SARAH YARNELL, PH.D.

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EDUCATION

Ph.D. in Hydrologic Sciences, University of California, Davis, March 2005.
Emphasis: Surface Hydrology and Stream Ecology

M.S. in Geology, University of California, Davis, September 2000.
Emphasis: Fluvial Geomorphology

B.S. with honors in Environmental Biology and Management, University of California, Davis, June 1995.
Minor: Geology

PROFESSIONAL EMPLOYMENT HISTORY

ACADEMIC RESEARCH EXPERIENCE

Associate Professional Researcher – Center for Watershed Sciences, University of California Davis, 2019-present

August, 2019 – December 2023
Collaboratively designed and monitored the **restoration of Van Norden meadow** in the northern Sierra Nevada. Project completed in collaboration with US Forest Service and South Yuba River Citizen's League (SYRCL); funded by SYRCL.

August, 2019 – March 2022
Obtained funding for and collaboratively developed **environmental flow recommendations to support flow enhancement in the Little Shasta River and San Juan Creek** using the California Environmental Flows Framework. Project completed in collaboration with Southern California Coastal Water Research Project (SCCWRP), UC Berkeley, CalTrout, and The Nature Conservancy (TNC); funded by California Wildlife Conservation Board.

July, 2019 – December 2021
Collaboratively planned large-scale **restoration of the Deer Creek headwaters in Childs Meadow**. Project completed in collaboration with US Forest Service, The Nature Conservancy, Collins Pine Co., and Point Blue Conservation Science; funded by Point Blue Conservation Science.

Associate Project Scientist – Center for Watershed Sciences, University of California Davis, 2014-2019

November, 2017 – March 2020
Collaboratively developed a **statewide environmental flow framework** for California. Project completed in collaboration with Southern California Coastal Water Research Project (SCCWRP), Dr. Sam Sandoval (UCD LAWR), UC Berkeley, CalTrout, and The Nature Conservancy (TNC); funded by State Water Resources Control Board.

April, 2017 – March 2019
Collaboratively assessed **drought and climate change vulnerability in southern California streams**. Project completed in collaboration with Southern California Coastal Water Research Project (SCCWRP); funded by SCCWRP.

July, 2016 – June, 2018
Collaboratively developed **first tier environmental flow recommendations** for the state of California. Project completed in collaboration with The Nature Conservancy (TNC), Southern California Coastal Water Research Project (SCCWRP), UC Berkeley, US Geological Survey, and CalTrout; funded by TNC.

August, 2015 – June 2018

Collaboratively conducted field experiments to evaluate the **restoration of Loney and Van Norden meadows** in the northern Sierra Nevada. Project completed in collaboration with South Yuba River Citizen's League (SYRCL); funded by SYRCL.

August, 2015 – June 2018

Conducted an **analysis of Sierra Nevada meadow conditions** using remote sensing techniques at selected study sites. Project funded by US Forest Service.

July, 2015 – March 2020

Collaboratively conducted field experiments to evaluate the **carbon sequestration and biodiversity benefits of beaver and beaver dam analogue restoration techniques** in Childs meadow, Tehama county, CA. Project completed in collaboration with The Nature Conservancy and US Forest Service; funded by California Dept of Fish and Wildlife.

July, 2015 – June 2018

Collaboratively conducted field experiments to assess montane meadow conditions and the **impacts of meadow restoration actions on Yosemite toad and Cascades frog** and their habitat. Project completed in collaboration with US Forest Service; funded by the National Fish and Wildlife Foundation.

June, 2015 – July 2018

Conducted field experiments to evaluate the **post-fire ecology and habitat suitability for the Sierra Nevada Yellow-legged frog** in northern Sierra streams. Project funded by US Forest Service.

Assistant Project Scientist – Center for Watershed Sciences, University of California Davis, 2010-2014

November, 2013 – November, 2016

Collaboratively conducted field experiments to assess the **impact of the snowmelt hydrograph on water quality, isotopic concentration and native species distribution** (via environmental DNA analysis) in northern Sierra rivers. Project completed in collaboration with Dr. Mike Miller (UCD Genetics) and Dr. Helen Dalhke (UCD LAWR); funded by the S.D. Becktel Jr. Foundation.

July, 2013 – July, 2017

Collaboratively conducted coupled flume, field, and numerical modeling experiments to quantify the **impact of hydrographs on sediment movement**. Project completed in collaboration with University of Idaho; funded by the National Science Foundation.

