

**CHARLES PATRICK HAWKINS**  
Curriculum Vitae

Department of Watershed Sciences  
Western Center for Monitoring and Assessment of Freshwater Ecosystems  
Ecology Center  
Quinney College of Natural Resources  
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**Education:**

- Ph.D. Oregon State University. Entomology (Aquatic Ecology emphasis / Statistics and Philosophy of Science integrated minor). 1982.
- M.A. California State University, Sacramento. Biology (Aquatic Biology emphasis). 1975.
- B.A. California State University, Sacramento. Biology (Biochemistry emphasis / Chemistry minor). 1973.

**Positions:**

- 2012 - 2014 Professor and Interim Head, Department of Watershed Sciences, Utah State University.
- 2003 - Director, Western Center for Monitoring and Assessment of Freshwater Ecosystems, Department of Watershed Sciences, Utah State University.
- 2002 - Professor, Department of Watershed Sciences, Utah State University.
- 1994 - 2002 Professor, Department of Fisheries and Wildlife, Utah State University.
- 1990 - 1995 Director, Watershed Science Unit, College of Natural Resources, Utah State University.
- 1988 - 1994 Associate Professor, Department of Fisheries and Wildlife, Watershed Science Unit, and Ecology Center, Utah State University.
- 1983 - 1988 Assistant Professor, Department of Fisheries and Wildlife, Watershed Science Unit, and Ecology Center, Utah State University.

**Areas of Professional Interest and Expertise:**

- Biodiversity, conservation, and ecology of freshwater ecosystems.
- Freshwater landscape ecology.
- Freshwater invertebrates and amphibians.
- Effects of climate, landscape, and waterway alteration on biodiversity and ecological integrity.
- Assessment and monitoring of biodiversity and ecological integrity.
- Sampling designs and statistical methods for ecological research, monitoring, and conservation.
- Identifying causes of ecological impairment.
- Predictive modeling.
- Science and environmental policy.
- Science communication.

**Significant Responsibilities and Leadership (last 12 years):**

- 2017 – Science Panel for California Biostimulatory-Biointegrity Policy for Wadeable Streams. California State Water Resources Control Board.
- 2014 Lead Author: Development of the 10-Year Science Plan (2015-2025) for the Biocriteria Program, Office of Science and Technology, US Environmental Protection Agency. *Advancing and Refining the Development and Application of Biological Criteria for the Protection of Aquatic Life: A Summary of Outstanding Technical Challenges and Their Potential Solutions.*
- 2014 – Chair, Publications Committee, Society for Freshwater Science.
- 2014 – Board of Directors, Society for Freshwater Science.
- 2014 – Global Advisory Group on the Ecological and Human Health Consequences of Salinization of Freshwater.
- 2013 USEPA Science Advisory Board (Review Panel): EPA Report - *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence.*
- 2013 – US Global Change Research Program (National Climate Assessment Aquatic Ecosystems Indicators Technical Team).
- 2012 External Panel – Review of the Management Indicator Species Program for National Forests in the Sierra Nevada.
- 2011 – 2012 Publications Committee, Society for Freshwater Science.
- 2011 External Review Panel, National Science Foundation, Long Term Ecological Research program review panel.
- 2010 – 2014 Chair, Biological Objectives Scientific Steering Committee, California State Water Resources Control Board.
- 2009 USEPA Science Advisory Board panel – EPA Report on the Environment Committee.
- 2009 External Review Panel, National Science Foundation, National Center for Earth Surface Dynamics, University of Minnesota.
- 2008 Chair, External Review Panel, Ecological Exposure Research Division, Office of Research and Development, US Environmental Protection Agency, Cincinnati, Ohio.
- 2007 – 2008 Chair, Local Arrangements Committee, 56<sup>th</sup> Annual Meeting of the North American Benthological Society.
- 2006 – Analysis Team, National Aquatic Resource Surveys, US Environmental Protection Agency Office of Water.
- 2001 – 2005 USEPA Science Advisory Board – Ecological Processes and Effects Committee.
- 2005 Community Condition Indicators Committee for Heinz Center Report on the Environment, H. John Heinz III Center for Science, Economics and the Environment, Washington, D.C.
- 2005 External Scientific Planning and Review Committee, California State Water Resources Control Board, Surface Water Ambient Monitoring Program.
- 2005 Indicator Development and Reference Condition Workgroups (National Wadeable Stream Survey, National Rivers Survey, National Lakes Survey), US Environmental Protection Agency Office of Water.

**Awards and Other Recognition:**

- 2011 Faculty of 1000 (Ecology/Marine & Freshwater Ecology)(www.f1000.com)
- 2011 Utah State University Department Teaching Excellence Award (team award)
- 2009 US Environmental Protection Agency – Scientific and Technological Achievement Award (Ecological Assessment)
- 2006 Researcher of the Year - College of Natural Resources, Utah State University.
- 2005 Service Recognition – USEPA Science Advisory Board (2001-2005)
- 2005 Graduate Student Mentor of the Year (Department of Aquatic, Watershed, and Earth Resources)
- 1999 Graduate Student Mentor of the Year (Department of Fisheries and Wildlife)

**Invited Plenary Talks:**

- 2018 Benthological Society of Asia (Nanking, China)
- 2017 American Water Resources Association – Connecting the dots: the emerging science of aquatic system connectivity (Snowbird, Utah)
- 2014 Nordic Benthological Society – Biodiversity loss in freshwater ecosystems: causes and consequences (Oulu, Finland)
- 2013 International Aquatic Health and Management Symposium / Australia Society of Limnology (Canberra, Australia)
- 2011 International Workshop on Assessment, Evaluation and Application of Ecological Modeling for River Ecosystem Enhancement (Daegu, Korea)

**Society Memberships:**

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| <ul style="list-style-type: none"> <li>American Association for the Advancement of Science</li> <li>American Geophysical Union</li> <li>American Institute of Biological Sciences</li> <li>Association for the Sciences of Limnology and Oceanography</li> </ul> | <ul style="list-style-type: none"> <li>Ecological Society of America</li> <li>International Association for Ecology</li> <li>International Society of Limnology</li> <li>Sigma Xi</li> <li>Society for Conservation Biology</li> <li>Society for Freshwater Science</li> </ul> |
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**Teaching and Mentorship:**

