

**Institute for Water and Watersheds  
Oregon State University**

**Annual Technical Report  
2019**

## General Information

### Products

Journal articles and book chapters

Caruso, P., C.G. Ochoa, W.T. Jarvis and T. Deboodt, 2019, A Hydrogeologic Framework for Understanding Local Groundwater Flow Dynamics in the Southeast Deschutes Basin, Oregon, USA, *Geosciences*, volume 9, No. 2, p. 57, 11 pp., <https://doi.org/10.3390/geosciences9020057>

Arellano, L., S. Good, R. Sanchez-Murillo, T. Jarvis, D. Noone and C. Finkenbiner, 2020, Bayesian estimates of the mean recharge elevations of water sources in the Central America region using stable water isotopes, *Journal of Hydrology: Regional Studies*, volume 32, pp. 1-15, <https://doi.org/10.1016/j.ejrh.2020.100739>

Jarvis, T., 2020, The tricky task of quantifying sustainable groundwater use: How to live with the uncertainty, in Zeitoun, Mark, Naho Mirumachi and Jeroen Warner. *Water Conflict: Analysis for Transformation*. Oxford: Oxford University Press.

Jarvis, W.T., 2020, Book Review/Governance of Offshore Freshwater Resources, *Groundwater*, Volume 58, No. 4.

Moore, C. and T. Jarvis, 2020, Scientific Mediation and Serious Gaming: New Models for Dealing with the Old Problem of Dueling Experts, *Rocky Mountain Mineral Law Foundation Journal*, Volume 57, No. 1, pp. 35-49.

Portugal, C.R.M., C. Fonyo, C.C. Machado, R. Meganck, and T. Jarvis, 2020, Microbiologically Induced Calcite Precipitation biocementation, green alternative for roads – is this the breakthrough? A critical review. *Journal of Cleaner Production*, Volume 262, pp. 1-11.

Theses and Dissertations

Davis, K.R. 2020. Drinking Water Access through a Transdisciplinary Lens, Master's thesis, Oregon State University, [https://ir.library.oregonstate.edu/concern/graduate\\_thesis\\_or\\_dissertations/t148fp84t](https://ir.library.oregonstate.edu/concern/graduate_thesis_or_dissertations/t148fp84t)

Demaree, D. 2020. Nitrate derived from Onsite Wastewater Treatment Systems (NOWTS): A Study of Public Perceptions, Politics, and Perpetual Permitting in the Western US. PhD Dissertation, Oregon State University, [https://ir.library.oregonstate.edu/concern/graduate\\_thesis\\_or\\_dissertations/zc77sx16v](https://ir.library.oregonstate.edu/concern/graduate_thesis_or_dissertations/zc77sx16v)

Dickman, J.C. 2020. Conflict & Context: An analysis of water conflict in Idaho from 1950 to 2019. Master's thesis, Oregon State University, [https://ir.library.oregonstate.edu/concern/graduate\\_projects/zp38wk79x](https://ir.library.oregonstate.edu/concern/graduate_projects/zp38wk79x)

Gandara, M.L. 2020. Evaluating the Potential Impacts of Homelessness on the Water Quality and Riparian Habitat of the Santa Ana River, Master's thesis, Oregon State University, [https://ir.library.oregonstate.edu/concern/graduate\\_projects/ms35tg873](https://ir.library.oregonstate.edu/concern/graduate_projects/ms35tg873)

Hall, J.L., 2020. A Hydrogeologic Framework for Understanding Watershed-Scale Surface Water and Groundwater Interactions in Western Oregon, USA, Master's thesis, Oregon State University, [https://ir.library.oregonstate.edu/concern/graduate\\_thesis\\_or\\_dissertations/fx719t93p](https://ir.library.oregonstate.edu/concern/graduate_thesis_or_dissertations/fx719t93p)

Kaiser, D.M. 2020. GeoPost: An Army Installation GIS Cloud Management System for Facilities and Emergency Services, Master's thesis, Oregon State University, [https://ir.library.oregonstate.edu/concern/graduate\\_projects/6h441100k](https://ir.library.oregonstate.edu/concern/graduate_projects/6h441100k)

### **Information Transfer Program**

The Institute for Water & Watersheds (IWW) distributes a monthly electronic newsletter, H2Oregon, that aggregates water news across the State, water resources research highlighted in the media for Oregon State University, Portland State University, University of Oregon, and Oregon Institute of Technology, and water related events sponsored by academia and industry. The newsletter is distributed to 623 recipients with a current open rate of 20%. The official Web site of the Institute for Water & Watersheds and sister Institute for Natural Resources, hosted by Oregon State University, appears at [water.oregonstate.edu](http://water.oregonstate.edu). We continue to co-organize weekly seminars with the Water Resources Graduate Program at OSU and Portland State University that are attended by water professionals in the State, students, and academic researchers.

IWW organizes and participates in many skills-building courses, workshops, and presentations, including the *Business of Water*, a course designed to support the emerging "waterMBA" under development between the Water Resources Graduate Program (WRGP) and College of Business, *Applied Field Methods*, a course designed to support the Water Cooperation and Diplomacy Program coordinated by the WRGP, *Environmental Conflict Resolution*, a course offered through the Conflict Resolution Program at the University of Oregon Law School. Related workshops include Water Conflict Resolution for the American Water Resources Association, and Scientific Mediation for the Oregon Mediation Association.

