

# CURRICULUM VITAE

## Roland A. Knapp

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### EDUCATION

1992 Ph.D. in Biology. University of California, Santa Barbara.  
1986 B.A. in Aquatic Biology. University of California, Santa Barbara.

### RESEARCH INTERESTS

- Factors influencing resistance and resilience of aquatic ecosystems to anthropogenic stressors.
- Impacts of nonnative species on the structure and function of aquatic ecosystems.
- Development of effective strategies to recover endangered amphibians.

### ACADEMIC APPOINTMENTS

2009-present Research Biologist, Sierra Nevada Aquatic Research Laboratory, U.C. Santa Barbara.  
2004-2009 Associate Research Biologist, Sierra Nevada Aquatic Research Laboratory, U.C. Santa Barbara.  
1993-2004 Assistant Research Biologist, Sierra Nevada Aquatic Research Laboratory, U.C. Santa Barbara.  
1992-1993 Post-doctoral Researcher, Marine Science Institute, U.C. Santa Barbara  
1991 Lecturer, Department of Biological Sciences, U.C. Santa Barbara  
1989-1991 Graduate Research Assistant, Marine Science Institute, U.C. Santa Barbara  
1989-1991 Graduate Teaching Assistant, Department of Biological Sciences, U.C. Santa Barbara

### HONORS and AWARDS

2013 U.S. Environmental Protection Agency "2013 Scientific and Technological Achievement Award" (for Bradford et al. 2011. *Environmental Toxicology and Chemistry* 32: 517–525; Bradford et al. 2011. *Environmental Toxicology and Chemistry* 30: 682-691).

2004 U.S. Forest Service "Excellence in Wilderness Stewardship Research Award".

2002 U.S. Forest Service Pacific Southwest Research Station "Distinguished Publication Award" (for Knapp, et al. 2001. *Ecological Monographs* 71: 401-421).

2000 U.S. Forest Service "Rise to the Future – Group Research Achievement Award" (with K. Matthews).

1991 UCSB Dissertation Fellowship.

1989 UCSB General Affiliates Graduate Fellowship.

1986 Phi Beta Kappa, UC Santa Barbara.

## PROFESSIONAL ORGANIZATIONS

American Association for the Advancement of Science  
Ecological Society of America

## PROFESSIONAL ACTIVITIES

### Reviewer:

Journals: American Naturalist, Amphibia-Reptilia, Animal Behaviour, Animal Conservation, Behavioral Ecology, Biological Conservation, Bulletin of Marine Science, Canadian Journal of Fisheries and Aquatic Sciences, Conservation Biology, Copeia, Diversity and Distributions, Ecography, EcoHealth, Ecological Applications, Ecological Monographs, Ecology, Ecosystems, Environmental Biology of Fishes, Freshwater Biology, Herpetological Conservation and Biology, Herpetological Review, Journal of Animal Ecology, Journal of Applied Ecology, Journal of Fish Biology, Journal of Herpetology, Journal of Zoology, Limnology and Oceanography, North American Journal of Fisheries Management, New Zealand Journal of Marine and Freshwater Research, Oecologia, PeerJ, Science, Transactions of the American Fisheries Society.

National Science Foundation grant proposals: Ecology, Ecosystems, and Animal Behavior programs.

Other grant proposals: Alberta Conservation Association Grants in Biodiversity, Austrian Academy of Sciences – Earth Systems Sciences

### Scientific Advisor:

#### Agencies

Technical Advisory Committee. Assisted the U.S. Fish and Wildlife Service, U.S. Forest Service, California Department of Fish and Wildlife, and National Park Service in developing a conservation assessment and conservation strategy for the mountain yellow-legged frog and Yosemite toad (6/1999-present).

Technical Advisory Committee. Assisted the U.S. Forest Service in evaluating the consequences of proposed changes in fish stocking practices for aquatic communities in four wilderness areas in the Sierra Nevada (11/1995-11/1996).

#### Non-governmental Organizations

Amphibian Conservation Science Panel. Served on a panel of scientists convened by the Pacific Rivers Council to assist in writing a report outlining steps that land management agencies should consider in efforts to conserve amphibians (1/2003-12/2005).

Advisor to National Science Foundation-funded *Research and Analysis Network for Neotropical Amphibians* project: Project objective was to improve coordination among researchers doing research on amphibian declines in the neotropics (2/2002-1/2006).

Trout Restoration Science Panel. Served on panel of scientists convened by the Pacific Rivers Council to assist in writing a report outlining the components of biologically sufficient recovery plans for threatened and endangered fish species (2/2002-1/2006).

### Consultant:

Garcia and Associates – Chevron Guadalupe Restoration Project: Analyzed long-term trends in California red-legged frog populations at the Guadalupe Dunes project site (with Maxwell Joseph; 10/2018-present).

California Department of Fish and Wildlife: Assisted with the development of a status review document for the mountain yellow-legged frog (11/2010-6/2011)

California State Parks: Surveyed aquatic habitats throughout Anza-Borrego State Park for amphibians (2/1993-4/1994).

**TEACHING EXPERIENCE**

## Guest Lecturer

- U.C. Santa Barbara: ES 1 - Introduction to Environmental Studies. 12/2014, 12/2016
- University of Redlands: Chemistry 260 – Mile High Chemistry: Environmental Chemistry Field Experience. 6/2013
- U.C. Santa Barbara: ES/EEMB 119 - Ecology and Management of California's Wildlands. 11/2005, 12/2006, 11/2008, 11/2010, 11/2011.
- U.C. Santa Barbara: EEMB 188/288 - Restoration Ecology Seminar. 11/2008.

## Lecturer

- U.C. Santa Barbara: Ethology and Behavioral Ecology. 1/1991-3/1991.