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| <ul style="list-style-type: none"> <li><i>Current Courses</i></li> <li>Freshwater Invertebrates</li> <li>Communicating Science</li> <li><br/></li> <li><i>Previously Taught Courses</i></li> <li>Stream Ecology</li> <li>Graduate Ecology (course coordinator and community ecology instructor)</li> <li>Introduction to Environmental Studies</li> <li>Principles of Watershed Science</li> <li>General Ecology</li> </ul> | <ul style="list-style-type: none"> <li>General Zoology</li> <li>Aquatic Entomology</li> <li>Concepts of Ecosystem Management</li> <li>Introduction to Aquatic Resources</li> <li>Water Pollution &amp; Water Quality</li> <li>Riparian Ecology &amp; Management</li> <li>Watershed Restoration</li> <li>Production Ecology in Aquatic Environments</li> <li>Resource Competition &amp; Community Structure</li> </ul> |
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**Graduate students (29): degree date and employment:**

Ann Baker (MS 1989, USFS, CA), Donald Benkendorf (PhD in progress), Nora Burbank (MS 2011, Scottish Ministry of the Environment), Daren Carlisle (MS 1995, USGS, VA), Yvette

Converse (MS 1996, USFWS, MT), Brian Creutzburg (PhD-ABD), Lynn Decker (PhD-ABD, USFS, UT), Margi Dubal (MS 2009, Statistics, research advisor, Paperless Post, NYC), James Eddings (MS in progress), Randall Filbert (MS 1991, Long View Associates, WA), James Hogue (MS 1990, PhD 2001, Cal State Univ, Northridge), Ryan Hill (PhD 2013, USEPA), Robin Jones (MS 2014, BLM), Saritha Kalyanam (MS 2003 – computer science, research advisor, Amtex Systems, CA), Simon Linke (PhD 2010, University of Canberra, co-advisor, Griffiths University), Angela Merritt (PhD in progress), Miriam Mueller (PhD in progress), John Olson (PhD 2012, California State University – Monterey Bay), Jeff Ostermiller (PhD-ABD, UT-DEQ), Richard Pimentel (MS 1986 – computer science, research advisor, Huntsman Cancer Institute, UT), Sirisha Pratha (MS 2014 – computer science, research advisor, Goldman Sachs, SLC, UT), Jeannine Rossa (MS 1999, US BLM), Gordon Russell (MS 1994, Clarke County, VA), Leonard (Trey) Simmons (PhD-ABD, US National Park Service, Alaska), Iva Sovoloska (MS 2014, PhD program Oregon State University), Jacob Vander Laan (MS 2012, Research Associate, Utah DEQ), Mark Vinson (PhD 1998, USGS, Wisconsin), Ellen Wakeley (MS 2015, Smithsonian Estuarine Research Laboratory).

### **External PhD Committees:**

#### *International*

Leonard Sandin. 2000. Swedish Agricultural University, Uppsala, Sweden. Opponent (PhD defense examination chair).  
 Dick de Zwart. 2005. University of Amsterdam, Netherlands. Opponent (PhD defense examination chair).  
 Simon Linke 2010. University of Canberra, Australia. External co-advisor.  
 Emmanuel Vellemu. 2017. Rhodes University, South Africa. External examiner.

#### *Domestic*

Kayla Coldsnow. 2017. Rensselaer Polytechnic Institute. External committee member.

### **Post-Doctoral Researchers and Visiting Scholars (11):**

David Behmer (visiting scholar 1986, Lake Superior State College)  
 Michelle Bowman (postdoctoral associate 2007, University of Saskatchewan)  
 Yong Cao (post-doctoral associate 2006 – 2011, University of Illinois)  
 Kai Chen (visiting doctoral student 2012, Nanjing Agricultural University)  
 Russel Death (visiting scholar 1988, Massey University, New Zealand)  
 Jack Feminella (postdoctoral associate 1990-1993, Auburn University)  
 Kaisa Mustonen (visiting doctoral student 2015, Oulu University)  
 Heikki Mykrä (visiting scholar 2011, Oulu University)  
 John Olson (postdoctoral associate 2013-14, California State University – Monterey Bay)  
 Christian Perry (postdoctoral associate 2015 - present)  
 Ralf Schäfer (visiting scholar 2015, University Koblenz-Landau, Germany)

**Publications:***Indices of Research Impact*

Web of Science (<http://www.researcherid.com/rid/A-4530-2008>) 5,580+ citations, h-index = 40  
 Google Scholar ([charles.p.hawkins](http://scholar.google.com/citations?user=charles.p.hawkins)) 10,380+ citations, h-index = 51

*Refereed Journal Articles*  
 (\*published with student)

In review or revision (5):

- \*Holthuijzen, M. F., D. R. Cutler, and C. P. Hawkins. 2018. A comparison of five statistical methods for predicting stream temperature. *Hydrological Processes* (in review).
- Bishop, I. W., A. T. Meredith, C. P. Hawkins, R. Mitchell, and Sarah Spaulding. 2018. Reduction in taxonomic bias in diatom species data. *Freshwater Science* (in review).
- Cao, Y. C., and C. P. Hawkins. 2017. Weighting effective number of species measures by abundance weakens detection of diversity responses. *Ecology* (in review)
- Rose, K. C., B. Bierwagen, S. D. Bridgham, D. M. Carlisle, C. P. Hawkins, N. L. Poff, J. S. Read, J. Rohr, J. E. Saros, and C. E. Williamson. 2017. Indicators of the effects of climate change on freshwater ecosystems. *Climatic Change* (in review).
- \*Chen, K., J. R. Olson\*, J. J. Vander Laan\*, R. A. Hill\*, B. Wang, C. P. Hawkins. 2017. Improving the performance of ecological indices by balancing reference site quality and representativeness. *Freshwater Science* (in revision following review).

Published or accepted (93):

- Mustonen, K.-R., H. Mykrä, H. Marttila, R. Sarremejane, N. Veijalainen, K. Sippel, T. Muotka, and C. P. Hawkins. 2017. Thermal and hydrologic responses to climate change predict marked alterations in boreal stream invertebrate assemblages. *Global Change Biology* (early view).
- Craig, L. S., J. D. Olden, A. H. Arthington, S. Entekin, C. P. Hawkins, J. J. Kelly, T. A. Kennedy, B. M. Maitland, E. J. Rosi, A. H. Roy, D. L. Strayer, J. L. Tank, A. O. West, M. S. Wooten. 2017. Meeting the challenge of interacting threats in freshwater ecosystems: A call to scientists and managers. *Elementa: Science of the Anthropocene* 5:72.
- \*Vaughn, A., P. Belmont, C. P. Hawkins, P. Wilcox. 2017. Discharge-suspended sediment relations: near-channel environment controls shape and steepness, land use controls median and low flow conditions. *Journal of Geophysical Research: Earth Surface* 122:1901-1923.
- Follstad Shah, J. J., J. S. Kominoski, M. Ardón, W. K. Dodds, M. O. Gessner, N. A. Griffiths, C.P. Hawkins, S.L. Johnson, A. Lecerf, C. J. LeRoy, D. W. P Manning, A. D. Rosemond, R. L. Sinsabaugh, C. M. Swan, J. R. Webster, L. H. Zeglin. 2017. Global synthesis of the temperature sensitivity of leaf litter breakdown in streams and rivers. *Global Change Biology* 23:3064-3075.
- \*Olson, J. R., and C. P. Hawkins. 2017. Effects of total dissolved solids on growth and mortality predict distributions of stream macroinvertebrates. *Freshwater Biology* 62:779-791.

