

Brian Patrick Kennedy

Associate Professor

Department of Fish & Wildlife Sciences & Water Resources Graduate Program

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EDUCATION

Ph.D., Dartmouth College, Hanover, NH, December 2000, Biological Sciences – Ecology & Evolutionary Biology

B.A., Colgate University, Hamilton, NY, May 1991, Biological Sciences

POSITIONS HELD

- 2011 – Present Associate Professor, University of Idaho, College of Natural Resources, Dept. of Fish and Wildlife Sciences
Adjunct Associate Professor, Dept. of Biological Sciences, Dept. of Geological Sciences, Environmental Sciences and Water Resources Graduate Program
- 2013 – 2015 Visiting Associate Professor, Massachusetts Institute of Technology, Dept. of Earth, Atmospheric and Planetary Sciences, Cambridge, MA, USA.
- 2005 – Present Visiting Assistant/Associate Professor, University of Michigan, Department of Geological Sciences
- 2006 – 2012 Affiliate Scientist, University of Montana, Flathead Lake Biological Station
- 2005 – 2011 Assistant Professor, University of Idaho, College of Natural Resources, Dept. of Fish and Wildlife Sciences
- 2001 – 2005 Postdoctoral Fellow and Visiting Assistant Professor – University of Michigan, Depts. of Geological Sciences and Biological Sciences
- 2000 – 2001 Aquatic Ecology Consultant, Conservation International Foundation
- 1994 – 2000 Graduate Research and Teaching Assistant, Dartmouth College
- 1991 – 1994 Research Assistant, Michigan State University, Kellogg Biological Research Station

SCHOLARSHIP**Recent Selected Publications (*graduate student mentee, **undergraduate advisee)**

- *Myrvold, K.M. and **Kennedy, B.P.** *In press.* Shifts in Great Blue Heron foraging locations following nest site usurpation: Implications for salmonids. *American Midland Naturalist.*
- *Myrvold, K.M. and **Kennedy, B.P.** *In press.* Warming temperatures exacerbate the impacts of density dependence in steelhead. *Canadian Journal of Fish and Aquatic Sciences.*
- *Myrvold, K.M. and **Kennedy, B.P.** *In press.* Indexing of salmonid abundance in small streams using reduced effort electrofishing. *Northwest Science.*
- *Myrvold, K.M. and **Kennedy, B.P.** *In press.* Size and growth relationships in juvenile steelhead: the advantage of large relative size diminishes with increasing water temperatures. *Environmental Biology of Fishes.*
- Hand, B.K., Devlin, S., Mulfeld, C.C., Frissell, C., Kennedy, B.P., Crabtree, R.L., Flint, C., McKee, A., and Luikart, G. *In Press.* A Socio-Ecological Systems approach for Riverscape Sustainability in the Columbia River Basin. *Frontiers in Ecology and Evolution.*
- *Hegg, J.C., Middleton, J., Robertson, B.L. and **Kennedy, B.P.** *In press.* The sound of migration: Exploring data sonification as a way of analyzing multivariate salmon movement datasets. *Heliyon.* 4(2) DOI: 10.16/j.heliyon.2018.e00532.
- *Myrvold, K.M. and **Kennedy, B.P.** (2016). Juvenile steelhead movements in relation to stream habitat, population density and body size: consequences on individual growth rates. *Canadian Journal of Fisheries and Aquatic Sciences*, 73(10): 1520-1529.
- **Taylor, T.N., Myrvold, K.M and **Kennedy, B.P.** (2016) Food habits of sculpin spp. in small Idaho streams: no evidence of predation on newly emerged Steelhead alevins. *Northwest Science*, 90(4): 484-490.
- *Hegg, J., Giarrizzo, T., and **Kennedy, B.P.** (2015) Diverse early life history strategies in migratory Amazonian catfish: Implications for conservation and management. *PLOS One*, 10(7): e0129697. DOI:10.1371/journal.pone.0129697.
- *Myrvold, K.M. and **Kennedy, B.P.** (2015) Metabolic constraints and physical habitat characteristics explain the spatial variation in the strength of self-thinning in a stream salmonid. *Ecology and Evolution*, 5(16):3231-3242.
- *Myrvold, K.M. and **Kennedy, B.P.** (2015) Age-specific density dependence and its impact on individual growth rates for a stream salmonid. *Ecosphere*, 6(12). DOI: 10.1890/ES15-00390.1.
- *Myrvold, K.M. and **Kennedy, B.P.** (2015) Variation in juvenile steelhead densities in relation to instream habitat and watershed characteristics. *Transactions of the American Fisheries Society.* *In press.*
- *McIlraith, B.J., Caudill, C.C., **Kennedy, B.P.**, Peery, C.A., and Keefer, M.L. (2015). Seasonal migration behaviors and distribution of adult Pacific Lamprey in unimpounded reaches of the Snake River basin. *North American Journal of Fisheries Management*, *In press.*

