser, M.L., M.L. Keefer, C.C. Caudill, and B.J. Burke. 2014. Evidence of effects of temperament on lamprey migration rate. *Ecological and Evolutionary Ethology of Fishes*, Corvallis, OR.
- Keefer, M.L. and C.C. Caudill. 2014. Cold water refuges: critical temporary habitats for migrating salmon and steelhead. 2014 Columbia River Estuary Workshop: Forging Links in the Columbia River Estuary, Lower Columbia River Estuary Partnership, Astoria, OR
- Caudill, C.C., M.A. Jepson, M.L. Keefer, S. Lee, T. Blubaugh, M. Knoff, M. Morasch, and C. Sharpe. 2014. Migration behavior and distribution of adult winter and summer steelhead radio-tagged at Willamette Falls in 2013. *USACE Willamette Fisheries Science Review*, Portland, OR.
- Caudill, C.C., G.P. Naughton, M.L. Keefer, T. Clabough, G. Taylor, M. Knoff, and C. Sharpe. 2014. Spawning success of spring Chinook Salmon in Fall Creek, North Fork Middle Fork Willamette and South Santiam rivers, 2008-2013. *USACE Willamette Fisheries Science Review*, Portland, OR.
- Keefer, M.L., M.A. Jepson, C.C. Caudill, S. Lee, T. Blubaugh, M. Knoff, and M. Morasch. 2014. Migration behavior and distribution of adult spring Chinook Salmon radio-tagged at Willamette Falls, 2011-2013. *USACE Willamette Fisheries Science Review*, Portland, OR.
- Colvin, M.E., J.T. Peterson, C. Sharpe, S. Benda, M. Kent, B. Dolan, C.C. Caudill, and C. Schreck. 2014. Integrating Science, management, and monitoring: a decision tool for optimizing annual spring Chinook Salmon outplanting strategies and prioritizing future research. *USACE Willamette Fisheries Science Review*, Portland, OR.
- Frick, K., M.L. Moser, C.C. Caudill, and M.L. Keefer. 2014. Improving adult Pacific lamprey passage using Lamprey Passage Structures and refuges. Oregon Division, American Fisheries Society meeting, Eugene, OR.
- 2013
- Keefer, M.L., C.C. Caudill. 2013. Estimating iteroparity in Columbia River steelhead using records archived in the PIT tag information system (PTAGIS). *USACE 2013 Anadromous Fish Evaluation Program Research Review*, Walla Wall, WA.
- Caudill, C.C., E. Johnson, T. Clabough, M. Jepson, M. Keefer, S. Lee, J. Garnett, L. Layng, T. Dick, B. Burke, and K. Frick. 2013. Evaluation of adult salmon and steelhead passage behavior and success in relation to fishway modifications at Bonneville Dam. *USACE 2013 Anadromous Fish Evaluation Program Research Review*, Walla Wall, WA.
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- Jepson, M.A., C.A. Peery, and C.C. Caudill. 2008. Adult Chinook salmon passage at Little Goose Dam in relation to spill operations, 2008. Meeting of the U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland, OR.
- Clabough, T.S., G.P. Naughton, C.C. Caudill, M.A. Jepson, C.A. Peery, and B.J. Burke. 2008. Adult salmon and steelhead passage at Lower Granite Dam with a modified transition pool and in relation to ladder temperature. Meeting of the U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland, OR.
- Caudill, C.C., C.A. Peery, C.T. Boggs, M.L. Keefer, and M.L. Moser. 2008. Down the river and back up again: toward conservation of Pacific lamprey in the Columbia Basin, USA. Society for Conservation Biology, Chattanooga, Tennessee.
- Caudill, C.C., and M. Parsley (symposium co-organizers). 2008. Overview of shad in the Columbia Basin: history and current status. American Fisheries Society Western Division Annual Meeting, Portland Oregon.
- Caudill, C.C., C.A. Peery and S.R. Lee. 2008. Up and down and back again, adult biology of American shad in the Columbia basin. American Fisheries Society Western Division Annual Meeting, Portland Oregon.
- R. Hogg\*, and C.C. Caudill. Relationships between recent ocean growth, condition, spawning history, and adult migration behavior in American shad. 2008 American Fisheries Society Western Division Annual Meeting, Portland Oregon. \*Undergraduate researcher.

