# D.C. Water Resource Research Institute
# College of Agriculture, Urban Sustainability and Environmental Sciences

## Annual Technical Report
## 2018

# General Information

## Products

During the reporting period, the DC Water Resources Research Institute received only an annual base federal grant (104b). The Institute supported seven research projects in FY2018, and the overall products of the funded projects are summarized as follows:

A. Articles in Refereed Scientific Journals:
1. Jessup, WH, SE MacAvoy and VP Connaughton (2019), Early developmental exposure to Anacostia River water from Bladensburg Waterfront, Park does not adversely affect zebrafish larvae. Ecotoxicology and Environmental Science.
2. Wilken, RL, A Imanalieva, S MacAvoy, and VP Connaughton (2019). Anatomical and behavioral assessment of larval zebrafish (Danio rerio) reared in Anacostia River water samples. Archives in Environmental Contamination and Toxicology, Submitted.
3. Jessup, WH, SE MacAvoy, and VP Connaughton (2019). Early developmental exposure to Anacostia River water from Bladensburg Waterfront Park does not adversely affect zebrafish larvae. Ecotoxicology and Environmental Science, Submitted.


B. MS Thesis:

1. Jessup, WH. (2018). Analyzing the health of the Anacostia River through zebrafish development and behavior. MS Thesis. American University.
2. Wiegand, J. (2019). Anatomical and behavioral effects of developmental exposure to decamethylcyclopentasiloxane (D5) and 2, 4, 6, 8-tetramethylcyclotetrasiloxane. MS Thesis. American University.
3. Holtscneider, M. (2019). Long-term Hydraulic performance assessment of bio-retention and permeable pavement systems with and without underdrains using monitoring study and modeling

C. Water Resources Research Institute Reports:
1. MacAvoy, Stephen, 2019, Inorganic geochemistry and endocrine disrupters in urban streams: quantifying links between development patterns and water chemistry, DC Water Resources Research Institute, Washington, DC.
2. Connaughton, Victoria, 2019, Using zebrafish to determine biological water health at Anacostia's Bladensburg Waterfront Park, DC Water Resources Research Institute, Washington, DC.
3. Song, Xueqing and Li, William, 2019, Chlorine and Chloramine Removal from Drinking Water by A Novel Polymer Resin with A Covalently Bonded Reducing Agent, DC Water Resources Research Institute, Washington, DC.
4. Behera, Pradeep, 2019, Runoff Control Performance Evaluation and Development of Design Guideline for Green Roof Systems for District of Columbia, DC Water Resources Research Institute, Washington, DC.
5. Farhadi, Leila, 2019, Hydraulic parameter estimation by remotely-sensed top soil moisture observations with the model reduce variational data assimilation scheme, DC Water Resources Research Institute, Washington, DC.
6. Massoudieh, Arash, 2019, Long-term Hydraulic performance assessment of bio-retention and permeable pavement systems with and without underdrains using monitoring study and modeling, DC Water Resources Research Institute, Washington, DC.
7. Zendehdel, Kamran and Trobman, Harris, 2019, Quantifying Innovative Productive Green Infrastructure, DC Water Resources Research Institute, Washington, DC.

D. Conference and Poster Presentations
1. MacAvoy S.E. (2018). Controls on base cations and nutrients in urban and suburban locations in the Anacostia River, Washington DC. Session B43L-2992, American Geophysical Union Annual Meeting, Washington DC.
2. Connaughton, VP, W Jessup, R Wilken, and S MacAvoy. 2019. Effects of Anacostia River water on growth and development in larval zebrafish (Danio rerio). Poster presentation. National Capital Region Water Resources Symposium. University of the District of Columbia. Washington, DC.
3. Wiegand, J. 2019. Laboratory-based assessment of Anacostia River Contaminants. Poster presentation, Robyn Rafferty Mathias Student Research Conference. American University, Washington, DC.
4. Sanchez, P., S Tait, Alhuwayshil S., Badal, J., and Behera, P. (2019). Design and construction of demonstrative green roof systems at Van Ness Campus, American Water Resources Association (AWRA) National Capital Region

Section, Annual Water Symposium: Water Management in Coastal Cities of the Future, Washington DC April 12, 2019

5. Weisshaar, D., and T. Deksissa (2019). Monitoring Nutrient Leaching in Noncirculating Hydroponic Systems at an Active Urban Farm in Washington, DC, American Water Resources Association (AWRA) National Capital Region Section, Annual Water Symposium, Washington, DC, April 12, 2019, Accepted.

6. Rathnayake, M., M. Subur, and T. Deksissa (2019). Assessing Spatial Distribution of Water Quality Contamination in Washington, DC: A Case Study of Coliform, Trace Metals and Polycyclic Aromatic Hydrocarbons, American Water Resources Association (AWRA) National Capital Region Section, Annual Water Symposium, Washington, DC, April 12, 2019, Accepted.