- *Hartson, R.B. and **Kennedy, B.P.** (2015) Competitive release modifies the impacts of hydrologic alteration for a partially migratory stream predator. *Ecology of Freshwater Fish.* 24(2): 276-292. **(Included in application packet)**
- *Myrvold, K.M. and **Kennedy, B.P.** (2015) Interactions between body mass and water temperatures cause energetic bottlenecks in juvenile steelhead. *Ecology of Freshwater Fish.* DOI 10.1111/eff.12151.
- *Bourret, S.L., **Kennedy, B.P.**, Caudill, C.C. and Chittaro, P.M. (2014). Using otolith chemical and structural analysis to investigate reservoir habitat use by juvenile Chinook salmon *Oncorhynchus tshawytscha*. *Journal of Fish Biology*, 85(5): 1507-1525.
- Chittaro, P.M., Zabel, R.W., Haught, K., Sanderson, B.L and **Kennedy, B.P.** (2014) Spatial and temporal patterns of growth and consumption by juvenile spring/summer Chinook salmon (*Oncorhynchus tshawytscha*). *Environmental Biology of Fishes.* 97(12): 1397-1409.
- *Hamann, E.J. **Kennedy, B.P.**, Whited, D.C., and Stanford, J.A. (2014) Spatial variability in spawning habitat selection by Chinook salmon (*Oncorhynchus tshawytscha*) in a wilderness river. *River Research and Applications.* 30(9): 1099-1109.
- *Hegg, J., **Kennedy, B.P.**, and Fremier, A.K. (2013) Predicting strontium isotope variation and fish location with bedrock geology: Understanding the effects of geologic heterogeneity. *Chemical Geology.* 360-361: 89-98.
- *Hegg, J., **Kennedy, B.P.**, Chittaro, P., and Zabel, R. (2013) Spatial structuring of an evolving life-history strategy under altered environmental conditions. *Oecologia.* 172: 1017-1029.
- *Hamann, E.J. and **Kennedy, B.P.** (2012) The effects of juvenile dispersal on straying in a migratory population. *Ecology.* 93(4): 733-740. **(Included in application packet)**
- Laitala, K.L., Prather, T.S., Thill, D., **Kennedy, B.P.**, and Caudill, C.C. (2012) Efficacy of benthic barriers as a control measure for Eurasian watermilfoil. *Invasive Plant Science and Management.* 5(2): 170-177.
- Cosens, B., Fiedler, F., Boll, J., Higgins, L., Johnson, G., **Kennedy, B.**, Laflin, M., Strand, E. and Wilson, P. (2011) Interdisciplinary Methods in Water Resources: Communication Across Disciplines. *Issues in Integrative Studies.* 29:118-143.
- *Lorion, C.M., and **Kennedy, B.P.** and Braatne, J.H. (2011) Altitudinal gradients in stream fish diversity and the prevalence of diadromy in the Sixaola River basin, Costa Rica. *Environmental Biology of Fishes.* 91:487-499.
- *Cromwell, K.J. and **Kennedy, B.P.** (2011) Diel distribution, behaviour, and consumption of juvenile Chinook salmon (*Oncorhynchus tshawytscha*) in a Wilderness stream. *Ecology of Freshwater Fish.* 20:421-430.

Recent Invited Talks –since 2013

Sept. 2016. University of California – Davis, Dept. of Wildlife, Fish and Conservation Biology, Davis, CA. USA. Toward a mechanistic understanding of salmonid life history diversity with

relevance to population dynamics and the conservation of freshwater habitats. B.P. Kennedy.

