

**Center for Water Resources Research
Utah State University**

**Annual Technical Report
2018**

General Information

Products

Research Publications:

- (1) (2018UT209B) Lane, B.A. and Rosenberg, D.E. "Promoting instream flows in the changing western U.S." J. Water Resources Planning and Management.
- (2) (2018UT209B) Lane, B.A. and Rosenberg, D.E. "Expanding instream flows to protect ecosystems in over-allocated river basins." Legislative Briefing, July 2018. https://digitalcommons.usu.edu/water_rep/678.
- (3) (2018UT208B) (2016UT200B) Neilson, B.T., Tennant, H., Stout, T.L., Miller, M., Gabor, R.S., Jameel, Y., Millington, M., Gelderloos, A., Bowen, G. and Brooks, P., 2018. Stream?centric methods for determining groundwater contributions in karst mountain watersheds. *Water Resources Research*. <https://doi.org/10.1029/2018WR022664>.
- (4) (2016UT203B) Barnett, M.J., D. Jackson-Smith, and J. Endter-Wada. 2019. Implications of Nontraditional Housing Arrangements for Urban Water Management in the United States Intermountain West. *Society & Natural Resources*. DOI: <https://doi.org/10.1080/08941920.2018.1539200>
- (5) (2016UT203B) Hale, R.L., C.G. Flint, D. Jackson-Smith, and J. Endter-Wada. 2018. Social Dimensions of Urban Flood Experience, Exposure, and Concern. *Journal of the American Water Resources Association* 54(5):1137-1150. DOI: 10.1111/1752-1688.12676
- (6) (2016UT203B) Avolio, M., T. Trammel, D. Pataki and J. Endter-Wada. 2018. Biodiverse Cities: the Nursery Industry, Homeowners, and Neighborhood Differences Drive Urban Tree Composition. *Ecological Monographs* 88(2):259-276. DOI: 10.1002/ecm.1290.
- (7) (2016UT203B) Endter-Wada, J., D.T. Wuenschell, C. Garrard, E.L. McGinty, K. Kopp, J. Hoover. 2019. Utah State Capitol Grounds Landscape Water Use Assessment. Research Report prepared for the Utah State Legislature. March 15, 2019.
- (8) (2015UT197B) Bassett, S.S., 2018. Evaluation of a side-by-side full-scale biofiltration conversion in a nutrient-limited environment. MS Thesis. Utah State University. <https://digitalcommons.usu.edu/etd/6983>
- (9) (2015UT197B) Bassett SS, Nieminski EC, Stevens DK. Evaluation of a side-by-side, full-scale conversion to biological filtration. *AWWA Wat Sci*. 2018;e1112. <https://doi.org/10.1002/aws2.1112>

Research Presentations:

- (10) (2018UT210B) Rui Gao, Ruijie Zeng, 2018. An image filtering approach to detect drainage systems in intensively managed landscape, , UCOWR conference, June 11, 2019, Snowbird, Utah.
- (11) (2018UT209B) Alger, M.,* Lane, B.A., Neilson, B.T. "Characterizing streamflow and temperature patterns on the Blacksmith Fork River to prevent summer dewatering," UCOWR Annual Conference. Snowbird, UT. June 13, 2019.
- (12) (2018UT209B) Lane, B.A. and Rosenberg, D.E. "Promoting instream flows in western states," University Council on Water Resources (UCOWR) Annual Conference. Snowbird, UT. June 13, 2019.
- (13) (2018UT209B) Alger, M.,* Lane, B.A., and Neilson, B.T. "Characterizing stream patterns on the Blacksmith Fork River to prevent summer channel dewatering," Spring Runoff Conference. Logan, UT. March 26, 2019.
- (14) (2018UT209B) Lane, B.A. and Rosenberg, D.E. "Promoting instream flows in Cache Valley," Cache Valley Water District Board Meeting. Dec 3, 2018.
- (15) (2018UT208B) Xu, T., and Tyson, C., 2018. Assessing effects of the choice of meteorological forcing datasets and downscaling methods on distributed snow simulations in a mountainous catchment. Presented at AGU Fall Meeting, Washington D.C., Dec. 2018.
- (16) (2017UT204B) Murray, D., Neilson, B., Brahney, J. (2019) Can beavers Mitigate NonPoint Source Pollution? Society for Freshwater Science, Salt Lake City Utah, May 19-23.
- (17) (2017UT204B) Murray D., Brahney, J. (2018) Beaver Pond Water Quality and Chemistry, Bear River Water Quality Task Force. National Resources Conservation Services, Logan, UT. 2018.
- (18) (2017UT204B) Capito, L., Neilson, B., Brahney, J. (2019). Environmental controls on didymo bloom formation. Poster presentation. Spring Runoff 2019 Society for Freshwater Science, Salt Lake City Utah, May 19-23.
- (19) (2017UT204B) Murray, D., Neilson, B., Brahney, J. (2018) Beaver-Induced Biogeochemical Alterations in Mountain Streams. Poster presentation. Society for Freshwater Science. Detroit Michigan, May 20-24, 2018.
- (20) (2017UT204B) Capito, L., Neilson, B., Brahney, J. (2019). Environmental controls on didymo bloom formation. Poster presentation. Spring Runoff, March 26, 2019.
- (21) (2017UT204B) Zastrow, M., Brahney, J. (2018) Can Beaver Dams Affect Water Quality. Poster Presentation,