November, 2012 – February, 2013

Collaborated on development of a framework for assessing **vulnerability of montane meadows** under changing hydroclimatic conditions. Project completed in collaboration with Dr. Joshua Viers, Dr. Peter Moyle, US Forest Service; funded by National Fish and Wildlife Foundation

December, 2010 – June, 2012

Collaboratively conducted an **experimental flume project** that evaluates the relationship between flow regime and channel bar morphology. Project completed in collaboration with U. of Idaho, US Forest Service; funded by the National Center for Earth Surface Dynamics.

July, 2010 – June, 2013

Collaboratively conducted an integrated analysis of empirical, hydrodynamic, and hydropower modeling data focused on improving the **understanding and management of the spring-snowmelt recession in Sierra Nevada rivers**. Project completed in collaboration with US Forest Service; funded by the California Energy Commission.

Post-doctoral Researcher – Center for Watershed Sciences, UC Davis, 2005-2010

April, 2009 – June, 2010

Conducted a field-based research project that validates **regional habitat suitability criteria and evaluates instream flow modeling applications for the Foothill Yellow-Legged Frog (*Rana boylii*)**. Project completed in collaboration with US Forest Service; funded by the California Energy Commission.

October, 2008 – March, 2009

Collaborated on development of a **conceptual model** describing the ecological importance of the spring snowmelt recession in Mediterranean-montane environments.

June, 2005 – September, 2008

Conducted an evaluation of the **effects of aseasonal pulsed flows below hydropower dams on *Rana boylii*** individuals and habitat. Project completed in collaboration with US Forest Service and other *Rana boylii* experts; funded by the Pulsed Flow Program at UC Davis and the California Energy Commission.

Post-Graduate Researcher/Graduate Student Researcher – Geology Department, UC Davis, 1997-2004

October, 2000 – December, 2004

Obtained funding for and conducted field-based PhD dissertation project in the South Yuba River basin in collaboration with USGS, Water Resources Division as part of the CALFED-funded Upper Yuba River Studies Program.

August - September, 2000

Collaborated in on-going field research on Bear Creek in the headwaters of the Fall River, California concerning the interaction between surface and groundwater hydrology in an alpine meadow restoration.

September, 1997 – June, 2000

Initiated and conducted field-based Masters thesis project on the fluvial geomorphology of Shady Creek in the South Yuba River basin. Project funded by California State Parks.

TEACHING EXPERIENCE

Lecturer – Dept. of Earth & Planetary Sciences, UC, Davis

April – June, 2019; April – June, 2020

Taught 'Rivers of California', a lower diversion undergraduate student course (GEL 35) providing 3 lectures per week about river form, function, and management in streams throughout California. Class included a one-day field trip to the South Fork American River to experience and discuss current water management issues.

Instructor – Dept. of Earth & Planetary Sciences, UC Davis

April – June, 2019; January – March, 2020

Co-taught with Dr. Nicholas Pinter and Dr. Truman Young 'Ecogeomorphology of the Yampa-Green Rivers' in 2019, an upper-division undergraduate and first-year graduate student course (GEL 136) providing field demonstrations and lectures about ecology, geomorphology, hydrology, and water resource development in the Yampa and Green watersheds. In 2020, co-taught with Dr. Nicholas Pinter 'Ecogeomorphology of the Grand Canyon', a graduate course (GEL 230) providing lectures about interdisciplinary science topics in the Colorado watershed and an optional field trip down the Colorado River through Grand Canyon.

Instructor – University of California Water Academy

April – June, 2018

Co-taught with Dr. Joshua Viers 'California Water', a UC-wide upper-division undergraduate and first-year graduate student course providing field demonstrations and lectures about water resource development in California watersheds.

Instructor – Wildlife, Fish and Conservation Biology Dept., UC Davis
April – June, 2014; April – June, 2015; April – June, 2016; April – June, 2018 (course held as GEL 136)
Co-taught with Dr. Peter Moyle 'Ecogeomorphology of the Tuolumne River', an upper-division undergraduate course (WFC 102) providing field demonstrations and lectures about ecology, geomorphology, hydrology, and water resource development in California watersheds.

Instructor – Environmental Science and Policy Dept., UC Davis
April – June, 2013
Co-taught with Dr. Joshua Viers 'Ecology and Management of Sierra Nevada Rivers', an upper-division undergraduate course (ESP 190) providing field demonstrations and lectures about ecology, geomorphology, hydrology and water resource development in several Sierra Nevada watersheds.