- \*Long, A. L., K. M. Kettenring, C. P. Hawkins, C. M. U. Neale. 2017. Distribution and drivers of a widespread, invasive wetland grass, *Phragmites australis*, in wetlands of the Great Salt Lake, Utah, USA. *Wetlands* 37:45-57.
- Nichols, S. J., L. A. Barmuta, B. C. Chessman, P. E. Davies, F. J. Dyer, E. T. Harrison, C. P. Hawkins, I. Jones, B. J. Kefford, S. Linke, R. Marchant, L. Metzeling, K. Moon, R. Ogden, M. Peat, T. B. Reynoldson, R. M. Thompson. 2017. The imperative need for nationally coordinated aquatic bioassessment of rivers and streams. *Marine and Freshwater Research* 68:599-613.
- \*Dhungel, S., D. G. Tarboton, J. Jin, and C. P. Hawkins. 2016. Potential effects of climate change on ecologically-relevant aspects of streamflow regimes. *River Research and Applications* 32:1827-1840.
- Hawkins, C. P. and L. L. Yuan. 2016. Multitaxon distribution models reveal severe alteration in the regional biodiversity of freshwater invertebrates. *Freshwater Science* 35:1365-1376.
- \*Jones, R., C. P. Hawkins, M. S. Fennessy, and J. J. Vander Laan. 2016. Modeling wetland plant metrics to improve the performance of vegetation-based indices of biological integrity. *Ecological Indicators* 71:533-543.
- Mazor, R. D., A. C. Rehn, P. R. Ode, M. Engeln, K. C. Schiff, E. D. Stein, D. Gillett, D. Herbst, and C.P. Hawkins. 2016. Bioassessment in complex environments: Designing an index for consistent meaning in different settings. *Freshwater Science* 35:249-271.
- Ode, P. R., A. C. Rehn, R. D. Mazor, K. C. Schiff, E. D. Stein, J. T. May, L. R. Brown, D. B. Herbst, D. Gillett, K. Lunde, and C. P. Hawkins. 2016. Evaluating the adequacy of a reference site pool for the ecological assessment of streams in environmentally complex regions. *Freshwater Science* 35:237-248.
- Cañedo-Argüelles, M., C.P. Hawkins, B. J. Kefford, J. R. Olson, R. B. Schäfer, B. Dyack, S. Brucet, D. Buchwalter, J. Dunlop, O. Frör, J. Lazorchak, E. Coring, H. R. Fernandez, W. Goodfellow, A. L. González Achem, S. Hatfield-Dodds, B. Karimov, P. Mensah, C. Piscart, N. Prat, S. Ponsá, C-J. Schulz, and A. J. Timpano. 2016. Saving freshwater from salts: Ion-specific standards are needed to protect biodiversity. *Science* 351:914-916.
- Hawkins, C. P. 2015. The Clean Water Rule: Defining the scope of the Clean Water Act. *Freshwater Science* 34: 1585-1587.
- Hawkins, C. P., H. Mykrä, J. Oksanen, and J. J. Vander Laan\*. 2015. Environmental disturbance can increase beta diversity of stream macroinvertebrate assemblages. *Global Ecology and Biogeography* 24: 483–494
- \*Hill, R. A., and C. P. Hawkins. 2014. Using modeled stream temperatures to predict macro-spatial patterns of stream invertebrate biodiversity. *Freshwater Biology* 59:2632-2644.
- \*Menuz, D. R., K. M. Kettenring, C. P. Hawkins, and D. R. Cutler. 2014. Non-equilibrium in plant distribution models – only an issue for introduced or dispersal limited species? *Ecography* 38:231-240.
- \*Hill, R. A., C. P. Hawkins, and J Jiming. 2014. Predicting thermal vulnerability of stream and river ecosystems to climate change. *Climatic Change* 125:399-412.
- \*Vander Laan, J. J., and C. P. Hawkins. 2014. Enhancing the performance and interpretation of

- freshwater biological indices: an application in arid zone streams. *Ecological Indicators* 36:470-482.
- \*Olson, J. R., and C. P. Hawkins. 2013. Developing site-specific nutrient criteria from empirical models. *Freshwater Science* 32:719-740.
- \*Vander Laan, J. J., C. P. Hawkins, J. R. Olson\*, and R. A. Hill\*. 2013. Linking land use, in-stream stressors, and biological condition of streams to infer causes of regional ecological impairment in streams. *Freshwater Science* 32:801-820.
- \*Hill, R. A., C. P. Hawkins, and D. M. Carlisle. 2013. Predicting thermal reference conditions in USA streams. *Freshwater Science* 32:39-55.
- \*Olson, J. R., and C. P. Hawkins. 2012. Predicting natural base-flow stream water chemistry in the western United States. *Water Resources Research* 48:W02504.
- Cao, Y., and C.P. Hawkins. 2011. The comparability of bioassessments: A review of conceptual and methodological issues. *Journal of the North American Benthological Society* 30:680-701.
- \*Chinnayakanahalli, K. J., C.P. Hawkins, D. G. Tarboton, and R. A. Hill\*. 2010. Natural flow regime, temperature and the composition and richness of invertebrate assemblages in streams of the western United States. *Freshwater Biology* 56:1248-1265.
- \*Hein, C. L., A. S. Pike, J. F. Blanco, A. P. Covich, F. N. Scatena, C. P. Hawkins, and T. A. Crowl. 2010. Effects of coupled natural anthropogenic factors on the community structure of diadromous fish and shrimp species in tropical island streams. *Freshwater Biology* 56:1002-1015
- Pfrender, M. E., C. P. Hawkins, M. Bagley, G. Courtney, B. R. Creutzburg\*, J. H. Epler, S. Fend, L. C. Ferrington, P. L. Hartzell, S. Jackson, D. P. Larsen, C. A. Levesque, J. C. Morse, M. Petersen\*, D. Ruitter, D. Schindel, M. Whiting. 2010. Assessing macroinvertebrate biodiversity in freshwater ecosystems: advances and challenges in DNA-based approaches. *Quarterly Review of Biology* 85:319-340.
- Hawkins, C. P., Y. Cao, and B. Roper. 2010. Method of predicting reference condition biota affects the performance and interpretation of ecological indices. *Freshwater Biology* 55:1066-1085.
- Hawkins, C. P., J. R. Olson\*, and R. A. Hill\*. 2010. The reference condition: predicting benchmarks for ecological and water-quality assessments. *Journal of the North American Benthological Society* 29:312-358.
- \*Hogue, J. N. and C. P. Hawkins. 2008. Notes on the distribution of the mayfly *Caudatella edmundsi* (Allen, 1959) (Ephemeroptera: Ephemerellidae). *Pan-Pacific Entomologist* 84:150-154.
- Hawkins, C. P., S. G. Paulsen, J. Van Sickle, and L. L. Yuan. 2008. Regional assessments of stream ecological condition: scientific challenges associated with the USA's national Wadeable Stream Assessment. *Journal of the North American Benthological Society* 27:807-808.
- Paulsen, S. G., A. Mayo, D. Peck, J. Stoddard, E. Tarquinio, S. Holdsworth, J. Van Sickle, L. L. Yuan, C. P. Hawkins, A. T. Herlihy, P. R. Kaufmann, M. T. Barbour, D. P. Larsen, and A. R. Olsen. 2008. Condition of stream ecosystems in the United States: an overview of the first