March 2016, University of Montana, Dept. of Wildlife Biology and Organismal Biology, Ecology & Evolution Program, Missoula, MT, USA. Rivers as the stage for adaptive plasticity and life history diversity. B.P. Kennedy.

March 2014. Universitat de Girona, Spain, Depts. of Biology and Environmental Sciences, Girona, ESP. The ecological and evolutionary significance of migration by salmon. B.P. Kennedy.

October 2013. Colgate University, Dept. of Biology and Geological Sciences, Hamilton, NY, USA. Understanding the adaptive significance of salmon migration with the help of geochemical tracers. B.P. Kennedy.

September 2013. Massachusetts Institute of Technology, Dept. of Earth, Atmospheric and Planetary Sciences, Cambridge, MA, USA. Understanding the drivers of Sr isotope variation and life history diversity in a Wilderness watershed. B.P. Kennedy.

May 2013. Eastern Washington University, Dept. of Geological Sciences, Cheney, WA, USA. The use of geochemical signatures to understand salmon migration. B.P. Kennedy.

Recent Professional Meeting Abstracts – 2015 to 2017

August 2017. Ecological Society of America, Portland, OR, USA. Warming temperatures amplify the impacts of density dependence in a stream salmonid population. K.M. Myrvold and B.P. Kennedy.

*March 2017. Joint annual meeting for the Idaho Fish and Wildlife Chapters; American Fisheries Society and Wildlife Society, Boise, ID, US. Using fish to study birds: Asymmetric competition and a landscape of fear. B.P. Kennedy and K.M. Myrvold. **Awarded: Ted Trueblood Communications Award for Best Professional Presentation at joint meeting.***

March 2017. Joint annual meeting for the Idaho Fish and Wildlife Chapters; American Fisheries Society and Wildlife Society, Boise, ID, US. Biology, Bayes, and bad data: incorporating life-history characteristics into models to address sparse and missing mark-recapture data. B. Oldemeyer, T. Copeland and B.P. Kennedy.*

March 2017. Joint annual meeting for the Idaho Fish and Wildlife Chapters; American Fisheries Society and Wildlife Society, Boise, ID, US. Use of isotope tracers to determine yearly variation in juvenile movement and maternal origin of Snake River fall Chinook salmon. J.C. Hegg, B.P. Kennedy, P. Chittaro and R. Zabel.*

May 2017. Western Division of the American Fisheries Society, Missoula, MT, USA. Reconstructing temperature-mediated growth in juvenile Chinook salmon using $\delta^{18}\text{O}$. K. Gillies-Rector and B.P. Kennedy.*

May 2017. Western Division of the American Fisheries Society, Missoula, MT, USA. Quantifying individual-based migration strategies to understand selection on juvenile life history for salmon in an altered landscape. J. Hegg and B.P. Kennedy.*

May 2017. Snake River Fall Chinook Recovery Symposium, Clarkston, WA, USA. Distinguishing natural and hatchery-origin individuals using multiple chemical signatures in otoliths. J. Hegg and B.P. Kennedy.*

May 2017. Snake River Fall Chinook Recovery Symposium, Clarkston, WA, USA. Determining natal rearing locations and ocean entry timing of untagged adult fish based on otolith microchemistry. B.P. Kennedy and J. Hegg.

