

54th Annual Meeting of the Delaware Water Resources Center

Biden Institute

44 Kent Way
University of Delaware
Newark, Del.
May 16, 2019

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





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MEMORANDUM

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

FROM: Dr. Gerald J. Kauffman, Director
Delaware Water Resources Center

DATE: April 19, 2019

SUBJECT: 54th Annual DWRC Advisory Panel Meeting

You are invited to the 54th Annual Meeting of the Advisory Panel of the University of Delaware Water Resources Center at 10 am on Thursday May 16, 2019 to be held at the Biden Institute at 44 Kent Way on the University of Delaware campus in Newark, Delaware. Our charge will be to review the research presentations of the FY18/19 water resources students, discuss the upcoming FY19/20 research projects, and establish water research priorities in Delaware for the upcoming year. Our business meeting will be in the morning followed by luncheon at noon. We will also discuss the exciting news about the home of the DWRC in the Biden School and joint ventures between the Delaware Water Resources Center and Delaware Sea Grant and what these initiatives mean for water policy, education, and research in the First State.

Agenda Delaware Water Resources Center 54th Annual Advisory Panel Meeting

10:00 am May 16, 2019	Biden Institute 44 Kent Way Newark, Del.
1. Introductions	10:00 am
2. FY18/19 Undergraduate/Graduate Research Presentations	10:15
3. DWRC FY19/20 Budget Submittal to DOI/USGS	11:00
4. FY19/20 Undergraduate Water Internship Proposals (start Sep 2019)	11:15
5. DWRC Advisory Panel Membership	11:30
6. DWRC and Delaware Sea Grant	11:45
7. Delaware Clean Water Campaign (Martha Narvaez)	11:55
8. Luncheon	noon

JOSEPH R. BIDEN, JR. SCHOOL OF PUBLIC POLICY & ADMINISTRATION

www.bidenschool.udel.edu

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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(GIS Services Manager)

Nicole M. Minni
Associate Policy Scientist
(GIS Laboratory/Lewes Office)

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



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.



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



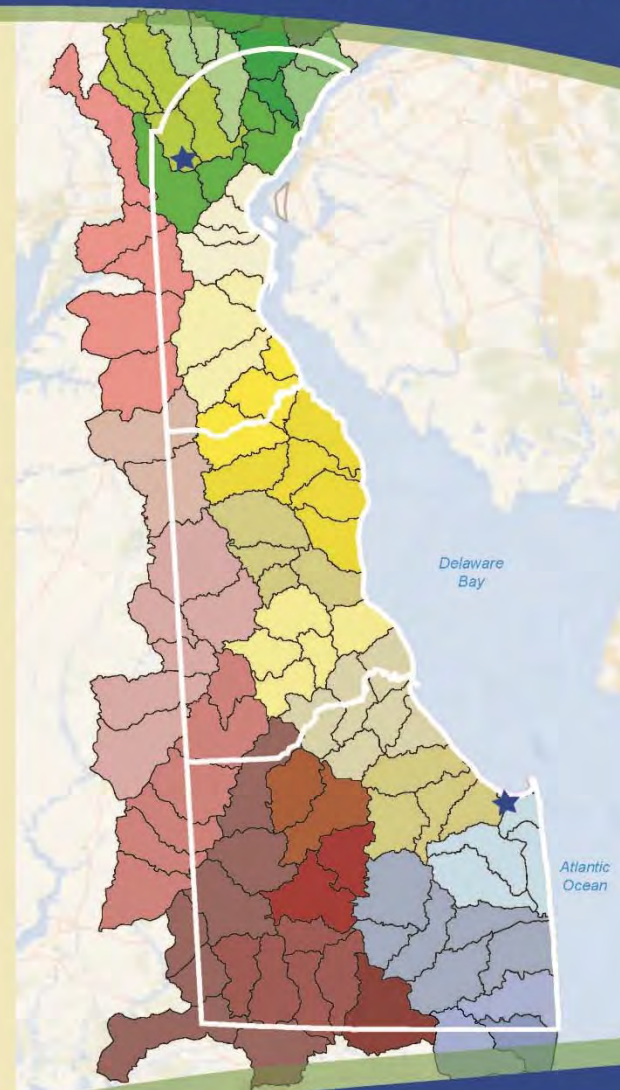
Where to find us



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 Hullen 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 811: 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.



