

Resume of
WILLIAM W. WOESSNER

Current as of March 2022

Address: Woessner Hydrologic, LLC
126 McLeod Avenue
Missoula, MT 59801
Cell: (406) 544 2216
Email: wwhydro@gmail.com

University of Montana Email
Email: william.woessner@umontana.edu

EDUCATION

1978 Ph.D. in Geology (Hydrogeology), minor in Civil and Environmental Engineering, University of Wisconsin, Madison

1974 M.S. in Water Resources Management, University of Wisconsin, Madison

1973 M.S. in Geology, University of Florida, Gainesville

1971 B.A. Major in Geology, College of Wooster, Ohio

Short Courses

1997 Groundwater Model Calibration and Uncertainty Analysis Using Nonlinear Regression and Associated Methods, USGS Training Center, Denver, CO.

1985 Modeling Pollutant Movement in Groundwater University of Wisconsin, Madison

1984 Applied Modeling of Ground Water Flow and Pollution Holcomb Research Institute, Butler University

APPOINTMENTS and AWARDS

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| 2020 | O.E. Meinzer Award, Geological Society of America |
| 2018 | Advisory Committee Member, The Groundwater Project, Guelph, Ontario, Canada |
| 2018 | Fellow, National Groundwater Association |
| 2018 | Lifetime Member, National Groundwater Association |
| 2013 | Visiting Scholar, National Centre for Groundwater Research and Training, February through March, School of the Environment, Faculty of Science and Engineering, Flinders University, Adelaide, Australia |
| 2011-14 | Associate Director, Montana Water Center |
| 2011 | Fulbright Student Program 2012-2013 Interview Panel, Vienna Austria, Austrian Fulbright Commission |
| 2011 | Fulbright Scholar-NAWI Austria, March through June 2011, Visiting Professor of Natural Science, Karl Franzens University and Graz University of Technology, Graz, Austria |
| 2008 | Montana Water Legend, Montana American Water Resources Association |
| 2007-10 | Chair, Department of Geosciences, University of Montana |
| 2008 | John Hem Excellence in Science and Engineering Award, Association of Ground Water Scientists and Engineers Membership Division, National Ground Water Association |
| 2004-06 | National Research Council Committee on River Science at the U.S.G.S., Water Science Board National Academy of Sciences |
| 2003-08 | Fulbright Senior Specialists Roster |
| 2003-07 | Acting Director and co-founder of University of Montana Center for Riverine Science and Stream Re-naturalization |
| 2003-08 | Editorial Board, Italian Journal of Engineering Geology and Environment Characterization |
| 2005 | California Bay-Delta Authority, Water-Management Science Board |

- 2005 Birdsall-Dreiss Distinguished Lecturer 2005, Geological Society of America, Hydrogeology Section (61lectures)
- 2004 Regents' Professor, Montana University System, University of Montana
- 2001-04 Board of Directors, Association of Ground Water Scientists and Engineers, National Ground Water Association (two terms)
- 2000 University of Waterloo, Farvolden Lecturer
- 1998 Fellow, Geological Society of America
- 1996-98 Associate Editor, *Ground Water*
- 1989-90 National Research Council Committee on Ground Water Recharge in Surface-Mined Areas.
- 1983-85 Governor's Groundwater Advisory Council, State of Montana
- 1979-81 National Research Council Committee on Groundwater Resources in Relation to Coal Mining, Parent Committee. Chairman, Subcommittee on Western Coal Development, Editorial Subcommittee member.

PROFESSIONAL REGISTRATION

1985 to Present: American Institute of Hydrology
 PROFESSIONAL HYDROGEOLOGIST, Certificate No. 528

PROFESSIONAL EXPERIENCE

Research and Consulting Experience

1977-present. Since receiving my MS degree I have engaged in a wide variety of groundwater consulting projects and conducted research on a broad range of groundwater topics. I specialize in review of projects involving groundwater development and management, groundwater contamination resolution, surface water-groundwater interactions, applying groundwater modeling, and hydrological education and workshop presentations. Much of the consulting work is performed as an independent expert reviewer. My principal employment (1978-2014) has been as a university professor of hydrogeology, first at the Desert Research Institute of the University of Nevada and then, for over 33 years, at the University of Montana.

Selected Areas of Consulting and Research

Water Development and Management:

- 1975-1978 Evaluation of groundwater-surface water resources on the Northern Cheyenne Reservation as part of large EPA project assessing the potential impacts from coal mining.
- 1977 Evaluation of water withdrawal from the Wheatland, Wyoming basin for power plant development.
- 1978-1981 Evaluation of an alluvial aquifer as a water supply for a large power plant in southern Nevada, Nevada Power Company.
- 1979 Evaluation of the formation of an artificial shallow aquifer in Las Vegas.
- 1988 Evaluation of the surface water and groundwater resources for the City and County of Missoula, Montana.
- 1981-2014 As the supervisor of graduate students the evaluation of surface and groundwater resources of the Helena Basin, Dillon Basin, Sullivan Flats Basin, Missoula Basin, Bitterroot Basin, Sheridan Basin, Lower Ruby River Basin and Arlee Basin, all of which are between 30 and 100 square miles in area. Groundwater modeling using MODFLOW was conducted for each study.
- 1992-1997 Technical reviewer for EISs being developed for large scale gold mines in Nevada.
- 1992-1998 Consultant for the State of Montana Natural Resource Damage Assessment to quantify groundwater resources and impacts in the Upper Clark Fork River Basin (Rocker, Anaconda, Milltown).
- 1981-2014 Investigations of the sole source alluvial aquifer in Missoula, MT.
- 2017 Review of groundwater model for a proposed water bottling facility

Groundwater Contamination Resolution:

- 1982-2013 Investigation of arsenic and metal contamination of a coarse grained aquifer at the Milltown Reservoir Superfund Site.
- 1984 Identifying the source of antimony in an intermittent stream near a tailing pond.
- 1984, 1989 Assessing the impact of oil well reserve pit brines on shallow groundwater.
- 1984-2004 Defining impacts of nitrates, bacteria, virus and pharmaceuticals originating from septic systems on groundwater.

- 1988-2009 Characterizing the impact of fuels on groundwater,
- 1989-1995 Assessment of groundwater impacts at three Superfund sites related to mining and smelting for the State of Montana's Natural Resource Damage Program.
- 1999 Review of how uranium tailings are impacting the Colorado River.
- 2005 Evaluating the potential for arsenic impacted river water to affect municipal groundwater quality.
- 2008, 2012 Review of contaminants impacting groundwater at a reactor site at Hanford.
- 2005-2010 Team member of a panel characterizing and proposing remediation for a DNAPL fractured sandstone aquifer.
- 2018 MT DEQ consultant gasoline release and water supply issues

Surface Water- Groundwater Interaction:

- 1975-78 Evaluation of Groundwater-surface water interactions on the Northern Cheyenne Reservation as part of large EPA water resources investigation.
- 1980 Intermittent flow evens and salinity loading relationships in the lower Colorado Basin.
- 1981 Erosion and salinity problems in arid regions.
- 1983 SW-GW relationships in Lake Mead, NV, including a salinity balance for the Lower Virgin River Basin, NV-AZ.
- 1984 Mine tailings GW and SW impacts.
- 1987 Urban runoff injection to groundwater, Missoula.
- 1989 Recharge-discharge relationships in the Jocko Valley Aquifer.
- 1990 National Academy of Science Committee on Ground Water Recharge in Surface Mined Areas.
- 2002 Hydrogeology of the floodplain and interaction of the Middle Fork of the Flathead River as part of a 3 year NSF Biocomplexity research effort.
- 2002 Surface-groundwater exchange and temperature modification of the Umatilla River, Umatilla Tribes.