- M.J. Parsley & C.C. Caudill. What's that small shad doing here? 2008. Evidence of multiyear freshwater residence by juvenile American shad. American Fisheries Society Western Division Annual Meeting, Portland Oregon.
- Caudill, C.C., L. Garrett, E. Starkey, T. Rodhouse, R. K. Steinhorst, and K.M. Irvine. 2008. Integrated water quality monitoring plan for the Upper Columbia Basin Network. 2008 National Park Service Aquatic Professionals Meeting, Fort Collins, Colorado. (Poster)
- Caudill, C.C., A. Chung-MacCoubrey, and D. Hughson. 2008. Establishing a long term monitoring plan for aquatic resources of the National Park Service Mojave Desert Network. 2008 National Park Service Aquatic Professionals Meeting, Fort Collins, Colorado and the 56<sup>th</sup> Annual Meeting of the North American Benthological Society, Salt Lake City, Utah. (Poster)

## **FUNDING & AWARDS (amounts are direct award to CCC)**

### **Current:**

- Caudill, C.C., and M.L. Keefer. 2018. USACE Portland District-Univ. Idaho Cooperative Ecosystems Study Unit (CESU) Agreement: Columbia River Fish Mitigation. Evaluation of interim management strategies for adult Chinook salmon and winter steelhead at Big Cliff and Detroit Dams: above- versus below-dam adult outplanting, 2019. \$68,500 awarded.
- Caudill, C.C., and M.L. Keefer. 2019. USACE Portland District-Univ. Idaho Cooperative Ecosystems Study Unit (CESU) Agreement: Columbia River Fish Mitigation. Evaluation of alternative outplant methods in relation to temperature and spawning success of natural-origin adult Chinook salmon collected at the Foster Adult Fish Facility. \$61,550 awarded.
- Caudill, C.C., J.R. Bellmore, and M. Dunkle. 2019-2023. Investigating the influence of watershed variability on meta-food web dynamics and salmonid growth in southeast Alaskan streams. Joint Venture Agreement with USFS, Pacific Northwest Research Station. \$277,741 awarded.
- Caudill, C.C., M.L. Keefer. 2018. USACE Portland District-Univ. Idaho Cooperative Ecosystems Study Unit (CESU) Agreement: Columbia River Fish Mitigation, 2018. Evaluation of effects of changes to temperature targets in the North Santiam River on adult Chinook salmon behavior and survival, 2018. \$53,957 to CCC, total project: \$151,312 including subcontract to ODFW.
- Caudill, C.C., J.R. Bellmore, and M. Dunkle. 2017-2019. Investigating the influence of hydrologic variability on food web dynamics and resource stability in southeast Alaskan streams. Joint Venture Agreement with US Forest Service PNW Research Station. \$ 14,000.
- Caudill, C.C., S. Narum, J. Nagler, and C.S. Sharpe. 2017. USACE Portland District-Univ. Idaho Cooperative Ecosystems Study Unit (CESU) Agreement: Columbia River Fish Mitigation, 2017. Multi-component research grant investigating fish migration passage and survival in the Columbia and Willamette rivers with five major tasks: Task 1: Adult Pacific Lamprey passage modifications at Bonneville Dam: DIDSON Monitoring and PIT Telemetry Monitoring, 2017-2018; Task 2: Evaluation of adult Pacific Lamprey passage behavior and performance at lower Columbia River dams using PIT- and radiotelemetry, 2017-2019; Task 3: Evaluation of reintroduction strategies for winter steelhead above Foster Dam on the S. Santiam River, 2017; Task 4: Evaluation of the Foster Dam Adult Fish Trap, 2017; Task 5: Evaluation of reintroduction strategies for Chinook salmon above Foster Dam on the S. Santiam River, 2017: Release of adult Chinook Salmon to Foster Reservoir. \$ 2,537,123 awarded to UI; \$2,221,813 direct to CCC.