- S.J. & Jessie E. Quinney College of Natural Resources Undergraduate Poster Research Week, 2018.
- (22) (2017UT204B) Towns, A., Quinney, N., Neilson, B., Brahney, J. (2017). The Effects of beaver dams on stream biogeochemistry. Poster presentation. iUtah iFellow Research Symposium Utah State University July 26, 2017.
- (23) (2017UT204B) Towns, A., Quinney, N., Neilson, B., Brahney, J. (2017). The Effects of beaver dams on stream biogeochemistry. Poster Presentation. iUtah Annual Symposium and All-Hands Meeting. Utah State University. July 21, 2017.
- (24) (2016UT203B) Endter-Wada, J. Connecting Land and Water: Research in the Colorado River Basin. Invited presentation for panel at Universities Council on Water Resources (COWR) Annual Conference, Snowbird, UT, USA, June 11, 2019.
- (25) (2016UT203B) Endter-Wada, J. Conservation Behavior: What's the Potential? Invited presentation for the 2019 Central Texas Water Conservation Symposium entitled "Integrated Water: Keeping Water Conservation at the Forefront," Austin, TX, USA, January 31, 2019.
- (26) (2016UT203B) Endter-Wada, J. Developing Water Policy to Support Resiliency. Invited presentation for Confluence 2019 sponsored by the Weber River Partnership, Ogden, UT, USA, January 15, 2019.
- (27) (2016UT203B) Endter-Wada, J. Conservation Behavior Panel: What's the Potential? Learning from Behavior Practitioners. Presented at 2018 Water Smart Innovations Conference, Las Vegas, NV, USA, Oct. 2-5, 2018.
- (28) (2016UT203B) Endter-Wada, J., J.I. Harvey Thomson, C. Carney. Water Conservation Motivations and Societal Outcomes. Invited presentation for the Utah Water Conservation Forum, West Jordan, UT, USA, May 17, 2018.
- (29) (2016UT203B) Rupp, L., K. Kopp, J. Endter-Wada, J. Goodspeed, and M. Kilcrease. Landscape Water Conservation. Invited presentation for the Utah Water Users Workshop, St. George, UT, USA, March 20-21, 2018.
- (30) (2016UT200B) Neilson, B.T., H. Tennant, T.L. Stout, Miller, M., Gabor, R.S., Y. Jameel, M. Millington, A. Gelderloos, G.J. Bowen, P.D. Brooks. "Stream?centric methods for determining groundwater contributions in karst mountain watersheds." 2019 USU Spring Runoff Conference. March 26, 2019. Logan, UT.
- (31) (2016UT200B) Strong, P., H. Tennant, J.S. Horsburgh, B.T. Neilson. "The Logan River Observatory: A lab in our own backyard." 2019 USU Spring Runoff Conference. March 26, 2019. Logan, UT.
- (32) (2013UT189B) Stormwater Impacts to an Urban River in the Intermountain West: the Use of Continuous Monitoring Datasets. 2018. Presented at the 111th Air and Waste Management Association Annual Conference and Exhibit, June 25 to 28, Hartford, CT. Paper #410122, Sustainability Metrics, Initiatives, and Analytics session. (R.R. Dupont, J. Richardson, D. Willey). (Peer reviewed)
- (33) (2013UT189B) Demonstrating the Pollutant Loading from Stormwater Discharge to an Urban River in the Intermountain West Using High-Frequency Data. 2018. Manuscript of platform presentation at the 2018 StormCon Conference, Denver, CO, August 14, 2018. (R.R. Dupont, J. Richardson, D. Willey).
- (34) (2013UT189B) Presentation to the Jordan River Watershed Council. 2019. "Demonstrating the Pollutant Loading from Stormwater Discharge to the Lower Jordan River Using High-Frequency Data." June 4, 2019. (*, J.Richardson, D. Willey, R. Fernandez).

