

**Virginia Water Resources Research Center
Virginia Polytechnic Institute and State University**

**Annual Technical Report
2018**

General Information

Products

Peer-Reviewed Research Publications (22):

Bailey, S.W., K.J. McGuire, D.S. Ross, M.B. Green, and O.L. Fraser. 2019. Mineral weathering and podzolization control acid neutralization and streamwater chemistry gradients in upland glaciated catchments, northeastern USA, *Frontiers in Earth Science*, 7, 63, doi:10.3389/feart.2019.00063.

Jensen, C.K., K.J. McGuire, D.L. McLaughlin, and D.T. Scott, D.T. 2019. Quantifying spatiotemporal variation in headwater stream length using flow intermittency sensors, *Environmental Monitoring and Assessment*, 191(4), 226, doi:10.1007/s10661-019-7373-8.

Lang, A.J., W.M. Aust, M.C. Bolding, K.J. McGuire, and E.B. Schilling. 2018. Best management practices influence sediment delivery from road stream crossings to mountain and piedmont streams, *Forest Science*, 64(6), 682–695, doi: 10.1093/forsci/fxy019.

Oda, T., M.G. Green, R. Urakawa, T.M. Scanlon, S.D. Sebestyen, K.J. McGuire, M. Katsuyama, K. Fukuzawa, M.B. Adams, and N. Ohte. 2018. Stream runoff and nitrate recovery times after forest disturbance in the USA and Japan. *Water Resources Research*, 54, 6042–6054, doi: 10.1029/2017WR021986.

McDonnell, J.J., J. Evaristo, K. Bladon, J. Buttle, I. Creed, S. Dymond, G. Grant, A. Iroume, C.R. Jackson, J. Jones, T. Maness, K. McGuire, D. Scott, C. Segura, R. Sidle, and C. Tague. 2018. Water sustainability and watershed storage, *Nature Sustainability*, 1: 378–379, doi:10.1038/s41893-018-0099-8.

McLaughlin, D.L., J.S. Diamond, C. Quintero, J. Heffernan, and M.J. Cohen. 2019. Wetland connectivity thresholds and flow dynamics from stage measurements. *Water Resources Research*: doi:10.1029/2018WR024652.

Schulte, M.L., D.L. McLaughlin, F.C. Wurster, J.M. Varner, R.D. Stewart, W.M. Aust, C.N. Jones, and B. Gile. 2019. Short- and long-term hydrologic controls on smoldering fire in wetlands soils. *International Journal of Wildland Fire* 28: 177-186, doi:10.1071/WF18086. [cover feature]

Jones, C.N., A. Ameli, B. Neff, G. Evenson, D.L. McLaughlin, H. Golden, and C. Lane. 2019. Modeling connectivity of non-floodplain wetlands: insights, approaches, and recommendations. *Journal of American Water Resources Association* 55: 559-577, doi:10.1111/1752-1688.12735. [in featured collections on The Emerging Science of Aquatic System Connectivity]

Schulte, M.L., D.L. McLaughlin, F.C. Wurster, K. Balentine, G.K. Speiran, M. Aust, R.D. Stewart, J.M. Varner, and C.N. Jones. 2019. Linking ecosystem function and hydrologic regime to inform restoration of a forested peatland. *Journal of Environmental Management* 233: 342-351, doi:10.1016/j.jenvman.2018.12.042.

Stovall, A., J.S. Diamond, R.A. Slesak, D.L. McLaughlin, and H. Shugart. 2019. Quantifying wetland microtopography with terrestrial laser scanning. *Remote Sensing of Environment*: doi:10.1016/j.rse.2019.111271.

Diamond, J., D.L. McLaughlin, R. Slesak, A. D'Amato, and B. Palik. 2018. Forested versus herbaceous wetlands: can management mitigate ecohydrologic regime shifts from invasive emerald ash borer. *Journal of Environmental Management* 222: 436-446, doi:10.1016/j.jenvman.2018.05.082.

Evenson, G., C.N. Jones, D.L. McLaughlin, H. Golden, C. Lane, B. DeVries, L.C. Alexander, M.W. Lang, G.W. McCarty, and A. Sharifi. 2018. A watershed- scale model for depressional wetland-rich landscapes. *Journal of HydrologyX* 1: doi:10.1016/j.hydroa.2018.10.002.

Dong, X., M.J. Cohen, J. Martin, D.L. McLaughlin, A. Murray, N.D. Ward, M. Flint, and J. Heffernan. 2018. Ecohydrologic processes and soil thickness feedbacks control limestone-weathering rates in a karst landscape. *Chemical Geology*: doi:10.1016/j.chemgeo.2018.05.021.

Juran, L., E.A. Adams, and S. Prajapati 2019. Purity, pollution, and space: barriers to latrine adoption in post-disaster India. *Environmental Management*. DOI: 10.1007/s00267-019-01202-6

Sherry, J., L. Juran, K.N. Kolivras, and L.H. Krometis, E.J. Ling 2019. Perceptions of water services and innovations to improve water services in Tanzania. *Public Works Management & Policy* 24(3): 260-283.