**GRADUATE STUDENT SUPERVISION**

## Thesis Committees:

|                 |       |      |                       |
|-----------------|-------|------|-----------------------|
| Adams, A.       | Ph.D. | 2017 | U.C. Santa Barbara    |
| Ellison, S.     | M.S.  | 2015 | C.S.U., San Francisco |
| Dodge, C. M.    | M.S.  | 2013 | C.S.U., San Francisco |
| Koster, P. D.   | M.S.  | 2012 | U.C. Riverside        |
| Deiner, K. L.   | Ph.D. | 2012 | U.C. Davis            |
| Epanchin, P. E. | Ph.D. | 2009 | U.C. Davis            |
| Pope, K. L.     | Ph.D. | 2008 | U.C. Davis            |

**EXTRAMURAL GRANTS**

- 2019-2022 California Department of Fish and Wildlife. \$159,666. Using frog translocations and reintroductions to recover frogs in the Rocky Basin Lakes, Inyo National Forest (co-PI: Thomas Smith).
- 2018-2022 National Park Service. \$96,602. Restoring genetic diversity of endangered mountain yellow-legged frogs (co-PI: Thomas Smith).
- 2018-2019 Yosemite Conservancy. \$105,772. Restoring rare frogs in Yosemite National Park.
- 2017-2019 National Park Service. \$70,500. Critical restoration efforts needed to recover endangered mountain yellow-legged frogs in Sequoia and Kings Canyon National Park.
- 2016-2021 National Science Foundation. \$225,747. Collaborative Research: Long-term dynamics of amphibian populations following disease-drive declines (PI: C. Briggs – UCSB).
- 2016-2019 California Department of Fish and Wildlife. \$195,000. Three important conservation actions to recover *Rana sierrae* in the northern Sierra Nevada.
- 2016-2019 U.S. Geological Survey. \$142,733. Understanding and ameliorating predation on reintroduced mountain yellow-legged frogs by terrestrial gartersnakes in the Sierra Nevada (co-PI: Brian Halstead).
- 2015-2018 U.S. Fish and Wildlife Service. \$140,000. Treatment and prevention by Bd in two species of mountain yellow-legged frogs (co-PI: D. Boiano – Sequoia & Kings Canyon National Parks).
- 2015-2018 National Science Foundation. \$600,000. Collaborative Research: Linking causes of variation in the amphibian skin microbiome with consequences for disease risk (PI: A. Jani, University of Hawaii).

**EXTRAMURAL GRANTS (continued)**

- 2015-2018 National Park Service. \$290,745. Restoring rare frogs in Yosemite National Park.
- 2014-2016 State Water Resources Control Board. \$295,200. Microbial source tracking at bacteria-impaired waters of the Lahontan region (co-PI: C. Nelson – University of Hawaii).
- 2014-2015 DisneyNature. \$24,916. Facilitating recovery of the endangered Sierra Nevada yellow-legged frog (*Rana sierrae*) in Yosemite National Park through identification of critical habitats and movement corridors.
- 2012-2015 State Water Resources Control Board. \$230,000. Microbial indicators of water quality in the Lahontan Region of California (PI: C. Nelson – UCSB).
- 2013-2015 U.S. Geological Survey. \$210,000. Factors influencing reintroduction success of the endangered mountain yellow-legged frog (PI: M. Brooks – USGS).
- 2013-2014 National Park Service. \$50,000. Sierra Nevada yellow-legged frog genetic analysis for Yosemite National Park (co-PI: Erica Rosenblum).
- 2012-2015 USDA Forest Service-Pacific Southwest Research Station. \$275,003. Effectiveness of reintroductions and probiotic treatment as tools to restore the endangered Sierra Nevada yellow-legged frog (*Rana sierrae*) to the Lake Tahoe Basin. (Co-PI: V. Vredenburg – San Francisco State University).
- 2012-2014 National Science Foundation. \$181,776. Collaborative research: Testing intervention strategies to change the outcome of disease-caused mass mortality events in a declining amphibian (Knapp portion = \$121,077).
- 2012-2013 National Park Service. \$116,146. Preventing the extirpation of mountain yellow-legged frog populations in Sequoia and Kings Canyon National Parks.
- 2007-2012 National Science Foundation. \$2,500,000. Collaborative Research: After the crash: factors allowing host persistence following outbreaks of a highly virulent disease. (PI: C. Briggs – UC Santa Barbara; Knapp portion = \$550,000)
- 2007-2008 Yosemite Fund. \$50,000. Hidden biodiversity in Yosemite’s lakes and ponds.
- 2005-2007 Environmental Protection Agency. \$251,583. Evaluation of reference site classification schemes, probability-based survey designs, biological indicators, biotic tolerance values, and the comparability of different sampling methods for western lakes and ponds. (PI: C. Hawkins – Utah State University)
- 2005-2008 Dept. of the Interior, Yosemite National Park. \$135,941. A proposal to reintroduce *Rana muscosa* to fishless lakes in Yosemite National Park.
- 2004-2006 Wildspaces Foundation. \$50,000. Impacts of nonnative trout on alpine-nesting birds in the Sierra Nevada.
- 2004-2005 Dept. of the Interior, Sequoia-Kings Canyon National Park. \$100,000. Amphibian resurvey of select lakes in Sequoia-Kings Canyon National Park.
- 2003 National Science Foundation. \$6,075. Research Experience for Undergraduates supplement to “Effects of exotic species eradication on the recovery of ecosystem structure and function”.