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.

COLLECTION:
*Public Papers
of the Presidents*



Lyndon B. Johnson
1963-64: Book II

Font Size:





The University of Delaware Water Resources Center, established on campus in 1965 at the 8th 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.

Delaware Water Resources Center at the University of Delaware DWRC

Undergraduate Internships In Water Resources 2015



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.

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. 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.wra.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 Pauler (mpauler@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

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NIWR & USGS A Model Partnership

NIWR
THE NATIONAL INSTITUTES
FOR WATER RESOURCES

USGS
science for a changing world

led 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

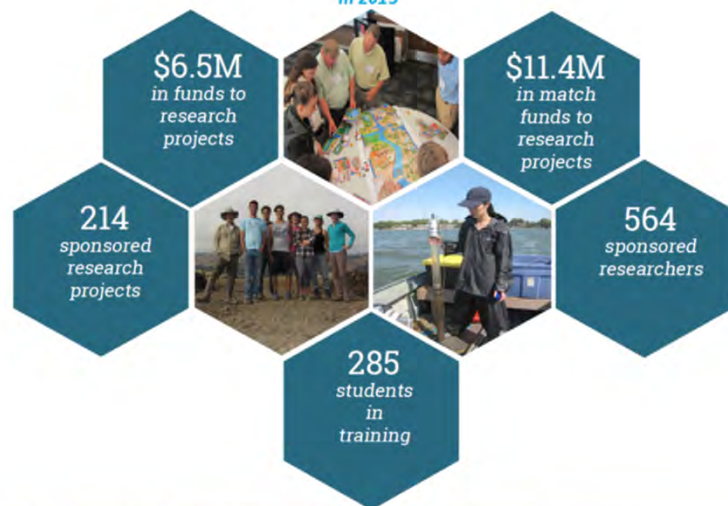
in water-related practices and policies

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 1964 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
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Past President: Dr. Richard Cruse, Iowa State University • rmc@iastate.edu

Visit us at 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:

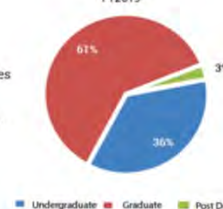
- "Trace Organic Contaminants in Urban Stormwater and Performance of Urban Bioretention Systems: a Field and Modeling Study" in Colorado
- "Using bioavailability to assess pyrethroid insecticide toxicity in urban sediments" in Illinois
- "Human and Ecological Health Impacts Associated with Water Reuse: 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 Peckenharn	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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COMMITTEE CHAIRS / LIAISONS

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April 3, 2019

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

Dear Jerry:

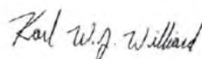
I am pleased to announce that you have been elected by the delegates of the Universities Council on Water Resources to serve as a member of the Board of Directors. On behalf of the entire Board, congratulations!

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.