Additional Projects:

- (35) (2018UT209B) "Characterizing streamflow and temperature patterns to determine impacts of summer dewatering on the Blacksmith Fork River," USGS 104b Federal Water Resources Research Grant [\$41,179, 2019-2020]
- (36) (2017UT204B) 2019 Utah State University Ecology Center Research Support, \$2,000
- (37) (2017UT204B) 2019 Royal Society of Chemistry Water Science Bursary, Murray, D., £2,000
- (38) (2017UT204B) 2018 Extension Water Initiative Grant, Brahney, J., Neilson, B., Murray, D. \$21,482
- (39) (2017UT204B) 2018 Society of Wetland Scientists, Student Research Award, Murray, D. \$1,450
- (40) (2017UT204B) 2018 Society of Freshwater Science Endowment Award, Murray, D. \$1,000
- (41) (2017UT204B) 2018 Utah State University Ecology Center Research Support, Murray D, \$1,800
- (42) (2017UT204B) 2018 Utah State University Undergraduate Research and Creative Opportunities, Capito, L \$1,000
- (43) (2017UT204B) 2017 Utah State University Undergraduate Research and Creative Opportunities, Zastrow, m \$1,000
- (44) (2017UT204B) 2017 Utah State University, iUTAH iFellow Undergraduate, Towns, A., \$4,500
- (45) (2016UT203B) Installation and Maintenance of Weather Stations in Eagle Mountain City. Sponsored by Utah State University (USU Research and Graduate Studies; Utah Climate Center; Plants, Soils and Climate Center; Center for Water Efficient Landscaping; WaterMAPS™ Program; Water Check Program). June 2018 - June 2023. \$36,408. [J. Endter-Wada and R. Gillies, PIs]

(46) (2016UT203B) Implementing Water Conservation Strategies in Eagle Mountain City, Utah. USU Extension Water Initiative Grant, Phase II. January 2019-June 2020. [Joanna Endter-Wada (PI), Kelly Kopp (co-PI), Larry Rupp (co-PI)].

Earned Degrees:

(47) (2017UT204B) Lindsay Capito, Watershed Sciences, B.Sc. S.J. Quinney College of Natural Resources, USU, undergraduate BS

(48) (2017UT204B) Max Von Zastrow, Wildland Resources, B.Sc. S.J. Quinney College of Natural Resources, USU

(49) (2015UT197B) Stetson Bassett, Environmental Engineering, Civil and Environmental Engineering

(50) (2013UT189B) Rosa Fernandez, Civil and Environmental Engineering, M.S., Environmental Engineering stormwater management.

Professional Placement of Graduates:

(51) (2017UT204B) Max Von Zastrow currently works in Moab for the Uranium Mill Tailings Remedial Action Project. He directly uses skills he acquired working in on his undergraduate project, specifically related to water and sediment chemistry.

(52) (2015UT197B) Stetson Bassett - Environmental Engineer at Carollo Engineers, Utah. January 2018

(53) (2014UT193B) Milada Majerova – Biowest

(54) (2013UT189B) Rosa Fernandez, Morris & Ritchie Associates, Abingdon, MD, stormwater management and system design.