**EXTRAMURAL GRANTS (continued)**

- 2002-2007 National Institutes of Health. \$2,484,295. Amphibian disease dynamics in a fragmented landscape (PI: C. Briggs – UC Berkeley; Knapp portion = \$443,920).
- 2002-2005 Environmental Protection Agency. \$214,848. Airborne agricultural contaminants, disease, and amphibian declines: using landscape-scale patterns to evaluate the severity of an emerging environmental problem (PI: C. Davidson – California State University, Sacramento; Knapp portion = \$99,601).
- 2000-2005 National Science Foundation. \$350,000. Collaborative Research: Recovery of ecosystem structure and function following exotic species eradication (co-PI: O. Sarnelle – Michigan State University; Knapp portion = \$200,000).
- 2000-2003 Yosemite Fund. \$376,250. Faunal surveys of Yosemite National Park's lentic habitats and their use in understanding impacts of nonnative fish and designing aquatic restoration measures.
- 2000-2002 Wildspaces Foundation. \$55,000. Restoration of alpine lakes in the Sierra Nevada following removal of nonnative trout.
- 1999-2002 Environmental Protection Agency and National Park Service. \$208,316. Analysis of natural and anthropogenic factors in controlling the distribution of amphibians in the alpine Sierra Nevada.
- 1999 National Science Foundation. \$5,000. Research Experience for Undergraduates supplement to "Effects of exotic species eradication on the recovery of ecosystem structure and function" (co-PI: O. Sarnelle – Michigan State University).
- 1998-1999 U.S. Dept. of Agriculture. \$83,612. Introduced trout in the Sierra Nevada, California: a proposal to study their distribution and impacts on aquatic ecosystems.
- 1998 National Science Foundation. \$6,000. Research Experience for Undergraduates supplement to "Effects of exotic species eradication on the recovery of ecosystem structure and function" (co-PI: O. Sarnelle – UC Santa Barbara).
- 1996-2000 National Science Foundation. \$300,000. Effects of exotic species eradication on the recovery of ecosystem structure and function (co-PI: O. Sarnelle – UC Santa Barbara).
- 1996-1998 U.S. Dept. of Agriculture. \$309,007. Introduced trout in the Sierra Nevada, California: a proposal to study their distribution and impacts on aquatic ecosystems (co-PI: R. Jellison – UC Santa Barbara).
- 1995-1997 U.S. Dept. of Agriculture. \$44,100. The impact of livestock grazing on spawning habitat of the golden trout, Golden Trout Wilderness.
- 1995-1996 U.S. Environmental Protection Agency. \$80,231. Evaluation of rangeland stream condition and recovery using physical and biological assessments of non-point source pollution (co-PI: D. Herbst – UC Santa Barbara).
- 1995-1996 U.S. Dept. of Agriculture. \$244,715. The distribution of non-native trout in the Sierra Nevada and their impacts on aquatic ecosystems (co-PI: R. Jellison – UC Santa Barbara).
- 1993-1996 U.S. Dept. of Agriculture. \$30,216. Conservation biology of the mountain yellow-legged frog: feasibility of trout removals and frog reintroductions.

**EXTRAMURAL GRANTS (continued)**

- 1993-1995 Water Resources Center. \$34,003. An experimental study of stream, riparian, and fishery recovery under differing grazing management practices (co-PI: D. Herbst – UC Santa Barbara).
- 1992-1994 U.S. Dept. of Agriculture. \$55,000. Golden trout ecology and the influence of livestock grazing on streams in the Golden Trout Wilderness.
- 1992-1993 California Air Resources Board. \$52,861. The potential effects of acid deposition on fishes in the Sierra Nevada (PI: S. Cooper - UC Santa Barbara).
- 1991-1992 National Science Foundation. \$8,770. Female mate choice in the bicolor damselfish (Dissertation Improvement Grant – co-PI: R.R. Warner - UC Santa Barbara).

**PUBLICATIONS**

- 2019 Ellison, S., **R. A. Knapp**, W. Sparagon, A. Sweig, and V. T. Vredenburg. Reduced skin bacterial diversity correlates with increased pathogen infection intensity in an endangered amphibian host. *Molecular Ecology* 28: 127-140.
- 2018 Joseph, M. B., and **R. A. Knapp**. Disease and climate effects on individuals drive post-reintroduction population dynamics of an endangered amphibian. *Ecosphere* 9: e02499.
- 2017 Jani, A. J., **R. A. Knapp**, and C. J. Briggs. Epidemic and endemic pathogen dynamics correspond to distinct host population microbiomes at a landscape scale. *Proceedings of the Royal Society B: Biological Sciences* 284: 20170944.
- 2017 Poorten, T. J., **R. A. Knapp**, and E. B. Rosenblum. Population genetic structure of the endangered Sierra Nevada yellow-legged frog (*Rana sierrae*) in Yosemite National Park based on multi-locus nuclear data from swab samples. *Conservation Genetics* 18: 731-744.
- 2017 Smith, T. C., A. M. Picco, and **R. A. Knapp**. Ranaviruses infect mountain yellow-legged frogs (*Rana muscosa* and *Rana sierrae*) threatened by *Batrachochytrium dendrobatidis*. *Herpetological Conservation and Biology* 12: 149-159.
- 2017 Wilber, M. Q., **R. A. Knapp**, M. Toothman, and C. J. Briggs. Resistance, tolerance and environmental transmission dynamics determine host extinction risk in a load-dependent amphibian disease. *Ecology Letters* 20: 1169-1181.
- 2016 **Knapp, R. A.**, G. M. Fellers, P. M. Kleeman, D. A. W. Miller, V. T. Vredenburg, E. B. Rosenblum, and C. J. Briggs. Large-scale recovery of an endangered amphibian despite ongoing exposure to multiple stressors. *Proceedings of the National Academy of Sciences* 113:11889–11894.
- 2016 Piovia-Scott, J., S. Sadro, **R. A. Knapp**, J. Sickman, K. L. Pope, and S. Chandra. Variation in reciprocal subsidies between lakes and land: perspectives from the mountains of California. *Canadian Journal of Fisheries and Aquatic Sciences* 73:1691–1701.
- 2016 Smith, T. C., **R. A. Knapp**, C. J. Briggs. Declines and extinctions of mountain yellow-legged frogs have small effects on benthic macroinvertebrate communities. *Ecosphere* 7: e01327.