- national assessment. *Journal of the North American Benthological Society* 27:812-821.
- Herlihy, A. T., S. Paulsen, J. Van Sickle, J. Stoddard, C. P. Hawkins, and L. L. Yuan. 2008. Striving for consistency in a national assessment: the challenges of applying a reference condition approach at a continental scale. *Journal of the North American Benthological Society* 27:860-877.
- Yuan, L. L., C. P. Hawkins, and J. Van Sickle. 2008. Effects of regionalization decisions on an O/E index for the national assessment. *Journal of the North American Benthological Society* 27:892-905.
- Carlisle, D. M., and C. P. Hawkins. 2008. Land use and the structure of western USA stream invertebrate assemblages: O/E and ecological traits. *Journal of the North American Benthological Society* 27:986-999.
- Ode, P. R., C. P. Hawkins, and R. D. Mazor. 2008. Comparability of biological assessments derived from predictive models and multimetric indices of increasing geographic scope. *Journal of the North American Benthological Society* 27:967-985.
- Paulsen, S. G., C. P. Hawkins, J. Van Sickle, and L. L. Yuan. 2008. An invitation to apply national survey data to ecological research. *Journal of the North American Benthological Society* 27:1017-1018.
- \*Creutzburg, B. R. and C. P. Hawkins. 2008. What do J-NABS papers tell us about the current state of knowledge in freshwater benthic science? *Journal of the North American Benthological Society* 27:593-604.
- Carlisle, D. M., C. P. Hawkins, M. R. Meador, M. Potapova, and J. Falcone. 2008. Biological assessments of Appalachian streams derived from predictive models for fish, macroinvertebrate, and diatom assemblages. *Journal of the North American Benthological Society* 27:16-37.
- Cao, Y., C. P. Hawkins, D. Larsen, and J. Van Sickle. 2007. Standardizing sampling effort on autosimilarity for comparing assemblages: effect of species-occurrence and species-abundance distributions. *American Naturalist* 170:381-395.
- Cao, Y., C. P. Hawkins, J. R. Olson\*, and M. A. Kosterman. 2007. Modeling natural environmental gradients improves the accuracy and precision of diatom-based indicators for Idaho streams. *Journal of the North American Benthological Society* 26:566-585.
- Hargett, E. G., J. R. Zumberge, C. P. Hawkins, and J. R. Olson\*. 2007. Development of a RIVPACS-type predictive model for bioassessment of wadeable streams in Wyoming. *Ecological Indicators* 7:807-826.
- Van Sickle, J., D. P. Larsen, and C. P. Hawkins. 2007. Exclusion of rare taxa affects the performance of the O/E index in bioassessments. *Journal of the North American Benthological Society* 26:319-331.
- Rehn, A. C., P. R. Ode, and C. P. Hawkins. 2007. Comparisons of targeted riffle and reach-wide macroinvertebrate samples: implications for data sharing in regional stream condition assessments. *Journal of the North American Benthological Society* 26:332-348.



- Hawkins, C. P. 2006. Maintaining and restoring the ecological Integrity of freshwater ecosystems: improving management by refining biological assessments. *Ecological Applications* 16:1249-1250.
- Hawkins, C. P. 2006. Quantifying biological integrity by taxonomic completeness: evaluation of a potential indicator for use in regional- and global-scale assessments. *Ecological Applications* 16:1251-1266.
- Stoddard, J. L., P. Larsen, C. P. Hawkins, R. K. Johnson, and R. H. Norris. 2006. Setting expectations for the ecological condition of running waters: the concept of reference condition. *Ecological Applications* 16:1267-1276.
- de Zwart, D., S. D. Dyer, L. Posthuma, and C. P. Hawkins. 2006. Use of predictive models to attribute potential effects of mixture toxicity and habitat alteration on the biological condition of fish assemblages. *Ecological Applications* 16:1295-1310.
- Van Sickle, J., D. D. Huff, and C. P. Hawkins. 2006. Selecting discriminant function models for predicting the expected richness of aquatic macroinvertebrates. *Freshwater Biology* 51: 359-372.
- Cao, Y., and C. P. Hawkins. 2005. Simulating biological impairment to evaluate the accuracy of ecological indicators. *Journal of Applied Ecology* 42: 954-965.
- Knapp, R. A., C. P. Hawkins, J. Ladau, and J. A. Garton. 2005. Fauna of Yosemite National Park lakes has low resistance but high resilience to fish introductions. *Ecological Applications* 15:835-847.
- Cao, Y., C. P. Hawkins, and A. D. Storey. 2005. A method for measuring the comparability of different sampling methods used in biological surveys: implications for data integration and synthesis. *Freshwater Biology* 50: 1105-1115.
- Van Sickle, J., C. P. Hawkins, D. P. Larsen, A. T. Herlihy. 2005. A null model for the expected macroinvertebrate assemblage in streams. *Journal of the North American Benthological Society* 24:178-191.
- \*Ostermiller, J. D. and C. P. Hawkins. 2004. Effects of sampling error on bioassessments of stream ecosystems: application to RIVPACS-type models. *Journal of the North American Benthological Society* 23:363-382.
- \*Vinson, M. R. and C. P. Hawkins 2003. Broad-scale geographic patterns in local stream insect genera richness. *Ecography* 26:751-767.
- Cao, Y., C. P. Hawkins, and M. R. Vinson. 2003. Measuring and controlling data quality in biological assemblage surveys with special reference to stream benthic macroinvertebrates. *Freshwater Biology* 48:1898-1911.
- Norris, R. H. and C. P. Hawkins. 2000. Monitoring river health. *Hydrobiologia* 435:5-17.
- Hawkins, C. P., R. H. Norris, J. N. Hogue\*, and J. W. Feminella. 2000. Development and evaluation of predictive models for measuring the biological integrity of streams. *Ecological Applications* 10:1456-1477.