- May 2017. *IBEST symposium: Ecological and evolutionary drivers of human health and welfare, Moscow, ID.* Understanding finer aspects of biodiversity and its relevance for stability in river ecosystems. B.P. Kennedy
- May 2016. *Annual meeting for the Society for Freshwater Science. Sacramento, CA.* The interacting effects of climate, density and water withdrawal on juvenile steelhead survival and migration: Insights from an 8-year study. B.P. Kennedy and N. Wingerter.
- May 2016. *Annual meeting for the Society for Freshwater Science. Sacramento, CA.* Modification in diet due to inter-cohort competition at low population densities in steelhead (*Oncorhynchus mykiss*). N. Wingerter and B.P. Kennedy.
- April 2016. Interior Columbia Life Cycle Modeling Symposium. Seattle, WA. Life history diversity and growth in juvenile Chinook salmon and steelhead. B.P. Kennedy.
- March 2016. *Annual meeting for the Idaho Chapter; American Fisheries Society, Coeur d'Alene, ID, US.* Using what you got: implementing Bayesian models to obtain useful information from poor rotary screw trap data. B. Oldemeyer*, B.P. Kennedy, and T. Copeland.
- March. 2016. *Annual meeting for the Idaho Chapter; American Fisheries Society, Idaho Falls, ID, US.* Variability of life history expression in *Oncorhynchus mykiss*: drivers of partial migration. J. Caisman*, and B.P. Kennedy.
- August 2015. *American Fisheries Society Annual Symposium, Portland, OR, USA.* Linking life history strategy to Environment: Using otolith microchemistry and growth to model stage-specific movement of juvenile Fall Chinook salmon. B.P. Kennedy, J. Hegg, R.W. Zabel, and P. Chittaro.
- August 2015. *American Fisheries Society Annual Symposium, Portland, OR, USA.* The limits of prediction: Applying strontium isoscape predictions to otolith studies across spatial scale and geologic heterogeneity. J. Hegg*, B.P. Kennedy, and A. Fremier.
- August 2015. *American Fisheries Society Annual Symposium, Portland, OR, USA.* Densities of juvenile steelhead in relation to instream habitat and watershed characteristics. K.M. Myrvold*, and B.P. Kennedy.
- August 2015. *American Fisheries Society Annual Symposium, Portland, OR, USA.* Variability of life history expression in *Oncorhynchus mykiss*: causes and consequences of partial migration. J. Caisman*, and B.P. Kennedy.
- August 2015. *American Fisheries Society Annual Symposium, Portland, OR, USA.* The effects of two pre-smoltification life history expressions have on juvenile Chinook salmon growth, migration timing, and fork length in a Wilderness environment. B. Oldemeyer*, B.P. Kennedy, and T. Copeland.
- August 2015. *American Fisheries Society Annual Symposium, Portland, OR, USA.* Identifying life history variation to inform recovery planning for Upper Willamette River Chinook salmon. C.C. Caudill, S. Bourret, M. Keefer, B. Clemens, B.P. Kennedy, G. Taylor, and C. Sharpe.
- August 2015. *American Fisheries Society Annual Symposium, Portland, OR, USA.* Distribution and behavior of adult Pacific lamprey (*Entosphenus tridentatus*) translocated into tributaries of the Snake and Clearwater Rivers, ID. B. McIlraith, C. Peery, D. Statler, J. Hess, C. Caudill, B.P. Kennedy, and E. Crow Jr.
- May 2015. *Advances in the Population Ecology of Stream Salmonids International Symposium. Gerona, Spain.* Interactions of climate and density on survival and movements of juvenile steelhead: Results from a 7-year study. B.P. Kennedy, K.M. Myrvold, J. Caisman, R. Hartson and E. Benson.
- May 2015. *Advances in the Population Ecology of Stream Salmonids International Symposium. Gerona, Spain.* Local habitat conditions explain the variation in self thinning slopes in steelhead parr. K.M. Myrvold*, and B.P. Kennedy.

May 2015. *Advances in the Population Ecology of Stream Salmonids International Symposium. Gerona, Spain.*
Modeling spatially explicit life history strategies in juvenile Chinook salmon using location specific data from otoliths. J. Hegg*, B.P. Kennedy, R. Zabel and P. Chittaro.

May 2015. *Advances in the Population Ecology of Stream Salmonids International Symposium. Gerona, Spain.*
Dichotomous life history expression of juvenile Chinook salmon in a Wilderness watershed: The effects of growth and size on migration timing. B. Oldemeyer*, B.P. Kennedy and T. Copeland.

Major Grants and Contracts Awarded

Active awards only

IGERT – NSF Adaptation to change in water resources: science to inform decision making across disciplines. \$3.1M. CoPI's: T. Link, B. Kennedy, M. Shrestha, B. Cosens.