**PUBLICATIONS (continued)**

- 2015 Matchett, J. R., P. B. Stark, S. M. Ostoja, **R. A. Knapp**, H. C. McKenny, M. L. Brooks, W. T. Langford, L. N. Joppa, and E. L. Berlow. Detecting the influence of rare stressors on rare species in Yosemite National Park using a novel stratified permutation test. *Scientific Reports* 5: 10702.
- 2015 Zhou, H., T. Hanson, and **R. A. Knapp**. Marginal Bayesian nonparametric model for time to disease arrival in populations of a threatened amphibian populations. *Biometrics*. doi: 10.1111/biom.12345.
- 2013 Berlow, E. L., **R. A. Knapp**, S. M. Ostoja, R. J. Williams, H. McKenny, J. R. Matchett, Q. Guo, G. M. Fellers, P. Kleeman, M. L. Brooks, and L. Joppa. A network extension of species occupancy models in a patchy environment applied to the Yosemite toad (*Anaxyrus canorus*). *PLoS ONE* 8: e72200.
- 2013 Bradford, D. F., K. A. Stanley, N. G. Tallent, D. W. Sparling, M. S. Nash, **R. A. Knapp**, L. L. McConnell, and S. L. Massey Simonich. Temporal and spatial variation of atmospherically deposited organic contaminants at high elevation in Yosemite National Park, California, USA. *Environmental Toxicology and Chemistry* 32: 517–525.
- 2013 Deiner, K., **R. A. Knapp**, D. M. Boiano, and B. May. Increased accuracy of species lists developed for alpine lakes using morphology and cytochrome oxidase I for identification of specimens. *Molecular Ecology Resources* 13: 820-831.
- 2013 Garwood, J. M., **R. A. Knapp**, K. L. Pope, R. L. Grasso, M. L. Magnuson, and J. R. Maurer. Use of historically fishless high-mountain lakes and streams by nearctic River Otters (*Lontra canadensis*) in California. *Northwestern Naturalist* 94: 51-66.
- 2013 Miner, B. E., J. C. Colbourne, **R. A. Knapp**, and M. E. Pfrender. Evolutionary history of alpine and subalpine *Daphnia* in western North America. *Freshwater Biology* 58: 1512-1522.
- 2011 Bradford, D. F., **R. A. Knapp**, D. W. Sparling, M. S. Nash, K. A. Stanley, N. G. Tallent-Halsell, L. L. McConnell, and S. M. Simonich. 2011. Pesticide distributions and population declines of California, USA, alpine frogs, *Rana muscosa* and *Rana sierrae*. *Environmental Toxicology and Chemistry* 30: 682-691.
- 2011 **Knapp, R. A.**, C. J. Briggs, T. C. Smith, and J. R. Maurer. Nowhere to hide: impact of a temperature-sensitive amphibian pathogen along an elevation gradient in the temperate zone. *Ecosphere* 2: art93.
- 2010 Briggs, C. J., **R. A. Knapp**, and V. T. Vredenburg. Enzootic and epizootic dynamics of the chytrid fungal pathogen of amphibians. *Proceedings of the National Academy of Sciences USA* 107: 9695-9700.
- 2010 Epanchin, P. N., **R. A. Knapp**, and S. P. Lawler. Nonnative trout impact an alpine-nesting bird by altering aquatic insect subsidies. *Ecology* 91: 2406-2415.
- 2010 Latta, L. C., Fisk, D. L., **R. A. Knapp**, and M. E. Pfrender. Genetic resilience of *Daphnia* populations following experimental removal of introduced fish. *Conservation Genetics* 11: 1737-1745.
- 2010 Vredenburg, V. T., **R. A. Knapp**, T. S. Tunstall, and C. J. Briggs. Dynamics of an emerging disease drive large-scale amphibian extinctions. *Proceedings of the National Academy of Sciences USA* 107: 9689-9694.

**PUBLICATIONS (continued)**

- 2008 **Knapp, R. A.**, and O. Sarnelle. Recovery after local extinction: factors affecting re-establishment of alpine lake zooplankton. *Ecological Applications* 18: 1850-1859.
- 2008 Kramer, A. M., O. Sarnelle, and **R. A. Knapp**. Allee effect limits colonization success of sexually reproducing zooplankton. *Ecology* 89: 2760-2769.
- 2007 Davidson, C., and **R. A. Knapp**. 2007. Multiple stressors and amphibian declines: dual impacts of pesticides and fish on yellow-legged frogs. *Ecological Applications* 17: 587–597.
- 2007 Fisk, D., L. Latta, **R. Knapp**, and M. Pfrender. Rapid evolution in response to introduced predators I: rates and patterns of morphological and life-history trait divergence. *BMC Evolutionary Biology* 7: 22.
- 2007 Latta, L., J. Bakelar, **R. Knapp**, and M. Pfrender. Rapid evolution in response to introduced predators II: the contribution of adaptive plasticity. *BMC Evolutionary Biology* 7: 21.
- 2007 **Knapp, R. A.**, D. M. Boiano, and V. T. Vredenburg. Removal of nonnative fish results in population expansion of a declining amphibian (mountain yellow-legged frog, *Rana muscosa*). *Biological Conservation* 135: 11-20.
- 2007 Morgan, J. A. T., V. T. Vredenburg, L. J. Rachowicz, **R. A. Knapp**, M. J. Stice, T. Tunstall, R. E. Bingham, J. M. Parker, J. E. Longcore, C. Moritz, C. J. Briggs, and J. W. Taylor. Population genetics of the frog-killing fungus *Batrachochytrium dendrobatidis*. *Proceedings of the National Academy of Sciences, USA* 104: 13845–13850.
- 2007 Vredenburg, V. T., R. Bingham, **R. Knapp**, J. A. T. Morgan, C. Moritz, and D. Wake. Concordant molecular and phenotypic data delineate new taxonomy and conservation priorities for the endangered mountain yellow-legged frog. *Journal of Zoology* 271: 361-374.
- 2006 **Knapp, R. A.**, and J. A. T. Morgan. Tadpole mouthpart depigmentation as an accurate indicator of chytridiomycosis, an emerging disease of amphibians. *Copeia* 2006: 188–197.
- 2006 Rachowicz, L. J., **R. A. Knapp**, J. A. T. Morgan, M. J. Stice, V. T. Vredenburg, J. M. Parker, and C. J. Briggs. Emerging infectious disease as a proximate cause of amphibian mass mortality. *Ecology* 87: 1671–1683.
- 2005 Adams, M. J., B. R. Hossack, **R. A. Knapp**, P. S. Corn, S. A. Diamond, P. C. Trenham, and D. B. Fagre. Distribution patterns of lentic-breeding amphibians in relation to ultraviolet radiation exposure in western North America. *Ecosystems* 8: 488-500.
- 2005 Briggs, C. J., V. T. Vredenburg, **R. A. Knapp**, and L. J. Rachowicz. Investigating the population-level effects of chytridiomycosis: an emerging infectious disease of amphibians. *Ecology* 86: 3149–3159.
- 2005 Brooks, P. D., C. M. O'Reilly, S. A. Diamond, D. H. Campbell, **R. Knapp**, D. Bradford, P. S. Corn, B. Hossack, and K. Tonnessen. Spatial and temporal variability in the amount and source of dissolved organic carbon: implications for ultraviolet exposure in amphibian habitats. *Ecosystems* 8: 478-487.