- 2004-2005 Microbial Observatory- river-floodplain exchange, NSF.
- 2004-2005 River recharge and water sources to wells in the Missoula Aquifer.
- 2006 Member of the Science Advisory Panel convened to comment on the development of the Michigan Water Assessment Tool, a mechanism to assess how groundwater pumping would impact stream flows and fisheries.
- 2008, 2012 Served on expert panels regarding the impact of activity at the Hanford Site on the shallow groundwater and fisheries habitat of the Columbia River.
- 2006-2013 Initiated and completed a modeling project with MTDEQ/EPA to forecast the impacts to groundwater levels resulting from the pre-removal drawdowns and dam removal actions at the 30 ft high Milltown Dam/Reservoir, Western Montana.
- 2014-2016 EPA funded grant to use groundwater as a STEM subject for high school science education with Beth Covitt

Applying Groundwater Modeling:

- 1979 Water balance modeling of potential impacts to water resources of the Northern Cheyenne Indian Reservation.
- 1981-2014 Groundwater flow and solute transport modeling. MODFLOW modeling of water resources of Helena, Missoula, Dillon, Sullivan Flats and Arlee Basins via MS student research.
- 1992 *Applied Groundwater Modeling* book with Mary Anderson.
- 1993-1995 Groundwater modeling short course instructor for National Water Well Association, the US Army Corps of Engineers, SW Florida Water Management District and Geological Society of America.
- 1993-94 Reviewer of large numerical models produced to predict dewatering and recovery at Gold Quarry Mine and the Lone Tree Mine in Nevada for EISs.
- 1994 Review of groundwater model for the Kansas City Plant, Alternative Concentration Limit Demonstration, Oak Ridge National Lab.
- 1994-95 Reviewer of a groundwater model for the planned expansion of the Lone Star Aggregate Mine NE extension in Columbia County, Oregon.

- 1998 Independent expert review of two models of the Prescott, AZ, area for the Director of the Arizona Department of Water Resources.
- 1998 Independent expert review of a vadose zone and groundwater model for a mill site near Moab, Utah, Nuclear Regulatory Agency.
- 1999 Review of flow and solute transport model of dissolved phase transport of solvents in a basin groundwater system for private industry.
- 1990-present Numerous publications on calibrating and appropriately applying groundwater models.
- 2006-2013 Modeling of water table changes related to the removal of the 10 m high Milltown Dam in Western Montana.
- 2005-2010 Independent review of finite element modeling of a fractured sandstone aquifer impacted with TCE.
- 2015 Publication of 2nd edition of *Applied Groundwater Modeling* with Mary Anderson and Randy Hunt
- 2015-2018 NSF Grant Comp Hydro: Integrating Computational Thinking and Science Model-based Reasoning to Build Model-Based Water Literacy, 9-12 grades, with multiple PIs

Hydrological Education and Workshops:

- 1978-1981 Assistant Research Professor and Research Coordinator-WRC Las Vegas, Water Resources Center, Desert Research Institute, Las Vegas, Nevada.
- 1981-1914 Regents' Professor (7/04), Chair (8/07-8/10), Professor (9/89-6/04) and Associate Professor (9/81 to 8/89), Department of Geosciences, University of Montana, Missoula, 59812. Responsibilities included teaching and research in basic and applied hydrogeology. Teaching included courses in Hydrogeology, Advanced Hydrogeology, Groundwater Modeling, Environmental Geology, SW-GW Interactions and Hydrogeology Field Camp.
- 1989-1990 Visiting Scholar, Centre for Groundwater Research, University of Waterloo, Ontario.
- 1992-1995 Groundwater modeling short course instructor for Geological Society of America, National Ground Water Association, Environmental Education Enterprises, and Southwest Florida Water Management District.
- 2011 Fulbright Scholar Visiting Professor of Natural Science, NAWI-Graz, Graz, Austria.

- 2013 Visiting Scholar, National Centre for Groundwater Research and Training School of the Environment, faculty of Science and Engineering, Flinders University, Adelaide, Australia.
- 2015 Emeritus Regents' Professor of Hydrogeology.
- 2014-2016 EPA funded grant to use groundwater as a STEM subject for high school science education with Beth Covitt
- 2015-2018 NSF Grant Comp Hydro: Integrating Computational Thinking and Science Model-based Reasoning to Build Model-Based Water Literacy, 9-12 grades, with multiple PIs
- 2019-Present Advisory Committee, Groundwater Project, Distributing Free high-quality groundwater educational material for all. gw-project.org

Hydrologic Panel, Committee and Review Experience

Reviewer. Private Consulting Firm, Groundwater modeling of near-surface groundwater contamination from oil and gas drilling, 2012.

Panel Member. Boeing, NASA, and DOE, Santa Susana Field Laboratory Site, CA: Provide general hydrogeologic input and co-groundwater-modeling oversight for a large scale remediation effort on a former rocket testing site, 2005- 2010.

Panel Member. Hanford Site Natural Resource Trustee Council and Industrial Economics, Inc., WA, Expert Panel: Characterizing the nature and extent of contaminant upwellings in the Columbia River for purposes of Natural Resource Injury Assessment, 2012.

Panel Member. Upwellings Advisory Panel (Geomatrix), Hanford Site, WA: Charactering the nature and extent of contaminant upwellings in the Columbia River, 2008.

Board Member. California Bay-Delta Authority Water-Management Science Board, 2005.

Panel Member. Science Advisory Panel for the Groundwater Conservation Advisory Council, East Lansing, MI: Review and input to Michigan Water Assessment Tool, a mechanism to assess how groundwater pumping would impact stream flows and fisheries, 2006.

Panel Member. National Research Council Committee on U.S.G.S. Water Resources Research, Water Science Board, National Academy of Sciences, 2004-2006.

Panel Member. National Research Council Committee on River Science at the U.S.G.S., Water Science Board, National Academy of Sciences, 2004-2006.

Workshop Faculty. Science for Judges Workshop: Dividing the Waters: A dialog for judges, masters and referees, Western Supreme Court, Water Judges, Water Masters and Water Referrers, 2003.

Workshop Member. Groundwater Fluxes Across Interfaces, National Research Council, Water Science and Technology Board, Committee on Hydrologic Sciences, 2001.

Reviewer. U.S. Nuclear Regulatory Agency: A vadose zone and groundwater model for the near Moab, Utah, 1999.

Reviewer. Private Industry: Flow and solute transport groundwater model of dissolved phase transport of solvents in a basin groundwater system, 1999.

