

# 55th Annual Meeting of the Delaware Water Resources Center

## University of Delaware Water Resources Center

DGS Annex 261 Academy St.  
Newark, Del.  
May 14, 2020

Gerald McAdams Kauffman, Ph.D.  
Director  
University of Delaware  
Water Resources Center

Martha B. Narvaez  
Associate Director  
University of Delaware  
Water Resources Center



# VIA ZOOM Call

- **55<sup>th</sup> Annual UDWRC Advisory Panel Meeting, May 14, 2020 10:00 am – 11:30 pm**
- May 14, 2020 10:00 am to 11:30 pm (GMT-04:00) Eastern Time - New York  
Event details and find a time <https://udel.zoom.us/j/505147266>  
Gerald Kauffman is inviting you to a scheduled Zoom meeting. Join Zoom Meeting  
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 Newark, DE 19716-7380  
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**MEMORANDUM**

**TO:** Advisory Panel of the University of Delaware Water Resources Center  
 Undergraduate/Graduate Water Research Students and Advisors

**FROM:** Gerald J. Kauffman, Director  
 Martha B. Narvaez, Associate Director  
 University of Delaware Water Resources Center

**DATE:** May 8, 2020

**SUBJECT:** 55<sup>th</sup> Annual UDWRC Advisory Panel Meeting, May 14, 2020 10 am

This is a follow up to your April 15, 2020 invitation to the 55<sup>th</sup> Annual Meeting of the Advisory Panel of the University of Delaware Water Resources Center at 10 am on Thursday May 14, 2019 to be held via ZOOM call from the University of Delaware campus in Newark, Delaware. Our charge will be to review the research presentations of the FY19/20 water resources students, discuss the upcoming FY20/21 research projects, and establish water research priorities in Delaware for the upcoming year. Our business meeting will be in the morning followed by a virtual luncheon at 11:30 am. Students please contact your advisors to present a one-slide powerpoint slide that presents your research to the DWRC Advisory Panel the morning of May 14, 2020. Your 10 to 15 page research report will be due June 15, 2020. For guidance on the contents of your research presentations, please see our website here. <https://www.wrc.udel.edu/education/internships/>

**Agenda**  
**Delaware Water Resources Center**  
**55<sup>rd</sup> Annual Advisory Panel Meeting**

10:00 am May 14, 2020		University of Delaware via ZOOM call
1. Introductions		10:00 am
2. FY19/20 Undergraduate/Graduate Research Presentations		10:10
3. DWRC FY20/21 Budget Submittal to DOI/USGS		10:40
4. FY20/21 Undergraduate Water Internship Proposals (start Sep 2020)		10:50
5. DWRC Advisory Panel Membership		11:00
6. DWRC and Delaware Sea Grant		11:10
7. Advanced Federal Water Research Opportunities		11:20
8. Virtual Luncheon		11:30

## Water Resources Research Act Program



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## Authorizations

Water Resources Research Act Program (WRRRA) activities are conducted under the authority of various pieces of authorizing legislation. Many of the primary authorizations that allow the USGS and WRRRA to serve the American people are listed below, along with descriptions of either how the authorization relates to USGS or what WRRRA activities are performed under a particular authorization.

### General USGS Authorizations

The **ORGANIC ACT OF MARCH 3, 1879**, (43 U.S.C. 31 et seq.) that established the Geological Survey, as amended (1962); and restated in annual appropriation acts. This section provides, among others, that the Geological Survey is directed to classify the public lands and examine the geological



**(d) Mails**

The Board may use the United States mails in the same manner and under the same conditions as other departments and agencies of the United States.

**(e) Experts and consultants**

Subject to such rules as may be prescribed by the Board, the Chairman may procure temporary and intermittent services under section 3109(b) of title 5, but at rates for individuals not to exceed the daily equivalent of the maximum annual rate of basic pay payable for GS-18 of the General Schedule.

(Pub. L. 97-425, title V, § 507, as added Pub. L. 100-202, § 101(d) [title III], Dec. 22, 1987, 101 Stat. 1329-104, 1329-121; Pub. L. 100-203, title V, § 5051, Dec. 22, 1987, 101 Stat. 1330-250.)

CODIFICATION

Pub. L. 100-202 and Pub. L. 100-203 added identical sections.

REFERENCES IN OTHER LAWS TO GS-16, 17, OR 18 PAY RATES

References in laws to the rates of pay for GS-16, 17, or 18, or to maximum rates of pay under the General Schedule, to be considered references to rates payable under specified sections of Title 5, Government Organization and Employees, see section 629 [title I, § 101(c)(1)] of Pub. L. 101-509, set out in a note under section 5376 of Title 5.

**§ 10268. Report**

The Board shall report not less than 2 times per year to Congress and the Secretary its findings, conclusions, and recommendations. The first such report shall be submitted not later than 12 months after December 22, 1987.

(Pub. L. 97-425, title V, § 508, as added Pub. L. 100-202, § 101(d) [title III], Dec. 22, 1987, 101 Stat. 1329-104, 1329-121; Pub. L. 100-203, title V, § 5051, Dec. 22, 1987, 101 Stat. 1330-250.)

CODIFICATION

Pub. L. 100-202 and Pub. L. 100-203 added identical sections.

TERMINATION OF REPORTING REQUIREMENTS

For termination, effective May 15, 2000, of provisions of this section relating to reporting to Congress 2 times per year, see section 3003 of Pub. L. 104-66, as amended, set out as a note under section 1113 of Title 31, Money and Finance, and the last item on page 186 of House Document No. 103-7.

**§ 10269. Authorization of appropriations**

Notwithstanding subsection (d) of section 10222 of this title, and subject to subsection (e) of such section, there are authorized to be appropriated for expenditures from amounts in the Waste Fund established in subsection (c) of such section such sums as may be necessary to carry out the provisions of this subchapter.

(Pub. L. 97-425, title V, § 509, as added Pub. L. 100-202, § 101(d) [title III], Dec. 22, 1987, 101 Stat. 1329-104, 1329-121; Pub. L. 100-203, title V, § 5051, Dec. 22, 1987, 101 Stat. 1330-251.)

CODIFICATION

Pub. L. 100-202 and Pub. L. 100-203 added identical sections.

**§ 10270. Termination of Board**

The Board shall cease to exist not later than 1 year after the date on which the Secretary begins disposal of high-level radioactive waste or spent nuclear fuel in a repository.

(Pub. L. 97-425, title V, § 510, as added Pub. L. 100-202, § 101(d) [title III], Dec. 22, 1987, 101 Stat. 1329-104, 1329-121; Pub. L. 100-203, title V, § 5051, Dec. 22, 1987, 101 Stat. 1330-251.)

CODIFICATION

Pub. L. 100-202 and Pub. L. 100-203 added identical sections.

**CHAPTER 109—WATER RESOURCES RESEARCH**

Sec. 10301. 10302. 10303. 10304. 10305. 10306. 10307. 10308. 10309.	Congressional findings and declarations. Congressional declaration of purpose. Water resources research and technology institutes. Research concerning water resource-related problems deemed to be in national interest. Development of water-related technology. Administrative costs. Types of research and development. Patent policy. New spending authority; amounts provided in advance.
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**§ 10301. Congressional findings and declarations**

The Congress finds and declares that—

(1) the existence of an adequate supply of water of good quality for the production of materials and energy for the Nation's needs and for the efficient use of the Nation's energy and water resources is essential to national economic stability and growth, and to the well-being of the people;

(2) the management of water resources is closely related to maintaining environmental quality, productivity of natural resources and agricultural systems, and social well-being;

(3) there is an increasing threat of impairment to the quantity and quality of surface and groundwater resources;

(4) the Nation's capabilities for technological assessment and planning and for policy formulation for water resources must be strengthened at the Federal, State, and local governmental levels;

(5) there should be a continuing national investment in water and related research and technology commensurate with growing national needs;

(6) it is necessary to provide for the research and development of technology for the conversion of saline and other impaired waters to a quality suitable for municipal, industrial, agricultural, recreational, and other beneficial uses;

(7) the Nation must provide programs to strengthen research and associated graduate education because the pool of scientists, engineers, and technicians trained in fields related to water resources constitutes an invaluable natural resource which should be increased, fully utilized, and regularly replenished; and<sup>1</sup>

(8) long-term planning and policy development are essential to ensure the availability

<sup>1</sup> So in original. The word "and" probably should not appear.

of product water, considering the amortization of all components of the demonstration plant and ancillary facilities. Such report shall be accompanied by a proposed contract (or cooperative agreement) between the Secretary and a duly authorized non-Federal entity, in which such entity shall agree to provide not less than 15 per centum and not more than 35 per centum of the total cost of the demonstration; such cost to include, without being limited to, necessary water rights, water supplies, rights-of-way, power source interconnections, brine disposal facilities, land, construction, ancillary facilities, and the operation and maintenance costs for a period of four years following final acceptance of the construction of the plant from the plant contractor. The contributions of the non-Federal entity under such proposed contract may be in-kind. During the participation by the Secretary in the construction and the operation and maintenance of such demonstration, access to the demonstration and its operating data will not be denied to the Secretary or his representatives. The period of participation by the Secretary in the operation and maintenance of any such demonstration shall be four years. The Secretary is authorized to include in the proposed contract a provision for conveying, as appropriate, and in such amounts as are appropriate, rights, title, and interest of the Federal Government in the demonstration project to the non-Federal public entity.

“(c) There is authorized to be appropriated, to remain available until expended, for the fiscal year ending September 30, 1978, and thereafter, the sum of \$50,000,000 to finance the total Federal share of the cost of the demonstration plants authorized by this section; such cost to include, without being limited to, necessary water rights, water supplies, rights-of-way, power source interconnections, brine disposal facilities, land, construction, ancillary facilities, and the operation and maintenance costs for the four-year period of Federal participation in such costs.

“(d) When appropriations have been made for the commencement or continuation of design, construction, or operation and maintenance of any demonstration plant authorized under this Act [this note], the Secretary may, in connection with such design, construction, or operation and maintenance, enter into contracts and cooperative agreements for miscellaneous services, for materials and supplies, as well as for construction, which may cover such periods of time as the Secretary may consider necessary but in which the liability of the United States shall be contingent upon appropriations being made therefor.”

[For termination of Trust Territory of the Pacific Islands, see note set out preceding section 1681 of Title 48, Territories and Insular Possessions.]

#### § 10302. Congressional declaration of purpose

It is the purpose of this chapter to assist the Nation and the States in augmenting their water resources science and technology as a way to—

- (1) assure supplies of water sufficient in quantity and quality to meet the Nation's expanding needs for the production of food, materials, and energy;
- (2) discover practical solutions to the Nation's water and water resources related problems, particularly those problems related to impaired water quality;
- (3) assure the protection and enhancement of environmental and social values in connection with water resources management and utilization;
- (4) promote the interest of State and local governments as well as private industry in research and the development of technology that will reclaim waste water and to convert saline and other impaired waters to waters

suitable for municipal, industrial, agricultural, recreational, and other beneficial uses;

(5) promote more effective coordination of the Nation's water resources research program;

(6) promote the development of a cadre of trained research scientists, engineers, and technicians for future water resources problems; and

(7) encourage long-term planning and research to meet future water management, quality, and supply challenges.

(Pub. L. 98-242, title I, §103, Mar. 22, 1984, 98 Stat. 97; Pub. L. 101-397, §1(a), Sept. 28, 1990, 104 Stat. 852; Pub. L. 104-147, §2, May 24, 1996, 110 Stat. 1375.)

#### REFERENCES IN TEXT

This chapter, referred to in text, was in the original “this Act”, meaning Pub. L. 98-242, Mar. 22, 1984, 98 Stat. 97, known as the Water Resources Research Act of 1984. For complete classification of this Act to the Code, see Short Title note set out under section 10301 of this title and Tables.

#### AMENDMENTS

1996—Par. (5). Pub. L. 104-147, §2(1), struck out “to” before “promote” and “and” after “program;”.

Par. (6). Pub. L. 104-147, §2(2), substituted “; and” for period at end.

Par. (7). Pub. L. 104-147, §2(3), added par. (7).

1990—Par. (5). Pub. L. 101-397 substituted “to promote more effective coordination of” for “coordinate more effectively”.

#### § 10303. Water resources research and technology institutes

##### (a) Establishment; designation of site by State legislature or Governor

Subject to the approval of the Secretary of the Interior (hereafter in this chapter referred to as the “Secretary”) under this section, one water resources research and technology institute, center, or equivalent agency (hereafter in this chapter referred to as the “institute”) may be established in each State (as used in this chapter, the term “State” includes the Commonwealth of Puerto Rico, the District of Columbia, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Mariana Islands and the Federated States of Micronesia) at a college or university which was established in accordance with the Act approved July 2, 1862 (12 Stat. 503) [7 U.S.C. 301 et seq.], or at some other institution designated by act of the legislature of the State concerned. If there is more than one such college or university in a State established in accordance with such Act of July 2, 1862, the institute in such State shall, in the absence of a designation to the contrary by act of the legislature of the State, be established at the one such college or university designated by the Governor of the State. Two or more States may cooperate in the establishment of a single institute or regional institute, in which event the sums otherwise allocated to institutes in each of the cooperating States shall be paid to such single or regional institute.

##### (b) Scope of research; other activities; cooperation and coordination

Each institute shall—



## Delaware Water Resources Center (DWRC)

A unit of the *Institute for Public Administration*  
within the School of Public Policy & Administration in the College of Arts & Sciences



### DWRC Staff

**Gerald J. Kauffman, Ph.D.**  
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**Nicole M. Minni**  
Associate Policy Scientist  
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**Martha C. Narvaez**  
Policy Scientist

**Angela Speers**  
Sponsored Programs  
Coordinator

**Kelly Jacobs**  
M.S. Energy & Environment Policy

**Jillian S. Young**  
M.S. Water Science and Policy

**Undergraduate and  
Graduate Research Fellows**  
bachelor's and master's degree  
students funded by the DWRC



### What is DWRC?

Established on campus in 1965, the University of Delaware Water Resources Center (DWRC) is one of the 54 National Institutes for Water Resources (NIWRs) at land grant universities in the 50 states, District of Columbia, and island territories of Guam, Puerto Rico, and U.S. Virgin Islands. The DWRC is supported by the U.S. Geological Survey through Section 104 of the Water Resources Research Act signed into law by Lyndon Baines Johnson in 1964. The mission of the DWRC is to: (1) support water resources research, education, and public outreach programs in Delaware and (2) sponsor training of future water scientists, engineers, managers, and policy-makers in the First State.