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
www.ucowr.org



Clean Water

A Bi-State Solution

May 3, 2018 | Mendenhall, PA



BRANDYWINE
CONSERVANCY



Brandywine
Red Clay Alliance



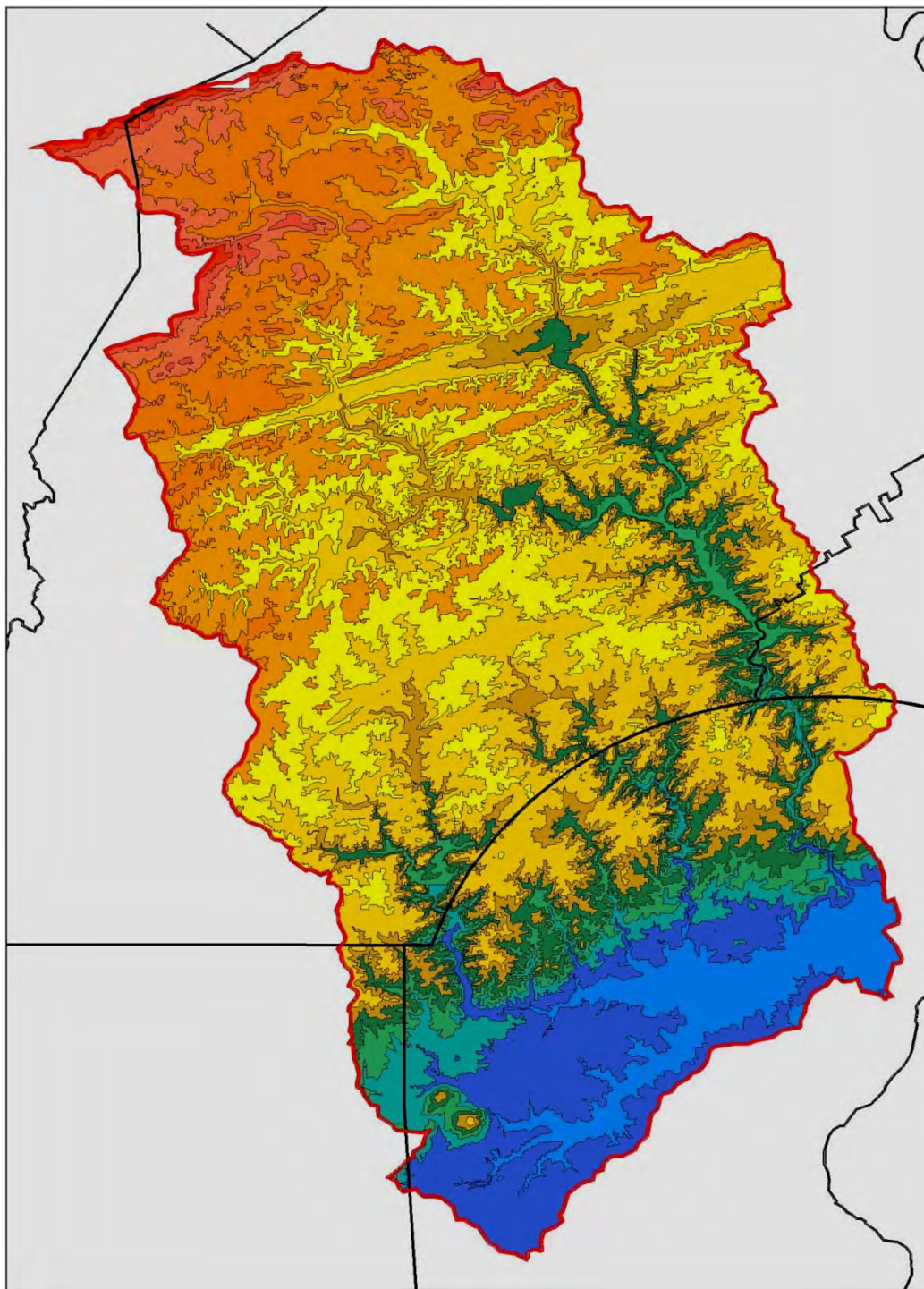
Natural
Lands

The Nature
Conservancy



STROUD[™]
WATER RESEARCH CENTER

UNIVERSITY OF
DELAWARE





Swedes settle at mouth of Christinakill
1638 AD



“Nation Makers”

H. Pyle

Battle of the Brandywine

1777 AD



Villages
Tavernes
Batailles &
Escarmouches



ici se fit le grand combat de l'Armée des
Rebellez fut battue le 26^{me} de
Sept. venant à la pointe du jour
attaquer notre ligne & le Quartier
General, le quel étant dans le tems
à Germantown.

L'ont surpris avec 1500
Grenades Angloises & les forces
de Philadelphie le 26^{me}
Sept. 1777.

Le 11^{me} d'Octobre Anglois marcha à Wilmington le 13^{me} de Sept.
& le Colonel de Boose le suivit, avec une brigade de hussards
pour protéger le transport de provisions, bagages &c. que nous reçûmes
par notre flotte, la quelle y avait ancré, ayant fait une ronde, en des-
cendant de Chesapeake. après la descente des troupes & montant
la Rivière de Delaware jusqu'à là.

NEW
JERSEY

OPERATIONS

de l'Armée royale en North. Amerique, sous les ordres
du General en Chef Sir William Howe Chevalier
de l'Ordre de Bath. Depuis la descente à Elk-
ferry, le 26^{me} d'Oct. jusqu'ayant pris Philadelphie
le 26^{me} de Sept. 1777.
Contre les Rebelles americains, commandés par
Monsieur Washington & d'autres Com-
mandeurs. dessinée par l'enseigne de C. H. H. H.