Reviewer. Independent Expert Review for the Director of the Arizona Department of Water Resources: Two groundwater models of the Prescott, AZ, area, 1998.

Panel Member. Riparian Ecology Workshop, EAWAG, Forschungszentrum fur Limnologie, Kastanienbaum, Switzerland, 1996.

Panel Member. Montana Department of Environmental Quality Task Force on Non-Degradation, 1995-.1996

Reviewer. Groundwater model for the planned expansion of the Lone Star Aggregate Mine NE extension in Columbia County, Oregon, 1994-95.

Expert Review and Testimony. Consultant for the State of Montana Natural Resource Damage Assessment that involved quantifying baseline and impacted groundwater resources in three mining impacted basins,1992-1998.

Panel Member. Office of Technology, Ontario Government, Canada: Review of the Waterloo Groundwater Center of Excellence, 1994.

Panel Member. Georgia Research Alliance, University of Georgia: Coupling Geosphere Transport Models with Regulatory Policies, 1994.

Panel Member. National Academy of Science Committee on Ground Water Recharge in Surface Mined Areas, 1992.

Panel Member. National Research Council Committee on Groundwater Resources in Relation to Coal Mining, Parent Committee. Chairman, Subcommittee on Western Coal Development, Editorial Subcommittee 1978-1981.

PROFESSIONAL PUBLICATIONS

82. Woessner, W.W., 2020. ***Groundwater-Surface Water Exchange***. The Groundwater Project, Guelph, Ontario, Canada, download at gw-project.org, 158 p.
81. Woessner, W.W., and Poeter, E.P., 2020. ***Hydrogeological Properties of Earth Materials and Principles of Groundwater Flow***. The Groundwater Project, Guelph, Ontario, Canada, download at gw-project.org., 205 p.
80. Woessner, W. W., and Weight, W.D., 2019. ***Chapter 10. Surface water Groundwater Interaction***, in Weight, W. D, 2019, *Practical Hydrogeology-Principles and Field Applications*. McGraw-Hill Global Education Holdings, LLC, New York, pp. 431-529.
79. Covitt, B., Podrasky, A., Fassnacht, D, Paquette, R. and Woessner, W. 2018, Delving below the surface with the Montana Groundwater Academy. Connected Science Learning, 5. <http://csl.nsta.org/2018/02/delving-below-the-surface/>
78. Woessner, W. W., 2017, ***Hyporheic Zones, in Methods in Stream Ecology: Volume 1: Ecosystem Structure 3rd edition***, Ed. R. Hauer and G.A. Lamberti, Academic Press-Elsevier, London, , p. 129-157.
77. Anderson, M.A., Woessner, W.W. and Hunt, R.J., 2015. ***Applied Groundwater Modeling: Simulation of Flow and Advective Transport***. Academic Press-Elsevier, London, 564 p.
76. Bean, J.R., A.C. Wilcox, W.W. Woessner, and C. Muhlfeld, 2014. Multi-scale geomorphic and hydrogeologic influences on bull trout (*Salvelinus confluentus*) spawning habitat. Canadian Journal of Fisheries and Aquatic Sciences, NRC Research Press, 10,1139/c/fas-2014-0534 web available.
75. Payne, S.M., I. A. Magruder and W. W. Woessner, 2013. Application of a groundwater classification system and GIS mapping system for the Lower Ruby Valley Watershed, Southwest Montana. Journal of Water Resource Protection. 5:8: 775-791.
74. Birk ,S., T. Wagner, G. Windler and W. W. Woessner, 2012. Warne als Tracer in Karstgebieten. Beitrage zur Hydrogeologie/59/Seiten 77-94/Graz.
73. Payne, S.M. and W.W. Woessner, 2010. An aquifer classification system and geographical information system-based analysis tool for watershed managers in the western U.S. Journal of the American Water Resources Association (JAWRA) 46(5):1003-1023. DOI: 10.0000/j.1752-1688.2010.00472.x

72. Ptacek, C., W. Woessner, T. Scheytt, D. Blowes, W. Robertson, L. Groza, K McLagan, S. Seibert, K. Heibig, M. Sabourin, and T. Lynch, 2010. Transport of mobile trace pollutants in highly permeable sediments. GW10 Groundwater Quality Management in a Rapidly Changing World , Proc. 7th International Groundwater Quality Conference, Zurich, 12018 June 2010. p 51-53.
71. Zhang B., D. G. Abbey , P. J. Martin , S. C. James, W. W. Woessner, R. G. Andrachek, C. Gabriel and W. Arnold, 2009. Optimization of a complex and highly parameterized groundwater system. The 7th International Conference on Calibration and Reliability in Groundwater Modeling “Managing Groundwater and the Environment” , Wuhan, China September 20-23.
70. Abbey, D., B. Zhang, C. Gabriel, P. Martin, S. James, W. Arnold, R. Andrachek, and W. Woessner, 2009. Application of singular value decomposition and regularization: Techniques for optimization of a highly parameterized FEFLOW model. Proceedings of 2nd International FEFLOW User Conference, Potsdam Germany, September 14-16, 2009, DHI WASY.
69. Magruder, I., W.W . Woessner, and S.N. Running, 2009. Ecohydrologic-process modeling of mountain-block ground water recharge. *Ground Water* 40:6, 774-785.
68. Poole, G. C., S.J. O’Daniel, K.L. Jones, W. W. Woessner, E.S. Bernhardt, A. M. Helton, J.A. Stanford, B.R. Boer, and T. J. Beechie, 2008. Hydrologic spiraling: the role of multiple interactive flow paths in stream ecosystems. *River Research and Applications*. Vol. 24:7: 1018-1031.
67. Arrigoni, A. S., G. C. Poole, L. A. K. Mertes, S. J. O’Daniel, W. W. Woessner and S. A. Thomas, 2008. Buffered, lagged, or cooled? Disentangling hyporheic influences on temperature cycles in stream channels. *WRR* 44, Wo9418, doi: 10.1029/2007WR006480,2008, 1-13.
66. Jones, K.L., G.C. Poole, W.W. Woessner, M.V. Vitale, B.R. Boer, S.J. O’Daniel, S.A. Thomas, B.A. Geffen, 2008. Geomorphology, hydrology, and aquatic vegetation drive seasonal hyporheic flow patterns across a gravel-dominated floodplain. *Hydrological Processes*. 22:2105-2115.
65. Woessner, W. W., 2007. Building a compact, low-cost, and portable peristaltic sampling pump. *Ground Water*, 45:6, p795-797.
64. Woessner, W. W., 2007. Influence of pumping on surface water features in basin headwaters. Proceedings of the American Bar Association-Environmental, Energy and Resources Section. 25th Annual Water Law Conference, Coronado, CA, February 22-23.
63. Committee on River Science at the U.S. Geological Survey, 2007. River Science at the U. S. Geological Survey. Water Science and Technology Board, Division on Earth and Life Studies, national Research Council of the National Academies. The National Academies Press, Washington, D. C., ISBN 978-0-309-10357-2: 193p.