### What is WRA?

Established in 1977 and modified in 1990 and 1997, the Water Resources Agency (WRA) is a program of the DWRC and provides regional water resources assistance to governments in Delaware and the Delaware Valley through the University of Delaware's land-grant public service, education, and research role. The WRA is supported by federal, state, and local government partners, including the State of Delaware, New Castle County, City of Newark, and City of Wilmington.

### Where is DWRC?

The DWRC is located in Newark, Delaware, on UD's main campus at 261 Academy Street in the Delaware Geological Survey (DGS) Annex, behind Penny Hall and the UD Rain Garden.

### DWRC Partners

- Brandywine Conservancy
- Brandywine Valley Association
- City of Wilmington
- City of Newark
- Delaware Nature Society
- Delaware Center for Horticulture
- Delaware Greenways
- Delaware Department of Transportation
- Delaware River Basin Commission
- Delaware Department of Natural Resources and Environmental Control
- FishAmerica Foundation
- New Castle Conservation District
- New Castle County
- National Oceanic and Atmospheric Administration
- National Park Service
- Partnership for the Delaware Estuary
- SUEZ Water Delaware
- The Nature Conservancy (Delaware)
- UD Colleges
- U.S. Environmental Protection Agency
- U.S. Geological Survey
- William Penn Foundation

### DWRC is involved with...

- Christina Basin Clean Water Partnership
- City of Wilmington Green Jobs Program
- Delaware Flora Database
- Delaware Source Water Assessment and Protection Program
- Delaware Water Supply Coordinating Council
- Delaware Watersheds
- Economic Value of Watersheds
- GIS Services/Education/Outreach
- Sussex Economic Development Action Committee
- Sustainable Coastal Community Initiative
- White Clay Creek Wild and Scenic Management Committee

[www.wrc.udel.edu](http://www.wrc.udel.edu)



## DWRC Faculty and Scientists



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The Delaware Water Resources Center (DWRC) is a unit of the Institute for Public Administration (IPA), a research center within the School of Public Policy & Administration (SPPA) at the University of Delaware. Dr. Jerome Lewis is the IPA Director and can be reached at 302-831-8971.

## Directions

DWRC has two Delaware offices its main office on the University of Delaware's Newark campus, between Penny Hall and the Perkins Student Center, and on the Hugh R. Sharp campus of the University of Delaware in Lewes. Detailed directions for both locations are at [www.wrc.udel.edu](http://www.wrc.udel.edu).



**DWRC Newark Office**  
 DGS Annex  
 261 Academy Street  
 University of Delaware  
 Newark, Delaware 19716

**DWRC Lewes Office**  
 805 Pilottown Road  
 Pollution Ecology Lab, Room 109  
 Lewes, Delaware 19958



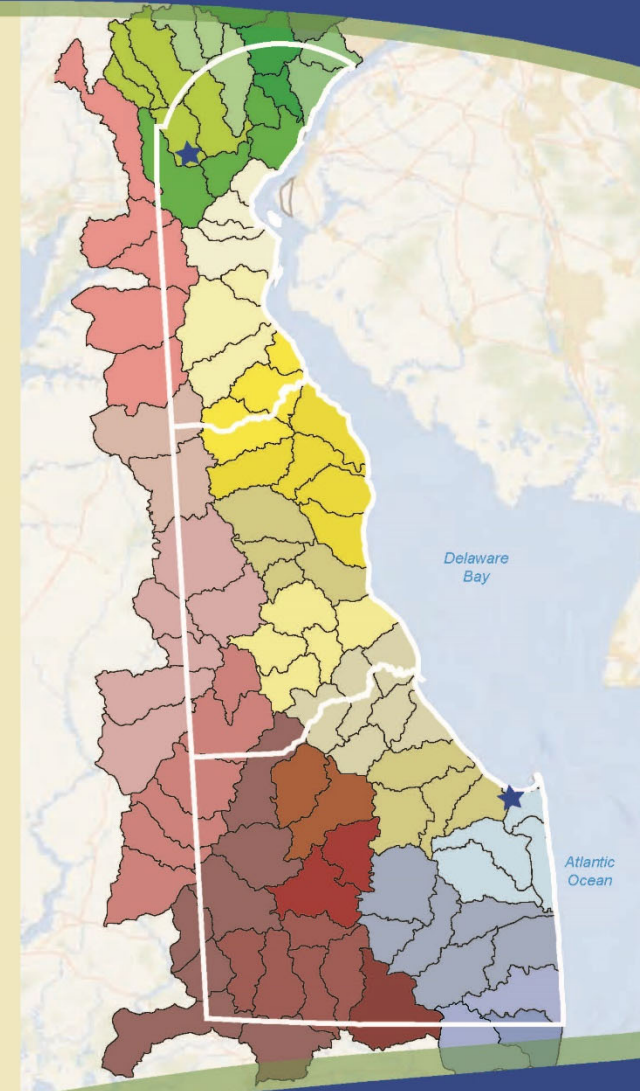
### Where to find us



### An Equal Opportunity / Affirmative Action Employer

The University of Delaware is committed to assuring equal opportunity to all persons and does not discriminate on the basis of race, color, gender, religion, ancestry, national origin, sexual orientation, veteran status, age, or disability in its educational programs, activities, admissions, or employment practices as required by Title IX of the Education Amendments of 1972, Title VI of the Civil Rights Act of 1964, the Rehabilitation Act of 1973, the Americans with Disabilities Act, other applicable statutes and University policy. Inquiries concerning these statutes and information regarding campus accessibility should be referred to the Affirmative Action Office, 305 Hulliher Hall, (302) 831-2835 (voice), (302) 831-4563 (TDD).

## Water Resources Center





## Mission

The University of Delaware Water Resources Center (DWRC), established in 1965, is one of the 54 National Institutes for Water Resources (NIWRs) at land-grant universities in the 50 states, District of Columbia and island territories of Guam, Puerto Rico, and U.S. Virgin Islands. The DWRC receives funding through Section 104 of the Water Resources Research Act of 1984, which was originally signed into law by Lyndon Baines Johnson in 1964. The U.S. Geological Survey administers the provisions of the Act and provides oversight of the nation's Water Resources Centers through the National Institute of Water Resources (NIWR).

As a member of the NIWR, the DWRC has two key missions related to Delaware's water resources – our precious groundwater aquifers and our streams, ponds, lakes, and coastal waters to: (1) support research, education, and public outreach programs that focus on water management issues of importance to Delaware citizens and (2) to foster and support training and education programs for the future water scientists, engineers, managers, and policy-makers.



## Education

DWRC provides an important role in water resources education at the University of Delaware and to the greater public. The DWRC carries out its education role through participating in outreach activities; offering courses, seminars and forums with a water resources focus; and advising undergraduate and graduate students through funded assistantships.



### Courses Offered

- UAPP 611: Regional Watershed Management
- GEOG 432: Environmental Hydrology
- CIEG 440: Water Resources Engineering
- UAPP 667: GIS Applications in Public / Nonprofit Sectors
- UAPP 652: GIS in Public Policy

### Conferences

- Water Policy Forum
- Delmarva GIS Conference

### Community Events

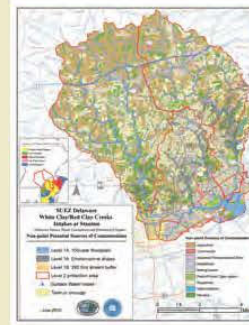
- Delaware Clean Water Rally
- Delaware GIS Day
- University of Delaware Ag Day
- University of Delaware Coast Day



## Public Service

DWRC provides water policy assistance to governments in Delaware and the surrounding region. This public service role is significant to the mission of the College of Arts & Sciences and the School of Public Policy & Administration (SPPA). DWRC takes a regional, intergovernmental approach to water management since watersheds and aquifers cross many political jurisdictions.

The Water Resources Agency, a project of the DWRC, receives support from Delaware, New Castle County, and the cities of Wilmington and Newark to provide water resources assistance to the public with regard to water supply, water quality, and watershed planning and management.



### Water Supply

- Delaware's Water Supply Coordinating Council
- Office of the State Water Coordinator
- New Castle County Water Resource Protection Areas, Technical Advisory Committee
- Delaware Source Water Assessment and Protection Program

### Watershed Management and Planning

- Christina Basin Clean Water Partnership
- White Clay Creek Wild and Scenic Management Committee
- Nonpoint Education for Municipal Officials (NEMO)
- Floodplain/Stormwater Management

### Mapping and Data Services

- Comprehensive Plan Mapping
- Mapping Applications
- Public and Private Education (K-12) Assistance
- Regional Watershed Mapping, Data Creation, and Analysis



## Research

DWRC seeks opportunities to collaborate with University faculty, scientists, and students to fund, conduct, and publish water-resources research.

### University of Delaware Experimental Watershed

Development of an experimental watershed as an on-campus education and research laboratory.

### Geospatial Analysis and Information Management

Repository of core DWRC data and information collaboration in water research with other groups on campus and beyond. Advancement of GIS and remote-sensing technologies for water resources management.

### Publications and Presentations

Research on topics such as water policy, watershed management, water rates, and public-private water management at regional and national conferences.

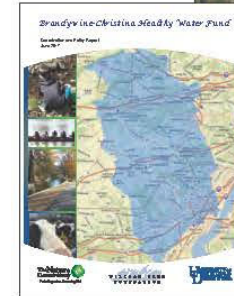
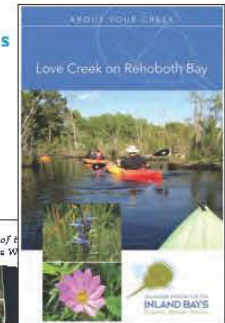




Figure 1. Map of Newark and environs (source: Water Resources Agency, Institute for Public Administration, University of Delaware\*, 2008)

The University of Delaware is fortuitously situated on campuses ideally suited by hydrology and geography to study water resources.



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**Great News on Our New Funding Levels for FY 2020**

Daniel Devlin <ddevlin@ksu.edu> Tue, Dec 17, 2019 at 8:56 AM  
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Dear NIWR Directors and Staff,

Greetings! I want to keep you updated on the latest regarding Fiscal Year 2020 funding. As this is the last week Congress is in session before the winter recess, a lot is transpiring over a few limited days.

**Fiscal Year 2020 Appropriations:**

The House of Representatives just released the text of two FY20 "minibus" appropriations bill that fund all Federal agencies through the rest of Fiscal Year 2020 (Until October of next year). I am pleased to report that Congress included \$234 million for USGS's Water Division, including **\$10 million for the WRRR Program**. This represents a \$3.5 million increase over current funding level of \$6.5 million.

In terms of process and timing, the House is scheduled to take up these minibus bills tomorrow on the House floor. The Senate is then expected to take up the packages later this week to send it to the President before the current Continuing Resolution expires at midnight on Dec. 20<sup>th</sup>. Indications at this point are that the President intends to sign the packages to avoid a government shutdown.

**WRRR Reauthorization:**

As you may also recall, both the House and the Senate have introduced a WRRR Reauthorization bill. I am pleased to report that both the House and Senate bills have bipartisan support. It is our understanding that both the House and Senate expect to move a series of water bills in the early part of next year, and we have been working with the committees to help ensure that our reauthorization is part of that process. Thank you to all of the state directors for reaching out to your Delegation Members to encourage them to cosponsor the bills. Showing that the bills have strong bipartisan support will ease the process towards moving the reauthorization.

I wanted to thank you all again for all of your advocacy with your state delegations. I hope that you all have a wonderful holiday season, and we look forward to working with you next year as we begin the FY21 process.