Nelson, J., C. Baxter, J. Forbey, and R. Hardy. 2018-2023 NSF-EPSCoR RII Track-1: Linking genome to phenome to predict adaptive responses of organisms to changing landscapes.

- Contributing senior personnel and contributor to original proposal concept.
- 2018-present: Co-lead for Trout Mechanisms Workgroup
- September 2020-present: Replaced R. Hardy upon retirement as co-PI for the University of Idaho. Year three funding (Federal FY21): Project-wide NSF funding: \$5,208,925 with UI receiving \$2,905,232; Project-wide State of Idaho funding: \$800,000 with UI receiving \$460,767.

**Previous Awards:**

- Caudill, C.C. 2015-2018. The role of Pacific lamprey marine-derived nutrients in freshwater food webs. \$143,385 awarded from Columbia River Intertribal Fisheries Commission and Yakama Fisheries.
- Gauthier, J-M., C.C. Caudill, and D. Tonina. 2019. Virtual Dynamic River (VDR): A novel approach for linking habitat to phenotype. Submitted to Idaho NSF EPSCoR GEM3 Seed Funding. \$49,817 Requested. Not Funded.
- Caudill, C.C., and C. Wright. 2018. Ice Harbor Dam lamprey passage structure biological evaluation, 2019. Subcontract through Blue Leaf Environmental/Real Time Research for USACE Walla Walla IDIQ Prime Contract W912EF-14-D-0004. \$30,111 awarded to UI.
- Caudill, C.C. 2016, J. Nagler, S.R. Narum, F. Loge, M.L. Keefer, and C. Sharpe (ODFW). 2016. USACE Portland District-Univ. Idaho Cooperative Ecosystems Study Unit (CESU) Agreement: Columbia River Fish Mitigation, 2016. Multi-component research grant investigating fish migration passage and survival in the Columbia and Willamette rivers with four major tasks: Task 1: Evaluation of salmon passage at an adult collection facility, 2016; Task 2: Characterization and return rates of UWR Chinook salmon life history types; Task 3: Evaluation of reintroduction strategies using genetic pedigree analysis, 2016; Task 4: Synthesis of status and trends in adult salmon and steelhead passage behavior and success in the lower Federal Columbia River Hydrosystem, 1996-2014. 2016 Total: \$522,480
- Caudill, C.C., and M.L. Keefer. 2016. Assembly and analysis of radiotelemetry and temperature logger data from adult Chinook salmon and steelhead migrating through the Columbia River basin. \$8,796 awarded from US EPA via subcontract from TetraTech.
- Caudill, C.C. 2015-2017. Evaluation of upper Columbia River steelhead adult migration and overwintering behavior. \$144,884 awarded from Washington Division of Fish and Wildlife.
- Evans, A., C.C. Caudill, and M. Keefer. 2015. Summary of adult steelhead passage and conversion in the Federal Columbia River Power System. Subcontract through Blue Leaf Environmental/Real Time Research for USACE Walla Walla IDIQ Prime Contract W912EF-14-D-0004. \$69,885 awarded to UI.
- Loge, F. and C.C. Caudill. 2015. Evaluation of adult fish ladder modifications to improve Pacific lamprey passage at McNary Dam, 2015. \$78,203 awarded from USACE Walla Walla District.
- Courter, I. et al. 2015. Evaluation of adult Pacific lamprey passage at lower Snake River dams, 2015. \$105,966 awarded from USACE Walla Walla District.
- Caudill, C.C. 2015. USACE-U. Idaho CESU Columbia River Fish Mitigation 2015 Steelhead closeout. \$33,601

awarded from USACE Portland District.