62. Woessner, W. W., 2007. Applied Flow and Solute Transport Modeling in Aquifers: Fundamental Principles and Analytical and Numerical Methods- Taylor & Francis Group , CRC Press 667 p. ISBN 0-8493-3574-4 Vedat Batu author. Book Review for Vadose Zone Journal.
61. Godfrey, E., W. W. Woessner and M. J. Benotti, 2007. Pharmaceuticals in on-site effluent and groundwater, western Montana. Ground Water. Ground Water, 45 (3), p. 263-271.
60. Tallman, A. A. and W. W. Woessner, 2006. Adaptive management of water resources. Proceedings 2006 AWAR Summer Specialty Conference, Missoula, MT. 7 p.
59. Dahm, C.N., H. M. Valett, C.V. Baxter and W. W. Woessner. 2006. **Hyporheic Zones. Chapter 6. in Methods in Stream Ecology, 2nd edition.** F.R. Haur and G. A Lamberti, AP Elsevier, Amsterdam. p. 119-142.
58. Johnson, A.N., B.R. Boer, W.W. Woessner, J.A. Stanford, G.C. Poole, S.A. Thomas, and S.J. O'Daniel, 2005. Evaluation of an inexpensive small diameter temperature logger for documenting ground water –river interactions. Ground Water Monitoring and Remediation. 25, 4:68-74.
57. Godfrey, Emily and William W. Woessner, 2004. Screening level study of pharmaceuticals in septic tank effluent and a wastewater treatment plant waste stream. Proceedings of the 4th International Conference on Pharmaceuticals and Endocrine Disrupting Chemicals in Water, held October 13-15, 2004, in Minneapolis, Minnesota (copyright 2004 by the National Ground Water Association, ISBN 1-56034-114-9): 296-308.
56. Poole G.C., Stanford JA, Running SW, Frissell CA, Woessner WW, Ellis BK., 2004. A patch hierarchy approach to modeling surface and sub-surface hydrology in complex flood-plain environments. Earth Surface Processes and Landforms 29: 1259-1274.
55. Reeves, D.M. and W.W. Woessner, 2004. Hydrologic controls on the survival of Water Howella (*Howellia aquatilis*) and implications of land management, Journal of Hydrology, 287 (1-4): 1-18
54. Loustaunau, P. K., W. W. Woessner and J. A. Kuhn, 2003. MTBE Fate near a Ground Water-Stream Interface. Proceedings 2003 Petroleum Hydrocarbons and Organic Chemicals in Ground Water, 20th Annual Conference, National Ground Water Association., Costa Mesa, CA. August 19-22, p. 229-240.
53. Baxter, C., Hauer, F. R. and Woessner, W. W., 2003. Measuring groundwater-stream exchange: New techniques for installing min-piezometers and estimating hydraulic conductivity. Transactions of the American Fisheries Society, 132: 493-502.
52. Moore, J.N., and Woessner, W.W., 2003, **Arsenic contamination in the water supply of Milltown, Montana, in Welch, A.H., and Stollenwerk, K.G., eds., Arsenic in Ground Water: Geochemistry and Occurrence.** Norwell, Massachusetts, Kluwer Academic Publishers, p. 329-350.
51. Woessner, W. W. and Anderson, M. P., 2002. The Hydro-Maloprop and the ground water table. Groundwater Vol. 40, no 5, p 465.

50. Woessner, W. W., Ball, P. N., DeBorde, D. C and Troy, T. L., 2001. Viral transport in a sand and gravel aquifer under field pumping conditions. *Ground Water* 39 (6), p. 886-894.
49. Moore, J.N. and Woessner, W. W.. 2000. Solute and solid phase relationships in the surface hyporheic zone of a metal contaminated stream, Silver Bow Creek, MT. *Proceedings of the Ground-Water/Surface Water Interactions Workshop*. USEPA/542/R-00/007, p. 151-155.
48. Woessner, W. W., 2000, Stream and fluvial plain ground-water interactions: re-scaling hydrogeologic thought. *Ground Water*, 38 (3), p. 423-429.
47. Gammons, C.H., Woessner, W. W. and Griffin, J.H., 2000. Examination of impacts to the surface-water and groundwater systems of the upper Clark Fork River from 100 years of mining and smelting. in Roberts, S., and Winston, D. Eds., *Geologic field trips, western Montana and adjacent areas: Rocky Mountain Section of the Geological Society of America*, University of Montana , p. 65-84.
46. Anderson, M.P. and Woessner, W. W., 2000, *Applied Groundwater Modeling-Simulation of Flow and Advective transport. Chinese Translation*. Harcourt Asia Pte Ltd.
45. Woessner, W. W., 1999, Conceptualization and complexities of modelling groundwater-stream interaction at the near-channel scale. *Proceedings of ModelCARE'99*, ETH, Zurich, Switzerland, Vol II, 781-786.
44. DeBorde, D.C., Woessner, W. W., Kiley, Q. T., and Ball, P., 1999, Rapid transport of viruses in a floodplain aquifer. *Water Research*, 33(10): 2229-2238..
43. Huggenberger, P., E. Hoehn, R. Beschta, and W. Woessner, 1998. Abiotic aspects of channels and floodplains in riparian ecology. *Freshwater Biology* 40: 407-425.
42. Woessner, W. W. and Anderson, M. P., 1998, Advantages and disadvantages of teaching MODFLOW using pre- and post- processors. Ed. E. Poeter, C. Zheng and M. Hill. *Proceedings of MODFLOW'98 International Conference*, Colorado School of Mines, Golden, CO., Vol. 1, p.473-480.
41. Woessner, W. W., 1998. Changing views of stream-ground-water interaction. *Proceedings of American Institute of Hydrology/International Association of Hydrologists XXVIII Congress: Gambling with Groundwater, Physical, Chemical and Biological Aspects of Aquifer-Stream Relationships.*, Sept. 1998, Las Vegas, NV, American Institute of Hydrology, St. Paul, MN, p.1-6.
40. DeBorde D.C., Woessner, W.W., Lauerma, B. and Ball, P., 1998, Virus occurrence and transport in a school septic systems and unconfined aquifer. *Ground Water*. 36 (5), p. 825-834.
39. DeBorde, D.C., Woessner, W. W., Lauerma, B., and Ball, P., 1998, Coliphage prevalence in high school septic effluent and associated groundwater. *Water Research* 32(12), p. 3781-3785.