DuPont Mills

1802 AD

Lee, Mass. Nov. 3-1905



Powder Mill on Brandywine near Wilmington, Del.

*These blow
up occasion-
ally and
then?*



Underground Railroad between the Brandywine and Christina at Wilmington, Harriet Tubman 1830-1865 AD





BIRDS EYE VIEW OF THE CITY OF WILMINGTON, DEL.

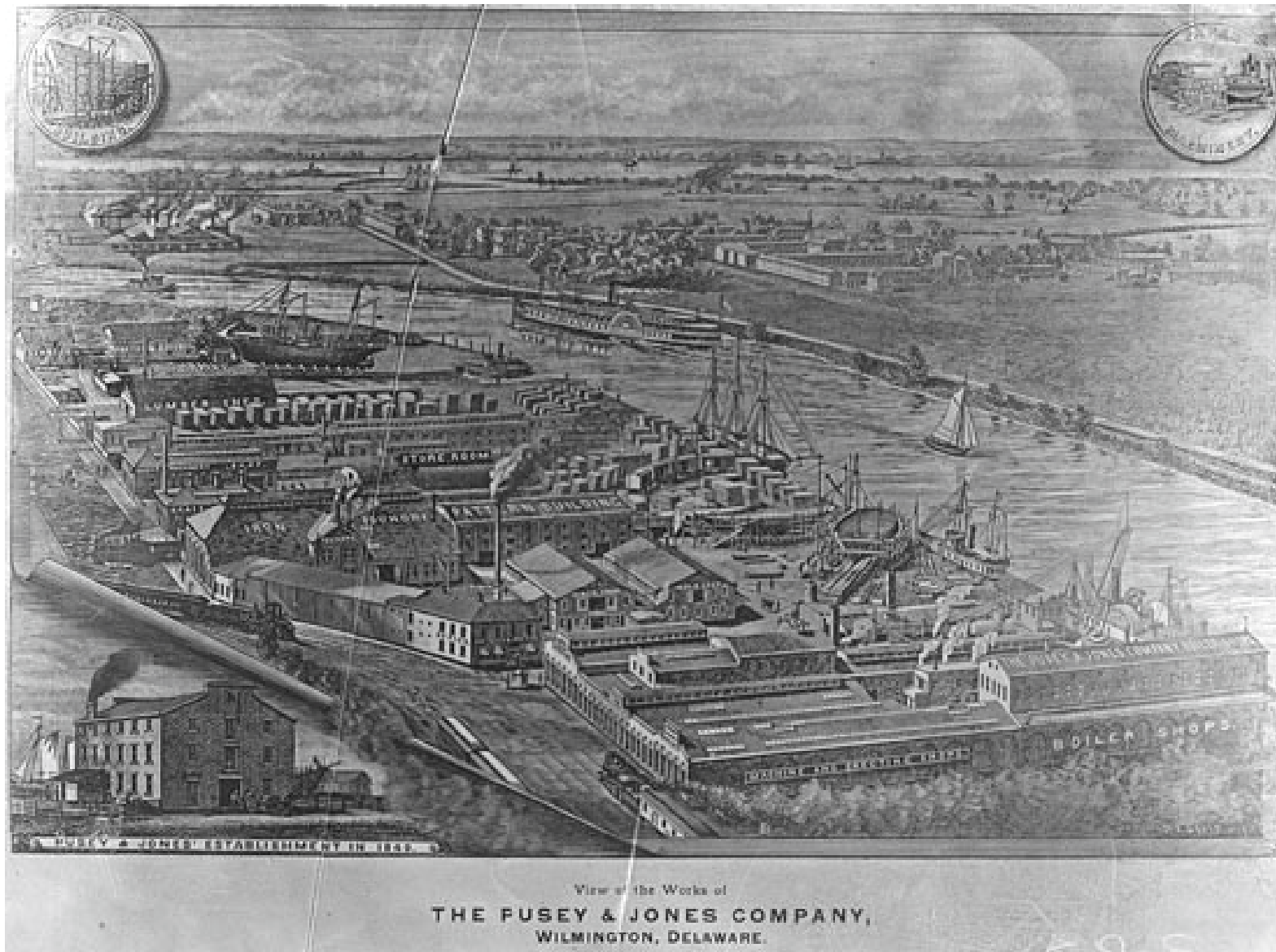
1864 AD

Wilmington 1874 AD



Bird's-eye view of Wilmington, H. H. Bailey, 1874.