- Caudill, C.C. and C. Sharpe (ODFW). 2015. Monitoring upstream migration and potential causes of prespawn mortality in adult UWR Chinook, 2015. \$475,931 awarded from USACE Portland District.
- Courter, I. et al. 2014. Evaluation of adult Pacific lamprey passage at lower Snake River dams, 2014. Walla Walla District USACE: \$56,576.
- Caudill, C.C (Lead PI), K. Frick (NOAA-Fisheries), B. Burke (NOAA-Fisheries), R. Budwig, D. Tonina, T. Friesen (ODFW), and C. Sharpe (ODFW). 2014. USACE-Univ. Idaho Cooperative Ecosystems Study Unit (CESU) Agreement: Columbia River Fish Mitigation, 2014. Multi-component research grant investigating fish migration passage and survival in the Columbia and Willamette rivers with seven major tasks: Task 1: Evaluation of Adult Lamprey Passage Behavior in Relation to Lower Columbia River Dam Modifications – 2014; Task 2: Evaluation of adult Pacific lamprey behavior and fate in the lower Columbia River using acoustic telemetry, 2014; Task 3: Development of Adult Lamprey Passage Structures at Lower Columbia and Snake River Dams – 2014; Task 4: Evaluation of Adult Salmon and Steelhead Passage Behavior and Success in the lower Federal Columbia River Hydrosystem – 2014; Task 5: Migration and Passage Behavior of Overwintering Summer Steelhead in the Lower Columbia and Snake Rivers – 2014; Task 6: Evaluation of adult UWR winter steelhead and summer steelhead upstream migration, distribution, survival, and life history, 2014; Task 7: Characterization and return rates of different juvenile UWR Chinook life history types; Task 8: Monitoring upstream migration and potential causes of prespawn mortality in adult UWR Chinook, 2014 total: \$1,995,743.
- Caudill, C.C., M.L. Moser (NOAA-Fisheries), B. Burke (NOAA-Fisheries), R. Budwig, D. Tonina, C. Schreck (OSU), M. Kent (OSU), T. Friesen (ODFW), and C. Sharpe (ODFW). 2013. USACE-Univ. Idaho Cooperative Ecosystems Study Unit (CESU) Agreement: Columbia River Fish Mitigation, 2013. Multi-component research grant investigating fish migration passage and survival in the Columbia and Willamette rivers with six major tasks: Task 1: Improving Adult Pacific Lamprey Passage and Survival at Lower Columbia River Dams – 2013; Task 2: Evaluation of adult Pacific lamprey behavior and fate in Columbia River reservoirs using acoustic telemetry, 2013; Task 3: Synthetic evaluation of adult Pacific lamprey passage, 2013; Task 4: Design and Fabrication of a Lamprey Passage Structure Modifications at Bonneville Washington Shore and John Day North fishways; Task 5: Monitoring upstream migration and potential causes of prespawn mortality in adult UWR Chinook, Middle fork Basin of the Willamette River; Task 6: Monitoring upstream migration, distribution, and pre- and post-spawn survival of adult UWR winter steelhead and summer steelhead. 2013 Total: \$2,630,074
- Caudill, C.C. and R. Qualls. 2012-2016. Development of water quality and climate monitoring plan and protocols for the Mojave Desert Network. \$160,332 (2012) & \$120,522 (2013) awarded for continuing development of sample design, statistical analysis, and initial implementation of a long term monitoring plan for groundwater, spring, lake, and stream resources for seven national park units covering 3,292,732 hectares (8,136,518 acres) as part of the NPS Vital Signs program (<http://science.nature.nps.gov/im/units/mojn/>).
- Evans, A., C.C. Caudill, and M.L. Keefer. 2015. Summary of adult Steelhead passage and conversion in the Federal Columbia River Power System. \$69,886 awarded from the U.S. Army Corps of Engineers, Walla Walla District.
- Loge, F. and C.C. Caudill. 2014. Evaluation of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at McNary and Ice Harbor Dams, 2014. \$200,606 awarded from the U.S. Army Corps of Engineers, Walla Walla District.