38. Woessner, W.W., Troy, T., Ball, P. and DeBorde, D.C., 1998, Virus transport in the capture zone of a well penetrating a high hydraulic conductivity aquifer containing a preferential flow zone: Challenges to Natural Disinfection, Proceedings of Source Water Protection International 98, Dallas Texas, April 28-30, National Water Research Institute, p. 167-174.
37. Woessner, W.W. and DeBorde, D.C., 1998, Virus transport in the floodplain groundwater of a headwater stream, western Montana, USA, Headwaters: Water Resources and Soil Conservation (ed. M..J. Haigh, J. Krecek, G.S. Rajwar and M.P.Kilmartin, IAHC, A. A. Balkema, Rotterdam, p. 197-207.
36. Woessner, W.W. and Anderson, M. P, 1996, Good model-bad model, understanding the flow modeling process. Ed. J. Richey and J. Rumbaugh III, ASTM D-18 Soil and Rock, D18.21 Ground Water and Vadose Zone Investigations, Phil., PA, p. 14-23.
35. Anderson, M.P. and W.W. Woessner, 1994, *Applied Groundwater Modeling: Simulation of Flow and Advective Transport*, Japanese Translation, Kyoritsy Shuppan Co., Ltd., 246 p.
34. Billings, J.G. and W.W. Woessner, 1993, The use of natural gradient tracer test data to refine the three-dimensional hydraulic conductivity distribution of a heterogeneous unconfined aquifer. Proceedings of the 1993 Ground Water Modeling Conference, International Ground Water Modeling Center and Colorado School of Mines, Denver, CO., June 9-12, 1993, p. 1-50 - 1-60.
33. Anderson, M.P. and Woessner, W.W., 1992, The role of the postaudit in model validation. Advances in Water Resources-Special Issue on Model Validation, Vol. 15, p. 167-173.
32. Woessner, W.W. and C. Brick, 1992, The role of groundwater in sustaining shoreline spawning kokanee salmon, Flathead Lake, Montana. In the Proceedings for 1st International Conference on Ground Water Ecology, AWRA, Tampa, FL, April 26-29, 1992, p. 257-266.
31. Woessner, W.W., V.H. Remenda, R. Ingelton and V. Kuhnel, 1992, Design and installation of small diameter piezometers to characterize flow and transport in Lake Agassiz, Clay. In the Proceedings for 1992 North Dakota Water Quality Symposium, Bismarck, Feb., p. 292-301
30. V.H. Remenda, D.L. Rudolph, J.A. Cherry, V. Kuhnel and W. Woessner, 1992, Major and minor ions in Lake Agassiz clay near Manvel N.D.: Implications for water quality and soil salinity. In the Proceedings for 1992 North Dakota Water Quality Symposium, Bismarck, Feb., p. 302-310
29. Anderson, M.P. and W.W. Woessner, 1992, ***Applied Groundwater Modeling: Simulation of Flow and Advective Transport***, Academic Press, 372 pp.
28. Woessner, W.W. and Anderson, M.P., 1992, Selecting calibration values and formulating calibration targets for ground-water flow simulations. In the Proceedings for Solving Ground Water Problems with Models, Association of Ground Water Scientists and Engineers, Dallas Texas, February 11-13, 1992.

27. Stephenson, D. A., B. L. Cutright and W. W. Woessner, 1991, Hydrogeology: It is. GSA Today, Vol. 1, No. 5, p. 93-99.
26. Stephenson, D. A., B. L. Cutright and W. W. Woessner, 1991, Hydrogeology: It is reprinted from GSA Today, Vol. 1, No. 5, p. 93-99. in Minnesota Ground Water Association Newsletter, October, Vo. 10, No. 3, p. 4-5.
25. Woessner, W.W. and Anderson, M.P., 1990, Setting calibration targets and assessing model calibration - room for improvement: an example from North America. in Calibration and Reliability in Groundwater Modelling, ModelCARE 90, The Netherlands, ed. Kovar, International Association of Hydrological Sciences Publication No. 195, Wallingford, Oxfordshire, UK, p. 279-288.
24. Anderson, M.P. and W.W. Woessner, 1990, Comment on Editorial: Who are these Manuals for? The model documentation needs for practitioners, F.D. Arnold, Ground Water.
23. Committee on Ground Water Recharge in Surface-Mined Areas, 1990, Surface Coal Mining Effects on Ground Water Recharge, (W.W. Woessner Committee Member), National Academy Press, Washington, D. C., 159 pp.
22. Woessner, W.W. and D.F. Potts, editors, 1989, Proceedings of the symposium on headwaters hydrology. American Water Resources Association, Bethesda, Maryland, 708 pp.
21. Woessner, W.W., Lazuk, R. and Payne, S., 1989, Characterization of aquifer heterogeneities using EM and surface electrical resistivity surveys at Lubrecht experimental forest, western Montana. Proceedings of the National Outdoor Action Conference on Aquifer Restoration, Ground Water Monitoring and Geophysical Methods. AGWSE-NWWA, p. 951-963.
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PAPERS PRESENTED AT MEETINGS OF SCHOLARLY SOCIETIES AND UNIVERSITIES

236. Podrasky, A., Covitt, B.A., and Woessner, W., 2017. Building place-based collaborations to develop high school students' groundwater systems knowledge and decisions –making capacity. AGU Fall meeting abstracts.
235. Woessner, W. W., 2017. **(INVITED)**. Forecasting groundwater level impacts from a dam removal in western Montana, USA: Data needs, establishing baselines, mitigating water user impacts. G360 Centre for Applied Groundwater Research, University of Guelph, Ontario, Canada.
234. Woessner, W. W. , 2016. **(INVITED)**. Forecasting and mitigating groundwater system impacts from dam removal at the Milltown Reservoir CERCLA site, western Montana. Simon Fraser University, British Columbia, Canada.
233. Woessner, W. W., 2015. **(INVITED)**. Forecasting, quantifying and mitigating groundwater system impacts from dam removal and restoration at the Milltown Reservoir CERCLA site, western Montana. Baylor University Geosciences Seminar, Texas.
232. Woessner, W.W., 2015, **(INVITED)**. The role of groundwater in streams, floodplains and riparian zones. Shallow Aquifer Recharge Meeting, Montana Department of Natural Resources, Helena, MT.

231. Covitt, B., Woessner, B., Fassnacht, D., Herbert, J., Paquette, B., Podrasky, A. Smith, C. , Toss, T., and Hutchins, M., 2015. Developing a groundwater classroom and field science program for high school students: The Montana Groundwater Academy (MGA). MT AWRA Meeting (late poster) , Missoula, MT.
230. Bean, J.R., A.C. Wilcox, W.W. Woessner, and C. Muhlfeld, 2014. Multi-scale geomorphic and hydrogeologic influences on bull trout (*Salvelinus confluentus*) spawning habitat in headwater streams, AGU fall meeting #EP31C-05.
229. Woessner W. W., 2012 (**INVITED**). Hydrology of groundwater-surface water interfaces. University Consortium 2012 Focus Meeting, Denver CO, November 1 and 2, 2012
228. Woesner, W. W., 2012 (**INVITED**). 50 years of stream and groundwater exchange science, have we provided managers with useful tools or unusable science? Is there hope? National Geological Society of America Meeting, Charlotte, NC, November 3-7,2012.
227. DeVaney, R., W. Woessner, F. Gilman, W. Holben, J. Kuhn, 2012. Gasoline remediation impacts on aquifer microbial communities, Ronan, Montana. Annual Meeting Proceedings MT AWRA, Fairmont Hot Springs, MT October 11-12, p. 37.
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223. Woessner, W. W., 2012 (**INVITED**). Formulating, Applying and Constraining Hydrological Models: Modeling 101. Water Center & School of Natural Resources Seminar Series, University of Nebraska. January 11, 2012
222. Woessner, W. W., 2011(**INVITED**). Groundwater level responses to a 10 m high dam removal river restoration action and proactive management, Western Montana, USA. Germany Fulbright Commission, Tech. University of Berlin Geosciences Seminar, Berlin, June 9, 2011