# 115<sup>th</sup> Congress

## Senate Committee on Environment and Public Works

### **Majority Members**

John A. Barrasso (R-WY) *Chairman*  
James M. Inhofe (R-OK)  
Shelley Moore Capito (R-WV)  
John Boozman (R-AR)  
Roger F. Wicker (R-MS)  
Debra S. "Deb" Fischer (R-NE)  
Jerry Moran (R-KS)  
M. Michael "Mike" Rounds (R-SD)  
LTC Joni K. Ernst, ARNG (Ret) (R-IA)  
Daniel S. "Dan" Sullivan, USMCR (R-AK)  
Richard C. Shelby (R-AL)

### **Minority Members**

Thomas R. "Tom" Carper (D-DE) *Ranking Member*  
Benjamin L. "Ben" Cardin (D-MD)  
Bernard "Bernie" Sanders (I-VT)  
Sheldon Whitehouse (D-RI)  
Jeff Alan Merkley (D-OR)  
Kirsten Elizabeth Gillibrand (D-NY)  
Cory A. Booker (D-NJ)  
Edward J. "Ed" Markey (D-MA)  
LTC Ladda Tammy Duckworth, ARNG (Ret) (D-IL)  
Christopher "Chris" Van Hollen, Jr. (D-MD)



# SUBCOMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

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Shelley Moore Capito (R-WV)  
John Boozman (R-AR)  
Roger F. Wicker (R-MS)  
Debra S. "Deb" Fischer (R-NE)  
Jerry Moran (R-KS)  
LTC Joni K. Ernst, ARNG (Ret) (R-IA)  
Daniel S. "Dan" Sullivan, USMCR (R-AK)  
Richard C. Shelby (R-AL)  
John A. Barrasso (R-WY) *Ex Officio, Non-Voting*

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Edward J. "Ed" Markey (D-MA)  
LTC Ladda Tammy Duckworth, ARNG (Ret) (D-IL)  
Thomas R. "Tom" Carper (D-DE) *Ex Officio, Non-Voting*

# 115<sup>th</sup> Congress

## Senate Committee on Appropriations

### **Majority Members**

William Thad "Thad" Cochran (R-MS) *Chairman*  
Addison Mitchell "Mitch" McConnell (R-KY)  
Richard C. Shelby (R-AL)  
Lamar Alexander (R-TN)  
Susan M. Collins (R-ME)  
Lisa Murkowski (R-AK)  
Lindsey O. Graham, USAFR (Ret) (R-SC)  
Roy Blunt (R-MO)  
Jerry Moran (R-KS)  
John H. Hoeven, III (R-ND)  
John Boozman (R-AR)  
Shelley Moore Capito (R-WV)  
James Lankford (R-OK)  
Steve Daines (R-MT)  
John Neely Kennedy (R-LA)  
Marco Rubio (R-FL)

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Patrick J. Leahy (D-VT) *Vice Chairman*  
Patty Murray (D-WA)  
Dianne Feinstein (D-CA)  
Richard J. "Dick" Durbin (D-IL)  
John F. "Jack" Reed (D-RI)  
Jon Tester (D-MT)  
Thomas S. "Tom" Udall (D-NM)  
Jeanne Shaheen (D-NH)  
Jeff Alan Merkley (D-OR)  
Christopher A. "Chris" Coons (D-DE)  
Brian E. Schatz (D-HI)  
Tammy Baldwin (D-WI)  
Christopher S. "Chris" Murphy (D-CT)  
Joe Manchin, III (D-WV)  
Christopher "Chris" Van Hollen, Jr. (D-MD)



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March 9, 2020

Congresswoman Lisa Blunt Rochester  
1123 Longworth House Office Building  
Washington, DC 20515

Re: Water Resources Research Act  
Fiscal Year 2021 Interior, Environment, and Related Agencies Appropriations Bill

Dear Congresswoman Blunt Rochester:

As Director of the University of Delaware Water Resources Center, I wish to respectfully request your support of the House Subcommittee to provide \$11 million for the Water Resources Research Act program in the Fiscal Year 2021 Interior, Environment, and Related Agencies Appropriations bill.

The Water Resources Research Act, signed by Lyndon Baines Johnson in 1964, established the National Institutes for Water Resources (NIWR) at 54 land grant universities (such as the University of Delaware) in the 50 states, Washington D.C., and three island territories of Guam, Puerto Rico, and V Through the U.S. Geological Survey in the Department of Interior, these institutes provide Federally-supported and state-based network dedicated to solving problems of water supply in partnership with universities, local governments, water industry, and the public. Each contributes a minimum of a 2:1 match, thus ensuring that local, state, and regional priorities are addressed and the impact of federal dollars is maximized. The University of Delaware Water Resources Center was established on campus in 1965 and since then we have supported training, and research of thousands of students (many from Delaware high schools) who have been solving the significant water resources issues of the day in Delaware, the Delaware Valley Unites States.

Please don't hesitate to contact me at [jerryk@udel.edu](mailto:jerryk@udel.edu) or cell 302-893-1571 if you have a about this important appropriation concerning our state and national water resources.

Warmly,

Gerald J. Kauffman, Director  
University of Delaware  
Water Resources Center  
Newark, Del. 19716

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March 9, 2020

Senator Chris Coons  
127A Russell Senate Office Building  
Washington, D.C. 20510

Re: Water Resources Research Act  
Fiscal Year 2021 Interior, Environment and Related Agencies Appropriations Bill

Dear Senator Coons:

As Director of the University of Delaware Water Resources Center, I wish to thank you for your continuing support of the Water Resources Research Act (WRRRA) program and respectfully request your support of the Senate Subcommittee to provide \$11 million for the Water Resources Research Act program in the Fiscal Year 2021 Interior, Environment, and Related Agencies Appropriations bill.

The Water Resources Research Act, signed by Lyndon Baines Johnson in 1964, establishes the National Institutes for Water Resources (NIWR) at 54 land grant universities (such as the University of Delaware) in the 50 states, Washington D.C., and three island territories of Guam, Puerto Rico, and Virgin Islands. Through the U.S. Geological Survey in the Department of Interior, these institutes provide a Federally-supported and state-based network dedicated to solving problems of water supply and quality in partnership with universities, local governments, water industry, and the public. Each state contributes a minimum of a 2:1 match, thus ensuring that local, state, and regional priorities are addressed and the impact of federal dollars is maximized. The University of Delaware Water Resources Center was established in 1965 and since then we have supported the education, training, and research of thousands of students (many from Delaware high schools) who have focused on the significant water resources issues of the day in Delaware, the Delaware Valley, and the United States.

Please don't hesitate to contact me at [jerryk@udel.edu](mailto:jerryk@udel.edu) or cell 302-893-1571 if you have any questions about this important appropriation concerning our state and national water resources.

Warmly,

Gerald J. Kauffman, Director  
University of Delaware  
Water Resources Center  
Newark, Del. 19716

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[www.sppa.udel.edu](http://www.sppa.udel.edu)

March 9, 2020

Senator Tom Carper  
513 Hart Senate Office Building  
Washington, DC 20510

Re: Water Resources Research Act (WRRRA)  
Fiscal Year 2021 Interior, Environment and Related Agencies Appropriations Bill

Dear Senator Carper:

As Director of the University of Delaware Water Resources Center, I wish to thank you for your continuing support of the Water Resources Research Act (WRRRA) program and respectfully request your support of the Senate Subcommittee to provide \$11 million for the Water Resources Research Act program in the Fiscal Year 2021 Interior, Environment, and Related Agencies Appropriations bill.

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Please don't hesitate to contact me at [jerryk@udel.edu](mailto:jerryk@udel.edu) or cell 302-893-1571 if you have any questions about this important appropriation concerning our state and national water resources.

Sincerely,

Gerald J. Kauffman, Director  
University of Delaware  
Water Resources Center  
Newark, Del. 19716

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March 9, 2020

Senator Lisa Murkowski, Chair,  
Subcommittee on Interior and Environment  
Appropriations Committee  
SD-131, Dirksen Senate Office Building  
Washington, DC 20510

Senator Tom Udall, Ranking Member,  
Subcommittee on Interior and Environment  
Appropriations Committee  
SH-125 Hart Senate Office Building  
Washington, DC 20510

Dear Senators Murkowski and Udall:

Thank you for the Subcommittee's continuing support for the Water Resources Research Act (WRRA) program. I write to urge your continued support for the WRRA and a request for an FY21 appropriation of \$11 million. The WRRA is a proven and effective program since 1964 and is a vital resource for many constituencies, regional water managers, and local business leaders. The Water Resources Research Act (32 USC 109 et seq.) established National Institutes for Water Resources (NIWR) at 54 land grant universities in the 50 states, District of Columbia, and island territories of Guam, Puerto Rico, and Virgin Islands to research water-related phenomena, aid the entry of new research scientists into water resources fields, train future water scientists and engineers, and distribute the results of sponsored research to water managers and the public.

The U.S. Geological Survey administers the program that provides valuable support for water research critical to local, state, and regional communities. These state programs match federal funds with a 2:1 match-that leverages federal support to address regional needs. These funds support long-term water planning and management and foster the next generation of water scientists, managers and engineers. Although the WRRA program is responsive to water needs of states and regions, it also addresses major national concerns related to drought, harmful algal blooms, flooding, and water contamination. The institutes collaborate with over 150 state agencies, 180 federal offices, and more than 165 local and municipal offices. In each year, Federal dollars are leveraged to support over 350 students in training, over 200 research projects, and more than 550 researchers. Such support fosters successful entry into the STEM job market regionally and nationally.

I appreciate the Subcommittee's support for the Water Resources Research Act and request that you continue funding this program in the FY21 Interior, Environment, and Related Agencies bill.

Warmly,

Gerald J. Kauffman, Director  
University of Delaware  
Water Resources Center  
Newark, Del. 19716

Cc: Senator Tom Carper, Senator Chris Coons

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March 9, 2020

Hon. Betty McCollum, Chairwoman  
Subcommittee on Interior, Environment,  
and Related Agencies  
House Committee on Appropriations  
2007 Rayburn House Office Building  
Washington, DC 20515

Hon. David Joyce, Ranking Member  
Subcommittee on Interior, Environment,  
and Related Agencies  
House Committee on Appropriations  
1016 Longworth Office Building  
Washington, DC 20515

Dear Chairwoman McCollum and Ranking Member Joyce:

I write to urge your continued support for the Water Resources Research Act (WRRA) program in FY 2021 and a request for an FY21 appropriation of \$11 million. The WRRA is a proven and effective program since 1964 and is a vital resource for many constituencies, including regional water managers and local business leaders. The Water Resources Research Act (32 USC 109 et seq.) established National Institutes for Water Resources (NIWR) at 54 land grant universities in the 50 states, District of Columbia, and island territories of Guam, Puerto Rico, and Virgin Islands to research water-related phenomena, aid the entry of new research scientists into water resources fields, train future water scientists and engineers, and distribute the results of sponsored research to water managers and the public.

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Warmly,

Gerald J. Kauffman, Director  
University of Delaware  
Water Resources Center  
Newark, Del. 19716

Cc: The Honorable Lisa Blunt Rochester

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## JFK signs 1961 DRBC Compact

## LBJ signs 1964 Water Resources Research Act



### LYNDON B. JOHNSON

XXXVI President of the United States: 1963-1969

#### 461 - Statement by the President Upon Signing the Water Resources Research Act.

July 17, 1964

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THE Water Resources Research Act of 1964, which I have approved today, fills a vital need.

Abundant, good water is essential to continued economic growth and progress. The Congress has found that we have entered a period in which acute water shortages are hampering our industries, our agriculture, our recreation, and our individual health and happiness.

Assuming a continuation of current practices, by the year 2000 there will not be enough usable water to meet the water requirements of parts of the States of Arizona, California, Colorado, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Utah, Wisconsin, and Wyoming.

This legislation will help us solve this problem. It will create local centers of water research. It will enlist the intellectual power of universities and research institutes in a nationwide effort to conserve and utilize our water resources for the common benefit. The new centers will be concerned with municipal and regional, as well as with national water problems. Their ready accessibility to State and local officials will permit each problem to be attacked on an individual basis, the only way in which the complex characteristics of each water deficiency can be resolved. The bill contemplates a high degree of interstate cooperation, and I urge that this be encouraged.

In large measure, this legislation is a tribute to the vision and wisdom of Senator Clinton P. Anderson of New Mexico. He has long recognized the problems. He developed the program. He guided it through Congress. He has been in the forefront of the effort to see that adequate supplies of water are available in all parts of the Nation.

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Lyndon B. Johnson  
1963-64: Book II

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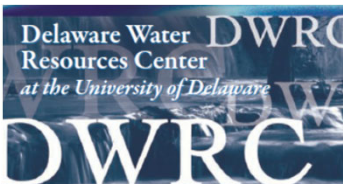






The University of Delaware Water Resources Center, established on campus in 1965 at the 8<sup>th</sup> oldest institution of higher learning in the nation (est. 1743), is now a research center within the Joseph R. Biden School of Public Policy & Administration.

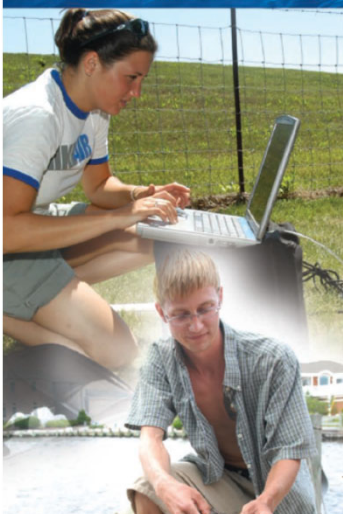




UNIVERSITY OF DELAWARE College of Agriculture & Natural Resources

Delaware Water Resources Center (DWRC) Undergraduate Internships in Water Resources provide a unique opportunity for undergraduate students and faculty to become directly involved in research and education projects addressing water resource related issues of critical importance to Delaware and the Mid-Atlantic region.

## Undergraduate Internships In Water Resources 2015



### Eligibility

All undergraduate students enrolled at an institution of higher learning in Delaware may apply, except for those graduating at the end of the spring semester. All students must have the active support of a faculty advisor and a minimum GPA of 3.0. If a student applies for any other UD-sponsored summer research experience s/he must indicate this on the DWRC application. The DWRC intends to award internships to only those students who have not been awarded another internship within a calendar year.

### Program Details and Deadline

The DWRC provides \$3500 in financial support for each undergraduate internship. Students typically work ten weeks full-time during the summer and additional hours during the fall and winter. Interns must submit a written report on their project and participate in a poster session at the UD spring undergraduate research conference. [The application deadline for 2015 DWRC internships is March 27, 2015.](http://www.dwrc.org) See second page for more information. For details on past projects, current faculty advisors, application materials to submit, and requirements for reports and posters, visit the DWRC website: <http://ag.udel.edu/dwrc/>

### Delaware Water Resources Center (DWRC) interns

experience a complete research or education project. Students, in cooperation with faculty advisors, identify a topic of interest, develop

## The DWRC Internship Program

All DWRC interns conduct a project consistent with the DWRC's research and educational interests (listed below in the green box) with the support of a faculty advisor from one of our co-sponsor organizations. Internships may be available in sponsorship with the following:

**University of Delaware (UD) Water Resources Agency** (<http://www.pa.udel.edu/wra/>): Internships are supported which focus on water resource policy and management.

**UD College of Agriculture and Natural Resources** (<http://canr.udel.edu/>): Projects are supported to work with faculty in the departments of Animal and Food Sciences, Entomology and Wildlife Ecology, Applied Economics and Statistics, or Plant and Soil Sciences. For example, an internship in the Department of Plant and Soil Sciences could relate soils, plants, and land management to water use and quality.