MRI: Acquisition of a Thermal Ionization Mass Spectrometer (TIMS) to strengthen collaborative Inter-University programs in isotope geochemistry. \$1.19M (includes University match of \$330,000). PI – B. Kennedy, co-PI's K. Harpp, D. Geist, C. Nezat (EWU) and J. Vervoort (WSU)

The impact of hydrologic alteration on the bioenergetics of juvenile steelhead (*Oncorhynchus mykiss*). USBOR \$171,000. Sole PI: B. Kennedy.

The evolution of life history in Snake River fall Chinook salmon (*Oncorhynchus tshawytscha*) \$505,000. Bonneville Power Association. Sole PI: B. Kennedy.

TEACHING

Courses Developed and Taught

University of Idaho

Fall 2005 – 2016 (except 2013 Sabbatical): Fish 314 & 315, Fish Ecology and Fish Ecology Laboratory – 4 credits.

Fall 2014 & 2015: Fish 404, The Ecology of Rivers – 4 credits, Part of Semester in the Wild.

Spring 2015, 2016 & 2017: Water Resources 507, International challenges to Water Resource Issues – a study abroad course for graduate students that is collaborative with Chilean universities.

Spring 2016 & 2017: Fish 430, Riparian Ecology and Management – 3 credits.

Spring 2013: Fish 530, Advanced Population Ecology – 3 credits.

Fall 2011: Fish 530, Advanced Stream Ecology – co-taught with Fremier – 3 credits.

Fall 2009: Fish 504 & 505, The Ecology of Running Waters – co-taught with Fremier – 3 credits.

Fall 2008: Water Resources 506, Interdisciplinary Methods in Water Resources – co-taught with Cosens and Fiedler – 3 credits.

Spring 2008: Fish 504, A Field Approach to Advanced Fish Ecology – 3 credits

Fall 2005, 2006, 2007: Natural Resources 101, Introduction to the Natural Resource Professions – 1 credit.

Fall 2005, 2006, 2007: Fish 102, Introduction to the Fish and Wildlife Professions – co-taught with Rachlow – 1 credit.

Spring 2007: Fish 504, Advanced Ecology and Behavior of Fish – co-taught with Peery – 1 credit.

Spring 2006: Fish 504, Hypothesis Development and Grant Proposal Writing – co-taught with Hampton – 3 credits.

Fall 2010: Wlf 541, Advanced Population Biology – co-instructor with Garton – 3 credits.

Students Advised/co-Advised*Graduate Students – Completed*

Jens Hegg, Ph.D. (2017)
 Jeff Caisman, M.S. (Fall 2015)
 Bryce Oldemeyer, M.S. (Fall 2015)
 Jessica Helsley, P.S.M. (Fall 2014)
 Knut Marius Myrvold, Ph.D. (Spring 2014)
 Liza Mitchell, M.S. (Spring 2014, coadvised with Alex Fremier)
 Sam Bourret, MS (Spring 2013)
 Chau Tran, M.S. (Fall 2012)
 Jens Hegg, M.S. (Spring 2011)
 Chris Lorion, Ph.D. (Fall 2007)
 Brian McIlraith, M.S. (Fall 2010 – coadvised with Chris Caudill)
 Richard Hartson, M.S. (Summer 2010)
 Ellen Hamann, M.S. (Spring 2010)
 Timothy Kiser, M.S. (Spring 2009)
 Kara Cromwell, M.S. (Spring 2009)
 Elizabeth Rosenberger (Seminet-Reneau), M.S. (Summer 2007 – lead advisor, S. Hampton)

Graduate Students – Current Ph.D.

Natasha Wingerter, Ph.D.

Graduate Students – Current M.S.

Austin Anderson
 Katherine Gillies – Rector

Honors and Awards while at University of Idaho

Ted Trueblood Communications Award	Idaho Chapter – Wildlife Society	2017
Nomination for University Teaching Award	University of Idaho	2017
Inspirational Mentor –Awards for Excellence	University of Idaho	2015
Excellence Award – Interdisciplinary and Collaborative Efforts – UI		2014
Inspirational Mentor –Awards for Excellence	University of Idaho	2013
Participant in LEAD 21 – Leadership training	National Land Grant Institutions	2012
Inspirational Mentor –Awards for Excellence	University of Idaho	2007
Inspirational Mentor –Awards for Excellence	University of Idaho	2006