Information Transfer Program

As one of 54 water research centers nationwide, the UCWRR at the UWRL supports and promotes responsible and sustainable water resource management and stewardship in the State of Utah. With Utah's ~50,000 miles of rivers and streams and 7,800 lakes, water is an essential resource for the economic, social, and cultural well-being of the State. The Center plays a vital role in disseminating information in support of these goals mainly by (1) providing ongoing updates to the UCWRR web page (<http://uwrl.usu.edu/research/ucwrr/>) and (2) continuing to publish a semi-annual newsletter (<http://uwrl.usu.edu/research/newsletter/>), which highlights recent research projects and their findings along with other water-related activities in the State by researchers affiliated with the Center. The digital newsletter is sent to approximately 350 readers and is freely available online. This publication highlights research projects and their findings, often of interest and value to constituents within the State of Utah, as well as nationally and internationally. Other publications from the UCWRR and UWRL appear regularly as technically reviewed project reports, professional journal articles, other publications and presentations, theses and dissertation papers presented at conferences and meetings, and project completion reports to other funding agencies. Many are available in USU's Digital Commons (<http://digitalcommons.usu.edu/water/>). The annual Mineral Lease Funds Report, submitted to the Utah Office of the Legislative Fiscal Analyst, reports on a wide range of research projects ongoing at the UCWRR and UWRL that specifically benefit the State of Utah (<http://uwrl.usu.edu/research/mlf-reports/>).

Student Support

5 graduate students; 4 undergraduates

Notable Achievements and Awards

2017UT204B--Deni Murray: 2019 Robins Award Master Student Research of the Years, Utah State University;

2017UT204B--Deni Murray: 2019 Master Student Researcher of the Year, Quinney College of Natural Resources;

2017UT204B--Lindsay Capito: 2018 Undergraduate Student of the Year, Quinney College of Natural Resources;

2016UT203B--2018 Award for Outstanding Service in the Academic Sector, Utah Section of the American Water Resources Association. Awarded to Joanna Endter-Wada.

Projects

Improving Representation of Environmental Objectives in Systems Models to Inform Integrated Water Management Strategies (104B)

Project Type: Annual Base Grant **Project ID:** 2018UT209B

Project Impact: In the arid western US, major landscape modifications like flood control and land use conversion have reduced the natural pathways of recharge and return flows to streams in agricultural river valleys. Combined with direct irrigation diversions, these modifications can result in depleted streamflows during the critical summer low flow period; thousands of stream miles in the western U.S. are now chronically depleted. Depleted streams are much more susceptible to extreme temperature variability, which is inextricably linked to aquatic habitat suitability. This research improved quantitative understanding of the relationship between streamflow depletion and water temperature response over a dry summer, using the Blacksmith Fork River in northern Utah as a case of study. Summer stream temperature patterns were found to be very sensitive to changes in channel morphology and groundwater inputs. Channel morphology varies naturally but is also often highly altered for flood conveyance and land conversion. Similarly, groundwater contributions to baseflow can occur naturally, but also include irrigation seepage lateral return flows that are influenced by irrigation practices and canal networks. This research highlights the sensitivity of stream temperature patterns and dependent aquatic species to land and water management decisions, and identifies opportunities to enhance baseflow and maintain stream temperature through the summer low flow period.

Mapping Didymosphenia in the Logan River Drainage (104B)

Project Type: Annual Base Grant **Project ID:** 2017UT204B

Project Impact: The project as funded generated two complementary research projects, one focused on *Didymosphenia geminata* in the Logan River drainage and a second on the influence of Beaver dams on river biogeochemistry in the Logan River drainage. *Didymosphenia geminata* (Didymo) is a nuisance algal species that has proliferated in stream environments in recent decades. Didymo was observed at all sampling locations in the main stem of the Logan River. However, excessive stalk development only occurred below 1st dam. Biomass of stalk at this location showed a negative relationship to soluble reactive phosphorus concentrations ($r^2 = 0.77$, p