**PUBLICATIONS (continued)**

- 2005 Brose, U., E. L. Berlow, T. Jonsson, C. Banasek-Richter, L.-F. Bersier, J. L. Blanchard, T. Brey, S. R. Carpenter, M.-F. C. Blandenier, J. E. Cohen, L. Cushing, H. A. Dawah, T. Dell, F. Edwards, S. Harper-Smith, U. Jacob, **R. A. Knapp**, M. E. Ledger, N. D. Martinez, J. Memmott, K. Mintenbeck, J. K. Pinnegar, T. Rayner, L. Ruess, W. Ulrich, P. Warren, R. J. Williams, G. Woodward, and P. Yodzis. Body sizes of consumers and their resources. *Ecology* 86: 2545-2545.
- 2005 Diamond, S. A., P. C. Trenham, M. J. Adams, B. R. Hossack, **R. A. Knapp**, S. L. Stark, D. Bradford, P. S. Corn, K. Czarnowski, P. D. Brooks, D. Fagre, B. Breen, N. E. Detenbeck, and K. Tonnessen. Estimated ultraviolet radiation doses in wetlands in six national parks. *Ecosystems* 8: 462-477.
- 2005 Harper-Smith, S., E. L. Berlow, **R. A. Knapp**, R. J. Williams, and N. D. Martinez. Communicating ecology through food webs: visualizing and quantifying the effects of stocking alpine lakes with trout. *In* de Ruiter, P. C, V. Wolters, and J. C. Moore (eds.), pages 407-423. *Dynamic food webs: multispecies assemblages, ecosystem development, and environmental change*. Academic, Burlington, Massachusetts
- 2005 **Knapp, R. A.** Effects of nonnative fish and habitat characteristics on lentic herpetofauna in Yosemite National Park, USA. *Biological Conservation* 121: 265-279.
- 2005 **Knapp, R. A.**, C. P. Hawkins, J. Ladau, and J. G. McClory. Fauna of Yosemite National Park lakes has low resistance but high resilience to fish introductions. *Ecological Applications* 15: 835-847.
- 2005 Sarnelle, O., and **R. A. Knapp**. Nutrient recycling by fish versus zooplankton grazing as drivers of the trophic cascade in alpine lakes. *Limnology and Oceanography* 50: 2032-2042.
- 2004 Armstrong, T. W., and **R. A. Knapp**. Response by trout populations in alpine lakes to an experimental halt to stocking. *Canadian Journal of Fisheries and Aquatic Sciences* 61: 2025-2037.
- 2004 Sarnelle, O., and **R. A. Knapp**. Zooplankton recovery after fish removal: limitations of the egg bank. *Limnology and Oceanography* 49: 1382-1392.
- 2003 **Knapp, R. A.**, K. R. Matthews, H. K. Preisler, and R. Jellison. Developing probabilistic models to predict amphibian site occupancy in a patchy landscape. *Ecological Applications* 13: 1069-1082.
- 2002 Matthews, K. R., **R. A. Knapp**, and K. L. Pope. Garter snake distributions in high-elevation aquatic ecosystems: is there a link with declining amphibian populations and nonnative trout introductions? *Journal of Herpetology* 36: 16-22.
- 2001 **Knapp, R. A.**, P. S. Corn, and D. E. Schindler. The introduction of nonnative fish into wilderness lakes: good intentions, conflicting mandates, and unintended consequences. *Ecosystems* 4: 275-278.
- 2001 **Knapp, R. A.**, J. A. Garton, and O. Sarnelle. The use of egg shells to infer the historical presence of copepods in alpine lakes. *Journal of Paleolimnology* 25: 539-543.
- 2001 **Knapp, R. A.**, K. R. Matthews, and O. Sarnelle. Resistance and resilience of alpine lake faunal assemblages to fish introductions. *Ecological Monographs* 71: 401-421. (Featured in the "Editors' Choice" section of *Science* 2001(293): 1731).

**PUBLICATIONS (continued)**

- 2001 Matthews, K. R., K. L. Pope, H. K. Preisler, and **R. A. Knapp**. Effects of non-native trout on Pacific treefrogs (*Hyla regilla*) in the Sierra Nevada. *Copeia* 2001: 1130-1137.
- 2001 Schindler, D. E., **R. A. Knapp**, and P. R. Leavitt. Alteration of nutrient cycles and algal production resulting from fish introductions into mountain lakes. *Ecosystems* 4: 308-321.
- 2000 **Knapp, R. A.**, and K. R. Matthews. Nonnative fish introductions and the decline of the mountain yellow-legged frog (*Rana muscosa*) from within protected areas. *Conservation Biology* 14: 428-438.
- 1999 **Knapp, R. A.**, and H. K. Preisler. Is it possible to predict habitat use by spawning salmonids? A test using the California golden trout (*Oncorhynchus mykiss aguabonita*). *Canadian Journal of Fisheries and Aquatic Sciences* 56: 1576-1584.
- 1998 **Knapp, R. A.**, and K. M. Matthews. Eradication of non-native fish by gill netting from a small mountain lake in California. *Restoration Ecology* 6: 207-213.
- 1998 **Knapp, R. A.**, V. T. Vredenburg, and K. M. Matthews. The effect of stream channel morphology on golden trout spawning habitat and recruitment. *Ecological Applications* 8: 1104-1117.
- 1996 **Knapp, R. A.**, and K. M. Matthews. Livestock grazing, golden trout, and streams in the Golden Trout Wilderness, California: impacts and management implications. *North American Journal of Fisheries Management* 16: 805-820.
- 1996 **Knapp, R. A.**, and V. T. Vredenburg. A field comparison of the substrate composition of California golden trout redds sampled with two devices. *North American Journal of Fisheries Management* 16: 674-681.
- 1996 **Knapp, R. A.**, and V. T. Vredenburg. Spawning by California golden trout: characteristics of spawning fish, seasonal and daily timing, redd characteristics, and microhabitat preferences. *Transactions of the American Fisheries Society* 125: 519-531.
- 1995 **Knapp, R. A.** Influence of energy reserves on the expression of a secondary sexual trait in male bicolor damselfish, *Stegastes partitus*. *Bulletin of Marine Science* 57: 672-681.
- 1995 **Knapp, R. A.**, P. C. Sikkel, and V. T. Vredenburg. Age of clutches in nests and the within-nest spawning site preferences of three damselfish species (Pomacentridae). *Copeia* 1995: 78-88.
- 1993 **Knapp, R. A.** The influence of egg survivorship on the subsequent nest fidelity of female bicolor damselfish, *Stegastes partitus*. *Animal Behaviour* 46: 111-121.
- 1991 **Knapp, R. A.**, and R. R. Warner. Male parental care and female choice in the bicolor damselfish, *Stegastes partitus*: bigger is not always better. *Animal Behaviour* 41: 747-756.
- 1991 **Knapp, R. A.**, and J. T. Kovach. Courtship as an honest indicator of male parental quality in the bicolor damselfish, *Stegastes partitus*. *Behavioral Ecology* 2: 295-300.
- 1990 **Knapp, R. A.**, and T. L. Dudley. Growth and longevity of golden trout, *Oncorhynchus aguabonita*, in their native streams. *California Fish and Game* 76: 161-173.