**UD College of Arts and Sciences** (<http://www.cas.udel.edu/>): Students can conduct internship projects in Biological Sciences, Chemistry, Political Science, Public Policy, or other subjects closely related to water resources.

**UD College of Earth, Ocean, and Environment** (<http://www.ceoe.udel.edu/>): Internships are supported in the areas of Geography, Geology, Marine Biology and Biochemistry, Marine Policy, Oceanography, or Physical Ocean Science and Engineering.

**UD College of Engineering** (<http://www.engr.udel.edu/>): Projects can be developed in areas such as Chemical Engineering, Civil and Environmental Engineering, or Mechanical Engineering.

**Delaware Geological Survey** (<http://www.dgs.udel.edu/>): Researchers offer internships focusing on hydrogeology, ground water supply, and water quality.

**Delaware State University** (<http://cars.desu.edu/>): Faculty support internships in the areas of agriculture, natural resources, aquaculture, and aquatic ecology.

**Delaware Department of Natural Resources and Environmental Control** (<http://www.dnrec.delaware.gov/>): Staff in DNREC offices related to water resources occasionally offer internships on topics such as soil and water conservation, water quality, and climate change.

### Topics in water resources research and education of interest to the DWRC:

- Water pollutants - their sources, fate, cycling, and transport
- Water supply, demand, and conservation
- Groundwater identification and protection
- Nutrient management and water quality
- Management and control of storm water runoff

## How to Apply for a DWRC Internship

Select your topic: DWRC internships are for students from a wide variety of backgrounds and research interests. Titles of past projects can be found at <http://ag.udel.edu/dwrc/interns.html> and <http://ag.udel.edu/dwrc/publications/DWRCinternshipSpotlight2009.pdf> and include: White Clay Creek Shad Restoration Project (Water Resources Agency); Developing Scientifically-Based Food Safety Metrics for Water Management and Irrigation Methods (Animal and Food Sciences); The Returns to Best Management Practices: Evidence from Early Proposals for Nutrient Trading in the Chesapeake Bay Watershed (Applied Economics and Statistics); Water Quality Management in Urban Ecosystems (Plant and Soil Sciences); The Impacts of Redefining Navigable Waters under the Clean Water Act (Political Science); Sediment Transport through Historic Mill Dams of the Christina River Basin (Geology); Characterization of Viral Diversity within the Mantle Fluid of the Eastern Oyster, *Crassostrea virginica* (Marine Biology); Preventing Formation of Toxic Chlorination Byproducts in Water Using Zerovalent Iron (Civil and Environmental Engineering); Hydraulic Properties of the Columbia Aquifer (Delaware Geological Survey); and Aquatic Health near Wastewater Discharge in Delaware Inland Bays Tidal Canal (Delaware State University).

Find a Faculty Advisor and Apply to the DWRC: Faculty contacts and their research interests are also listed on the DWRC website, under "Faculty and Staff". Contact the DWRC program coordinator, Maria Pautler ([mpautler@udel.edu](mailto:mpautler@udel.edu); 302-831-0847), to say that you are interested. Students should contact potential faculty advisors to discuss and identify a project topic of mutual interest and then submit their application to the DWRC by the deadline **March 27, 2015**. Faculty may not advise more than two interns concurrently and must provide matching funds consistent with DWRC guidelines, usually by committing a percentage of their time to the intern's project.



### Delaware Water Resources Center

Gerald J. Kauffman, Ph.D., Director  
DGS Annex 261 Academy Street  
Newark, DE 19716  
Phone: 302-831-4929  
E-mail: [jerryk@udel.edu](mailto:jerryk@udel.edu)



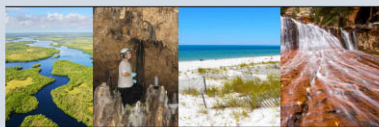
# NIWR & USGS A Model Partnership



run by Danielle Quigley

### PARTNERSHIP WITH USGS

- The National Institutes for Water Resources (NIWR) partners with the U.S. Geological Survey (USGS) through the provisions of the Water Resources Research Act (WRRRA) to address water-related concerns by providing a national platform for research, training and collaboration.
- USGS provides each institute with a grant to target local priorities, recruit researchers and leverage federal funds with state money and private funding.
- 54 NIWR member institutes are housed in the country's land-grant universities in all 50 states, three U.S. territories and the District of Columbia.
- NIWR is the only federally mandated research program that focuses on applied water resource research, education, training and outreach.



Housed in the nation's leading research universities, NIWR

### MAXIMIZING FEDERAL IMPACT

NIWR's ability to attract and match non-federal funds to USGS grant-sponsored research multiplies the federal investment in local water projects. The NIWR-USGS partnership also strengthens USGS's own funding model, as NIWR institutes often allow funds to pass through the institutes to USGS State Water Science Centers. The NIWR institutes open doors for the USGS at the state-level to other funding sources that may require non-federal matching funds. In recent years, the USGS State Water Science Centers have benefitted from funds that have flowed through NIWR institutes from external sources for technical assistance and scientific expertise on large-scale, multi-partner projects that address emerging water research needs.

### WANTED: INTERNS

The USGS is encouraging NIWR institutes to take advantage of its nationwide internship program, details of which follow:

- The interns are hired by the NIWR institute but work with USGS Water Science Center researchers.

### IMPACT & COLLABORATION

- NIWR member institutes assist public and private sector groups in their mission to protect human health, environmental resources and economic sustainability.
- Last year, NIWR member institutes sponsored more than 1,200 groundbreaking research projects.
- Grants from USGS and other sponsors are awarded through a competitive, peer-reviewed process.
- NIWR member institutes collaborated on projects with over 200 universities, 150 state agencies, 180 federal agencies, departments and divisions, and more than 165 local and municipal offices.





# SUCCESS FROM THE GROUND UP

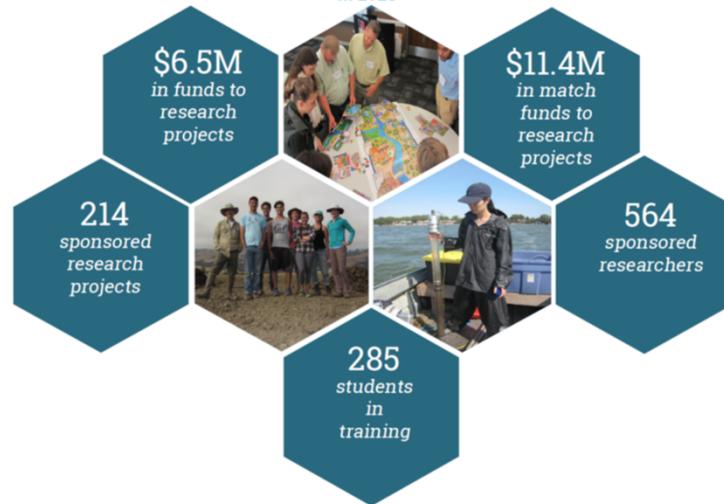
## in water-related practices and policies

The National Institutes for Water Resources (NIWR) plays a major role in addressing water-related concerns by providing a platform for research, training, and collaboration at the state level. Housed in the nation's land-grant universities and four U.S. territories, the 54 NIWR member institutes leverage university expertise in research, education, and outreach to find solutions for the water management challenges we face. With our funding and educational services, water-related professionals and researchers receive support for the creation of local tools and policies to better manage our water. These successes start at the local level and have the ability to grow and make an impact across the United States.

In FY 2015, Congress appropriated \$6.5 million dollars in WRRRA grant funding, enabling cutting-edge research on the nation's most pressing water issues. This financial source requires matching from non-federal sourced funds from the public and private sector. This local financing significantly leverages the available federal dollars for water research.

### NIWR BY THE NUMBERS

in 2015



Photos, starting clockwise at top: 2016 North Carolina Watershed Stewardship Network workshops  
2016 Iowa State University PhD student holding a sediment core at East Okoboji Lake in Iowa.  
2016 University of California field team assessing improvements in water quality during groundwater recharge

## Our history started in 1964

### Water Resources Research Act, USGS, and NIWR

The 1964 Water Resources Research Act (WRRRA) established the nation's Water Resources Research Institutes. Pursuant to the WRRRA of 1984 as amended, the United States Geological Survey (USGS) within the U.S. Department of the Interior assumed responsibility for administering WRRRA funding, which targets local, regional, and national water priorities, helps train and recruit researchers, and aids in the transfer of technology and best practices.

Coordination and interaction between the Institutes and USGS is facilitated by NIWR. A volunteer-led organization, the NIWR network represents the only authorized federal-state program that focuses on applied water resource research, education, training, and outreach.

### NATIONAL INSTITUTES FOR WATER RESOURCES

#### NIWR Board Officers

President: Dr. Stephen H. Schoenholtz, Virginia Tech • [stephen.schoenholtz@vt.edu](mailto:stephen.schoenholtz@vt.edu)  
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Visit us at [niwr.info](http://niwr.info)

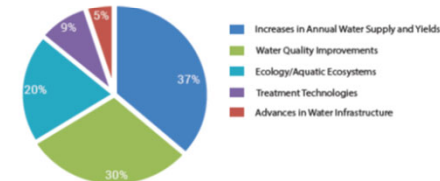
Fact Sheet 2017

# TOOLS FOR

## Annual Base Grants

The largest of the USGS-NIWR research grant programs is the 104(b) Annual Base Funding grant program. Approximately \$5 million in 104(b) grants are awarded annually to NIWR member institutes to help each institute plan and conduct applied and peer-reviewed research, education, and outreach activities on water.

Annual Base Grants Research Areas  
FY 2015



## National Competitive Grants

The 104(g) National Competitive Grants program funds research in water issues that are of a regional or interstate nature or relate to a specific program priority identified by the Secretary of the Interior and the Institutes.

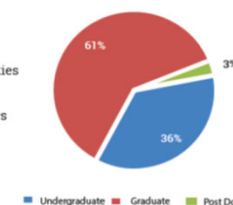
Approximately \$1 million is available each year. In 2015, 104(g) funding was awarded to four research projects studying important national priority issues in water quality and quantity. These projects were:

- "Trace Organic Contaminants in Urban Stormwater and Performance of Urban Bioretention Systems: a Field and Modeling Study" in Colorado
- "Using bioavailability to assess pyrethroid insecticide toxicity in urban sediments" in Illinois
- "Human and Ecological Health Impacts Associated with Water Reuse: Engineered Systems for Removing Priority Emerging Contaminants" in South Carolina
- "Hydrologic Life Cycle Impact of Mountain Pine Bark Beetle Infestations" in South Dakota

## TRAINING OUR FUTURE LEADERS IN WATER

The National Institutes for Water Resources supports learning opportunities for students with funded research projects. Both undergraduate and graduate students explore new ideas and learn new skills. This fosters successful entry into a competitive water resources job market and allows them to make life-long positive water resource impacts.

Student Support  
FY2015



■ Undergraduate ■ Graduate ■ Post Doc

Total Students: 285



# The Network of Water Resources Research Institutes



State	NIWR	University	Department	City	Director	Rank
Alabama	Water Resources Research Institute	Auburn	Agriculture Economics Rural Sociology	Auburn	Dr. Samuel Fowler	Associate Professor
Alaska	Water & Environmental Research Center	Alaska	Institute of Northern Engineering	Fairbanks	Dr. William Schnabel	Associate Professor
Arizona	Water Resources Research Center	Arizona	Agriculture and Resource Economics	Tucson	Dr. Sharon Megdal	Neely Endowed Professor
Arkansas	Water Resources Center	Arkansas	Agriculture/Coop Extension	Fayetteville	Dr. Brian Haggard	Professor
California	Institute for Water Resources	California	Agriculture/Natural Resourc.	Oakland	Dr. Doug Parker	Professor
Colorado	Water Institute	Colorado	Soil and Crop Sciences	Fort Collins	Dr. Reagan Waskom	Professor
Connecticut	Institute of Water Resources	Connecticut	Natural Resources	Storrs	Dr. Glenn Warner	Professor
Delaware	Water Resources Center	Delaware	Public Policy and Administration	Newark	Dr. Gerald Kauffman	Assistant Professor
District of Columbia	Water Resource Research Institute	D.C.	Agriculture/Environment	D.C.	Dr. Tolessa Deksissa	Associate Professor
Florida	Water Resources Research Center	Florida	Sustainable Infrastructure	Gainesville	Dr. Kirk Hadfield	Professor
Georgia	Water Resources Institute	Georgia Tech.	Civil and Environmental Engineering	Atlanta	Dr. Aris Georgakakos	Professor
Guam	Water Research Institute Western Pacific	Guam	Water Resources Engineering	Mangilao	Dr. Khosrowpanah	Professor
Hawaii	Water Resources Research Center	Hawaii	Sea Grant	Honolulu	Dr. Darren T. Lerner	Research Faculty
Idaho	Water Resources Research Institute	Idaho	Civil Engineering	Boise	Dr. John Tracy	Professor
Illinois	Water Resources Center	Illinois	Sea Grant	Urbana	Dr. Brian Miller	Director
Indiana	Water Resources Research Center	Purdue	Agronomy	West Lafayette	Dr. Ronald Turco	Professor
Iowa	Water Center	Iowa State	Agronomy	Ames	Dr. Rick Cruse	Professor
Kansas	Water Resources Institute	Kansas State	Agricultural Resources and the Environment	Manhattan	Dr. Daniel Devlin	Director
Kentucky	Water Resources Research Institute	Kentucky	Civil and Environmental Engineering	Lexington	Dr. Lindell Ormsbee	Raymond-Blythe Professor
Louisiana	Water Resources Research Institute	Louisiana State	Civil and Environmental Engineering	Baton Rouge	Dr. Frank Tsai	Associate Professor
Maine	Water Resources Research institute	Maine	Senator George Mitchell Center for Sustainability	Orono	Dr. John Peckenham	Senior Research Scientist
Maryland	Water Resources Research Center	Maryland	Civil and Environmental Engineering	College Park	Dr. Kaye Brubaker	Associate Professor
Massachusetts	Water Resources Research Center	Massachusetts	Engineering	Amherst	Dr. Paula Rees	Director
Michigan	Institute of Water Research	Michigan State	Agriculture, Recreation and Resource Studies	East Lansing	Dr. Jon Bartholic	Professor
Minnesota	Water Resources Center	Minnesota	Humphrey School of Public Affairs	St. Paul	Dr. Deborah Swackhamer	Professor
Mississippi	Water Resources Research Institute	Mississippi State	Cooperative Extension	Starkville	Dr. Joe E. Street	Associate. Director
Missouri	Water Resources Research Center	Missouri	Civil and Environmental Engineering	Columbia	Dr. Baolin Deng	C.W. LaPierre Professor