- Hawkins, C. P. and R. H. Norris. 2000. Performance of different landscape classifications for aquatic bioassessments: introduction to the series. *Journal of the North American Benthological Society* 19:367-369.
- Hawkins, C. P., R. H. Norris, J. Gerritsen, R. M. Hughes, S. K. Jackson, R. H. Johnson, and R. J. Stevenson. 2000. Evaluation of landscape classifications for biological assessment of freshwater ecosystems: synthesis and recommendations. *Journal of the North American Benthological Society* 19:541-556.
- Hawkins, C. P. and M. R. Vinson\*. 2000. Weak correspondence between landscape classifications and stream invertebrate assemblages: implications for bioassessments. *Journal of the North American Benthological Society* 19:501-517.
- \*Carlisle, D. M. and C. P. Hawkins. 1998. Relationship between invertebrate assemblage structure, 2 trout species, and habitat structure in Utah mountain lakes. *Journal of the North American Benthological Society* 17:286-300.
- \*Converse, Y. K., C. P. Hawkins, and R. A. Valdez. 1998. Habitat relationships of subadult humpback chub in the Colorado River through Grand Canyon: spatial variability and implications of flow regulation. *Regulated Rivers Research and Management* 14:267-284.
- \*Vinson, M. L. and C. P. Hawkins. 1998. Biodiversity of stream insects: variation at local, basin, and regional spatial scales. *Annual Review of Entomology* 43:271-293.
- Hawkins, C. P., J. N. Hogue\*, L. A. Decker\*, and J. W. Feminella. 1997. Channel morphology, water temperature, and assemblage structure of stream insects. *Journal of the North American Benthological Society* 16:728-749.
- \*Goodwin, C, C. P. Hawkins, and J. L. Kershner. 1997. Riparian restoration in the western United States: overview and perspective. *Restoration Ecology* 5:4-14.
- Hawkins, C. P., K. Bartz\*, and C. M. U. Neale. 1997. Vulnerability of riparian vegetation to catastrophic flooding: implications for riparian restoration. *Restoration Ecology* 5:75-84.
- \*Russell, G., C. P. Hawkins, and M. P. O'Neill. 1997. The role of GIS in selecting sites for riparian restoration based on hydrology and land use. *Restoration Ecology* 5:56-68.
- O'Neill, M. P., J. C. Schmidt, J. P. Dobrowolski, C. P. Hawkins, and C. M. U. Neale. 1997. Identifying sites for riparian wetland restoration: a conceptual framework and its application to reaches within the upper Arkansas River basin. *Restoration Ecology* 5:85-102.
- \*Vinson, M. R., and C. P. Hawkins. 1996. Effects of sampling area and subsampling procedure on comparisons of taxa richness among streams. *Journal of the North American Benthological Society* 15:392-399.
- Feminella, J. W., and C. P. Hawkins. 1995. Interactions between stream herbivores and periphyton: a quantitative analysis of past experiments. *Journal of the North American Benthological Society*. 14:465-509.
- \*Filbert, R. B. and C. P. Hawkins. 1995. Variation in condition of rainbow trout in relation to food, temperature, and individual length in the Green River, Utah. *Transactions of the American Fisheries Society* 124:824-835.

- Feminella, J. W., and C. P. Hawkins. 1994. Tailed frog tadpoles differentially alter their feeding behavior in response to non-visual cues from four predators. *Journal of the North American Benthological Society* 13:310-320.
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- Hawkins, C. P. and J. R. Sedell. 1991. The role of refugia in the recolonization of streams devastated by the 1980 eruption of Mt. St. Helens. *Northwest Science* 64:271-274.
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- Hawkins, C. P. 1988. Effects of watershed vegetation and disturbance on invertebrate community structure in western Cascade streams: implications for stream ecosystem theory. *Verhandlungen des Internationalen Verein Limnologie*. 23:1167-1173.
- Hawkins, C. P., L. J. Gottshalk\*, and S. S. Brown. 1988. Densities of tailed frog tadpoles in small streams following watershed disturbance. *Journal of the North American Benthological Society* 7:246-252.
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- Hawkins, C. P. and J. K. Furnish\*. 1987. Are snails important competitors in stream ecosystems of the Pacific Northwest (USA). *Oikos* 49:209-220.
- Behmer, D. J. and C. P. Hawkins. 1986. Effects of overhead canopy on macroinvertebrate production in a Utah stream. *Freshwater Biology* 16:287-300.
- Hawkins, C. P. 1986. Variation in individual growth rates and population abundances of ephemereid mayflies. *Ecology* 67:1384-1395.
- Hawkins, C. P. 1985. Food habits of species of Ephemerellidae (Insecta: Ephemeroptera) in streams of Oregon. *American Midland Naturalist* 113:343-352.
- Harper, F. and C. P. Hawkins. 1984. Description of the imagines of *Ephemerella veruca* Allen and Edmunds (Ephemeroptera, Ephemerellidae). *Aquatic Insects* 6:13-16.

- Hawkins, C. P. 1984. Substrate associations and longitudinal distributions in species of Ephemereididae (Insecta: Ephemeroptera) from western Oregon. *Freshwater Invertebrate Biology* 3:181-188.
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- Hawkins, C. P., M. L. Murphy, and N. H. Anderson. 1982. Effects of canopy, substrate composition, and gradient on the structure of macro-invertebrate communities in Cascade Range streams of Oregon. *Ecology* 63:1840-1856.
- Hawkins, C. P. and J. R. Sedell. 1981. Longitudinal and seasonal changes in functional organization of macroinvertebrate communities in four Oregon streams. *Ecology* 62:387-397.
- Murphy, M. L., C. P. Hawkins, and N. H. Anderson. 1981. Effects of canopy modification and accumulated sediment on stream communities. *Transactions of the American Fisheries Society* 100:469-478.