Aksha, S.K., L. Juran, L.M. Resler, and Y. Zhang 2019. An analysis of social vulnerability to natural hazards in Nepal using a modified Social Vulnerability Index. *International Journal of Disaster Risk Science* 10(1): 103-116.

Drover, D.R., C.E. Zipper, D.J. Soucek, and S.H. Schoenholtz. 2019. Using density, dissimilarity, and taxonomic replacement to characterize mining-influenced benthic macroinvertebrate community alterations in central Appalachia. *Ecological Indicators* <https://doi.org/10.1016/j.ecolind.2019.105535>

DeBruler, D.G., S.H. Schoenholtz, R.A. Slesak, B.D. Strahm, and T.B. Harrington. 2019. Soil phosphorus fractions vary with harvest intensity and vegetation control at two contrasting Douglas-fir sites in the Pacific northwest. *Geoderma* 350: 73-83. <https://doi.org/10.1016/j.geoderma.2019.04.038>

Vander Vorste, R., A. Timpano, C. Cappellin, B. Badgley, C. Zipper, and S. Schoenholtz. 2019. Anthropogenic salinization alters microbial and macroinvertebrate communities but not organic matter decomposition in Appalachian headwater streams. *Freshwater Biology* 64(4): 671-684. <https://doi.org/10.1111/fwb.13253>

Lin, J., J.E. Compton, S.G. Leibowitz, G.W. Mueller-Warrant, W. Matthews, S.H. Schoenholtz, D.M. Evans, R.A. Coulombe. 2019. Seasonality of nitrogen balances in a Mediterranean climate watershed, Oregon, US. *Biogeochemistry* 142(2): 247-264. <https://doi.org/10.1007/s10533-018-0532-0>

Krenz III, R.J. C.E. Zipper, and S.H. Schoenholtz. 2018. Periphyton structure and function in constructed headwater streams of the Appalachian coalfield. *Freshwater Science*. 37(4): 780-794. <https://doi.org/10.1086/700621>

Whitmore, K.M., S.H. Schoenholtz, D.J. Soucek, W.A. Hopkins, and C.E. Zipper. 2018. Selenium dynamics in headwater streams of the central Appalachian coalfield. *Environmental Toxicology & Chemistry* 37(10): 2714-2726. <https://doi.org/10.1002/etc.4245>

Peer-Reviewed Research Publications from VWRRC Seed Grant Program (3):

Jensen, C. K., K.J. McGuire, D.L. McLaughlin, and D.T. Scott. 2019. Quantifying spatiotemporal variation in headwater stream length using flow intermittency sensors. *Environmental Monitoring and Assessment*, 191(4), 226.

Lofton, M. E., R.P. McClure, S. Chen, J.C. Little, and C.C. Carey. 2019. Whole-Ecosystem experiments reveal varying responses of phytoplankton functional groups to epilimnetic mixing in a eutrophic reservoir. *Water*, 11(2), 222.

Adadevoh, J.S.T., C.A. Ramsburg, and R.M. Ford, R.M. 2018. Chemotaxis increases the retention of bacteria in porous media with residual NAPL entrapment, *Environmental Science & Technology*, doi:10.1021/acs.est.8b01172.

Information Transfer Program

Introduction to Information Transfer Program

The VWRRC supports timely dissemination of science-based information to policy- and decision-making entities and to citizens. The VWRRC used its USGS 104b funds to support expert personnel with responsibilities related to administration of the VWRRC and production of the VWRRC's outreach and collaborative programs. USGS 104b funds were not used to support the VWRRC's research program. During the reporting period, the USGS 104b funds were used for:

1. Partial support for administration of the USGS 104b funds, including preparation of 104b proposals and reports and managing 104g proposal submissions.
2. Preparation and electronic publication of the 2019 annual inventory of Virginia General Assembly water-related

bills (<https://www.vwrcc.vt.edu/wp-content/uploads/2019/04/WaterBills2019.pdf>).

3. Partial administrative support for the Virginia Water Monitoring Council.

4. Partial support for production and management of the VWRRC webpage (<https://www.vwrcc.vt.edu/>), VWRRC Facebook, VWRRC Twitter, and Virginia Water Radio.

5. Preparation and electronic publication of the Virginia Water Central Water News Grouper containing annotated links to articles and references relevant to Virginia's water resources. The Water News Grouper is accessed via the VWRRC webpage (<http://vawatercentralnewsgrouper.wordpress.com>).