Pusey and Jones Shipyard 1887 AD





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



Brandywine Plant 1929 AD



Brandywine Plant from the air, 1929.

Hoopes Reservoir

1931 AD



Hoopes Reservoir under construction, 1931.

Christiana River Tunnel

1931 AD



"It's quittin' time!"



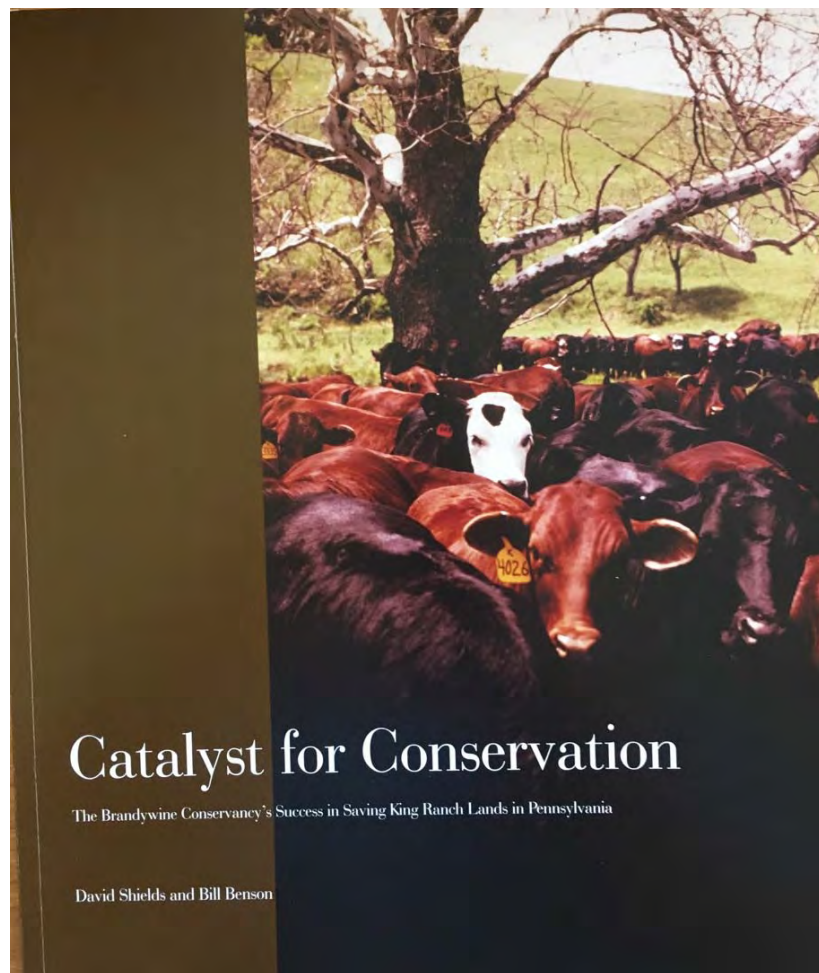
CHRISTIANA RIVER TUNNEL
7th SHIFT COMING OFF SEPT. 9-1931