- Caudill, C.C., F. Loge, and M. Timko. 2013. Adult Steelhead and Chinook Salmon Passage, Survival, and Conversion through the Lower Snake River. \$395,670 awarded from the U.S. Army Corps of Engineers, Walla Walla District.
- Loge, F. and C.C. Caudill. 2013. Underwater video monitoring of adult fish ladder modifications to improve Pacific lamprey passage at McNary, Ice Harbor and Lower Monumental dams, 2013. \$194,869 awarded from the U.S. Army Corps of Engineers, Walla Walla District.
- Caudill, C.C., M.L. Moser (NOAA-Fisheries), R. Budwig, D. Tonina, C. Schreck (OSU), M. Kent (OSU), T. Friesen (ODFW), and C. Sharpe (ODFW). 2012. USACE-Univ. of Idaho Cooperative Ecosystems Study Unit (CESU) Agreement: Columbia River Fish Mitigation, 2012. Multi-component research grant investigating fish migration passage and survival in the Columbia and Willamette rivers with six major tasks: Task 1: Improving Adult Pacific Lamprey Passage and Survival at Lower Columbia River Dams – 2012; Task 2: Evaluation of adult Pacific lamprey behavior and fate in Columbia River reservoirs using acoustic telemetry, 2012; Task 3: Synthetic evaluation of adult Pacific lamprey passage, 2012; Task 4: Design and Fabrication of a Lamprey Passage Structure Modifications at Bonneville Washington Shore and John Day North fishways; Task 5: Monitoring upstream migration and potential causes of prespawn mortality in adult UWR Chinook, Middle fork Basin of the Willamette River; Task 6: Monitoring upstream migration, distribution, and pre- and post-spawn survival of adult UWR winter steelhead and summer steelhead. Total: \$1,568,570.
- Loge, F. and C.C. Caudill. 2012. Underwater video monitoring of adult fish ladder modifications to improve Pacific lamprey passage at McNary, Ice Harbor and Lower Monumental dams, 2012. \$300,325 awarded from the U.S. Army Corps of Engineers, Walla Walla District.
- Caudill, C.C. and M. L. Keefer. 2011. Review of Pacific Salmon and Steelhead Straying in the Columbia River Basin. \$52,883 awarded to UI. U.S. Army Corps of Engineers, Walla Walla District.
- Loge, F. and C. C. Caudill. 2011. Underwater video monitoring of adult fish ladder modifications to improve Pacific lamprey passage at McNary and Ice Harbor dams, 2011. \$304,941 awarded to UI. U.S. Army Corps of Engineers, Walla Walla District.
- Caudill, C.C. and M.L. Moser. 2011. Improving adult Pacific lamprey passage and survival at Lower Columbia River Dams , 2011. \$613,693.
- Caudill, C.C., C. Schreck, and M. Kent. 2011. Monitoring upstream migration and potential causes of prespawn mortality in adult UWR Chinook, Middle fork Basin of the Willamette River, 2011. \$334,322. U.S. Army Corps of Engineers, Portland District.
- Fremier, A.F., B.P. Kennedy, and C.C. Caudill. 2011-2015. Integrated data-driven spatial analysis to support life cycle modeling for effectiveness monitoring in the Columbia Basin 2011. \$499,808 awarded from Bureau of Reclamation to A. Fremier.
- Caudill, C.C. Development of a long-term water quality monitoring plan and protocol for the Mojave Network. National Park Service. \$380,414 (2007-2012). Development of sample design, statistical analysis, and initial implementation of a long term monitoring plan for groundwater, spring, lake, and stream resources for seven national park units covering 3,292,732 hectares ( 8,136,518 acres) as part of the NPS Vital Signs program (<http://science.nature.nps.gov/im/units/mojn/>).
- Caudill, C.C., B.P. Kennedy, and L. Borgerson. 2011. Comparing the Effectiveness of Head-of-Reservoir Collection and Transport with Direct Reservoir and Dam Passage: Estimating relative abundance and

production of Chinook salmon life history types in select Willamette River tributaries, 2011. \$150,015. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland District.