Montana	Water Center	Montana State	Ecology	Bozeman	Dr. Wyatt Cross	Associate Professor
Nebraska	Water Center	Nebraska	Civil Engineering	Lincoln	Dr. Chittaranjan Ray	Professor
Nevada	Water Resources Research Institute	Desert Res. Inst.	Hydrologic Services	Reno	Dr. James Thomas	Director
New Hampshire	Water Resources Research Center	New Hampshire	Environmental Science	Durham	Dr. William McDowell	Professor
New Jersey	Water Resources Research Institute	Rutgers	Environmental Resources	New Brunswick	Dr. Christopher Obropta	Director
New Mexico	Water Resources Research Institute	New Mexico State	Agriculture	Las Cruces	Dr. Alexander Fernald	Professor
New York	Water Resources Institute	Cornell	Earth and Atmospheric Sciences	Ithaca	Dr. Susan Riha	Professor
North Carolina	Water Resources Research Institute	North Carolina St.	North Carolina Sea Grant	Raleigh	Dr. Susan White	Executive Director
North Dakota	Water Resources Research Institute	North Dakota St.	Civil and Environmental Engineering	Fargo	Dr. Eakalak Khan	Professor
Ohio	Water Resources Center	Ohio State	Civil and Environmental Engineering	Columbus	Dr. Linda Weavers	Professor
Oklahoma	Water Resources Research Institute	Oklahoma State	Environmental/Natural Resources Engineering	Stillwater	Dr. Garey Fox	Orville and Helen Buchanan Chair
Oregon	Institute for Water and Watersheds	Oregon State	Water Resources Science	Corvallis	Dr. Todd Jarvis	Assistant Professor
Pennsylvania	Water Resources Research Center	Penn. State	Ecosystem Science	University Park	Dr. Elizabeth Boyer	Associate Professor
Puerto Rico	Water/Environmental Research Institute	Puerto Rico	Environmental Science	Mayaguez	Dr. Jorge Santos	Director
Rhode Island	Water Resources Center	Rhode Island	Civil and Environmental Engineering	Kingston	Dr. Leon Thiem	Associate Professor
South Carolina	Water Resources Center	Clemson	Strom Thurman Institute	Clemson	Dr. Jeffrey Allen	Assistant Professor
South Dakota	Water Resources Research Institute	South Dakota State	Agricultural Engineering	Brookings	Dr. Van Kelley	Associate Professor
Tennessee	Water Resources Research Center	Tennessee	Institute for Secure and Sustainable Environment	Knoxville	Mr. Tim Gangaware	Associate Director
Texas	Water Resources Institute	Texas A&M	Institute of Renewable Resources	College Station	Dr. Roel Lopez	Professor
Utah	Center for Water Resources Research	Utah State	Civil and Environmental Engineering	Logan	Dr. Mac McKee	Director
Vermont	Water Resources and Lake Studies Center	Vermont	Rubenstein School of Environment Resources	Burlington	Dr. Breck Bowden	Patrick Professor of Watershed
Virgin Islands	Water Resources Research Institute	Univ. of Virgin Islands	Water Resources	St. Thomas	Dr. Henry Smith	Director
Virginia	Water Resources Research Center	Virginia Tech.	Forest Resources	Blacksburg	Dr. Kevin McGuire	Associate Professor
Washington	Water Research Center	Washington State	Economic Studies	Pullman	Dr. Jonathan Yoder	Professor
West Virginia	Water Research Institute	West Virginia	National Research Center for Coal and Energy	Morgantown	Dr. Paul Ziemkiewicz	Director
Wisconsin	Water Resources Institute	Wisconsin	UW Aquatic Sciences Center/Sea Grant	Madison	Dr. James Hurley	Director
Wyoming	Office of Water Programs	Wyoming	Research/Economic Development	Laramie	Dr. Greg Kerr	Director/Lecturer



# 2019 UCOWR/NIWR Annual Water Resources Conference



June 11-13, 2019  
Snowbird, Utah

**UCOWR**  
UNIVERSITIES COUNCIL  
ON WATER RESOURCES

**NIWR**  
THE NATIONAL INSTITUTES  
FOR WATER RESOURCES

# UCOWR | UNIVERSITIES COUNCIL ON WATER RESOURCES

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**Elizabeth (Beth) Boyer**  
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[ewb100@psu.edu](mailto:ewb100@psu.edu)

**COMMITTEE CHAIRS / LIAISONS**

2019 Awards – Sharon Megdal  
2019 Conference – David Stevens  
2019 Tech Program – Kevin Wagner  
2019 Tech Apprentice – Kelly Cobourn  
Board Elections – Kevin Wagner  
Warren Hall Medal – Kevin Wagner  
Strategic Planning – Jeff Johnson  
NIWR Liaison – Doug Parker  
NIDIS Representative – Jeff Johnson

April 3, 2019

Dr. Gerald Kauffman  
University of Delaware  
Water Resources Center  
DGS Annex, 261 Academy St  
Newark, DE 19716

Dear Jerry:

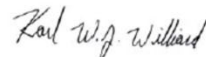
I am pleased to announce that you have been elected by the delegates of the Universities Council on Water Resources to serve as a member of the Board of Directors. On behalf of the entire Board, congratulations!

Your term will commence with the UCOWR Board meeting to be held on Thursday, June 13 at 7:00 am, at the 2019 UCOWR/NIWR Conference at Snowbird, Utah. There will be an earlier Board meeting held the day before the conference begins, on Monday, June 10 at 9:00 am, which you are encouraged to attend as a guest. Your term will extend for a period of three years, ending with the 2022 Annual Conference.

We hope that you will be able to attend this year's conference in order to formally meet the other Board members, be introduced to the delegates at the Delegate Luncheon on June 11, and attend both of the Board meetings that will be held at the conference. Registration for the conference is available at <https://ucowr.org/2019-conference/registration/>. If you have questions regarding the conference, please contact Staci Eakins at [seakins@siu.edu](mailto:seakins@siu.edu).

Thank you for your willingness to assume the responsibility of serving on our Board. We look forward to working with you to further the mission of UCOWR.

Sincerely,



Karl W.J. Williard  
Executive Director

KW:se

1231 Lincoln Drive, Room 118  
Southern Illinois University – Mail Code 4526  
Carbondale, IL 62901  
Phone (618) 536-7571 • Fax (618) 453-2671 • E-Mail [ucowr@siu.edu](mailto:ucowr@siu.edu)  
[www.ucowr.org](http://www.ucowr.org)



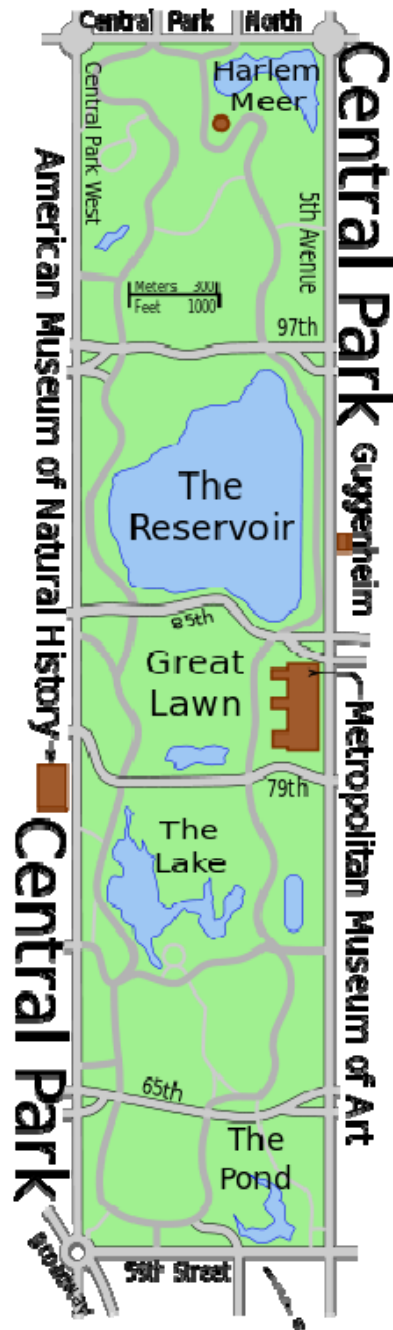
## FY19-20 DWRC Undergraduate Water Research Interns

Undergraduate Intern	Advisor	Major	Research Topic
Sicily Bordick	Anastasia Chirnside	Environmental Engineering	Optimization of HPLC Analysis of Ergosterol to Quantify Fungal Biomass within Solid State Bioreactors utilizing Varying Support Materials
Zach Burcham	Anastasia Chirnside	Environmental Engineering	Optimization of HPLC Analysis of Ergosterol to Quantify Fungal Biomass within Solid State Bioreactors utilizing Varying Support Materials
Ji Zhendong	James Pizzuto	Environmental Science	Discriminating between Mill Dam and Flood Deposits along the White Clay Creek
Justin Leary	Gerald Kauffman	Environmental Engineering	Characterization and Monitoring of Headwater Streams in the White Clay Creek Watershed
Savanah Love	Stephanie Stotts	Wesley College Environ. Science	Interactive art exhibit focused on salinification of wetlands
Aaron Nolan	Gerald Kauffman	Environmental Engineering	Coastal Flood Planning and Response for Transportation Infrastructure
Polly Ni	Andrew Homsey	Environmental Engineering	Brandywine Piedmont Watershed Stream Monitoring and Habitat Assessment
Luke Stirparo	Gerald Kauffman	Environmental Engineering	Effects of Road Salt and Winter Deicing Agents on Delaware Stream Systems
Michaela Dougherty	Martha Narvaez	Energy and Environ. Policy	Energy Water Nexus and Water Supply Withdrawals in Delaware Watersheds
Undergraduate Student	Gerald Kauffman	Public Policy	Economics and Cost Effectiveness of Watershed Restoration in Delaware Coastal Plain Streams

# Delaware Water Resources Center

## Graduate Students

- **Matt Kirchman (Energy and Environmental Policy),**  
Advisor: Andrew Homsey (Biden School). White Clay  
Creek Water Quality Modeling
- **Kelly Jacobs (Energy and Environmental Policy),**  
Advisor: Martha Narvaez (Biden School). Economic  
Value of the Nanticoke River Watershed in Delaware  
and Maryland

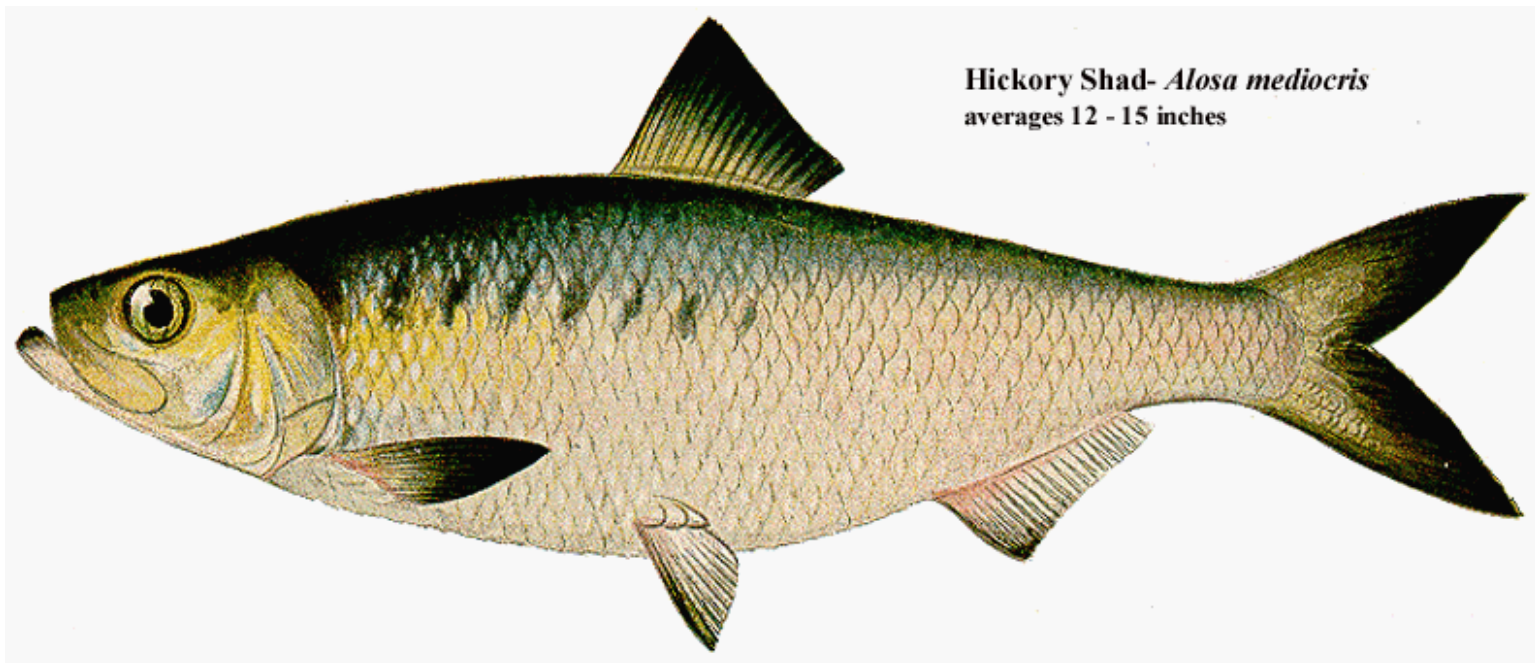


Frederick Law Olmsted designed Central Park in NYC and Brandywine Park in Wilmington, Del. during the 19<sup>th</sup> century