University of California, Davis Extension – Land Use and Natural Resources
April, 2010; July, 2011
Co-taught with Dr. Jeff Mount 'The Wild and Scenic Tuolumne River: Ecology and Water Resources Management', a continuing education course providing field demonstrations and on-river lectures about ecology, geology, geomorphology, hydrology and water resource development in the Tuolumne River watershed.

Graduate Student Teaching Assistant – Geology Dept., UC Davis
October, 2004 – December, 2004
Taught one lab per week for an undergraduate 'Fluvial Geomorphology' course.
April, 2002 – June, 2002; April, 2003 – June, 2003, April, 2004 – June, 2004
Assisted in designing a senior-level undergraduate field-based course, 'Ecology and Geomorphology of Streams'; taught one lab per week and provided occasional class lectures.
January, 1998 – March, 1998; April, 2001 – June, 2001
Taught two discussions per week for an undergraduate 'Introduction to Geology' course.

PROFESSIONAL EXPERIENCE

Consultant/Technical Advisor – Sierra Nevada Meadows Partnership
February, 2015 – current
Member and participant in annual workshops and meetings to discuss meadow restoration efforts, and technical advisor regarding hydrogeomorphic conditions in meadows. Contributing author of Sierra Nevada Meadows Strategy final report.

Consultant/Technical Advisor – Public Policy Institute of California, San Francisco, CA
January, 2019 – current
Participated on a technical advisory team to evaluate policy and legal options for managing California's diverse freshwater ecosystems and to improve statewide management of environmental flows. Contributing author of final reports.

Consultant/Technical Advisor – Delta Stewardship Council, Sacramento, CA
December, 2013 – January, 2014
Participated on a technical advisory team to evaluate instream environmental flow methodologies and recommend to the California State Water Resources Control Board methods to develop flow criteria for priority tributaries to the Sacramento-San Joaquin Delta.

Consultant/Project Scientist – Sequoia Ecological Consulting, Danville, California
September – December, 2012; November – December, 2013; November – December, 2014
Collaboratively managed the 2012, 2013 and 2014 amphibian monitoring plan for Pacific Gas & Electric's Spring Gap-Stanislaus Hydropower relicensing project; provided expertise on ecology of sensitive amphibian species; supervised field crews; authored final annual report; provided recommendations for hydropower management and downstream river flows.

Consultant/Project Scientist – Entrix Cardno, Sacramento, California
August, 2006 – December, 2011
Developed and collaboratively managed the amphibian study plan for Placer County Water Agency's Middle Fork American Hydropower relicensing project; provided expertise on ecology of sensitive amphibian species; supervised field crews; evaluated instream flow hydrodynamic modeling results specific to *Rana boylii* management; participated in on-going discussions regarding recommendations for hydropower management and downstream river flows.

August, 2001 – September, 2003; June, 2008
Conducted amphibian surveys for Big Creek Alternative Licensing Project; provided expertise on ecology of sensitive amphibian species; participated in on-going discussions with utilities, stakeholders, and resource agencies regarding recommendations for hydropower management and downstream river flows.

Independent Contractor/Consultant – U.S. Forest Service Region 5
March, 2009 – October, 2009; April, 2010 – September, 2010; April, 2011 – September, 2011; April, 2012 – September, 2012; April, 2013 – August, 2013
Provided species (*Rana boylii*) expertise for Drum-Spaulding (Yuba/Bear Rivers) and Yuba River Hydropower Relicensing Projects; reviewed instream flow and special-status amphibian study plans and study data; participated in on-going discussions with utilities, stakeholders, and resource agencies regarding recommendations for hydropower management and downstream river flows.

December, 2006 – February, 2007
Participated in the North Fork Feather Rock-Cresta Hydropower Reclicensing Project, Ecological Resources Committee technical subgroup to evaluate relicensing study results and provide recommendations for instream flow management conducive to *Rana boylii* conservation.

May – June, 2005; June, 2006 – April, 2008
Collaboratively developed habitat suitability criteria for *Rana boylii* for use in instream flow assessments for Desabla-Centerville Hydropower Relicensing Project; authored technical report; and participated in discussions with utilities, stakeholders, and resource agencies regarding hydropower management recommendations.

PUBLICATIONS

Eyster, T.D., M.S. Johnson, S.M. Yarnell, and C.S. Lowry. *Submitted.* Analyzing the subsurface consequences of dam removal on groundwater storage and vegetation patterning in mountain meadow ecosystems. Ecological Engineering.

Obester, A.N., R.A. Lusardi, N.R. Santos, R.A. Peek, and S.M. Yarnell. *In Revision*. Conservation management of freshwater fish over large geographic areas using suites of umbrella species. Aquatic Conservation: Marine and Freshwater Ecosystems.