**PUBLICATIONS (continued)**

- 1989 **Knapp, R. A.**, and R. C. Sargent. Egg-mimicry as a male mating strategy in the fantail darter (*Etheostoma flabellare*): females prefer males with eggs. *Behavioral Ecology and Sociobiology* 25: 321-326.
- 1988 Wilzbach, M. A., K. W. Cummins, and **R. A. Knapp**. Toward a functional classification of stream invertebrate drift. *Verhandlung Internationale Vereinigung für Theoretische und Angewandte Limnologie* 23: 1244-1254.

**Reports, Non-Peer Reviewed Papers, and Proceedings**

- 2006 Davidson, C., and **R. A. Knapp**. Airborne agricultural contaminants, disease, and amphibian declines: using landscape-scale patterns to evaluate the severity of an emerging environmental problem. Final technical report, U. S. Environmental Protection Agency Futures Research in Natural Sciences Program, Grant Number 2001-STAR-K2
- 2004 Armstrong, T. W., and **R. A. Knapp**. Response by trout populations in Sierra Nevada alpine lakes to an experimental halt to stocking. Final report submitted to the California Department of Fish and Game. 73 pp.
- 2004 **R. A. Knapp**. Montane lake research program. *International Journal of Wilderness* 10: 32-33.
- 2004 **Knapp, R. A.** Non-native fish introductions and the reversibility of amphibian declines in the Sierra Nevada. Proceedings of the Sierra Nevada Science Symposium. PSW-GTR-193, pages 127-132. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.
- 2003 **Knapp, R. A.** Yosemite Lakes Survey: 2000-2002. Final report submitted to Yosemite National Park. 144 pp.
- 2000 **Knapp, R. A.**, and K. R. Matthews. Effects of nonnative fishes on wilderness lake ecosystems in the Sierra Nevada and recommendations for reducing impacts. Proceedings: Wilderness Science in a Time of Change. Proceedings RMRS-P-15-Vol. 5, pages 312-317. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- 2000 Corn, P. S., and **R. A. Knapp**. Fish stocking in protected areas: summary of a workshop. Proceedings: Wilderness Science in a Time of Change. Proceedings RMRS-P-15-Vol. 5, pages 301-303. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- 1999 Matthews, K. R., and **R. A. Knapp**. A study of high mountain lake fish stocking effects in the U.S. Sierra Nevada wilderness. *International Journal of Wilderness* 5: 24-26.
- 1996 **Knapp, R. A.** Non-native trout in natural lakes of the Sierra Nevada: An analysis of their distribution and impacts on native aquatic biota. Sierra Nevada Ecosystem Project: Final Report to Congress. Volume III: Assessments, Commissioned Reports, and Background Information. Chapter 8. Davis: University of California, Centers for Water and Wildland Resources. <http://ceres.ca.gov/snep/pubs/v3.html>.
- 1996 Moyle, P. B., R. M. Yoshiyama, and **R. A. Knapp**. Status of fish and fisheries. Sierra Nevada Ecosystem Project: Final Report to Congress. Volume II: Assessments and Scientific Basis for Management Options. Chapter 33. Davis: University of California, Centers for Water and Wildland Resources. <http://ceres.ca.gov/snep/pubs/v2.html>.

**Reports, Non-Peer Reviewed Papers, and Proceedings (continued)**

- 1994 Jenkins, T. M. Jr., **R. A. Knapp**, K. W. Kratz, S. D. Cooper, J. M. Melack, A. D. Brown, and J. Stoddard. Aquatic biota in the Sierra Nevada: current status and potential effects of acid deposition on populations. California Air Resources Board. Contract No. A932-138: 150 p.

**INVITED SEMINARS AND SYMPOSIA**

- 2019 Recovering endangered amphibians in the presence of a recently-emerged disease. University of Colorado, Boulder.
- 2017 Local and watershed-scale effects of fish eradication from lakes in California's Sierra Nevada. International Meeting on the Conservation of High Mountain Lakes. Gran Paradiso National Park, Italy.
- 2017 Recovering the endangered mountain yellow-legged frog in the Sierra Nevada. Tahoe Environmental Research Center, Incline Village, Nevada.
- 2017 Against the odds: recovering endangered mountain yellow-legged frogs in the Sierra Nevada. Amphibian Populations Task Force annual meeting. Santa Barbara, California.
- 2015 Sources of bacterial contamination in eastern Sierra Nevads streams. Sierra Nevada Aquatic Research Laboratory, Spring Public Lecture Series.
- 2013 Causes of amphibian population extinction versus persistence following disease-caused mass mortality events. University of California, San Diego.
- 2012 Causes of amphibian population extinction versus persistence following disease-caused mass mortality events. University of Nevada, Reno.
- 2012 Reversing the decline of mountain yellow-legged frogs: current knowledge and future research. Yosemite Forum, Yosemite National Park, California.
- 2011 Chytridiomycosis: impacts to amphibian populations and conservation implications. The Wildlife Society – Western Section fungal diseases symposium, Riverside, California.
- 2011 Fungal diseases in amphibians. Partners in Amphibian and Reptile Conservation - Northwest Chapter amphibian diseases symposium, Gig Harbor, Washington.
- 2011 Challenges for species recovery in an age of multiple stressors: the mountain yellow-legged frog example. Webinar: Perspectives on extinction. U.S. Fish and Wildlife Service National Conservation Training Center, Sheperdstown, West Virginia.
- 2011 Impacts of nonnative trout on mountain ecosystems: thinking outside of the lake. Utah State University, Logan, Utah.
- 2011 Causes of amphibian population extinction versus persistence following disease-related mass mortality events. Utah State University, Logan, Utah.
- 2010 Fish stocking impacts to Sierra Nevada ecosystems: promise and peril of policy-relevant science. University of California, Santa Barbara.