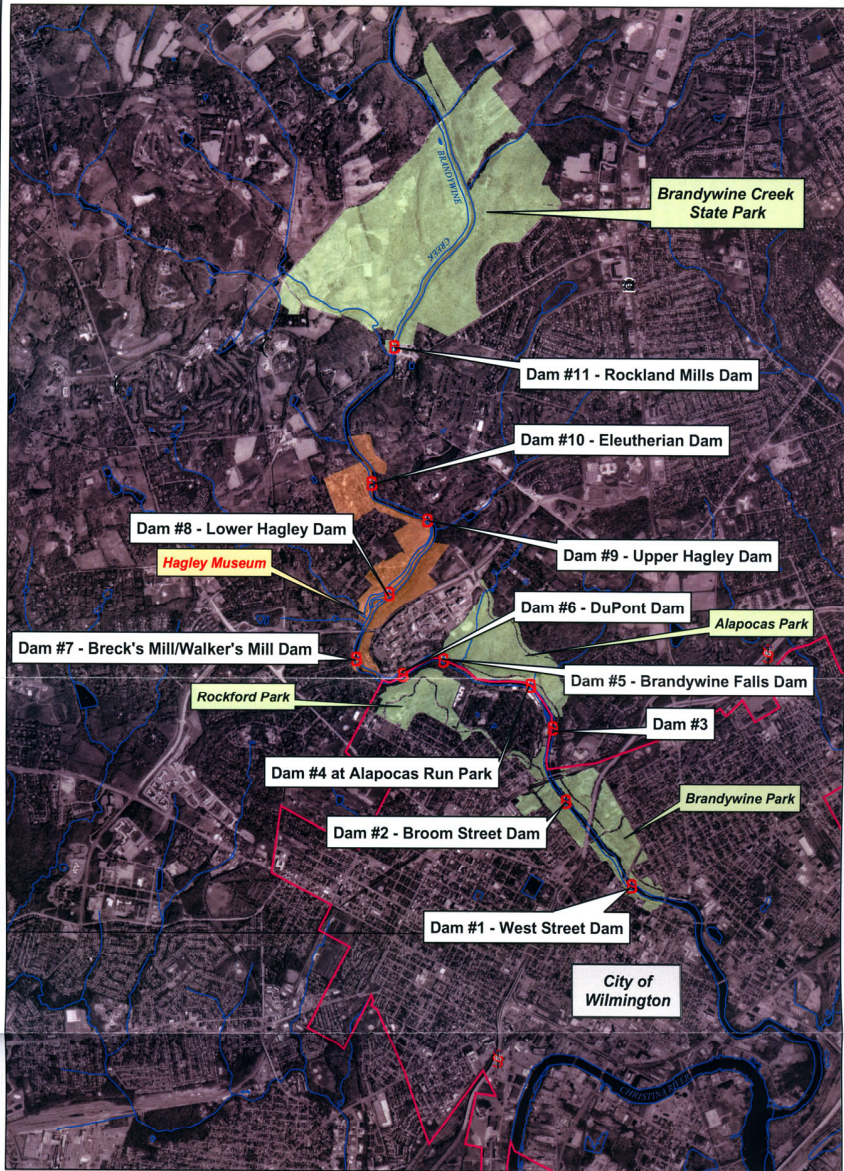




## America's Founding Fish







**Legend**

- S Dam locations
- Streams
- Parks
- Hagley Museum lands
- City of Wilmington

*Map 3*  
**Delaware Dams  
of the  
Brandywine River**

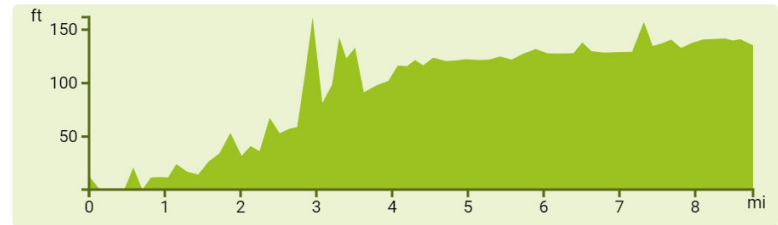


0 0.25 0.5 1 Miles

**Environmental Management Center  
BRANDYWINE CONSERVANCY**  
P.O. Box 141, State Park, Pennsylvania 19117, 610-284-2700  
DATE SOURCE: Base data from Chester County GIS data distribution, 2001.  
Aerial photograph from PECCO/DIR aerial photography, Rowe 2000, Delaware  
Hydrology data from USGS, 2004.

Date: January 19, 2005

**Elevation profile**



## *In Delaware, Dams Are Being Removed to Spur Fish Migration*

Will American shad, striped bass and other fish return to early spawning grounds that were blocked off starting in the mid-1700s by early settlers?

By Jon Hurdle

Feb. 25, 2020

WILMINGTON, Del. — When migratory fish follow their ancestral instinct to swim up Delaware's Brandywine Creek during this spring's spawning season, they will find, for the first time in more than 200 years, that their route is not blocked by a dam.

The fish — American shad, hickory shad and striped bass — have been unable to return to their traditional spawning grounds in the Pennsylvania section of the creek about 25 miles to the north since a series of dams was built across the creek by early American settlers, starting in the mid-18th century.

This year, the fish will be able to swim past the site of a dam that was demolished by the city of Wilmington last fall, allowing them to move as far as the next barrier, Dam 2, about three-quarters of a mile upstream, where large numbers are expected to create a sudden bonanza for anglers.

Beginning next month, "there will be thousands of American shad sitting here," said Jerry Kauffman, a University of Delaware professor. "This area will be full of fishermen because it will be a big fish magnet. It's going to be like Christmas."

Dr. Kauffman, who leads the university's Water Resources Center, is part of Brandywine Shad 2020, a nonprofit that hopes to remove or modify all 10 remaining dams on the 23-mile Delaware section of the creek over the next three years.

Dam 2 won't immediately be removed because that project would be bigger and more expensive. Dr. Kauffman and his associates want to remove or modify four other dams this year, kicking off one of the nation's biggest dam-removal programs across a single watershed.

"This one is probably the most dams that have been targeted on a single river," said Laura Craig, director of river restoration at American Rivers, a conservationist group. "The main thing that distinguishes it is the watershed approach, looking at a set of dams at the same time for removal. This is going to be an example that others will continue to follow."

Removing dams reconnects fish habitat, lowers water temperature, speeds water flow, increases dissolved oxygen — an important indicator of a river's ability to support fish populations — and improves water quality for cities like Wilmington, Dr. Craig said.

The return of shad and other migratory fish to the creek will not only restore an ancient natural rhythm but will also nurture other wildlife like bald eagles that prey on the fish, while their decomposed bodies, post-spawning, add nutrients to the waterway.





# The Billion Dollar Brandywine (\$2013)

The water, natural resources, and ecosystems in the Brandywine Creek watershed contribute an economic value of **\$560 million to \$2 billion** annually to the Pennsylvania and Delaware economies.

1. The Brandywine Creek watershed contributes over **\$890 million** in annual economic activity from water quality, water supply, fish/wildlife, recreation, agriculture, forests, and public parks benefits.
2. Habitats in the Brandywine Creek watershed provide **\$560 million** annually in ecosystem goods and services, with a net present value (NPV) of **\$18.3 billion** calculated over a 100-year period.
3. Natural resources within the Brandywine Creek watershed directly and indirectly support **50,000 jobs** with over **\$2 billion** in annual wages.





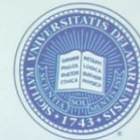
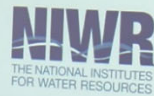


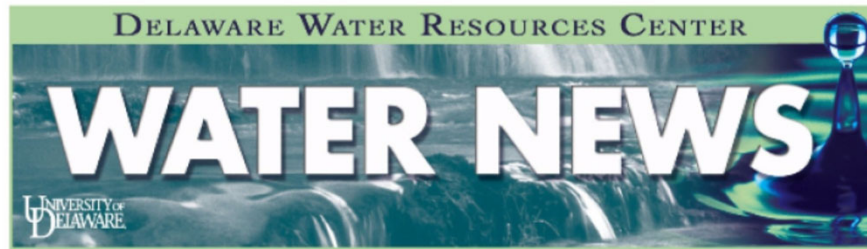


# Delaware Water Resources Center

Joint Atlantic Regional Meeting  
NOAA Sea Grant College Programs & USGS Water Research  
Institutes  
Washington, DC  
Feb 28, 2019

Gerald J. Kauffman, Ph.D., Director  
University of Delaware  
Water Resources Center





January 2020

Volume 18

No. 1

[View the newsletter online.](#)

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## UDWRC Director's Message

### Delaware, the First State in Water

*Dr. Gerald McAdams Kauffman, Director  
University of Delaware  
Water Resources Center*

This has been a very good year in 2019 at the University of Delaware Water Resources Center (UDWRC) as I am pleased to report to you that the UDWRC has been recognized as "exceptional" in support of our students at Delaware universities. In accordance with the Water Resources Research Act of 1984, the U.S. Geological Survey informed the University of Delaware by letter that the UDWRC is "unique nationally" and its collaborations are "impressive," a high rating granted by the US Department of Interior. The five-year evaluation of the 54 National Institutes for Water Resources (NIWR) at land grant universities that stretch from Maine to Micronesia noted that our institute: (1) engages with universities/colleges around the state, (2) has strong leadership on the part of the Institute Director, and (3) facilitates research and information transfer closely tied to the water resources needs/issues of Delaware.

Our very good grade on the USGS report card is due to our sterling water faculty and scientists who have advised over 250 students in research and on-the-job training for careers that address the critical water issues of the day in Delaware such as coastal flooding, water pollution, and climate change. Our national prominence in water was further cemented this year with the news that the University of Delaware student section of the American Water Resources Association was voted for the 4<sup>th</sup> time as the national chapter of the year, a feat only surpassed by the University of Wisconsin and University of Florida.

I am also grateful to have been elected in June 2019 to a three-year term to the Board of Directors of the Universities Council on Water Resources (UCOWR) at the annual meeting along Little Cottonwood Creek, Utah. My fellow UCOWR board members include faculty from Oklahoma State, Mississippi State, Penn State, Purdue, Virginia Tech, Kansas State, Delaware, Hawaii, Cal Berkeley, Washington State, and Southern Illinois. What a great group of water scientists and even better people too!

Established on-campus in 1965, the UDWRC is one of the 54 Congressionally-mandated National Institutes for Water Resources (NIWR) supported by the Department of Interior and US



Geological Survey at land grant universities throughout the US by the Water Resources Research Act of 1984.

Delaware was the first state to sign the Constitution in 1787 and now as we enter our 55<sup>th</sup> year on campus in 2020, we are a "First State" in water as well.



UDWRC Director Gerald Kauffman installed to the Board at the annual Universities Council on Water Resources (UCOWR) conference in Snow Bird, Utah.

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## UDWRC Faculty and Scientists

The UDWRC, established in 1965, is one of 54 NIWRs at land-grant universities in the 50 states, District of Columbia and island territories of Guam, Puerto Rico, and U.S. Virgin Islands. UDWRC is supported through Section 104 of the Water Resources Research Act (WRRRA) of 1984, which was originally signed into law by Lyndon Baines Johnson in 1964. The U.S. Geological Survey administers the provisions of the Act and provides oversight of the nation's Water Resources Centers through the NIWR.

As a member of the NIWR, the UDWRC has two key missions related to Delaware's water resources – our precious groundwater aquifers and our streams, ponds, lakes, and coastal waters to: (1) support research, education, and public outreach programs that focus on water management issues of importance to Delaware citizens and (2) to foster and support training and education programs for the future water scientists, engineers, managers, and policy-makers.

The UDWRC is a unit of the Institute for Public Administration (IPA), a research center within the Biden School of Public Policy & Administration at the University of Delaware. Dr. Jerome Lewis is the IPA Director. The UDWRC faculty, scientists and students include:

- [Gerald J. Kauffman](#) Ph.D. (Director/Assistant Professor)
- [Martha C. Narvaez](#) (Policy Scientist)
- [Andrew R. Homsey](#) (Policy Scientist/Manager of the GIS Lab)
- [Nicole M. Minni](#) (Associate Policy Scientist GIS Lab/Lewes Campus)
- [Angela Speers](#) (Sponsored Programs Coordinator)
- [Kelly Jacobs](#) (Graduate Research Assistant M.S. Energy and Environmental Policy)
- [Matt Kirchoff](#) (Graduate Research Assistant M.S. Energy and Environmental Policy)

UDWRC has two Delaware offices, its main office on the University of Delaware Newark campus, between Penny Hall and the Perkins Student Center, and on the Hugh R. Sharp campus of the

University of Delaware in Lewes. Detailed directions for both locations are [here](#).



Andrew Homsey, Martha Narvaez, and Gerald Kauffman pictured with graduate research assistant Jillian Young after she received the Biden School Excellence in Water Resources Award at Honor's Day in May 2019.