221. Woessner, W. W., 2011 Pre and post restoration groundwater response: Consequences of a poor conceptual model when predicting the response of a riparian water table position to stream restoration, Western Montana USA. HydroEco 2011, Vienna. May 3, 2011
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218. Poole, G. C., S. J. O'Daniel, K.L. Jones, , W. Woessner, A. Arrigoni, and A.M. Helton, 2009. The interdependence of diel temperature cycles in surface and hyporheic water on the Umatilla River floodplain, Oregon. Geological Society of America National Meeting, Portland, OR, October.
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216. Woessner, W. W., 2008. Mitigating a +100 million dollar impact to a groundwater supply using uncertain model results: approach and decisions. MODFLOW and More 2008. International ground Water Modeling Center, Colorado School of Mines, April.
215. Berthelote, A., W. Woessner, 2008. The influence of multiple conceptual models on well replacement strategies required to mitigate dam removal activities. MODFLOW and More 2008. International ground Water Modeling Center, Colorado School of Mines, April.
214. Gannon, J., P. Ramsey, K. Feris, J. Moore, W. Woessner and M. Rilling 2008. Riparian ecosystem consequences-a microbial perspective: or prediction and quantifying natural resource damage in chronically stressed ecosystems. NIEHS International Symposium on Mine Tailings. June 4-6 University of Arizona.
213. Woessner, W. W., 2008 (**INVITED**) Isn't the calibration of an interpretive groundwater model the testing of multiple conceptual models? NGWA 2008 Summit. Session, March 30-April 3. Memphis, TN.
212. Woessner, W. W., 2008 (**INVITED**). Snow on the mountains, green grass and Indianapolis: a model of a colleague. NGWA 2008 Summit. Session In Memory of Thomas Prickett, March 30-April 3. Memphis, TN.
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210. Swierc, J. and W. W. Woessner. 2008. Preliminary Hydrogeologic assessment of storm water infiltration through Class V injection wells in a coarse grained vadose zone, Missoula valley, Montana. NGWA 2008 Summit. March 30-April 3. Memphis, TN.
209. Swierc, J. E. and W. W. Woessner. 2007. Assessment of geologic controls to infiltration through a coarse grained vadose zone, Missoula valley, Montana. Annual Meeting GSA. Nov. Denver, CO.
208. Engstrom, D., W. W. Woessner and J. E. Gannon. 2007. Preferential flow-paths developed in hyporheic open-framework gravels of braided river sediments. Annual Meeting GSA. Nov. Denver, CO.
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203. Poole, G. C., S. J. O'Daniel, K. L. Jones, E. S. Bernhardt, A. M. Helton, W. W. Woessner and B.R. Boer, 2007. Hydrologic spirals: a conceptual model for the hydrologic template of alluvial stream and river ecosystems. North American Benthological Society. 55 th Annual Meeting. Spring.
202. Woessner, W. W., 2007. "The discovery continues"... do mid-sized university geoscience departments need to evolve? NSF Workshop Connecting Geoscience Departments to the Future of Science: New Structures for Research and Curriculum. Carlton College April 25-April 27 2007.
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200. Farinacci, A., A. Beothote, W. W. Woessner, and J. Harvala, 2006. Monitoring the impact to ground water from drawdown of the Milltown Reservoir during the initial stage of dam removal, western Montana. 4th Annual Conference "Assessing Stream Restoration Success: Developing Sustainable Ecological and Physical Systems. Center for Riverine Science and Stream Re-naturalization, Missoula, MT. Sept. 28 and 29.
199. Woessner, W. W., 2006. **(INVITED)**. The Ground Water Model. Managing Clark Fork River Basin Ground Water. Clark Fork Technical Advisory Committee and the Center for Riverine Science and Stream Re-naturalization, University of Montana, September 27.
198. Woessner, W. W., 2006 **(INVITED)**. Groundwater and groundwater issues in the Missoula valley. Park Water Company Engineering Conference, Missoula, MT. June 22.
197. Woessner, W. W., 2006 **(INVITED)** The science and technology: Restoration opportunities and obligations, the Montana university system. Governor's Restoration Conference, Billings, MT., June 8-9.
196. Woessner, W. W., 2006 **(INVITED)** Is there value in independent model oversight, or how can you become a better modeler without modeling? Modflow and More 2006: Managing ground water Systems. International ground Water Modeling Center, Colorado School of Mines, May 21-24.
195. Woessner, W. W., 2006 **(INVITED)**. Groundwater and groundwater issues in the Missoula valley. Senior Forum, Missoula, MT. May 10.
194. Sutherland, M. K., W. W. Woessner, J. Kuhn and P. Skibicki, 2006. Assessing traditional well log techniques in determining the hydrologic controls on a MTBE contaminated aquifer, western MT. 2006 Ground Water Summit, NGWA, San Antonio, TX, April 23-26.
193. Engstrom, D., W. W. Woessner and J. E. Gannon, 2006. Hydrologic investigation of preferential flow paths, Nyack floodplain, Montana. 2006 Ground Water Summit, NGWA, San Antonio, TX, April 23-26.
192. Woessner, W. W., 2006. **(INVITED)** Water water everywhere: will there be a drop to drink? 2006 University of Montana Alumni Lecture Series. Sun to Seeds, Our World Around Us, March.
191. Woessner, W. W., 2006. **(KEYNOTE)** Occurrence and persistence of sewage-source pharmaceuticals in shallow groundwater. British Columbia Ground water Association Annual Meeting, Langley City, B. C. March.
190. Woessner, W. W., 2006. **(INVITED)** Surface water leakage as a primary source of water to production wells: geochemical and physical approaches. British Columbia Ground water Association Annual Meeting, Langley City, B. C. March.
- 128-189. Geological Society of America Birdsall Dreiss Distinguished Lecturer Spring, Summer and Fall 2005 **(INVITED)** 61 lectures at 49 Colleges, Universities and Groundwater Organizations. Lecture Titles:
- Examining the Exchange of Groundwater With Stream/Floodplain Systems: Physical, Thermal, Geochemical Approaches with ties to Stream Renaturalization.*
- Occurrence, Transport and Fate of Viruses and Pharmaceuticals in Groundwater Impacted by Septic System Effluent: The Hydrogeologist and Human Health.*