Keung, N.C., S.P. Lawler, S.M. Yarnell, B.D. Todd, and C. Brown. *In Revision*. Movement ecology of stream-dwelling Sierra Nevada Yellow-legged Frog (*Rana sierrae*) informs reintroductions of a federally endangered species. Herpetological and Conservation Biology.

Patterson, N.K., B.A. Lane, S. Sandoval-Solis, G.B. Pasternack, S.M. Yarnell, Y. Qiu. *In Press*. A hydrologic feature detection algorithm to quantify seasonal components of flow regimes. Journal of Hydrology.

Grantham, T., J. Mount, E.S. Stein, and S.M. Yarnell. 2020. Making the Most of Water for the Environment: A Functional Flows Approach for California's Rivers. Public Policy Institute of California. Technical Report. https://www.ppic.org/publication/making-the-most-of-water-for-the-environment/

Yarnell, S.M., K. Pope, E.C. Wolf, R. Burnett, and K. Wilson. 2020. A Demonstration of the carbon sequestration and biodiversity benefits of beaver and beaver dam analogue restoration techniques in Childs Meadow, Tehama County, California. Center for Watershed Sciences Technical Report (CWS-2020-01), University of California, Davis. Prepared for CA Department of Fish and Wildlife. pp. 29.

Yarnell, S.M., E.D. Stein, J.A. Webb, T. Grantham, R.A. Lusardi, J. Zimmerman, R.A. Peek, B.A. Lane, J. Howard, and S. Sandoval-Solis. 2020. A functional flows approach to selecting ecologically relevant flow metrics for environmental flow applications. River Research and Applications 36(2): 318-324. doi: 10.1002/rra.3575.

Mount, J., B. Gray, K. Bork, J. Cloern, F. Davis, T. Grantham, L. Grenier, J. Harder, Y. Kuwayama, P. Moyle, M. Schwartz, A. Whipple, and S. Yarnell. 2019. A Path Forward for California's Freshwater Ecosystems. Public Policy Institute of California. Technical Report. https://www.ppic.org/publication/a-path-forward-for-californias-freshwater-ecosystems/

Yarnell, S.M., R.A. Peek, N. Keung, B.D. Todd, S. Lawler, and C. Brown. 2019. A lentic breeder in lotic waters: Sierra Nevada Yellow-Legged Frog (*Rana sierrae*) habitat suitability in northern Sierra Nevada streams. Copeia 107(4): 676-693. doi: 10.1643/CH-19-213.

Pinter, N., J. Brasington, A. Gurnell, M.G. Kondolf, K. Tockner, G. Wharton, and S.M. Yarnell. 2019. River research and applications across borders. River Research and Applications 35: 768–775. doi: 10.1002/rra.3430.

Milner, V., S.M. Yarnell, and R.A. Peek. 2019. The ecological importance of unregulated tributaries to macroinvertebrate diversity and community composition in a regulated river. Hydrobiologia 829:291-305. doi: 10.1007/s10750-018-3840-4.

Lane, B., S. Sandoval, S.M. Yarnell, E.D. Stein, G.B. Pasternack, and H. Dahlke. 2018. Beyond Metrics? The role of hydrologic baseline archetypes in environmental flows management. Environmental Management 62: 678-693. doi: 10.1007/s00267-018-1077-7.

Steel, A., R.A. Peek, R.A. Lusardi, and S.M. Yarnell. 2018. Associating metrics of hydrologic variability with benthic macroinvertebrate communities in regulated and unregulated snowmelt-dominated rivers. Freshwater Biology 63(8): 844-858. doi: 10.1111/fwb.12994

Rheinheimer, D.E. and S.M. Yarnell. 2017. Tools for sediment management in rivers, In: *Water for the Environment: Policy, Science, and Integrated Management*. Edited by A. Horne, A. Webb, M. Stewardson, B. Richter, and M. Acreman, Elsevier Inc., pp chapter 12.

Yarnell, S.M., E.M. Yager, and M. Kenworthy. 2017. A mechanistic understanding of hydrograph shape influence on temporal variations in bedload transport, grain size distributions, and armor persistence. Final Project Report to National Science Foundation. June, 2017.

Yarnell, S.M., R.A. Peek, G.E. Epke, and A.J. Lind. 2016. Management of the spring snowmelt recession in regulated systems. Journal of American Water Resources Association (52): 723-736. doi: 10.1111/1752-1688.12424.