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## 2019/2020 UDWRC Research Interns

With support from the U.S. Department of Interior and U.S. Geological Survey (USGS) through the WRRRA appropriated by Congress, the UDWRC supports undergraduate and graduate students studying water resources to develop research projects that reflect their unique interests. The UDWRC Research Interns for the 2019-2020 school year are:

- **Sicily Bordrick (Environmental Engineering)** *Optimization of HPLC Analysis of Ergosterol to Quantify Fungal Biomass within Bioreactors*
- **Zach Burcham (Environmental Engineering)** *Optimization of HPLC Analysis of Ergosterol to Quantify Fungal Biomass within Bioreactors*
- **Zhendong Ji (Geological Sciences)** *Discriminating Between Mill Dam and Flood Deposits Along the White Clay Creek*
- **Justin Leary (Environmental Engineering)** *Brandywine Piedmont Field Monitoring Plan*
- **Savanah Love (Environmental Science, Wesley College)** *Interactive Art Exhibit Focused on Salinification of Wetlands*
- **Aaron Nolan (Environmental Engineering)** *Wilson Run Watershed Plan in the Brandywine River*
- **Polly Ni (Environmental Engineering)** *Brandywine Piedmont Field Monitoring Plan*
- **Emily Symes (Geological Sciences)** *Sediment Fingerprint Red Clay Creek Watershed*
- **Mary Kegelman (Environmental Engineering)** *Brandywine Piedmont Field Monitoring Plan*
- **Kelly Jacobs (M.S. Energy and Environmental Policy)** *Delaware Center for Inland Bays Economic Valuation*
- **Matt Kirchoff (M.S. Energy and Environmental Policy)** *White Clay Creek Wild & Scenic River Mapping*



Kelly Jacobs

Kelly is a second-year Master's student in the Energy and Environmental Policy program. She is from Dallas, Pennsylvania and received her Bachelor's degree from Lebanon Valley College in Economics. Kelly has worked on various projects for UDWRC including the City of Wilmington's Green Jobs program, field work for White Clay Wild and Scenic, and an economic valuation report for the Nanticoke River watershed in southern Delaware. Kelly is writing her Master's thesis on Marcellus Shale fracking documentaries and how they have influenced public perception and policy in Pennsylvania.



Matt Kirchoff

Matt is a second-year Master's student in the Energy and Environmental Policy program. He is from Laytonsville, Maryland and received his Bachelor's degree from the University of Delaware in Environmental Science. Since Matt is working towards his GIS certificate, most of his work for UDWRC involves mapping and data analysis. He is currently working on a solar aeration project for the City of Newark and updating a web-based, interactive map of the White Clay Creek watershed. Matt's research interests include national seashore feasibility and equity issues related to water resources.

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## USGS Recognizes UDWRC as "Unique Nationally" and "Impressive"

A 5-year evaluation conducted by the U.S. Geological Survey (USGS) under the provisions of Section 104 of the Water Resources Research Act of 1984 finds that among the 54 National Institutes for Water Resources at land grant universities throughout the United States, the University of Delaware Water Resources Center is "unique nationally" and its collaborations are "impressive." In the letter from the USGS to the University of Delaware, the USGS evaluation panel found that:

- The University of Delaware Water Resources Center is unique nationally in that it follows a model that is highly supportive of students. This exceptional support of students is to be commended.
- The extensive collaboration with state and federal agencies, universities, and other entities due to the use of student internships and fellowships was impressive.

UDWRC Director Dr. Gerald J. Kauffman thanks the Administration, Congress, and the USGS for its support of the research, education, and work force training of over 250 student water resources researchers from the University of Delaware, Delaware State University, and Wesley College since 2002. We are especially grateful to our Delaware Congressional Delegation (Senator Tom Carper, Senator Chris Coons, and Congresswoman Lisa Blunt Rochester) for their support of the appropriations in the Water Resources Research Act in the Department of Interior budget. This recognition could not have happened without the leadership from the first two directors since the UDWRC was established on campus in 1965 (Dr. Robert Varrin, Professor of Civil and Environmental Engineering and Dr. Tom Sims, Deputy Dean of Agriculture and Natural Resources) and Bernard Dworsky, first director of the UD Water Resources Agency. Dr. Jerome Lewis (Director) and Lisa Allred (Policy Scientist) of the Institute for Public Administration are instrumental in hosting the UDWRC and bringing the research students on-board for their



graduate assistantships and undergraduate internships.

This is good news as we enter the 55th year of the University of Delaware Water Resources Center!



UDWRC Graduate Research Students Jillian Young (MS Water Science and Policy) (left) and Kelly Jacobs (MS Energy and Environmental Policy Candidate) (right) prepare for fieldwork along the White Clay Creek National Wild and Scenic River in May 2019

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## **The University of Delaware Water Resources Center and Delaware Sea Grant College Program, from Watershed to the Sea**

Two thousand and nineteen was the year that the University of Delaware Water Resources Center (a program of the U.S. Department of Interior in USGS) and Delaware College Sea Grant Program (a program of the U.S. Department of Commerce in NOAA) integrated their research programs from freshwater in the watersheds to saltwater in the bay and the ocean. The UDWRC is one of the 54 National Institutes for Water Resources (NIWR) supported by the USGS at land grant universities throughout the US that traditionally focuses on research in the upland or freshwater regions in Delaware. Delaware Sea Grant (DSG) is one of the 33 sea grant programs along the Atlantic and Pacific and Great Lakes that focuses research on the coastal tidewater and saltwater regions of the First State. Due to our flat coastal geography and status as the lowest lying state in the nation, no area in Delaware is more than 10 miles from sea level. Therefore, it makes sense for the UDWRC and DSG to coordinate our research programs. In February 2019, the USGS Water Research Institutes and NOAA Sea Grant Programs from the Atlantic met in Washington, DC to coordinate our water research programs at Rutgers, Cornell, Penn State, Delaware, Maryland, and Virginia Tech. As part of the integration UDWRC Associate Director Martha Narvaez has been appointed to the Delaware Sea Grant Advisory Council and DSG Associate Director Christian Hauser was appointed to the Delaware Water Resources Center Advisory Panel.



UDWR Director, Dr. Gerald Kauffman, presents at the Joint Atlantic Regional Meeting of the NOAA Sea Grant College Program and USGS Water Research Institutes on February 28, 2019 in Washington, D.C.

## 54th UDWR Advisory Panel Meets at the Biden Institute

On May 16th, the advisory panel of the UDWR met for the 54th annual meeting at the Biden Institute, located at 44 Kent Way. UDWR interns had the opportunity to present their research projects and receive feedback from panel members. Project topics ranged from regenerative agriculture practices at the Coverdale Farm Preserve to addressing perfluoroalkyl chemical contamination in Delaware. UDWR interns spend 10 hours a week from September to May working on their research projects, which often includes fieldwork and collaboration with professors from various departments.

Advisory panel members also discussed new business, including FY 2019/20 research projects, research priorities for the upcoming year, joint ventures with Delaware Sea Grant, and the UDWR becoming part of the newly established Biden School of Public Policy and Administration.

### 2018/19 UDWR Undergraduate Interns include:

- **Michaela Becker (Environmental Engineering)**, Advisor: Paul Imhoff (Civil and Environmental Engineering), Impact on New Castle County Roadway Soils Amended with Biochar
- **Nicolette Bugher (Environmental Engineering)**, Advisor: Gerald Kauffman (Biden School), Monitoring of Perfluoroalkyl Substances (PFAs) in Delaware Drinking Water Aquifers
- **Chelsea Caplinger (Political Science)**, Advisor: Gretchen Bauer (Political Science), Policy and Governance of Watershed Management
- **Alyssa Cortese (Environmental Science)**, Advisor: Gerald Kauffman (Biden School), Nitrogen Levels in the White Clay Creek National Wild and Scenic River Watershed
- **Monica Crosby (Environmental Studies)**, Advisor: Paul Jackson (Geography), Water Policy and Wetland Ecology
- **Veronica Hill (Resource Economics)**, Advisor: Leah Palm Forster (Resource Economics) and Andrew Homsey (Biden School), Sea Level Rise along Southern Coastal Delaware
- **Allison Kaltenbach (Environmental Engineering)**, Advisor: Gerald Kauffman (Biden School), Environmental Mitigation of Perfluoroalkyl Substances
- **Rebecca Steiner (Public Policy)**, Advisor: Nina David (Biden School), Land Use Change in the Delaware Inland Bays Watershed
- **Mia Kane, (Environmental Science)**, Advisor: Gerald Kauffman (Public Policy), Nonprofit Management of Watersheds and River Basins
- **Liam Warren (Energy and Environmental Policy)**, Advisor: Phillip Barnes (Biden School), Coastal Inundation of Delaware Infrastructure

- **Natalie Zimmerman (Geology)**, Advisor: Gerald Kauffman (Biden School), Sediment Fingerprinting in the White Clay Creek National Wild and Scenic River Watershed
- **Andrew Dorazio (Mechanical Engineering)**, Advisor: Gerald Kauffman (Biden School). Hydropower Potential along the White Clay Creek National Wild and Scenic River

**2018/2019 UDWRC Graduate Students include:**

- **Jillian Young (Water Science and Policy)**, Advisor: Gerald Kauffman and Andrew Homsey (Biden School). Analysis of the Watershed GIS Registry to Evaluate Stormwater Practices in the Christina River Watershed
- **Kelly Jacobs (Energy and Environmental Policy)**, Advisor: Gerald Kauffman and Martha Narvaez. GIS Mapping of Farms and Agricultural Stormwater Runoff in the White Clay Creek National Wild and Scenic River Watershed in Delaware and Pennsylvania.



UDWRC Interns and Presenters (left to right): Michaella Backer (Environmental Engineering), Alyssa Cortese (Environmental Science), Liam Warren (Engineering and Environmental Policy), Chelsea Caplinger (Political Science), Rebecca Steiner (Public Policy) and Natalie Zimmerman (Geology)



UDWRC Interns and Presenters (left to right): Veronica Hill (Resource Economics) Natalie Zimmerman (Geology), Alyssa Cortese (Environmental Science), and Mia Kane (Environmental Science)



On October 6<sup>th</sup>, the annual Coast Day event was held at the University of Delaware's Hugh R. Sharp campus in Lewes. The College of Earth, Ocean, and Environment (CEOE) and Delaware Sea Grant organized the event. This year's theme was "A Ripple Through Time" to emphasize the importance of scientists studying how our environment changes over time and how we can work to improve our future. UD faculty and various environmental groups presented their research through hands-on displays, poster presentations, and demonstrations in labs and outdoor tents. Other events included a crab cake cook-off, seafood chowder challenge, chemical magic show, watershed dance, and multiple seafood cooking demonstrations.

UDWRC staff and students attended the event and spoke to the attendees about research and policy initiatives related to water quality and water supply in the state and region. In addition to speaking about research projects, UDWRC staff and students helped children construct water-related crafts out of recycled eggs cartons, these included lobsters, flounder, and oysters. Children participating in the Coast Day scavenger hunt also stopped by the UDWRC table to collect a clue about the importance of aquatic creatures to the Maryland Coastal Bays watershed. For the full lineup of events, [click here](#).



UDWRC graduate research assistant, Matt Kirchoff, prepares materials to create water-related crafts.

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## The Salt Conundrum

On October 29<sup>th</sup>, the DWRC hosted The Salt Conundrum at The Outlook at the Duncan Center in Dover, Delaware. Martha Narvaez, UDWRC, and Emily Whiting, Delaware Department of Transportation (DelDOT), coordinated and hosted the event. Program sponsors included the University of Delaware Sustainable Coastal Communities Initiative (SCCI) and the Delaware Section of the American Water Resources Association (DEAWRA). The goal of the event was to bring stakeholders together to discuss various issues related to road salt application during the winter season.

The program agenda highlighted state and regional transportation practices and environmental research and concerns related to salt. Representatives from Delaware, Maryland, Pennsylvania, and Virginia's departments of transportation (DOT) spoke about their specific practices related to road salt application. Each DOT has a plan in place to reduce the amount of salt used for deicing purposes, which includes properly training employees to apply salt correctly. Scientists from Stroud Water Research Center, USGS, Delaware Geological Survey, and the University of Delaware also discussed the environmental impacts of road salt, specifically related to water quality. When road salt migrates into surface water, chloride levels become elevated, causing damage to aquatic ecosystems. Road salt also penetrates the groundwater supply used for drinking water purposes, often making tap water taste salty. Due to the negative ecological and human effects, reducing chloride pollution in surface water and groundwater has become an

important environmental goal for the region.

Following the event, attendees were invited to a happy hour at Fordham & Dominion Brewing Company to continue the discussion. For the full agenda and access to the conference presentations, [click here](#).



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## UD AWRA Student Chapter, Four-Time Winner!

On Wednesday, November 6th, the American Water Resources Association (AWRA) presented the University of Delaware Student Chapter (UDAWRA) with the AWRA Outstanding Student Chapter for 2019. This award is presented to the AWRA Student Chapter that has been most active in advancing water resources knowledge and carrying out the association's mission. This is the third consecutive year UDAWRA won the award and the fourth overall win. UDAWRA also won in 2015, 2017, and 2018. UDAWRA is officially the second winningest school in AWRA history; the only other Student Chapter with more wins than UDAWRA is the University of Wisconsin-Stevens Point.

Jillian Young, the former UDAWRA Student Chapter Vice President and UDWRC graduate fellow, accepted the award during the awards luncheon on the final day of the conference in Salt Lake City, Utah. Members of the Executive Board for the 2018-19 school year included Maggie Capocci (President), Jillian Young (Vice President), Lauren Mosesso (Secretary), and Nate Sienkiewicz (Treasurer).

The UD Student Chapter's objectives are to advance water resources research, planning, development, management, and education; to establish a common meeting ground for physical, biological, and social scientists, engineers, and other persons concerned with water resources on the University of Delaware's campus; and to collect, organize, and disseminate ideas and information on the field of water resources science and technology. For more information about the UD Student Chapter, [click here](#).



Jillian Young (left) and Martha Narvaez, UD Student Chapter advisor (right), pose after the awards luncheon in Salt Lake City, Utah.



Polly Ni (left), Justin Leary (center) and Mary Kegelman (right)  
UDWRRC Research Interns working on the  
Brandywine Shad 2020 project.