**INVITED SEMINARS AND SYMPOSIA (continued)**

- 2010 Causes of amphibian population extinction versus persistence following disease-related mass mortality events. Scripps Institute of Oceanography - University of California, San Diego.
- 2010 Changing the outcome of Bd epizootics using field anti-fungal treatments: does it work? Bd Mitigation Conference, University of Zurich, Switzerland.
- 2010 Impacts of nonnative fish on mountain ecosystems: thinking outside of the lake. Webinar: Mountain lakes management and research. U.S. Fish and Wildlife Service National Conservation Training Center, Sheperdstown, West Virginia.
- 2010 Fish stocking impacts to Sierra Nevada ecosystems: promise and peril of policy-relevant science. Keynote address, Graduate Student Symposium, University of California, Davis.
- 2009 Mountain yellow-legged frogs in the Sierra Nevada: taxonomy, status, and threats. U.S. Fish and Wildlife Service, Sacramento, California (with Vance Vredenburg).
- 2008 Thinking outside of the lake: effects of fish introductions on aquatic and terrestrial ecosystems in the Sierra Nevada. U.S. Forest Service Fisheries Regional Meeting, Sacramento, California.
- 2008 Emerging disease and the decline of amphibians in the Sierra Nevada. U.S. Forest Service Fisheries Regional Meeting, Sacramento, California.
- 2008 Emerging disease and the decline of amphibians in the Sierra Nevada. Sierra Nevada Aquatic Research Laboratory, Spring Public Lecture Series, Mammoth Lakes, California.
- 2007 Recovery of mountain lake ecosystems following the removal of nonnative fish. University of California, Santa Cruz.
- 2007 Hidden biodiversity in Sierra Nevada lakes and ponds. Sierra Nevada Aquatic Research Laboratory, Spring Public Lecture Series, Mammoth Lakes, California.
- 2006 Restoration of lake ecosystems – does Humpty Dumpty reassemble spontaneously or does reassembly require tape and glue? University of California, Davis.
- 2006 Restoration of lake ecosystems – does Humpty Dumpty reassemble spontaneously or does reassembly require tape and glue? University of Maine, Orono.
- 2006 Restoration of lake ecosystems – does Humpty Dumpty reassemble spontaneously or does reassembly require tape and glue? Natural Reserve System Advisory Committee, University of California Office of the President, Oakland.
- 2005 Turning back the clock: restoring lake ecosystems by eradicating introduced fish. Symposium: New Currents in Conserving Freshwater Systems. American Museum of Natural History – Center for Biodiversity and Conservation, New York, New York.
- 2005 Pesticide drift and the decline of amphibians in the Sierra Nevada. Sierra Nevada Aquatic Research Laboratory, Spring Public Lecture Series, Mammoth Lakes, California.
- 2005 Sierra Nevada lakes: A natural history tour of an unknown underwater world. Parsons Memorial Lodge Summer Seminar Series, Yosemite National Park, California.

**INVITED SEMINARS AND SYMPOSIA (continued)**

- 2005 Recovery of mountain lake ecosystems following the removal of nonnative trout. California Academy of Sciences, San Francisco, California.
- 2004 Does species-level conservation help or hinder ecosystem restoration efforts?: An unfinished story of declining amphibians, conflicting mandates, and unforeseen consequences. Plenary presentation, Bay Area Conservation Biology Symposium, University of California, Davis.
- 2004 Resistance and resilience of lake-dwelling fauna to fish introductions: a predictive modeling approach. Symposium: Resistance, Resilience, and Multiple Stable States: Defining Endpoints and Recovery Pathways for Damaged Ecosystems. Ecological Society of America annual meeting, Portland, Oregon.
- 2003 Perturbation and recovery of aquatic fauna in mountain lakes following fish introduction and disappearance. Oklahoma State University, Stillwater.
- 2002 Nonnative species introductions and the reversibility of amphibian declines in the Sierra Nevada. Dept. of Biology, Fresno State University, California.
- 2002 Nonnative species introductions and the reversibility of amphibian declines in the Sierra Nevada. Dept. of Biology, Utah State University, Logan.
- 2002 Nonnative species introductions and the reversibility of amphibian declines in the Sierra Nevada. Sierra Nevada Science Symposium, Kings Beach, North Lake Tahoe.
- 2001 Removal of nonnative trout from Sierra Nevada lakes to restore mountain yellow-legged frog populations. Declining Amphibians Workshop, Western Section of the Wildlife Society annual meeting, Sacramento, California (with V. Vredenburg and C. Milliron).
- 2001 Recent observations of chytridiomycosis in Sierra Nevada mountain yellow-legged frog populations. Declining Amphibians Workshop, Western Section of the Wildlife Society annual meeting, Sacramento, California.
- 2001 Alien species: their role in amphibian population declines and restoration. Declining Amphibian Populations Task Force symposium, Society for the Study of Amphibians and Reptiles annual meeting, Indianapolis, Indiana (with D. Bradford).
- 2001 Nonnative species introductions and the reversibility of amphibian declines in the Sierra Nevada. Dept. of Ecology, Evolution, and Conservation Biology, University of Nevada, Reno.
- 2000 Resistance and resilience of alpine lake fauna to fish introductions. Dept. of Ecology and Evolution, University of Chicago, Chicago, Illinois.
- 2000 Golden trout on the Kern Plateau: a natural and unnatural history. Sierra Nevada Aquatic Research Laboratory, Spring Public Lecture Series, Mammoth Lakes, California.
- 1999 Removal of introduced trout from Sierra Nevada lakes to restore amphibian habitat. Symposium: Ecosystem Restoration – a Practitioners Workshop. The Wildlife Society, Oregon Chapter, Portland, Oregon.