Drew, W.M., Hemphill, N., Keszey, L. Merrill, A., Hunt, L. Fair, J. Yarnell, S., Drexler, J. Henery, R., Wilcox, J., Burnett, R., Podolak, K., Kelley, R., Loffland, H., Westmoreland, R., Pope, K. 2016. Sierra Meadows Strategy. Sierra Meadows Partnership Paper 1: pp 40.

Fong, C.A., S.M. Yarnell, and J.H. Viers. 2016. Pulsed flow wave attenuation on a regulated montane river. River Research and Applications 32(5): 1047-1058. doi: 10.1002/rra.2925.

Yarnell, S.M., G.E. Petts, J.C. Schmidt, A.A. Whipple, E.E. Beller, C.N. Dahm, P. Goodwin, and J.H. Viers. 2015. Functional flows in modified riverscapes: Hydrographs, habitats and opportunities. BioScience 65(10): 963-972. doi:10.1093/biosci/biv102.

Podolak, K. and Yarnell, S.M. 2015. Adaptive management in Federal Energy Regulatory Commission relicensing. In: *The Water Sustainability Reader: Lessons from California for the 21st Century*. Edited by A. Lassiter. University of California Press. Berkeley. pp chapter 13.

Dahm, C., K. Winemiller, M. Kelly, and S. Yarnell. 2014. Recommendations for Determining Regional Instream Flow Criteria for Priority Tributaries to the Sacramento-San Joaquin Delta. A report to the California State Water Resources Control Board. Prepared for the Delta Stewardship Council, Delta Science Program. February 2014.

Yarnell, S.M. 2013. Stream habitat associations of the Foothill Yellow-legged Frog (*Rana boylii*): The importance of habitat heterogeneity. In: *Ecohydraulics: An Integrated Approach*. Edited by I. Maddock, A. Harby, P. Kemp and P. Wood. John Wiley & Sons, Ltd. London. pp 193-211.

Yarnell, S.M, R.A. Peek, D.E. Rheinheimer, A.J. Lind, and J.H. Viers. 2013. Management of the Spring Snowmelt Recession: An Integrated Analysis of Empirical, Hydrodynamic, and Hydropower Modeling Applications. Final Report. California Energy Commission. Publication number: CEC-500-2014-030.

Viers, J.H., S.E. Purdy, R.A. Peek, A. Fryjoff-Hung, N.R. Santos, J.V.E. Katz, J.D. Emmons, D.V. Dolan, and S.M. Yarnell. 2013. Montane Meadows in the Sierra Nevada: Changing Hydroclimatic Conditions and Concepts for Vulnerability Assessment. Center for Watershed Sciences Technical Report (CWS-2013-01), University of California, Davis. 63 ppd.

Bondi, C.A., S.M. Yarnell, and A.J. Lind. 2013. Transferability of habitat suitability criteria for a stream breeding frog (*Rana boylii*) in the Sierra Nevada, California. Herpetological Conservation and Biology 8(1):88–103.

Rheinheimer, D.E., S.M. Yarnell, and J.H. Viers. 2013. Hydropower costs of environmental flows and climate warming in California's upper Yuba River watershed. River Research and Applications 29(10):1291-1305.

Yarnell, S.M., A.J. Lind, and J.F. Mount. 2012. Dynamic flow modelling of riverine amphibian habitat with application to regulated flow management. River Research and Applications 28:177-191.

Lind, A.J. and S.M. Yarnell. 2011. Frogs that go with the Flow. River Management Society Journal: 24(4): 10-12.

Yarnell, S.M., C. Bondi, A.J. Lind, R.A. Peek. 2011. Habitat models for the Foothill yellow-legged frog (*Rana boylii*) in the Sierra Nevada of California. Final Report. California Energy Commission, PIER. Publication number: CEC-500-2011-TBD.

Kupferberg, S.K., A.J. Lind, V. Thill, and S.M. Yarnell. 2011. Water velocity tolerance in tadpoles of the Foothill yellow-legged frog (*Rana boylii*): Swimming performance, growth, and survival. Copeia 1: 141-152.

Yarnell, S.M., J.H. Viers, and J.F. Mount. 2010. Ecology and management of the spring snowmelt recession. Bioscience 60(2): 114-127.

Kupferberg, S., A. Lind, J. Mount, and S. Yarnell. 2009. Pulsed flow effects on the Foothill yellow-legged frog (*Rana boylii*): Integration of empirical, experimental and hydrodynamic modeling approaches. Final Report. California Energy Commission, PIER. Publication number CEC 500-2009-002.