*Book Chapters (9)*

- Bisson, P. A., C. M. Crisafulli, B. R. Fransen, R. E. Lucas, and C. P. Hawkins. 2005. Responses of fish to the 1980 Eruption of Mount St. Helens. Pages 183-198 in V. Dale, F. Swanson, and C. Crisafulli (editors), *Ecological responses to the 1980 eruptions of Mount St. Helens*. Springer-Verlag, New York.
- Crisafulli, C. M., L. S. Trippe, C. P. Hawkins, and J. A. MacMahon. 2005. Amphibian responses to the 1980 eruption of Mount St. Helens. Pages 163-182 in V. Dale, F. Swanson, and C. Crisafulli (editors), *Ecological responses to the 1980 eruptions of Mount St. Helens*. Springer-Verlag, New York.
- Stevenson, R. J., R. C. Bailey, M. C. Harrass, C. P. Hawkins, J. Alba-Tercedor, C. Couch, S. Dyer, F. A. Fulk, J. M. Harrington, C. T. Hunsaker, R. K. Johnson. 2004. Designing data collection for ecological assessments. Pages 55-84 in M. T. Barbour, S. B. Norton, H. R. Preston, and K. W. Thornton (eds), *Ecological Assessment of Aquatic Resources: Linking Science to Decision-Making*. Society of Environmental Toxicology and Chemistry, Pensacola, FL.
- Stevenson, R. J., R. C. Bailey, M. C. Harrass, C. P. Hawkins, J. Alba-Tercedor, C. Couch, S. Dyer, F. A. Fulk, J. M. Harrington, C. T. Hunsaker, R. K. Johnson. 2004. Interpreting results of ecological assessments. Pages 85-101 in M. T. Barbour, S. B. Norton, H. R. Preston, and K. W. Thornton (eds), *Ecological Assessment of Aquatic Resources: Linking Science to Decision-Making*. Society of Environmental Toxicology and Chemistry, Pensacola, FL.
- Hawkins, C. P. and D. M. Carlisle. 2001. Use of predictive models for assessing the biological integrity of wetlands and other aquatic habitats. Pages 59-83 in R. B. Rader, D. P. Batzer, and S. A. Wissinger (editors) *Bioassessment and management of North American freshwater wetlands*. John Wiley & Sons, New York.
- Hawkins, C. P. and R. H. Norris. 2000. Effects of taxonomic resolution and exclusion of taxa on the sensitivity of RIVPACS models used to predict biotic conditions in streams. Pages 217-228 in J. F. Wright, D. W. Sutcliffe, and M. T. Furse (editors). *Assessing the biological*

quality of freshwaters: RIVPACS and other techniques. Freshwater Biological Association, Ambleside.

Crisafulli, C. M., and Hawkins, C. P. 1997. Ecosystem recovery following a catastrophic disturbance: lessons learned from Mount St. Helens, in Mack, M., P. Opler, C. Haecker, P. Doran and L. Huckably (editors.). Status and trends of the Nation's biological resources. USDI, Washington D.C.

Hawkins, C. P. 1990. Relationship between habitat dynamics, food availability, and growth patterns of ephemereid mayflies from western North America. Pages 35-42 in I. Campbell (editor.), Mayflies and stoneflies: biology and life histories. Kluwer Academic Publishers.

Baker, A. D. and C. P. Hawkins. 1990. Patch specific differences in drift of *Baetis*. Pages 269-274 in I. Campbell (ed.), Mayflies and stoneflies: biology and life histories. Kluwer Academic Publishers.

#### *Published Symposia (2)*

Hawkins, C. P. 1994. What are riparian ecosystems and why are we worried about them? Natural Resources and Environmental Issues 1:1-10.

Hawkins, C. P., J. Dobrowolski, J. J. McDonnell, and M. O'Neill. 1992. Interdisciplinary education in Watershed Science: a natural resources perspective. Pages 249-254 In JA Royal (ed.), Hydrology and Water Resources Education, Training, and Management. Water Resources Publications, Littleton, Colorado. Symposium on Hydrology and Water Resources Education and Training: the Challenges to Meet at the Turn of the Century. Chihuahua, Mexico.

#### *Commentaries and Book Reviews (2)*

Hawkins, C. P. 1996. Book review. *Current directions in research on Ephemeroptera* by L.D. Corkum and J.J.H. Ciborowski. Journal of the North American Benthological Society 15:136-138.

Hawkins, C. P. 1986. Pseudo-understanding of pseudoreplication. Bulletin of the Ecological Society of America 67:184-185.

#### *Major Technical Reports (5)*

Paulsen, S, and others. 2006. Wadeable Streams Assessment: A Collaborative Survey of the Nation's Streams. United States Environmental Protection Agency Office of Water, Washington, DC. EPA 841-B-06-002 (collaborator and contributor).

Stoddard JL, DV Peck, AR Olsen, DP Larsen, J Van Sickle, CP Hawkins CP, RM Hughes, TR Whittier, G Lomnicky, AT Herlihy, PR Kaufmann, SA Peterson, PL Ringold, SG Paulsen, R Blair. 2005. Environmental Monitoring and Assessment Program (EMAP). Western Streams and Rivers Statistical Summary. United States Environmental Protection Agency, Office of Research and Development. EPA 620/R-05/006.

Dickson, K. L., G. A. Burton, D. Grothe, and C. P. Hawkins. 1997. Technical expert panel report - EPA 305(b) aquatic life use support (ALUS) workshop - Washington, D.C., August 12-14, 1997. 18 pp.

Hawkins, C. P. and five others. 1994. Cumulative watershed effects: an extensive analysis of responses by stream biota to watershed management. Final Report to USDA Forest Service, Region 5 (California).

Wurtsbaugh, W. and C. P. Hawkins. 1990. Trophic interactions between fish and invertebrates in Bear Lake, Utah-Idaho. Final Report to the Utah Division of Wildlife Resources. 167 pp.

### **Major Editorial Responsibilities:**

Hawkins, C. P., S. G. Paulsen, J. Van Sickle, and L. L. Yuan (editors). 2008. Regional assessments of stream ecological condition. *Journal of the North American Benthological Society*, 27(3).

Hawkins, C. P. and R. H. Norris (editors). 2000. Landscape classifications: aquatic biota and bioassessments. *Journal of the North American Benthological Society* 19 (3).

Associate Editor (Community Ecology and Applied Ecology): *Journal of the North American Benthological Society* (1993 - 1996).

Associate Editor (Community Ecology): *Journal of the North American Benthological Society* (1987 - 1989).

### **Extramural Funding (>\$13M total) – PI unless otherwise noted:**

- 2018 Strategic Environmental Research and Development Program. - \$1,079,606. A Data-Driven Decision Support System to Identify Optimal Land Use Alternatives for Protecting Species of Concern on DoD and Surrounding Lands.
- 2017. USDI Bureau of Land Management. - \$1,341,924. Base Support for the USU/BLM National Aquatic Monitoring Center.
- 2017. Great Lakes Environmental Center (USEPA funds). - \$65,664. Technical and Regulatory Support for the Development of Criteria for Water Media Ecological Emphasis.
- 2017. Washington Department of Natural Resources. - \$39,198. Eastside Type N Riparian Effectiveness Wet/Dry Projects.
- 2016. USDI Bureau of Land Management. - \$786,095. Base Support for the USU/BLM National Aquatic Monitoring Center.
- 2016. Utah Department of Environmental Quality. - \$33,270. Utah and Colorado Survey for Mussels.
- 2016. Kansas Department of Health and Environment. - \$38,500. Development of Indices of Biological Condition for Kansas Streams.
- 2015. USDI Bureau of Land Management. - \$58,000. Base Support for the USU/BLM National Aquatic Monitoring Center.
- 2015. National Science Foundation. - \$237,515. Collaborative Research: Integration of Physiological, Life-history, and Macro-Ecological Approaches for Understanding Thermal Limitation in Aquatic Insects: Implications for Freshwater Biodiversity in a Warming World.