**INVITED SEMINARS AND SYMPOSIA (continued)**

- 1999 Design and implementation of aquatic reserves to restore amphibian populations impacted by introduced fishes. Ecosystem Conservation Workshop: Managing for Conservation. U.S. Fish and Wildlife Service, National Conservation Training Center.
- 1999 Resistance and resilience of amphibian populations in the Sierra Nevada to fish introductions: are declines reversible? Dept. of Ecology, Evolution, and Marine Biology, University of California, Santa Barbara.
- 1999 For the love of fish: a tale of frogs, fish, and unintended consequences in the Sierra Nevada. Truckee River Days symposium, Truckee River Habitat Restoration Group, Truckee, California.
- 1998 Fish stocking in wilderness lakes of the Sierra Nevada: is it necessary? Sierra Nevada Aquatic Research Laboratory summer seminar series, Mammoth Lakes, California.
- 1998 Developing a watershed-based reserve system for native aquatic species in the Sierra Nevada, California. Symposium: Effects of Fisheries Management on the Amphibians and Other Biota of Wilderness Lakes, Flathead Lake Biological Station, Polson, Montana.
- 1996 Trout stocking and trout distribution patterns in Sierra Nevada lakes: implications for amphibian introductions. The Wildlife Society, Western Section annual meeting, Sparks, Nevada.
- 1996 Introduced trout and the decline of the mountain yellow-legged frog in the Sierra Nevada, California. University of California, Davis.
- 1996 Modeling the changing distribution of exotic trout under different trout-stocking scenarios: implications for fishery management. American Fisheries Society, CA/NV Chapter annual meeting, Arcata, California.
- 1996 Modeling the changing distribution of exotic trout under different trout-stocking scenarios: implications for amphibian reintroductions. American Fisheries Society, Western Division annual meeting, Eugene, Oregon.
- 1996 Fish and frogs in the Sierra Nevada: the past, present, and future. Sierra College, Rocklin, California.
- 1993 Female mate choice in the bicolor damselfish, *Stegastes partitus*. University of Sydney, Australia
- 1993 Female mate choice in the bicolor damselfish, *Stegastes partitus*. University of California, Berkeley.

**PRESENTED PAPERS**

- 2019 Where do mountain yellow-legged frogs go in winter? Remote underwater observations in the alpine zone. Amphibian Populations Task Force annual meeting, Arcata, California.
- 2018 Drivers of survival and recruitment in translocated populations of the endangered mountain yellow-legged frog in Yosemite National Park. Amphibian Populations Task Force annual meeting, Auburn, California.
- 2017 Anti-fungal treatments conducted during Bd-caused mass-die-offs increase frog survival. Amphibian Populations Task Force annual meeting, Santa Barbara, California.

**PRESENTED PAPERS (continued)**

- 2016 Population genetic structure of the endangered Sierra Nevada yellow-legged frog in Yosemite based on multi-locus nuclear markers. California-Nevada Amphibian Populations Task Force annual meeting, University of California, Davis, California.
- 2015 Populations of the endangered frog *Rana sierrae* are increasing in abundance despite ongoing disease. California-Nevada Amphibian Populations Task Force annual meeting, Pepperdine University, Malibu, California.
- 2014 Long-term population trends of an endangered frog in a Bd-positive landscape. Amphibian Diseases annual meeting, Arizona State University, Tempe, Arizona.
- 2014 Recovering mountain yellow-legged frog populations in the Sierra Nevada : what works and what doesn't? California-Nevada Amphibian Populations Task Force annual meeting, Beatty, Nevada.
- 2013 Does host density affect frog disease dynamics? Amphibian Diseases annual meeting, Arizona State University, Tempe, Arizona.
- 2012 Modeling the past to understand the present: historical distribution and patterns of decline in the endangered mountain yellow-legged frog (*Rana muscosa*, *Rana sierrae*). California-Nevada Amphibian Populations Task Force annual meeting, Placerville, California.
- 2011 Nowhere to hide: impact of a temperature-sensitive amphibian pathogen across an elevation gradient. NSF/NIH Ecology of Infection Diseases Program annual meeting, Madison, Wisconsin.
- 2011 Changing the outcome of Bd epizootics using field anti-fungal treatments: does it work? California-Nevada Amphibian Populations Task Force annual meeting, Yosemite National Park, California.
- 2009 Differential impact of chytridiomycosis on amphibians across an elevation gradient. California-Nevada Amphibian Populations Task Force annual meeting, Bodega Bay, California.
- 2002 Factors influencing the recovery of alpine lake zooplankton following removal of nonnative fish. Ecological Society of America annual meeting, Tuscon, Arizona (with O. Sarnelle).
- 2000 The distribution of non-native trout in protected areas of the Sierra Nevada: impacts to native species and implications for the design of aquatic reserves. Wilderness Science Conference, Missoula, Montana.
- 1998 Amphibian declines in the Sierra Nevada: using landscape-scale analyses to separate local from global causes. Ecological Society of America annual meeting, Baltimore, Maryland.
- 1997 Livestock grazing effects on the population structure of California golden trout: a paradox resolved. Society for Conservation Biology annual meeting, Victoria, British Columbia.
- 1996 Modeling the changing distribution of exotic trout under different trout-stocking scenarios: implications for amphibian reintroductions. Society for Conservation Biology & Ecological Society of America joint annual meeting, Providence, Rhode Island.
- 1996 The impact of trout introductions on historically fishless lake ecosystems in the Sierra Nevada: a landscape perspective. Mountain Research Center, Montana State University, Bozeman, Montana.

**PRESENTED PAPERS (continued)**

- 1996 The impact of trout introductions on historically fishless lake ecosystems in the Sierra Nevada: a landscape perspective. Aldo Leopold Wilderness Research Institute, University of Montana, Missoula, Montana.
- 1996 The impact of trout introductions on historically fishless lake ecosystems in the Sierra Nevada: a landscape perspective. Flathead Lake Biological Station, University of Montana, Polson, Montana.
- 1994 Watershed restoration: looking beyond salmonids. Salmonid Restoration Conference, Redding, California.
- 1994 The impacts of livestock grazing on golden trout (*Oncorhynchus mykiss aguabonita*) in their native streams. American Fisheries Society, CA/NV Chapter annual meeting, Arcata, California.
- 1992 Male parental care, energy reserves, and the evolution of courtship in the bicolor damselfish. Society for the Study of Evolution, Berkeley, California.
- 1991 The influence of egg predation by brittlestars on the spawning patterns of female bicolor damselfish. Western Society of Naturalists, Santa Barbara, California.
- 1990 Courtship as an honest indicator of male parental quality in the bicolor damselfish. Western Society of Naturalists, Monterey, California.