Yarnell, S.M. 2008. Quantifying physical habitat heterogeneity in an ecologically meaningful manner: A case study of the habitat preferences of the Foothill yellow-legged frog (*Rana boylii*). In: *Landscape Ecology Research Trends*. Eds. Dupont, A. and H. Jacobs. Nova Publishers.

Yarnell, S.M., J.F. Mount, and E.W. Larsen. 2006. The influence of relative sediment supply on riverine habitat heterogeneity. Geomorphology 80:310-324.

Yarnell, S.M. 2005. Spatial Heterogeneity of *Rana boylii* Habitat: Physical Processes, Quantification and Ecological Meaningfulness. Ph.D. Dissertation. Hydrologic Sciences. University of California, Davis, CA.

Curtis, J.A., L.E. Flint, C.N. Alpers, and S.M. Yarnell. 2005. Conceptual model of sediment processes in the upper Yuba River watershed, Sierra Nevada, CA. Geomorphology 68:149-166.

Lind, A. J., Bettaso, J. B. and Yarnell, S. M. 2003. Natural History Notes: *Rana boylii* and *Rana catesbeiana*. Reproductive Behavior. Herpetological Review 34(3): 234-235.

Yarnell, S.M. 2000. The influence of sediment supply and transport capacity on Foothill Yellow-legged Frog habitat, South Yuba River, California. Master's Thesis. Geology Department. University of California, Davis, CA

ABSTRACTS AND PRESENTATIONS last 5 years, presenting author only

Yarnell, S.M., K. Podolak, K. Pope, E. Wolf, and R. Burnett. 2019. An experimental study of beaver and beaver dam analogue restoration techniques in Childs Meadow. Abstract EP43A-05 presented at 2019 Fall Meeting, AGU, San Francisco, December, 2019.

Yarnell, S.M., E.D. Stein, T. Grantham, J. Zimmerman, B. Lane, S. Sandoval, and R. Lusardi. Stakeholder Engagement in the California Environmental Flows Framework. 2019. International Society for River Science, Sixth Biennial Symposium, Vienna, Austria, August, 2019.

Yarnell, S.M., E.D. Stein, R. Lusardi, J. Zimmerman, R.A. Peek, T. Grantham, B. Lane, J. Howard, and S. Sandoval. 2019. An ecosystem-based approach for selecting flow metrics for environmental flow applications. Society for Freshwater Science Annual Meeting, Salt Lake City, UT, May, 2019.

Yarnell, S.M. 2019. An Experimental Study of Beaver and Beaver Dam Analogue (BDA) Restoration Techniques in Childs Meadow. **Invited Speaker**. Sierra Streams Spring 2019 Science Speaker Series. Grass Valley, CA. March, 2019.

Yarnell, S.M., L. Bernacchi, and J. Viers. 2018. Getting Students Wet! Key Lessons From Immersive Education on California's Water Science, Policy and Management. Abstract ED33D-1111 presented at 2018 Fall Meeting, AGU, Washington D.C., December, 2018.

Yarnell, S.M. 2018. Conservation of Sierran streams and headwaters in a changing climate. **Plenary Speaker**. Sierra Bioregional Rendezvous. Nevada City, CA. October, 2018.

Yarnell, S.M., E.D. Stein, R. Lusardi, J. Zimmerman, R.A. Peek, T. Grantham, B. Lane, J. Howard, and S. Sandoval. 2018. An ecologically based approach for selecting flow metrics for environmental flow applications. 12th International Symposium on Ecohydraulics, Tokyo, Japan, 19-24 August 2018.

Yarnell, S.M. 2018. Foothill yellow-legged frog habitat: structure and hydrology; FERC relicensing and *Rana boylii*. **Invited Lecturer**. Foothill yellow-legged frog management and natural history workshop, The Wildlife Society-Western Section, Arcata, CA, June, 2018.

Yarnell, S.M. 2018. What is a watershed? California hydrology overview. **Invited Speaker**. Laboratory for environmental narrative strategies, UCLA Ethnic Media Watershed Fellowship Training, Resources Legacy Fund, Sacramento, CA, April, 2018.

Yarnell, S.M., E. Stein, S. Sandoval, J. Zimmerman, B. Lane, T. Grantham, L. Brown, R. Lusardi, J. Howard, and J. Lund. 2017. Developing tiered environmental flow targets using a functional flows approach for California streams. **Invited Speaker**. International Society for River Science, Fifth Biennial Symposium, Hamilton, New Zealand, November, 2017.