- Caudill, C.C., and B.J. Burke. 2010. Evaluation of adult salmon and steelhead delay and fallback at Snake and Columbia river dams, 2010. \$518,301 awarded to U.I. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland District.
- Caudill, C.C. and M.L. Moser. 2010. Evaluation of adult Pacific lamprey passage success at McNary and Ice Harbor dams, 2010. \$187,595 awarded to UI. U.S. Army Corps of Engineers Walla Walla District.
- Caudill, C.C., C.B. Schreck, and M. Kent. 2010. Condition and spawning success of adult spring Chinook salmon in the Willamette River, 2010. \$119,748 awarded to UI. U.S. Army Corps of Engineers Portland District.
- Caudill, C.C. and F. Loge. 2010. Video monitoring of adult fish ladder modifications to improve Pacific lamprey passage at the McNary Dam Oregon shore fishway, 2010. \$56,405 awarded to UI. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Walla Walla District.
- Caudill, C.C. 2010. Evaluation of adult Pacific lamprey behavior and fate in Columbia River reservoirs using acoustic telemetry, 2010. \$89,088 awarded to UI. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland District.
- Caudill, C.C., and M.L. Moser. 2010. Improving adult Pacific lamprey passage and survival at lower Columbia River dams, 2010. \$315,908 awarded to UI. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland District.
- Comparative survival of reservoir reared and reservoir bypassed spring Chinook salmon in the Willamette River basin: Phase 1: Use of otolith and scale analyses to characterize life history variation in spring Chinook salmon in three Willamette Valley Project reservoirs and tributaries. 2009. Caudill, C.C. and B.P. Kennedy. \$146,680 awarded to UI. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland District.
- Migration of adult Chinook salmon and Steelhead in Hood River, Oregon, 2009. C.C. Caudill. \$41,631. Confederated Tribes of the Warm Springs Reservation of Oregon.
- Juvenile fall Chinook telemetry monitoring (continuation of Telemetry evaluation of habitat use by juvenile Snake River Fall Chinook salmon in reservoirs). 2009. Caudill, C.C. \$177,530. U.S. Army Corps of Engineers, Walla Walla District.
- Condition and spawning success of adult spring Chinook salmon in the Willamette River-2009. 2008. Caudill, C.C., C.B. Schreck, and M. Kent. \$156,501 awarded to U.I. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland District.
- Evaluation of adult salmon and steelhead delay and fallback at Snake and Columbia river dams, 2009. 2008. Caudill, C.C., and B.J. Burke; \$306,260 awarded to U.I. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland District.
- Improving adult Pacific lamprey passage and survival at lower Columbia River dams, 2009. 2008. Caudill, C.C., and M.L. Moser. \$314,943. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Portland District.

Evaluation of adult Pacific lamprey passage success at McNary and Ice Harbor dams, 2009. 2008. Caudill, C.C. and M.L. Moser. \$221,608. U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Walla Walla District.

Telemetry evaluation of habitat use by juvenile Snake River Fall Chinook salmon in reservoirs as part of Aquatic Monitoring of Navigation Channel Maintenance Sites, Snake River, WA. (FY 2008-2009). Caudill, C.C. & D. Bennett. \$292,034. U.S. Army Corps of Engineers, Walla Walla District.

Improvement in estimates of Columbia River fall Chinook salmon (*Oncorhynchus tshawytscha*) escapements. \$70,218 (FY2009-2010). Collaborative with Columbia River Inter-tribal Fisheries Commission (S.-Y. Hyun, lead CRITFC P.I.), funded by Pacific Salmon Commission.

### **2007 and earlier:**

Development and implementation of water quality monitoring protocols for the National Park Service I&M program: Upper Columbia Basin Network (UCBN). Caudill, C.C., \$109,100 (FY 2005- 2007).

Ecology and distribution of migratory fishes in the Mekong River. Hogan, Z, G.P. Naughton, C.A. Peery, and C.C. Caudill. 2005. \$70,000, IUCN World Conservation Union Mekong Wetlands Biodiversity Program.

Habitat use and migration behavior of adult salmon in the Columbia River Estuary as a test of the National Marine and Estuary Classification. C. Peery, N. Wright, and C.C. Caudill. 2004-2006. \$196,000, NOAA Coastal Services Program.

National Science Foundation Dissertation Improvement Grant. 1998-2000. \$9,000.