IWW presents original research through invited lectures: "Lower Umatilla Basin Groundwater Management Area (LUBGWMA) Designation and the Technical Impracticability Waiver" to the LUBGWMA action committee; "Water Issues in the Western US: Implications and the Extent of Groundwater Shortages" for the Rotary Club of Corvallis; and "Offshore Groundwater" for the OSU Clean Water Initiative Conference and Yachats Academy of Science.

IWW staff are regularly called upon to troubleshoot domestic water wells in areas undergoing groundwater depletion (Carlton, Brownsville, Amity) and Harmful Algal Blooms in private lakes (Salem) in the Willamette Valley.

### **Offshore Groundwater**

**Project Type:** Annual Base Grant **Project ID:** NA\_Technology Transfer

Offshore groundwater exploration and development may enable alternatives to meet the water needs of coastal communities worldwide. Although region-specific information on the occurrence and volume of offshore fresh groundwater (OFG) remains limited, there is growing evidence to suggest that it exists on a global scale in quantities large enough to supplement long-term coastal water supplies. Offshore basalt aquifers are also uniquely suited for use in geologic CO<sub>2</sub> sequestration, which is considered an essential component of plans to achieve the “2-degree scenario” (2DS) of greenhouse gas emission reductions. This review focuses on a case study offshore Oregon, USA in evaluating the feasibility of using offshore aquifers for water supply or carbon storage. Existing knowledge suggests that tapping offshore fresh groundwater reserves is technically viable, but further research on contextural engineering is necessary to implement such an effort in specific regions.

### **Western Waters Digital Library**

**Project Type:** Annual Base Grant **Project ID:** NA\_Cost Share

**Project Impact:** The Institute for Natural Resources initiated the process of reinvigorating and redesigning the Western Waters Digital Library, <http://westernwaters.org/>, which provides free public access to a wide range of significant resources on water in the Western United States. Available resources include classic water literature, legal transcripts, maps, reports, personal papers, water project records, photographs, audio recordings, videos, and other material. Audiences include policy-makers, legal professionals, students, faculty, and community members.

### **Mid-Coast Integrated Water Management Plan Development**

**Project Type:** Annual Base Grant **Project ID:** NA\_Cost Share

**Project Impact:** As part of a project team working with Creative Resources Strategies, LLC, Oregon State University Extension, and Oregon Sea Grant, and the Institute for Natural Resources have been working with the Mid-Coast Water Planning Partnership (<https://www.midcoastwaterpartners.com/>) to do collaborative and participatory process design, strategic group facilitation, and strategic plan writing to complete an integrated water resource management plan by December 2021. The Mid-Coast Water Planning Partnership is one of four water planning partnerships within Oregon that received funds from the Oregon Department of Water Resources to collaboratively develop regional sustainable solutions that provide adequate water supplies for water systems and local industry while supporting healthy fish and wildlife populations. The plan will be interactive and hosted on our Oregon Explorer platform.

Oregon Explorer is a natural resources digital library provides access to integrated natural resources and community information organized by topic, location and data portals. Through OE, users can interact with place-based, up-to-date scientific information through maps, data, images, publications, and user-driven tools. Information is archived, neutral, and maintained over the long-term.

### **Trees to Tap – Forest Management and Community Drinking Water Supplies**

**Project Type:** Annual Base Grant **Project ID:** NA\_Cost Share

**Project Impact:** In 2020, sponsored by the Oregon Forest Resources Institute, the Institute for Natural Resources lead a science-based review of the effects of forest management on drinking water. The 300-page report provides the results of a literature review on the effects of active forest management (harvest, forest roads, and reforestation) on drinking water quality. In addition to the review, community water suppliers who rely on surface water as their primary source were surveyed to better understand their operations and priorities, and three case studies were conducted. The final report is best characterized as a working paper and will be formally published as a book by Oregon State University's Extension and Experiment Station Communications after further review and editing. OSU College of Forestry will be providing a conference on the report in March 2021.

### **Myrtle Point Source Water Protection Plan**

**Project Type:** Annual Base Grant **Project ID:** NA\_Cost Share

**Project Impact:** As part of the National Water Quality Initiative, the Institute for Natural Resources is working with the Oregon State University College of Forestry and the Coos Bay Soil and Water Conservation District to develop the Myrtle Point Source Water Protection Plan for drinking water.

### **Water Quality Characterization Within the Oak Creek Watershed, Western Oregon**

**Project Type:** Annual Base Grant **Project ID:** NA\_Technology Transfer

**Project Impact:** Multiple land uses associated with Oak Creek, from its headwaters at the McDonald-Dunn forest through agricultural and urban settings until it meets Mary's River, may influence water quality indicators (e.g., temperature, conductivity, nutrients). Objectives of this study are to: (1) determine various land use influence on stream water-anion concentration along the Oak Creek longitudinal gradient; (2) assess stream-aquifer interaction potential effects on nutrient concentration of stream water; and, (3) determine potential origins of surface water and groundwater flows influencing streamflow-water quality relations in Oak Creek. This project is part of a broader long-term study aimed to investigate land use - water quantity/quality relations within the Oak Creek watershed near Corvallis, Oregon.

**Student Support:**

Number of students directly or indirectly supported:

2 Undergraduate

10 Graduate

0 Post Doc

**Notable Achievements and Awards**

IWW Director appointed as first out-of-state member to Executive Board of Groundwater Resources Association of California

IWW Director invited to Science Committee - 2nd International Conference on Transboundary Aquifers, UNESCO, Paris