127. Boer, B. R., Woessner, W. W., Poole, G. C., O'Daniel, S. J. 2005. A heat budget for a shallow channel/floodplain aquifer: influence of riparian zone land use on river temperature, Northeastern Oregon. National Meeting Geological Society of America. Salt Lake City, UT. October, Program Vol. 37, No 7, p. 27.
126. O'Daniel, S. J., G. C. Poole, L.A.K Mertes, and W. W. Woessner, 2005. Stream temperature controls related to shallow groundwater exchange,. American Fisheries Society Meeting, Anchorage, AK. 9/05
125. O'Daniel, S. J., G. C. Poole, L.A.K Mertes, and W. W. Woessner, 2005. A data rich approach to water quality management, National States Geographic Information Council, Rochester, NY. 9/05
124. Woessner, W. W., 2005. **(INVITED)** Convocation Address- The University, Its Faculty and Being a Student. 2005-2006 August 27, 2005. The University of Montana New Student Convocation. University Theater.
123. Jones, K. L. , M. V Vitale, S. J. O'Daniel, G. C. Poole, L.A.K. Mertes, W. W. Woessner, 2005. Hyporheic Hydrology of the Umatilla River: Interactions among Physical and Biological Drivers, Eos Trans. AGU,86(18), Jt. Assem. Suppl., Abstract H41A-02, B33E-17. May
122. O'Daniel, S. J., G. C. Poole, L.A.K Mertes, and W. W. Woessner, 2005. Inferring floodplain subsurface flowpaths using remote sensing vegetation indices, Eos Trans. AGU,86(18), Jt. Assem. Suppl., Abstract H41A-02 USDA/NASA meeting, New Orleans, LA., 5/05
121. O'Daniel, S. J., G. C. Poole, L.A.K. Mertes, and W. W. Woessner, 2005. Remote sensing inputs to drive a data rich water quality decision support system, International Association of Landscape Ecology, Syracuse, NY, March
120. O'Daniel, S. J., G. C. Poole, L.A.K. Mertes, and W. W. Woessner, 2005. Creating and validating metadata in a data rich computing environment, Earth Science, Information Partnership Meeting, Washington DC, January
119. O'Daniel, S. J., G. C. Poole, L.A.K. Mertes, and W. W. Woessner, 2004. An information rich approach to water quality management, Oregon Watershed Enhancement Board (OWEB) Biannual Meeting, Ashland, OR. November
118. O'Daniel, S. J., G. C. Poole, L.A.K Mertes, and W. W. Woessner, 2004. A multisensor approach to water quality management, Geoscience and Remote Sensing Symposium, 2004. IGARSS '04. Proceedings. Institute of Electrical and Electronic Engineers (IEEE), September
117. A. Arrigoni, G.C. Poole, S. J. O'Daniel S.A. Thomas, W.W. Woessner, L.A.K. Mertes and B.R. Boer. 2003. The Effect of Geomorphic Complexity on Water Temperature in a Pacific Northwest Alluvial River, Presented at the Fall 2003 American Geophysical Meeting December.

116. Geffen, B.A., G. C. Poole¹, M.V. Vitale, B.R. Boer, S.A. Thomas¹, W.W. Woessner, and S. O'Daniel, 2004. Seasonal variation in water sources within the hyporheic and perirheic zones of an alluvial floodplain, Presented at the NABS Annual meeting, Vancouver, British Columbia, June.
115. Vitale, M.V., G.C. Poole¹, B.A. Geffen¹, B.R. Boer, S.A. Thomas, W.W. Woessner, and S. O'Daniel, 2004. Spatiotemporal variation in channel-aquifer hydrologic connectivity within the hyporheic zone of an alluvial river. Presented at the NABS Annual meeting, Vancouver, British Columbia, June.
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113. O'Daniel, S. J., G. C. Poole, L.A.K Mertes, and W. W. Woessner, 2004. Data Rich Decision Support Environment for Water Quality, Pacific Northwest Chapter of the Society of Wetland Scientists National Meeting, July 11-15.
112. O'Daniel, S. J., G. C. Poole, L. A. K. Mertes, W. W. Woessner, 2004. DRDiSE Project / CTUIR, Capstone Engineering conference, Northern Arizona State University, Flagstaff, April; Northwest Power Planning and Conservation Council, Portland, OR. 2/5/04; Umatilla Watershed Technical Committee, Pendleton, OR. 2/24/04; BPA/CBFWA - Collaborative System-wide Monitoring & Evaluation Committee, Portland, OR. 2/23/04; Idaho Department of Environmental Non-point Source Workshop, Boise, ID., 1/04; Umatilla Watershed Technical Committee, Pendleton, OR. 12/21/03
111. Godfrey, Emily and William W. Woessner. 2004. Screening level study of pharmaceuticals in septic tank effluent and a wastewater treatment plant waste stream. Proceedings of the 4th International Conference on Pharmaceuticals and Endocrine Disrupting Chemicals in Water, held October 13-15, 2004, in Minneapolis, Minnesota
110. Diehl, Cain, Brian Boer, William W. Woessner, Jack Stanford, and Mac Hendrix, 2004. Characterizing groundwater flow patterns and water exchange in a highly conductive floodplain, Middle Fork of the Flathead River, MT. Proceedings of Assessing Rivers Impacted by Dams and Dam Removal, Center for Riverine Science and Stream Re-naturalization, Sept. 23 and 24, Missoula, MT.
109. Pete, Shandin, William W. Woessner, and Seth Makepeace, 2004. Defining pre re-naturalized surface water/groundwater exchange in the channel and floodplain of the Jocko River, Flathead Indian Reservation, Montana. Proceedings of Assessing Rivers Impacted by Dams and Dam Removal, Center for Riverine Science and Stream Re-naturalization, Sept. 23 and 24, Missoula, MT.
108. Boer, Brian, William W. Woessner, Matt Vitale, Emily Godfrey, Scott O'Daniel, Geoffery, Poole, Alicia Arrigoni and Leal Mertes, 2004. Constraining streambed and aquifer hydrologic and thermal properties by 2D modeling surface water-ground water heat exchange in the Umatilla River, Oregon. Proceedings of Assessing Rivers Impacted by Dams and Dam Removal, Center for Riverine Science and Stream Re-naturalization, Sept. 23 and 24, Missoula, MT.