Hoopes Reservoir

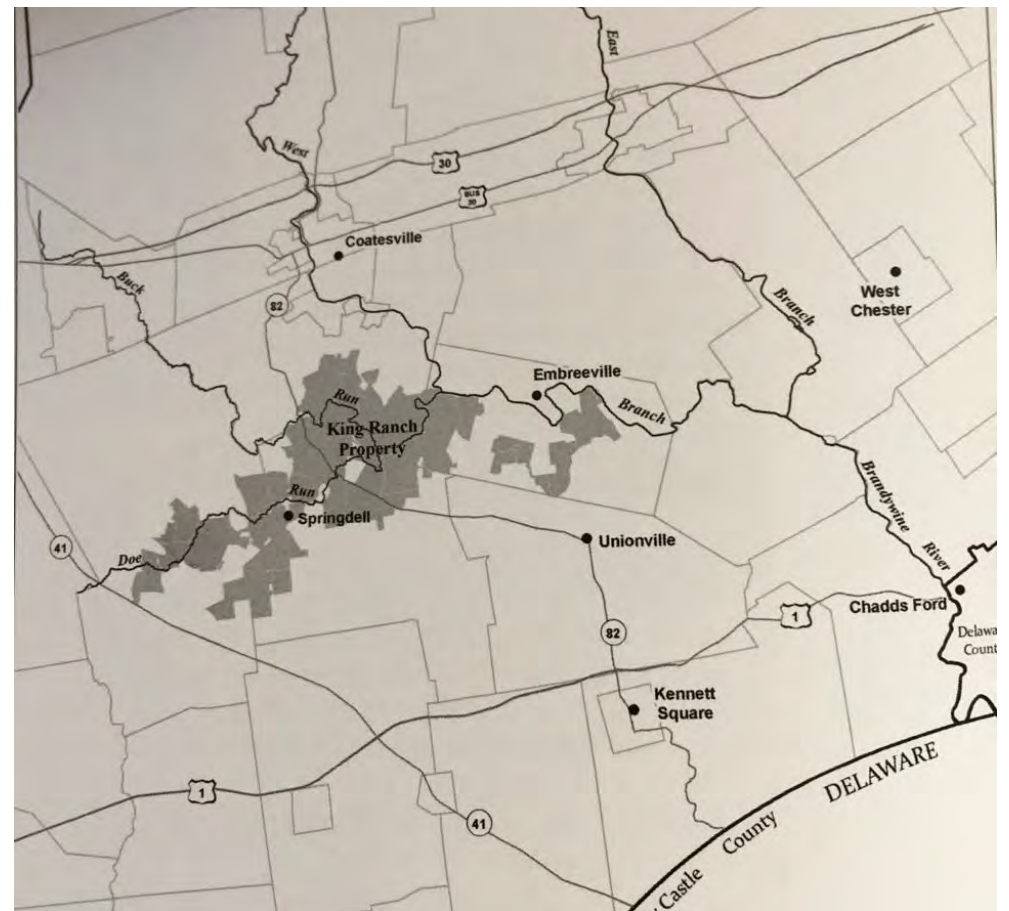
1932 AD



Hoopes Reservoir, Dam, and Pumping Station from the air, ca. 1932.



Brandywine Conservancy conserves King Ranch 1984 AD



Brandywine Creek 1940 AD



Brandywine Creek above city dam, 1940.

July 27



FLOW GAUGE installed on lower Brandywine measures and records volume of water going down the stream. These data help in computing topsoil loss.



TWELVE RAINFALL GAUGES, like one above, record precipitation at various locations in the Valley.

THE WORK OF THE BRANDYWINE VALLEY ASSOCIATION

STATE FARM FORESTER, working with Brandywine Valley Association staff member, explains woodlot management to class in agriculture.



ASSOCIATION staff member shows slides of conservation methods to family group in farm home.

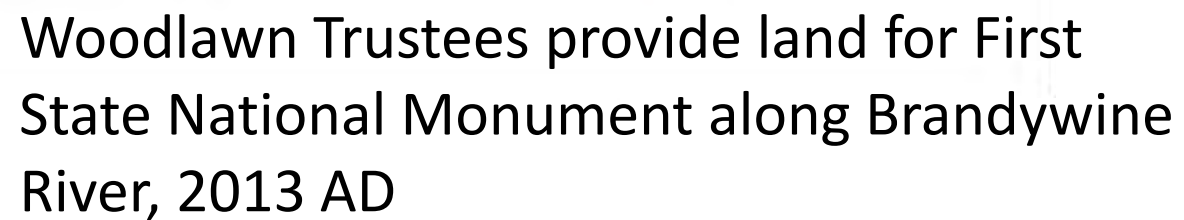


FARM PONDS provide water for farm animals, fish, and fire protection, help retard flood water run-off. Soil conservation technicians look on while check is made of growth rate of wooded fish.

COUNTY AGENTS and Association representatives (below) conduct farm tours to observe and study conservation practices.



Brandywine Valley Association, America's first small watershed association, est. 1945 AD





Delaware Gets Its First National Monument

The National Park System finally reaches all 50 states.



A lone sycamore tree stands at Woodlawn, the heart of Delaware's newly declared national monument.