Research and travel grants during Ph.D. training, 1996-2000. Fifteen awards totaling \$6,856. Sources: Sigma Xi Grants-in-Aid of Research (National and Cornell Chapters), North American Benthological Society Student Travel Award, Cornell University Rawlins Endowment, Cornell University Griswold Endowment, Cornell Graduate School, RMBL Lee R.G. Synder Fund.

Research and travel grants during M.S. training, 1993-1995. Four awards totaling \$2,400. Sources: University of New Hampshire Center for Marine Biology and UNH Graduate School.

### **AWARDS**

2017, 2018 UI Alumni Award for Excellence in mentoring (Graduate mentoring of Charles Erdman and Sammy Matsaw, respectively).

2013 American Fisheries Society Fisheries Engineering Committee Distinguished Project in Fisheries Engineering and Ecohydrology, Honorable Mention for *Lamprey passage at migration barriers on the Columbia River* (multiagency award shared with 32 other federal and tribal biologists and engineers including 2 graduate advisees, H. Zobbot and C. Symms).

2005 Zayed International Prize for the Environment, co-recipient as participant in the Millennium Ecosystem Assessment.

### **PROFESSIONAL SERVICE, DEVELOPMENT AND OUTREACH**

#### **University Service:**

2017-present Department of Fish and Wildlife Annual Film Festival Organizing and Selection Committee  
2016-present Department of Fish and Wildlife Sciences Assessment Committee  
2016-2020 University of Idaho Common Read selection committee.

- 2013-2020 University of Idaho Research Council, Faculty Representative for College of Natural Resources.
- 2016 Department of Fish and Wildlife Tenure and Promotion Committee
- 2015 Faculty search committee (Wildlife Ecology Management), Department of Fish and Wildlife Sciences.
- 2015 Search committee, CNR Director Graduate Studies
- 2014 Faculty search committee, Department of Fish and Wildlife Sciences.
- 2014 Faculty search committee, Department of Fish and Wildlife Sciences.
- 2014 College of Natural Resources ad hoc committee reviewing service performance of CNR Fiscal Services.
- 2014 Promotion and Tenure review committee, Department of Forestry, Rangeland, and Fire Sciences.
- 2013-2014 University-wide committee to review compensation time policy, Faculty Representative for College of Natural Resources.
- 2013 College of Natural Resources ad hoc committee faculty representative on CNR internal accounting policy

**Scientific outreach:**

- Hardy, R. and C.C. Caudill. Investigating the Nature vs. Nurture Question. *The Researcher-Idaho NSF EPSCoR Spring Newsletter* pg. 5-6.
- Seaborn, T., and C.C. Caudill. Simulating Trout Distribution to Understand Environmental Change. *The Researcher-Idaho NSF EPSCoR Fall Newsletter* pg. 5-6.
- Caudill, C.C. 2016 & 2017. Connections between salmon, the Columbia River and endangered orca whales of Puget Sound. Lecture and separate ½ field trip to Lower Granite Dam for 20 middle school children, Palouse Prairie Charter School, Moscow, ID.
- Caudill, C.C. 2016. Thermal ecology of Upper Willamette River Spring Chinook Salmon. Invited seminar, 12 April 2016, Salem, OR for Willamette Instream Flow Science Review Workshop.
- Caudill, C.C. 2016. The long way home: a very short history of fish migration in the Columbia Basin. Invited seminar 7 March 2016, Moscow, ID for UI Environmental Law Society, Native American Law Students Association, and Friends of the Clearwater.
- Caudill, C.C. 2015. Pink fish for blackfish: A short history of Pacific Northwest Salmon. American Society for Literature and the Environment Biennial Meeting, University of Idaho, Moscow, Idaho (Invited speaker and panel member).
- Organizer of screening of *Blackfish* at the Kenworthy Theater, Moscow, ID and host/moderator for panel discussions with three cast members of the movie. October 16-17 2014, Moscow, ID. Co-sponsored by UI Fish and Wildlife Sciences and the Moscow Food Co-op.
- Caudill, C.C. 2014. Snake River Steelhead: Trials and tribulations of migration in the modern world. Clearwater Flycasters, Moscow, ID.
- Caudill, C.C. 2014. Pink fish for blackfish: A short history of Pacific Northwest Salmon. Super Pod Three, The Whale Museum, Friday Harbor, WA (Invited).