## Delaware GIS Day 2019

On Monday, November 18th at the Air Command Mobility Museum in Dover the GIS Day Committee held its 12<sup>th</sup> Annual GIS Day field trip. GIS day is an International Event which falls during Geography Awareness Week. The GIS Day Committee, a subcommittee of the Delaware Geographic Data Committee, is made up of nine GIS professionals ranging from the federal, state, and county government; higher education; and utility industries.



2019 DE GIS Committee. Photo by: Scott Figurski

Approximately 285 fifth grade students attended this year's event, which represented three schools; John R. Downes Elementary, Nellie Hughes Stokes and Frederick Douglass Elementary. There were 16 stations, each providing the students with a unique experience learning how geospatial technologies are used across many industries. There were 60 volunteers guiding the students on their tour.



## WATER RESEARCH GRANTS

The state water resources research institutes authorized by section 104 of the [Water Resources Research Act of 1984](#) are organized as the National Institutes for Water Resources. The NIWR cooperates with the U.S. Geological Survey to support, coordinate and facilitate research through the Annual Base Grants, National Competitive Grants, Coordination Grants, and in operating the [NIWR-USGS Student Internship Program](#). The Annual Base Grants, 104(b), and National Competitive Grants, 104(g), make up the backbone of the USGS 104 program. Below is a brief explanation of these two similar, but different grants.



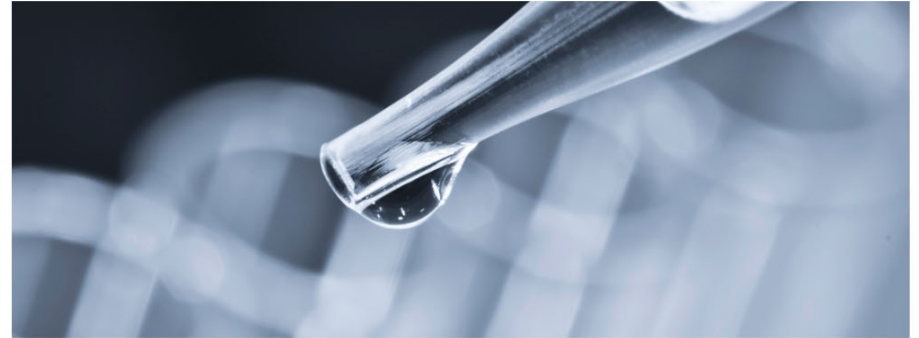
### State Water Research Grants - USGS 104(b) Program

These grants provide competitive seed grant funding opportunities for faculty members or affiliates at institutions of higher education. Applications must be submitted through your State Water Research Institute or Center. The Institutes or Centers may only consider project proposals from faculty members or affiliates at institutions of higher education in its State. To find out where your state's Institute or Center is located visit the Institutes webpage [here](#) and click on your state.

Unique characteristics of this program include:

- Research priorities are set by each institute in consultation with its state advisory board.
- Research focuses on state and regional water resources problems that can be addressed by researchers at academic institutions in states with common problems.
- All federal funds must be matched by at least two non-federal dollars for each federal dollar.

For more information on the USGS 104 program visit the USGS Water Resources Research Institutes website [here](#).



### National Water Research Grants - USGS 104(g) Program

The goals of the National Competitive Grants program are to promote collaboration between the USGS and university scientists in research on significant national and regional water resources issues; promote the dissemination and results of the research funded under this program; and to assist in the training of scientists in water resources. The USGS 104(g) Program provides the major mechanism to meet the growing needs not filled by state or federal research programs.

Unique characteristics of this program include:

- Research priorities are set jointly by the National Institutes for Water Resources and the U.S. Geological Survey.
- The program focuses on regional and interstate water resources problems beyond those of concern only to a single state.
- All federal funds must be matched by at least one non-federal dollar for each federal dollar.

For more information on the USGS 104 program visit the USGS Water Resources Research Institutes website [here](#).

# Program Name: Water Resources Research Act Program (WRRRA)

- **Program Purpose:** The Water Resources Research Act (32 USC 109 et seq.) established university-based institutes to research water and water-related phenomena, aid the entry of new research scientists into the water resources fields, train future water scientists and engineers, and distribute the results of sponsored research to water managers and the public. The U.S. Geological Survey administers the program that provides valuable support for water research that is critical to local, state and regional communities. In turn, these state programs match the federal funding—in some cases with a 2:1 match—that leverages federal support to address regional needs. These funds support superior long-term water planning and management, and foster the next generation of water scientists, managers and engineers.
- **Fiscal Year 2019 Funding Received:** \$6.5 million
- **Fiscal Year 2020 Funding Received:** \$9.0 million
- **Level of Funding Requested for Fiscal Year 2021: \$ 20 million**

## FY20/21 Water Research Students

Last	First	School	Major	Research Advisor	Title of Proposed Research
Singer	Anna	UD	Environmental Studies/Public Policy	Jerry Kauffman	Watershed Characterization of White Clay Creek National Wild and Scenic River in Delaware and Pennsylvania
Doran	Delaney	UD	Environmental Engineering	Jerry Kauffman	Watershed Characterization of Brandywine Piedmont Tributaries at First State National Park in Delaware
DeSonier	Elizabeth	UD	Environmental Science	Jim Pizzuto	Mapping the distribution of deposits in the valley of the White Clay Creek
Peterson	Lillian	UD	Environmental Engineering	Jerry Kauffman	Watershed Characterization of Brandywine Piedmont Tributaries at First State National Park in Delaware
Avelino	Sitlaly	UD	Environmental Engineering	Jerry Kauffman	Watershed Characterization of Brandywine Piedmont Tributaries at First State National Park in Delaware
Perez	Jady	UD	Environmental Engineering	Jerry Kauffman	Watershed Characterization of Brandywine Piedmont Tributaries at First State National Park in Delaware
Hussar	Grace	UD	Environmental Studies/Wildlife Ecology	McKay Jenkins	Stormwater and Environmental Justice



# DWRC Water Resources Research and Education Priorities

- Water quality (nutrients, pathogens, public health), harmful algal blooms, PFOA contamination
- Storm water runoff (management and control)
- Water supply, demand, and conservation (infrastructure/technology)
- Water policy (governance and economics)
- Climate change, sea level rise, riverine/coastal flooding
- Groundwater (remediation and treatment)
- Watershed management
- Wetlands (protection and restoration)
- Wastewater management (treatment and reuse)
- Water, food, and energy nexus

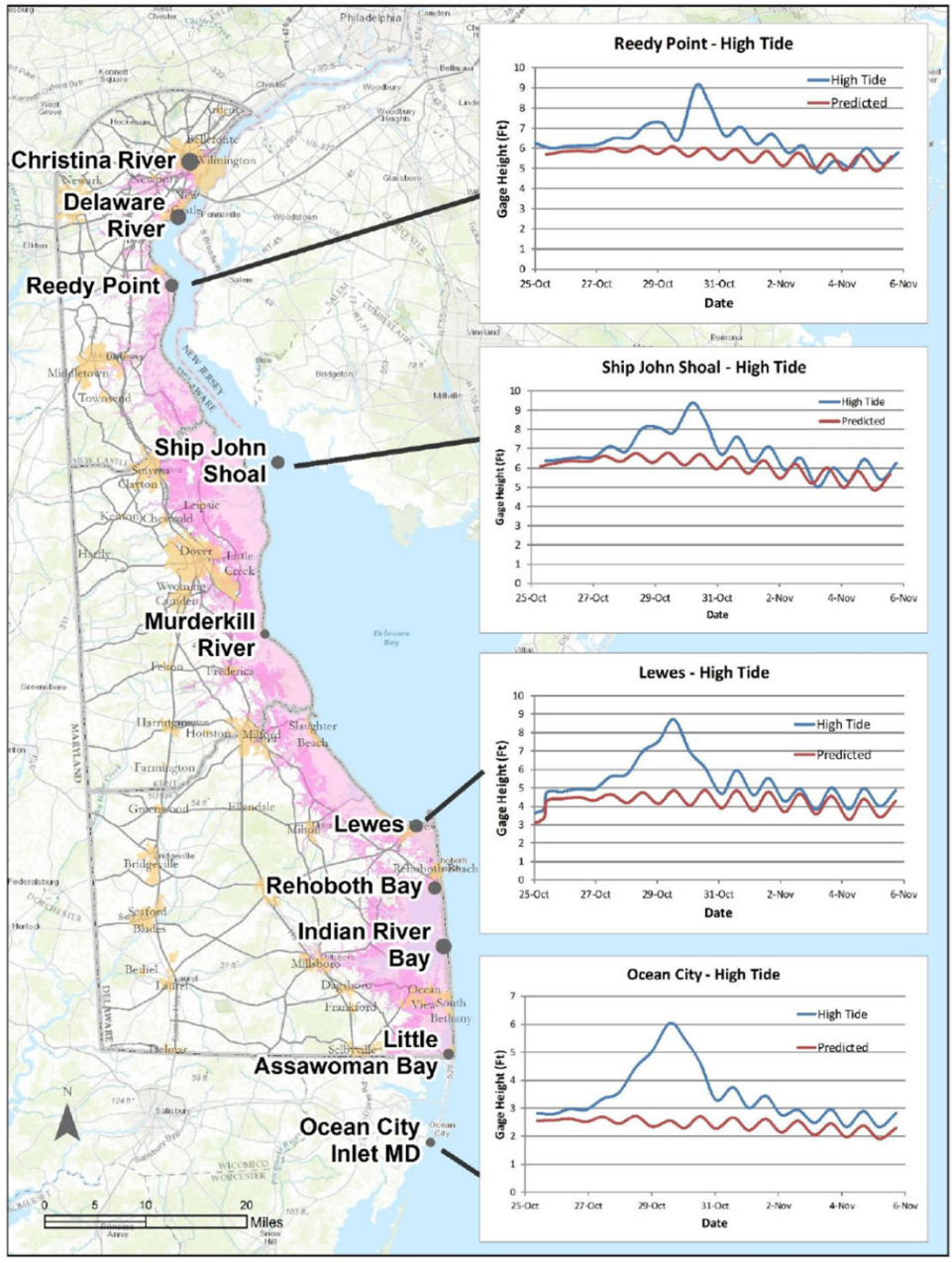


Figure 6.4 Tide levels at NOAA gages, Delaware Bay and River, Superstorm Sandy (October 2012)

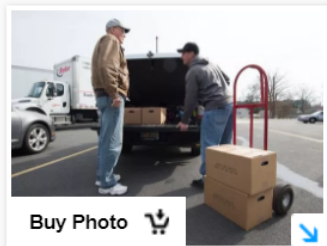
# Sussex town's residents told not to drink or cook with water because of PFC contamination

Maddy Lauria, The News Journal

Published 7:22 p.m. ET Feb. 8, 2018 | Updated 10:58 a.m. ET Feb. 12, 2018



PFCs found in the drinking water in Blades Jason Minto/The News Journal/USA TODAY



(Photo: Jason Minto, The News Journal)

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A tiny town in southern Delaware is facing a major water crisis.

Residents and businesses in Blades, a Sussex County town just south of Seaford, have been told not to use their tap water for drinking and cooking after [perfluorinated compounds, or PFCs](#), were



The only brand\* recommended by: Whirlpool every drop

\*EveryDrop® products and the recommending brands' products are all owned and distributed by Whirlpool Corporation.



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## Algae bloom prompts swimming prohibition at Newark Reservoir



No impact on drinking water, officials say

By Josh Shannon [jshannon@chespub.com](mailto:jshannon@chespub.com) Aug 19, 2017



A triathlete swims in the Newark Reservoir during last year's Top of Delaware Triathlon. This year's triathlon had to be converted to a duathlon because of algae in the reservoir.

NEWARK POST FILE PHOTO BY DAVID MFLION

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March 27, 2020

Dr. Asia Dowtin  
Department of Forestry  
Natural Resources Building  
Michigan State University  
480 Wilson Rd. East  
Lansing, MI 48824

Dear Asia:

As Director and Associate Director of the University of Delaware Water Resources Center, we are pleased to invite you to serve on the DWRC Advisory Panel for a two-year term through May 1, 2022 based on your expertise in water issues of importance to Delaware and the Mid-Atlantic region. Established on campus in 1965, the DWRC is one of the 54 National Institutes for Water Resources (NIWR) supported by the U.S. Geological Survey at land grant universities in the 50 states, District of Columbia, and three island territories of Guam, Puerto Rico, and U.S. Virgin Islands. Responsibilities of the NIWR include: (1) innovative research that fosters entry of new research scientists into water resources fields, training of future water scientists and engineers, exploration of new ideas that address water issues, dissemination of research to water managers and the public and (2) cooperate with other colleges to develop a statewide program designed to resolve state/regional water problems.

We are proud of our water research program that was begun by my predecessor Deputy Dean Dr. Tom Sims and has supported over 300 undergraduate interns and graduate fellowships since 2000. In accordance with the Water Resources Research Act of 1964, the DWRC Director appoints an advisory panel to assist in the review and ranking of research projects and establish priorities for center activities. We meet annually in the spring where our interns present the results of their research projects. In your role as an advisory panel member you would have responsibilities to: (1) provide input to the Director regarding the successful mission of the DWRC, (2) assist in review of DWRC graduate fellowship and undergraduate internship applications, and (3) help promote interaction of the DWRC with other organizations in the state, region, and nation.

Please let me know if you wish to serve on the DWRC Advisory Panel and don't hesitate to contact us at 302-831-4929 or [jerryk@udel.edu](mailto:jerryk@udel.edu)/[mcorrozi@udel.edu](mailto:mcorrozi@udel.edu). Thank you for your consideration.

Warmly,

*Gerald J. Kauffman*

Gerald J. Kauffman, Director  
University of Delaware  
Water Resources Center  
Newark, DE 19716

Martha B. Narvaez, Associate Director  
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## **DWRC Advisory Panel**

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Future University of Delaware Water Resources Center Building



# Questions?