Student Support

STUDENT SUPPORT

Undergraduate s 8

Masters 1

Ph.D. 2

Post-Doc 0

Total 11

Notable Achievements and Awards

Outreach and Information Transfer Accomplishments

Notifications to Virginia Water Monitoring Council

The VWRRC provides administrative support to the Virginia Water Monitoring Council (VWMC). The VWMC was formed to promote and facilitate coordination of water monitoring programs throughout the Commonwealth of Virginia. Membership in the VWMC is open to any person or organization with responsibility for or interest in water monitoring in Virginia. Weekly water-related announcements via list server are provided to 700 members (representing more than 275 different organizations) of the VWMC. Announcements include information about conferences, workshops, public water meetings in Virginia, job openings, newly published reports, information posted on Web sites, and other pertinent information.

1. Distributed 60 sets of general announcements (>1,300 individual announcements) as e-mail messages to the VWMC membership; each message contained at least a dozen informational announcements, including: calls for papers, conference announcements, job openings, training opportunities, recently published reports, information posted on websites, total maximum daily load (TMDL) public meetings in Virginia, and other pertinent information.
2. Developed 8 sets of special announcements and distributed these as e-mail messages to the VWMC membership for a total of approximately 100 unique announcements; these announcements pertained to VWMC-sponsored activities, information about beach-monitoring and water recreation as specified in grants from the Virginia Department of Health (VDH), job opportunities, stormwater management training opportunities and upcoming conferences.
3. Collaborated with VDH to develop special beach monitoring announcements for distribution to the VWMC membership and beyond.
4. Weekly announcements are posted on the VWRRC (<https://www.vwmc.vwrcc.vt.edu/>) and VWMC (www.VirginiaWMC.org) websites.

VWRRC Website
(www.vwrcc.vt.edu)

The VWRRC website is updated at least weekly and supports a Water News Grouper blog page, which is updated typically twice each week. During the reporting cycle there were approximately 300 posts listed on the Water News

Grouper blog page and approximately 7,000 page views (~22/day). The VWRRC website also serves as the portal for two other websites that the VWRRC manages:

1. Virginia Water Monitoring Council (<http://www.vwmc.vwrrc.vt.edu/>)
2. Virginia Department of Environmental Quality Stormwater BMP Clearinghouse (<https://www.swbmp.vwrrc.vt.edu/>)

VWRRC is on Twitter at <http://twitter.com/VaWaterCenter> and Facebook (<http://www.facebook.com/pages/Blacksburg-VA/Virginia-Water-Resources-Research-Center/186479556264?v=wall>)

Virginia Water Radio
(www.virginiawaterradio.org)

The VWRRC produces and hosts a weekly 5-minute radio show featuring summaries of recent water news, upcoming water events, and water-related sounds or music. The radio show also includes relevance to specific Virginia science and social studies standards of learning for Virginia public schools for each episode. Virginia Water Radio is broadcast on two campus stations: WECH at Emory & Henry College and WVRU at Radford University. During the reporting period, 52 weekly episodes were produced and the Water Radio Web site had approximately 2,300 page views (~8/day).

Inventory of Virginia General Assembly Water-related Bills

The most-recent final inventory of water-related bills considered by the Virginia General Assembly was posted in April 2019 online at <http://www.vwrrc.vt.edu/virginia-water-legislation/>.

Coordination of Studies

The VWRRC chaired the Water Quality Academic Advisory Committee, which serves an advisory role for the Virginia Department of Environmental Quality to establish and evaluate water-quality criteria and standards for freshwater resources in the Commonwealth of Virginia. During the reporting period, the VWRRC coordinated a study of classification of Class VII swampwaters in Virginia by determining habitat and geomorphological variables that best indicate water bodies for which pH, dissolved oxygen, and biological assemblage criteria for free-flowing streams are not appropriate. The VWRRC also coordinated a literature review of emergin contaminants in Virginia waters to inform future monitoring strategies. This report covers a wide list of emerging contamininants including

- Pharmaceuticals and Personal Care Products (PPCPs)
- Flame Retardants
- Hormones and Endocrine Disruptors
- Perfluorinated Compounds
- Antibiotics, Antibiotic Resistant Microorganisms, and Antibiotic Resistant Genes
- Microplastics and Microfibers
- Nanoparticles

Reports for these two efforts are currently being finalized as VWRRC publications.

International Outreach Activities

1. VWRRC Faculty serve as referees for numerous international journals.
2. Associate Director McGuire serves as Associate Editor of Hydrological Processes, Water Resources Research, and Special Chief Editor of Frontiers in Forests and Global Change, Forest Hydrology section, which publish international research.
3. Director Schoenholtz serves as sub-editor of Current Forestry Reports, an international journal, and as Associate Editor of Journal of American Water Resources Association, which publishes international research.
4. Assistant Professor McLaughlin serves as Associate Editor of Frontiers in Forests and Global Change, an

international journal.

Projects

N/A

Project Type: Coordination Grant **Project ID:** N/A

Project Impact: N/A

N/A

Project Type: National Competitive Grant **Project ID:** N/A

Project Impact: N/A

N/A

Project Type: Annual Base Grant **Project ID:** N/A

Project Impact: N/A

N/A

Project Type: Student Internship **Project ID:** N/A

Project Impact: N/A