107. Fiaschetti , Aaron, Seth Makepeace and William W. Woessner, 2004. Assessment of Pre Re-naturalized Ground Water Exchange in Two Stream Channels and Riparian Zones, Jocko Valley, Western Montana. Proceedings of Assessing Rivers Impacted by Dams and Dam Removal, Center for Riverine Science and Stream Re-naturalization, Sept. 23 and 24, Missoula, MT.
106. Gannon , J. E., W.W. Woessner, J.A. Stanford, and W.E. Holben, 2004. The Nyak microbial observatory. NSF Microbial Observatory National Meeting, Big Sky Montana.
105. Cook, R., A. Tallman and W. Woessner, 2004. Preliminary Results for Defining River Recharge and the Fate of Arsenic in the Shallow Groundwater System Adjacent to a Losing River, Western Montana. Proceedings of Assessing Rivers Impacted by Dams and Dam Removal, Center for Riverine Science and Stream Re-naturalization, Sept. 23 and 24, Missoula, MT.
104. Tallman, Amelia, Robyn Cook and William W. Woessner. 2004. Preliminary Results of a Capture Zone Study on Bank-side Production Wells and Their Interaction with a Perched River in an Alluvial Aquifer, Western Montana. Proceedings of Assessing Rivers Impacted by Dams and Dam Removal, Center for Riverine Science and Stream Re-naturalization, Sept. 23 and 24, Missoula, MT.
103. Woessner, W. W., 2004. Controls on the transport of pathogens in groundwater systems. Workshop on Geology and Human Health. NSF NAGT May, Chico Hot Springs, Montana.
102. Woessner. W. W., 2004. Conditions, Plans and Issues: Milltown Dam. Missoula Mining Club, February.
101. Boer, B. R., W. W Woessner, S. A. Thomas, S. O'Daniel, G. Poole, A. Arrigoni and L. Mertes, 2003. Preliminary analyses of surface water-groundwater flux and heat exchange in a northeast Oregon stream and floodplain. GSA National Meeting. Proceeding Abstracts Vol. 35 (6), Denver.
100. Brick, C. and W. W. Woessner, 2003. Groundwater modeling at Milltown Reservoir to predict the impacts of dam removal. Assessing and Re-naturalizing Streams Impacted by Mining, Center for Riverine Science and Stream Renaturalization Annual Meeting, Missoula, MT, September and MT AWRA meeting, October, Butte, MT.
99. Boer, B. R., W. W Woessner, S. A. Thomas, S. O'Daniel, G. Poole, A. Arrigoni and L. Mertes, 2003. Preliminary analysis of natural thermal pulses in a floodplain aquifer: Interpreting aquifer properties along the Umatilla River, Oregon. MT AWRA, October, Butte, MT.
98. Boer, B. R., W. W Woessner, S. A. Thomas, S. O'Daniel, G. Poole, A. Arrigoni and L. Mertes, 2003, Preliminary assessment of the role of groundwater as a control on stream temperature in a northeastern Oregon stream. Assessing and Re-naturalizing Streams Impacted by Mining, Center for Riverine Science and Stream Renaturalization Annual Meeting, Missoula, MT, September.
97. Diehl, C., B. Boer, J. Stanford, W. Woessner and M. Hendrix, 2003, Preliminary results of investigating and characterizing groundwater flow patterns in a highly conductive floodplain, Middle Fork of the Flathead River,

MT. Assessing and Re-naturalizing Streams Impacted by Mining, Center for Riverine Science and Stream Renaturalization Annual Meeting, Missoula, MT, September.

96. Woessner, W. W., 2003, **(INVITED)**, Judging Amy's Model: Assessing Flow Model Credibility. MODFLOW2003 and More, International Groundwater Modeling Institute, Colorado School of Mines, Sept. 2003.

95. Woessner, W. W., 2003. **(INVITED)** Role of data in modeling. Science for Judges Workshop. Dividing the Waters: A dialog for judges, masters and referees. Snowbird, Utah, April 28, 29.

94. Cosens, B. and Woessner W. W., 2003. . **(INVITED)** Negotiation of the Montana-National Park Service compact. Science for Judges Workshop. Dividing the Waters: A dialog for judges, masters and referees. Snowbird, Utah, April 28, 29.

93. Leake, S. A. and Woessner, W. W., 2003. . **(INVITED)** MODFLOW data structure, surface water/ground water modeling. Science for Judges Workshop. Dividing the Waters: A dialog for judges, masters and referees. Snowbird, Utah, April 28, 29.

92. Poole, G. C., O'Daniel, S., Woessner, W. W., Mertes, L., Thomas, S. A. , Arrigoni, A. and Qin, X. 2003, Hyporheic flow response to historical changes in channel morphology and flow regulation. Association of Limnologists' and Oceanographers, Salt Lake City, February.

91. Woessner, W. W., 2002. **(KEYNOTE)** Exchange of Ground Water and Stream Systems: Conceptualization and Implications for Renaturalization. National Ground Water Association, Association of Ground Water Scientists and Engineers, National Meeting, Las Vegas, NV, December.

90. Loustaunau, P. K., Woessner W. W. and Kuhn, J., 2002, MTBE-behavior at a stream-ground water interface. National Ground Water Association, Association of Ground Water Scientists and Engineers, National Meeting, Las Vegas, NV, December.

89. Johnson, A., Woessner, W. W. and Stanford, J. A., 2002. Preferential flow in the hyporheic zone of a large alluvial river. National Ground Water Association, Association of Ground Water Scientists and Engineers, National Meeting, Las Vegas, NV, December.

88. Boer, B., Woessner, W. W. and O'Daniel, S. 2002. Analysis of subsurface features in an Oregonian floodplain using ground penetrating radar. National Ground Water Association, Association of Ground Water Scientists and Engineers, National Meeting, Las Vegas, NV, December.

87. Vitale, M., Hinman, N. and Woessner, W. W., 2002. Effects of groundwater-surface water exchange on creek channel mineral deposits in a hydrothermal environment. National Ground Water Association, Association of Ground Water Scientists and Engineers, National Meeting, Las Vegas, NV, December.

86. Arrigoni, A., Mertes, L, O'Daniel, S., Poole, G., Woessner W., Thomas, S., and Mason, J.. 2002. Characterizing diversity of thermal and hydrodynamic properties in waters of the Umatilla River, Oregon, and its floodplain. AGU, December.
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COMMITTEES AND SERVICE

Advisory Board Member, 2003-2006 Advisory Board, Italian Journal of Engineering Geology and Environment

Board Member, 2001-2004 Board of Directors, Association of Ground Water Scientists and Engineers, National Ground Water Association (two terms)

Technical Committee 2003, 2006, 2008 MODFLOW and More, International Ground Water Modeling Center Conference, Colorado School of Mines

Co-Chair 2002 Association of Ground Water Scientists and Engineers National Meeting, December 2002, Las Vegas, National Ground Water Association

Technical Chairman 1989 Headwater Hydrology Symposium, AWRA, June

Ad-Hoc committee on a Hydrogeology Division Scholarship 1987-88 Geological Society of America

Clark Fork River Committee 1987 to 1988 Office of the Governor, Helena

Organizing Committee 1985 Clark Fork River Symposium

Governor's Groundwater Advisory Council 1983-85 State of Montana

Organizing Committee 1984 Northwest Scientific Association--Montana Academy of Sciences Conference --Geology and Environmental Science, Missoula, MT

Organizing Committee 1984 13th Rocky Mountain Groundwater Conference, Great Falls, MT

PROFESSIONAL ASSOCIATION MEMBERSHIP AND SERVICE

Advisory Committee Member. The Groundwater Project (gw-project.org), Guelph, Ontario, Canada

Reviewer. European Science Foundation 2002

Reviewer. Natural Sciences and Engineering Research Council of Canada 2001-2014

Board of Directors. Association of Ground Water Scientists and Engineers (11000 members), 2001-2003

Associate Editor. *Ground Water*, 1996 to 1998.

Reviewer. National Science Foundation

Reviewer. National Research Council

Reviewer. *Water Resources Research*, AGU

Reviewer. *Ground Water*

Rocky Mountain Hydrogeology Division Representative. Geol. Soc. of America, 1993 to 2002

Fellow. Geological Society of America, 1998-present

American Water Resources Association. 1974 to 2009

National Ground Water Association. 1974 to present.

Fellow. National Groundwater Association. 2018

Lifetime Member. National Groundwater Association, 2018

Sigma Gamma Epsilon. Honorary Earth Science, 1971 to 1973

American Geophysical Union. 1982 to 2010

Sigma Xi. 1982

Geological Society of America. 1976 to present

American Association for the Advancement of Science. 1994-1995, 2004- 2012.