Yarnell, S.M., K. Podolak, K. Pope, E. Wolf, and R. Burnett. 2017. An experimental study of beaver and beaver dam analogue restoration techniques in Childs Meadow. **Invited Speaker**. 2017 Riparian Summit: Confluence to Influence, Davis, CA, October, 2017.

Yarnell, S.M. 2017. Developing tiered environmental flow criteria using a functional flows approach for California Streams. **Invited Speaker**. Delta Science Council Brown Bag Seminar, Sacramento, CA, July, 2017.

Yarnell, S.M., E. Stein, S. Sandoval, J. Zimmerman, B. Lane, T. Grantham, L. Brown, R. Lusardi, J. Howard, and J. Lund. 2017. Developing Tier 1 environmental flow targets using a functional flows approach. SWRCB Surface Water Ambient Monitoring Program (SWAMP) science symposium, Sacramento, CA, June, 2017.

Yarnell, S.M., E. Stein, S. Sandoval, J. Zimmerman, B. Lane, T. Grantham, L. Brown, R. Lusardi, J. Howard, and J. Lund. 2017. Developing Tier 1 environmental flow targets using a functional flows approach. American Fisheries Society, Cal-Neva chapter annual meeting, Eureka, CA, April, 2017.

Yarnell, S.M., K. Podolak, K. Pope, E. Wolf, and R. Burnett. 2017. A demonstration of the carbon sequestration and biodiversity benefits of beaver and beaver dam analogue restoration techniques in Childs Meadow, Tehama County CA: Year 2 Update. **Invited Speaker**. State of Beaver Restoration in California, Salmonid Restoration Federation Annual Meeting, Davis, CA, March, 2017.

Yarnell, S.M., K. Podolak, K. Pope, E. Wolf, and R. Burnett. 2016. First year results from an experimental study of the ecohydrologic benefits of beaver and beaver dam analogue restoration techniques in Childs Meadow, CA. Abstract EP51B-0906 presented at 2016 Fall Meeting, AGU, San Francisco, CA, December, 2016

Yarnell, S.M. 2016. Managing functional environmental flows in regulated river systems. **Invited Speaker**. 23rd Annual Meeting of the California Aquatic Bioassessment Workgroup, Davis, CA, October, 2016.

Yarnell, S.M., G.E. Petts, J.C. Schmidt, A.A. Whipple, E.E. Beller, C.N. Dahm, P. Goodwin, and J.H. Viers. 2016. Functional flows in modified riverscapes: Hydrographs, habitats and opportunities. **Invited Speaker**. Society for Freshwater Science Annual Meeting, Sacramento, CA, May 2016.

Yarnell, S.M., K. Podolak, and K. Pope. 2016. A demonstration of the carbon sequestration and biodiversity benefits of beaver dam analogues in Evolving science and policy to restore streams using instream obstructions and beaver dam analogues workshop. 34th Annual Salmonid Restoration Conference, Fortuna, CA, April, 2016.

Yarnell, S.M., E. Yager, and S. Leidman. 2016. Impacts of hydrograph shape on sediment transport in a gravel-bedded stream. Paper 26175 in, Webb JA, Costelloe JF, Casas-Mulet R, Lyon JP, Stewardson MJ (eds.) *Proceedings of the 11th International Symposium on Ecohydraulics*. Melbourne, Australia, 7-12 February 2016. The University of Melbourne, ISBN: 978 0 7340 5339 8.

Yarnell, S.M., R.A. Peek, D. Weixelman, and J.H. Viers 2015. Characterizing the Source Water for Montane Meadows to Assess Resiliency under Changing Hydroclimatic Condition. Abstract H13F-1612 presented at 2015 Fall Meeting, AGU, San Francisco, CA, December, 2015.

Yarnell, S.M. and K. Pope. 2015. Montane Meadow Restoration: Reconciling Research and Implementation. 22nd Annual Meeting of the California Aquatic Bioassessment Workgroup, Davis, CA, October, 2015.

Yarnell, S.M., G.E. Petts, J.C. Schmidt, A.A. Whipple, E.E. Beller, C.N. Dahm, P. Goodwin, and J.H. Viers. 2015. Functional flows in modified riverscapes: Hydrographs, habitats and opportunities. **Invited**

Speaker. International Society for River Science, Fourth Biennial Symposium, LaCrosse, Wisconsin, August, 2015.

Yarnell, S.M., V. Milner, and R.A. Peek. 2015. Influence of unregulated perennial tributaries to longitudinal trends in benthic invertebrates in a regulated river. International Society for River Science, Fourth Biennial Symposium, LaCrosse, Wisconsin, August, 2015.