- Caudill, C.C. and M.L. Keefer. 2014. Conversion of radio-tagged adult salmon and steelhead through the Federal Columbia River Power System. Bilateral Okanagan Technical Work Group, 27 March 2014.
- Conference Advisory Board Member (invited), National Conference on Engineering and Ecohydrology for Fish Passage, June 27-29, 2011, Amherst, MA.
- Participant, Lamprey Technical Work Group and Lamprey Passage Metrics Standards Subcommittee, both subcommittees of the Columbia Basin Fish and Wildlife Authority's Anadromous Fish Advisory Committee, 2009-2010.
- Co-organized and moderated "Overview of shad in the Columbia Basin: history and current status". 2008 American Fisheries Society Western Division Annual Meeting, Portland Oregon.
- Organized and moderated "Migration in a Changing World" Evening Session at 2005 Ecological Society Meetings, Montreal, Quebec.
- Manuscript reviewer for 2020: *PLOS One*; *Ecology*; *Hydrobiologia*; *Can. J. Fisheries and Aquatic Sci.*; *Ecology & Evolution*; *N. Amer. J. Fisheries Management*; 2019: *Science of the Total Environment*; *Transactions of the American Fisheries Society*; *Reviews in Fish Biology and Fisheries*; 2018: *Journal of Ecohydraulics*; *River Research and Applications*; *Fisheries Research*; 2017: *PLOS One*; *Journal of Applied Ecology*; *Ecology of Freshwater Fish*; *Ecological Engineering*; 2016: *BioScience* (2); *Hydrobiologia* (2); *Journal of Fish and Wildlife Management*; *Water Resources Research*; *Canadian Journal of Fisheries and Aquatic Sciences*; 2015: *River Research and Applications*; *Journal of Applied Ecology*; *Fisheries*; *Hydrobiologia*; *Springer (Edited Volume Book Proposal)*; *Book chapter for Jawless Fishes of the World*; *Ecological Engineering*; *Environmental Biology of Fishes*; 2014: *Freshwater Science (review recognized as Excellent by Editor)*; *Environmental Science and Policy*; *Ecological Engineering*; 2013: *PLOS One*, *Fisheries*, *River Research and Applications*, *Transactions of the American Fisheries Society* (2), *Canadian Journal of Fisheries and Aquatic Sciences*; 2012: *Conservation Letters*, *North American Journal of Fisheries Management* (2); 2011: *Animal Behaviour*, *Physiological and Biochemical Zoology*, *North American Journal of Fisheries Management*, *American Fisheries Society Books*. 2008-2010: *Ecology*, *Ecological Applications*, *Hydrobiologia*, *Journal of Animal Ecology*, *Journal of Applied Ecology*, *Journal of the North American Benthological Society*, *North American Journal of Fisheries Management*, *Oikos*, *Transactions of the American Fisheries Society*, *USFWS*, and *USGS*.
- Proposal reviews for the National Science Foundation, Canadian Natural Sciences and Engineering Research Council (NSERC), Great Lakes Fishery Commission.
- Attended Leading and Sustaining Your Research Program, weeklong workshop on "business for scientists" jointly presented by University of Idaho Institute of Bioinformatics and Evolutionary Studies and the College of Business and Economics. June 2-6, 2014, Moscow Idaho.
- Participant in UI PNW NSF COSMOS Indigenous Knowledge Field Camp 2016, 8-11 August. Workshop with nine native students from U. Idaho, U. Montana, and Montana State University, their graduate mentors, and Nez Perce elders exploring native history, culture and barriers and opportunities to native STEM graduate education on Nez Perce tribal lands.
- Invited panelist for the University of Idaho Sustainability Center's Sustainability Leadership Program on Mike Simpson's Dam Removal. Webinar for 90+ attendees throughout Idaho. 29 March 2021.