2014. USDI Bureau of Land Management. - \$707,000. Base Support for the USU/BLM National Aquatic Monitoring Center.
2013. National Aeronautics and Space Administration (Co-PI). - \$277,816. System for Mapping and Predicting Species of Concern (SMAP-SOC).
2012. U.S. Geological Survey. - \$124,864. Modeling Reference Condition Stream Water Chemistry for the Conterminous United States.
2010. U.S. Geological Survey. - \$84,937. Modeling Reference Condition Stream Temperatures for the Conterminous United States.
2010. Nevada Division of Environmental Protection. - \$126,419. Developing Indices for Assessing the Biological Condition of Nevada Streams and Rivers.
2010. U.S. Environmental Protection Agency (subcontract from Michigan State University). - \$240,104. Integrating Indicators of Ecological Condition and Services.
2009. U.S. Environmental Protection Agency. - \$789,533. Consequences of Global Climate Change for Stream Biodiversity and Implications for the Application and Interpretation of Biological Indicators of Aquatic Ecosystem Condition.
2007. Colorado Department of Public Health and Environment. - \$47,812. Development of a Fish Multivariate Predictive Model for the State of Colorado.
2007. U.S. Geological Survey. - \$89,975. Establishing a National Reference Site Clearinghouse (NRSC): a Public Database Containing the Biological Data Needed to Conduct Biological Assessments of Freshwater Ecosystems in the United States.
2005. U.S. Environmental Protection Agency. - \$234,999. Evaluation of Reference Site Classification Schemes, Probability-based Survey Designs, Biological Indicators, Biotic Tolerance Values, and the Comparability of Different Sampling Methods for Lakes and Ponds.
2005. TetraTech, Corp. - \$22,000. Ecological Data Application System (EDAS) Enhancement and Multimetric/Multivariate Development.
2005. Idaho Department of Environmental Quality. - \$41,429. Developing and Validating a Periphyton Bioassessment Tool for Wadeable Streams in Idaho.
2005. Utah Department of Environmental Quality. - \$41,700. Building Tools to Interpret Biological Data in Utah.
2005. U. S. Environmental Protection Agency. - \$146,510. Refining Bioassessment Tools and Biocriteria for Western States.
2005. U. S. 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.
2005. U. S. Environmental Protection Agency. - \$42,980. Critical Review of the State-of-the-Science of Bioassessment Comparability.
2005. U. S. Environmental Protection Agency. - \$794,200. Congressional Funding in support of the Western Center for Monitoring and Assessment of Freshwater Ecosystems

2004. U. S. Environmental Protection Agency. - \$298,000. Congressional Funding in support of the Western Center for Monitoring and Assessment of Freshwater Ecosystems.
- 2003 U. S. Environmental Protection Agency. - \$883,515. Testing watershed classifications relevant to bioassessment, conservation planning, and watershed restoration.
- 2003 U. S. Environmental Protection Agency. \$100,000. Establishment of the Western Regional Center for Biological Monitoring and Assessment of Freshwater Ecosystems: initial tasks and deliverables.
- 2001 U. S. Environmental Protection Agency - \$1,499,691. An empirical evaluation of the performance of different approaches to classifying reference conditions in streams.
- 2000 U.S. Forest Service: \$52,000. Habitat associations and spatial distribution of the Larch Mountain salamander.
- 2000 U.S. Forest Service: \$48,704. Development and testing of a procedure for conducting integrated riparian corridor assessments: phase 1 - data needs, identification of collaborators, and design of field work.
- 2000 U.S. Forest Service: \$97,735. Assessing effects of watershed and stream alteration on the biological integrity of streams in eastern Oregon and Washington.
- 2000 Utah State University: \$18,000. Development of Predictive Models for Assessing the Biological Condition of Utah Streams and Rivers.
- 1998 U.S. Environmental Protection Agency: \$325,999. Comparison of the behavior and performance of alternative methods of biological assessment for streams.
- 1998 U.S. Forest Service: \$126,591. Development and testing of a procedure for providing quantitative, consistent, and interpretable measures of the effects of forest management on the ecological integrity of streams.
- 1995 U.S. National Science Foundation: \$20,000. Initial response of stream biota to catastrophic flooding: interaction between flood magnitude, watershed physiography, and landscape alteration.
- 1994 U.S. Forest Service, Wilderness Institute: \$15,117. One year seed grant to conduct a literature review on the effects of livestock grazing on aquatic and riparian ecosystems within wilderness of the western United States.
- 1993 U.S. Forest Service, Wilderness Institute: \$11,000. Effects of exotic fish introductions in Uinta Mountain Lakes.
- 1992 U.S. Environmental Protection Agency: \$118,000. Selecting priority sites for riparian wetland restoration: a case study in the San Luis Rey Watershed.
- 1992 U.S. Environmental Protection Agency: \$150,124. Selecting priority sites for riparian wetland restoration: a case study in the Upper Arkansas River, Colorado (co-principal investigator).
- 1992 U.S. Forest Service: \$27,000. Long-term response of stream biota to catastrophic watershed disturbance.
- 1992 U.S. Forest Service: \$21,000. Evaluation of videography as a habitat monitoring tool.