7. Hunt. B. and T. Deksissa (2019). Effectiveness of Green Infrastructure in Retention and Nutrient Removal, American Water Resources Association (AWRA) National Capital Region Section, Annual Water Symposium, Washington, DC, April 12, 2019.

8. Mirowski, V and T. Deksissa (2019). Application of Electrical Conductivity for Nutrient Measurement in the Hydroponic System, American Water Resources Association (AWRA) National Capital Region Section, Annual Water Symposium, Washington, DC, April 12, 2019.

9. Akinleye, I. and T. Deksissa (2018). Assessment of catalytic wet peroxide oxidation for treating pharmaceuticals in water: A review, American Water Resources Association (AWRA) National Capital Region Section, Annual Water Symposium, Washington, DC, April 6, 2018

10. Mendera T., A. Thompso, H. Schomberg, T. Deksissa (2018). Evaluating effects of deficit irrigation strategies on the yield and nutritional values of ethnic crops, American Water Resources Association (AWRA) National Capital Region Section, Annual Water Symposium, Washington, DC, April 6, 2018

11. Guerrero, P.S., T. Deksissa (2018). Trends of lead contamination in tap water, American Water Resources Association (AWRA) National Capital Region Section, Annual Water Symposium, Washington, DC, April 6, 2018

12. Arlotta, C., S. Dachos, K. Williams, T. Deksissa (2018). Monitoring water quality variables in aquaponics systems, American Water Resources Association (AWRA) National Capital Region Section, Annual Water Symposium, Washington, DC, April 6, 2018.

## Information Transfer Program

A. Conferences
In collaboration with NCR-AWRA, the DC WRRI sponsored and co-organized quarterly or annual water symposium or workshop:

1. 2019 NCR WATER RESOURCES SYMPOSIUM, Water Management in Coastal Cities of the Future, Friday, April 12, 8:30 AM - 5:00 PM, University of the District of Columbia (UDC), Washington, DC: http://www.awrancrs.org/events/2018-2019.html. Click here for full program: http://www.awrancrs.org/images/Symposiums/2019/2019_AWRA-NCR_Water_Symposium_Program.pdf.
2. QUARTERLY WATER RESOURCES WORKSHOP: The Food-Energy-Water-Nexus (FEW Nexus), Wednesday, March 20, 5:30 PM - 7:30 PM, the University of the District of Columbia (UDC), Washington, DC: http://www.awrancrs.org/events/2018-2019.html.

B. Laboratory Testing Services:
• The DC WRRI maintained the national accreditation of NELAP (National Environmental Laboratory Accreditation Program) for its Environmental Quality Testing Laboratory (EQTL) at UDC. The UDC's Environmental Quality Testing Laboratory is now accredited in the following areas:
o Microbial analysis in potable and non-potable waters.
o Trace metal element analysis in potable and non-potable waters.
o Mineral element analysis in potable and non-potable waters.
o Mercury analysis in potable and non-potable waters.
o Semi-volatile organic compounds and pesticides in potable and non-potable waters (pending).
o Trace metal element analysis in soil.
o Mineral element analysis in soil.
o Mercury element analysis in soil.
o Semi-volatile organic compounds and pesticides analysis in soil (pending)

• The EQTL provides soil/solid and water quality testing service to DC residents and beyond. In addition, the lab trained graduate and undergraduate students from various program including, PSM in water resources management, urban sustainability, urban agriculture, civil engineering, biology, and chemistry. The laboratory courses are supported by the EQTL lab.

## Student Support

Students supported with annual base (104b) and required matching funds:
Number of Students Supported, by Degree and Grant Type: FY2018
Degree Base (104B) Grants
Undergraduate 10
Masters 14
Ph.D. 5
Post Doc 0

## Notable Achievements and Awards

During the reporting period, the DCWRRI secured more than one-million-dollar extramural funding; became nationally (NELAP) accredited and reaccredited in water quality lab; trained 28 graduate and undergraduate students:

• Leila Farhadi from Howard University developed a research proposal for an observation-driven mapping of the linkage between the Terrestrial Water, Energy and Carbon Cycles, NSF CAREER proposal, July 17th 2019 - pending.
• Arash Massoudieh from Catholic University of America created a cost-effective approach for monitoring and data storage that can be used on a wide range of stormwater green infrastructure. We expect to apply for some grants to implement the system on more storm water GI facilities in DC area in the future.
• Stephen MacAvoy from American University has trained students in organic geochemical methods each semester.
• Harris Trobman and Dr. Kamron Zendehdel have secured five additional funding to support and expand the research project:
o Quantifying the Performance of Rooftop Farms in the District's MS4. Funded by District Department of Energy and the Environment, February 2019, $99,995.
o Incorporating Green Infrastructure into Urban Agriculture. Funded by National Fish and Wildlife Foundation (NFWF), September 2018, $200,000.
o National Green Infrastructure Certificate Training Grant. Funded by DC Water, May 2019, $252,000
o UDC green roof Dashboard Project. Funded by District Department of Energy and the Environment, June, 2019, $200,000.