RESEARCH GRANTS

2019-2023. Van Norden Meadow Restoration and Monitoring Project. $367,836. South Yuba River Citizen's League.

2019-2021. Restoring the Deer Creek Headwaters at Childs Meadow Planning Grant. $57,744. Point Blue Conservation Science.

2019-2022. Application of a Tiered Framework for Environmental Flow Recommendations to support Flow Enhancement Implementation in two California Watersheds. $499,955. Wildlife Conservation Board.

2017-2020. Statewide Environmental Flow Framework. $447,718. State Water Resources Control Board.

2017-2019. Drought and Climate Change Vulnerability in Southern California Streams. $35,000. Southern California Coastal Water Research Project.

2017-2018. Tier 1 Environmental Flows for California, $100,000. The Nature Conservancy.

2016-2017. Meadows Clearinghouse Updates. $10,530. CalTrout.

2015-2020. Benefits of Beaver Dam Analogue Restoration Techniques. $539,672. CA Dept Fish & Wildlife.

2015-2020. Post-fire Ecology and Habitat Suitability of Sierra Nevada Yellow-legged Frogs. $424,586. US Forest Service.

2015-2018. Van Norden and Loney Meadows Restoration Monitoring. $75,000. South Yuba River Citizen's League.

2015-2018. Monitoring of Sierra Nevada Meadow Conditions. $70,235. US Forest Service.

2015-2018. Meadow restoration for Sierra Nevada Amphibians. $104,195. National Fish & Wildlife Foundation/US Forest Service.

2014-2015. Water Temperature Thresholds for Golden Trout. $44,000. National Fish & Wildlife Foundation/US Forest Service.

2013-2017. Collaborative Research: Mechanistic Understanding of Hydrograph Shape Influence on Temporal Variations in Bedload Transport. $209,378. National Science Foundation.

2010-2012. Management of the Spring Snowmelt Recession. $299,948. California Energy Commission.

2010-2011. Impacts of Flow Recession Dynamics on Channel Bar Morphology. $20,350. National Center for Earth-surface Dynamics.

2009-2011. Regional Habitat Suitability Criteria for Rana boylii. $285,650. California Energy Commission.

2009-2010. Yellow-legged Frog Tadpole Movement. $16,072. UC Regents/CIEE

2007-2010. Modeling Tools to Restore a River-breeding Frog. $47,840. National Fish and Wildlife Foundation.

2005-2007. Aseasonal Pulsed Flow Effects on Rana boylii. $296,138. California Energy Commission.

ACADEMIC SERVICE

2014-Present. **Faculty Representative**, Outdoor Adventures Advisory Council.

2012-Present. **Peer Group Member or Chair**, Peer Group Reviews, Academic Merits & Promotions Committee, John Muir Institute of the Environment.

2011-Present. **Technical reviewer** for BioScience, PeerJ, Ecohydrology, River Research and Applications, Geomorphology, Freshwater Science, Journal American Water Resources Association, Water Resources Research, Oxford book review, California Seagrant proposals, National Science Foundation proposals.

2014-Present. **External Committee Member** for M. Kenworthy at University of Idaho (PhD Qualifying Exams, dissertation committee.)

December, 2019. **Session Co-convener**, American Geophysical Union, Annual Fall Meeting.

August 2019. **Session Organizer**, International Society for River Science bi-annual conference.

2017-2018. **External Committee Member** for T. Eyster at University of British Columbia (M.S. thesis committee).

2017. **Technical advisor** for Delta Science Council on instream flows to the delta.

November 2017. **Session Organizer**, International Society for River Science bi-annual conference.

2015-2017. **External Committee Member** for M. Ayers at Montclair State University (PhD Qualifying Exams).

2014-2016. **Member**, Technical Advisory Committee for Southern California Coastal Water Research Program flow-ecology project.

October 2015. **Session Organizer**, California Chapter of Society for Freshwater Sciences annual conference meeting.

August 2015. **Session Organizer**, International Society for River Science bi-annual conference.

2013-2014. **Technical Advisor** for State Water Resources Control Board on delta instream flows.

February 2014. **Steering Committee**, National Fish and Wildlife Foundation Montane Meadows Workshop.

PROFESSIONAL AFFILIATIONS

American Geophysical Union (AGU)

American Fisheries Society, Cal/Neva Chapter (AFS)

International Society for River Science (ISRS)

Society for Freshwater Sciences, California Chapter (SFS)