- 1992 U.S. Forest Service: \$55,000. The influence of habitat complexity on trout population dynamics.
- 1988 U.S. Forest Service: \$479,546. Cumulative watershed effects: an empirical evaluation of the response by stream biota to forest management.
- 1987 Utah Division of Wildlife Resources: \$38,905. Trophic interactions between fish and invertebrates in Bear Lake, Utah-Idaho: Phase II (co-principal investigator).
- 1987 U.S. Forest Service: \$32,235. Response of stream biota to cumulative watershed perturbation.
- 1987 U.S. Forest Service: \$61,392. Determining temporal and spatial effects of watershed disturbance on stream biota: a pilot study.
- 1986 Utah Division of Wildlife Resources: \$54,100. Trophic interactions between fish and invertebrates in Bear Lake, Utah-Idaho: implications for management (co-principal investigator).
- 1986 U.S. Forest Service: \$9,321. Development of a study plan to test the relationships between habitat units, stream dynamics, and stream communities.
- 1985 National Science Foundation: \$250,000. Succession in a stream ecosystem following catastrophic disturbance.
- 1984 Utah State University: \$7,940. Geographic variation in growth and size of aquatic poikilotherms.
- 1983 National Science Foundation: \$90,771. Regulation of community structure and trophic dynamics in stream ecosystems by a snail (co-principal investigator).
- 1981 National Science Foundation: \$1,100,000. Role of riparian vegetation in the metabolism and structure of stream ecosystems (co-principal investigator).
- 1981 USDA Cooperative Research: \$44,042. Recovery of biological and habitat integrity in aquatic ecosystems surrounding Mt. St. Helens (Awarded to major professor).
- 1980 U.S. Forest Service: \$50,012. Establishment of permanent benchmark stream ecosystem and fish habitat research sites around Mt. St. Helens (Awarded to major professor).
- 1978 U.S. Environmental Protection Agency: \$72,000. Effects of sediment-trophic interactions on stream communities (Awarded to major professor).
- 1977 National Science Foundation Doctoral Improvement Grant: \$5,630. The response of the genus *Ephemarella* to changes in food quality and quantity in a stream ecosystem.

### **Other Significant Experience and Responsibilities:**

#### *Technical Advice to Agencies*

Chair, External Review Panel, Ecological Exposure Research Division, National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio. April 2008.

Member, External Scientific Planning and Review Committee of the California State Water

Resources Control Board's Surface Water Ambient Monitoring Program. October 2005.

Invited Participant: Establishing reference conditions for streams and rivers in the western United States. USEPA, Phoenix, AZ, February, 2001.

Invited Participant: Pellston Workshop - Ecological Assessment of Aquatic Resources: Application, Implementation, and Communication. Society of Environmental Toxicology and Chemistry, Pellston, Michigan, September 2000.

Invited Participant: US EPA sponsored workshop on Predicting the Effects of Climate Change on Aquatic Ecosystems of the Great Basin and Rocky Mountains. U.S. Environmental Protection Agency, Salt Lake City, Utah, March, 2000.

Technical Expert: Workshop on application of predictive models in bioassessment of water quality. California Department of Fish and Game, Sacramento, California, September 1999.

Technical Expert Panel: Large Rivers Science Advisors Workgroup. US EPA, Office of Water. Baltimore, Maryland, 1-3 April 1998.

Instructor: U.S. Forest Service Continuing Education Short Courses. Modules on the theory and practice of stream ecosystem monitoring. 1993 -2000.

Technical Advisor: Biological Data Analysis Workshop. US EPA Regions 8 and 10. Boise, Idaho. 29-30 January 1998.

Technical Expert Panel: Provide peer review of US EPA draft document revising Guidelines on Making Use Support Decisions for Aquatic Life (section 305(b) of the Clean Water Act ). 12 - 14 August 1997.

Science Panelist: Provide technical guidance at US EPA workshop on Stream Corridor and Wetland Restoration. 19 - 21 August 1997.

Panelist: (1995, 1996, 1997): Joint EPA and NSF sponsored research competition on Water and Watersheds.

Invited Participant: International workshop on the biological assessment of ecological quality of rivers. Institute of Freshwater Ecology, Natural Environmental Research Council, United Kingdom, Jesus College, Oxford, 16 - 18 September 1997.

Invited Participant: Workshop on use of aquatic invertebrates in bioassessment of water quality in California. California Department of Fish and Game, Sacramento, California, 26 September 1994.

Member: U.S. Environmental Protection Agency Scientific Advisory Board Subcommittee on Biological Criteria (1993). Provide advice to EPA regarding the reliability of using biological criteria for detecting and monitoring water quality.

Invited Participant: US EPA sponsored workshop on Selection of Indicators to Monitor Stream Ecosystem Health. U.S. Environmental Protection Agency, Cincinnati, Ohio, 26-28 February, 1992.

Invited Participant: Workshop on Cumulative Impact Assessment organized by the Ontario Ministry of Natural Resources, Toronto, Canada, 4 December, 1992.

Invited Participant: US EPA sponsored workshop on Predicting the Effects of Climate Change on Desert Ecosystems. U.S. Environmental Protection Agency, Logan, Utah, 15-17 September, 1991.

Invited Participant: US EPA sponsored workshop on Strategies for Restoring Riparian Wetlands. U.S. Environmental Protection Agency, Denver, Colorado, 25-26 July, 1991.

Invited Member: Committee to review of the U.S. Forest Service aquatic ecosystem analysis program. USDA. Forest Service, Lakewood, Colorado, 3-4 December, 1990.

Invited Participant: US EPA sponsored workshop on Selection of Indicators to Monitor Riparian Ecosystem Health. U.S. Environmental Protection Agency, Las Vegas, Nevada, 25-27 September, 1990.

Invited Participant: US EPA sponsored symposium on Lotic Ecosystem Recovery held at Duluth, Minnesota, Oct 3-6, 1988.

Invited Participant: International workshop on Factors Controlling Community Structure and Function in Tropical Versus Temperate Streams sponsored by the U.S. National Science Foundation, Flathead Lake Biological Station, University of Montana, 24-28 April 1987.

Member: Executive Committee, North American Benthological Society (1988 - 1989). Consider society business brought forth at the annual meeting and advise the president of the society.

Member: Nominations Committee for the North American Benthological Society (1986).

#### *Society Leadership*

Chair (Publications Committee) and Board of Directors, Society for Freshwater Science.

Chair, Local Arrangements Committee, 2008 Annual Meeting of the North American Benthological Society.

Chair: Aquatic Ecology Section, Ecological Society of America (1989 - 1990). Plan, schedule, and conduct the Section's annual business meeting and represent the Section's interest in the ESA Council, which governs the society.

Program Committee: Ecological Society of America, (1989 - 1990).

Vice Chair: Aquatic Ecology Section, Ecological Society of America (1987 and 1988). Represent the Section on the Program Committee for the society's annual meeting. Stand in for the Chair in his/her absence.

Program Chairman: 1985 Annual Meeting of the North American Benthological Society.

#### *Sabbatical Studies*

Developing stressor-specific indices for diagnoses of the causes of biological impairment. National Center for Environmental Assessment, US Environmental Protection Agency, Washington, D.C. 2004-2005.

Evaluation of multivariate and multimetric approaches for assessing stream biological water quality. Cooperative Research Centre for Freshwater Ecology, University of Canberra, Canberra, Australian National Territory, January 1996-1997.

Stream Ecology, Department of Zoology, University of Otago, Dunedin, New Zealand, 1989-1990.