PHOTOGRAPH BY MICHAEL MELFORD, NATIONAL GEOGRAPHIC

By **Brad Scriber**, [National Geographic News](#)

PUBLISHED MARCH 27, 2013

Shortly after noon on Monday, with a declaration from President Obama designating the First State National Monument, the [National Park Service](#) welcomed Delaware into its fold for the first time. (Related: "[Obama Declares Monuments to Preserve Pieces of U.S. Heritage.](#)")

President Obama created the monument along with four other national monuments in an Oval Office ceremony alongside Vice President [Joe Biden](#) and Secretary of the Interior [Ken Salazar](#), using powers designated under the Antiquities Act of 1906 to recognize historically significant

2013 AD

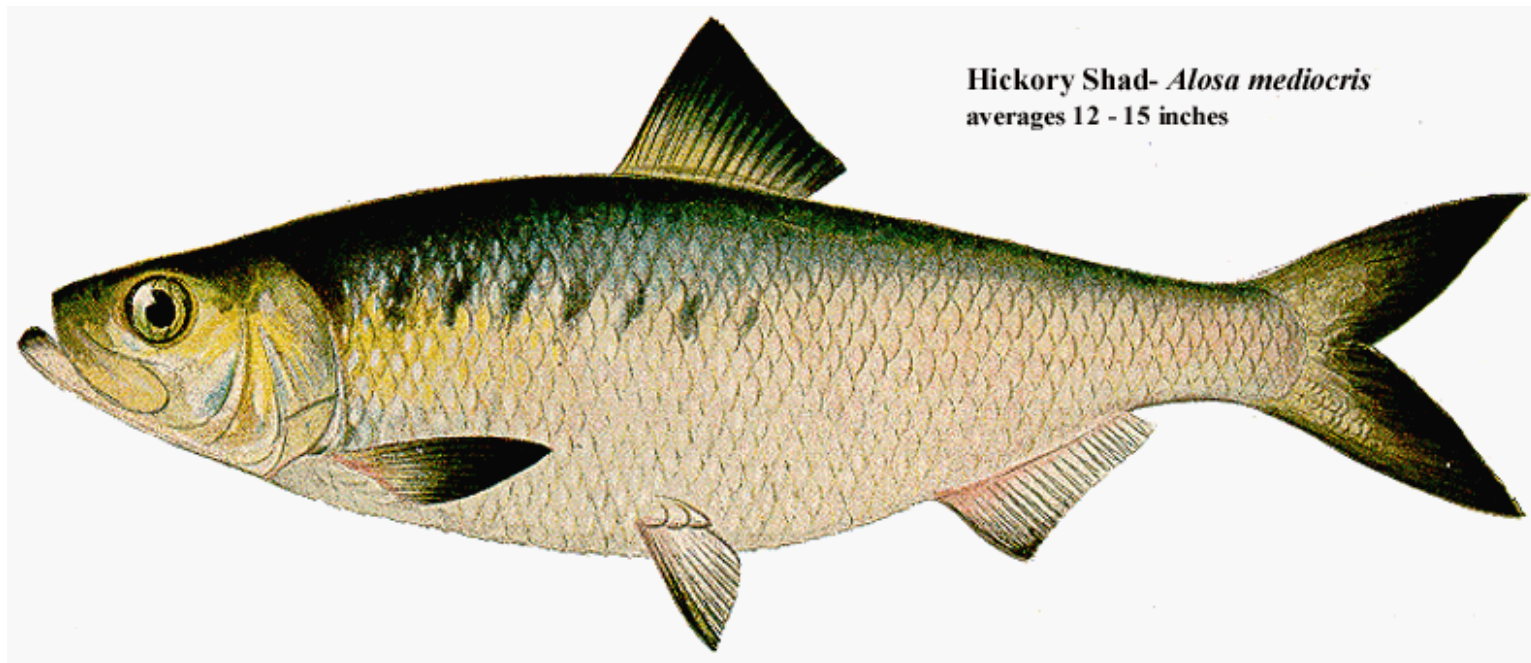
First State National Monument

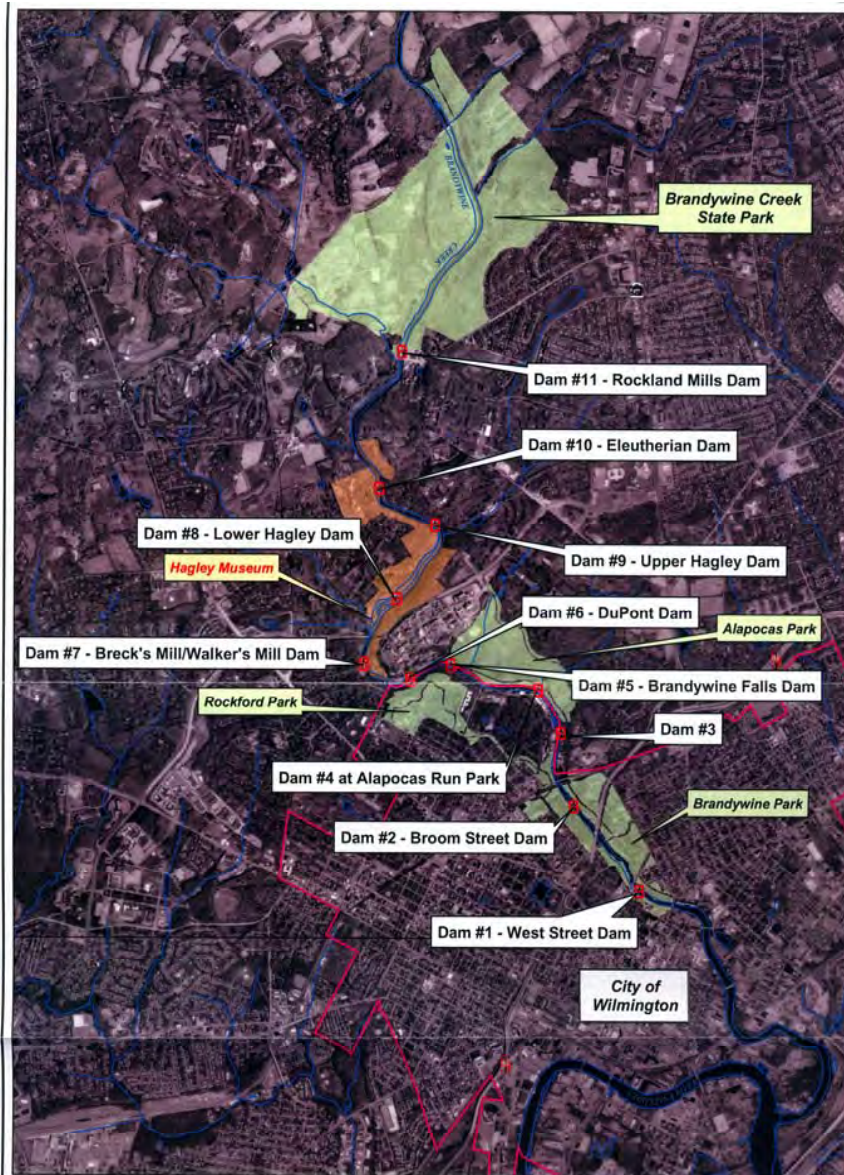
2014 AD





America's Founding Fish





Legend

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

Map 3
Delaware Dams
of the
Brandywine River

®

0 0.25 0.5 Miles

Environmental Management Center
BRANDYWINE CONSERVANCY
P.O. Box 101, State Park, Wilmington, DE 19880-0101
DATA: NHD 2013; Base data from Chesapeake County GIS data distribution, 2001;
Aerial photography from PRISM 1:50K aerial photography, 2004; Delaware
Hydrology data from USGS, 2004.

Date: January 15, 2009

Elevation profile

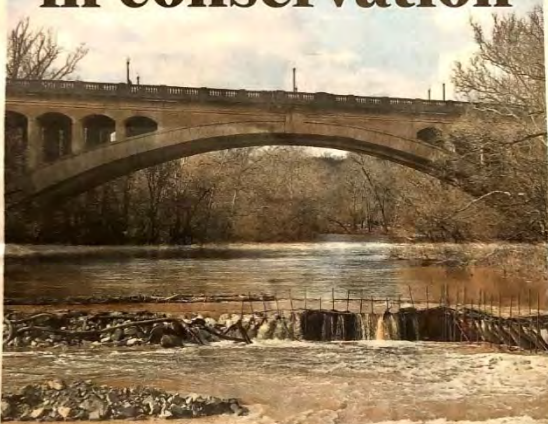


THE NEWS JOURNAL

PART OF THE USA TODAY NETWORK

BRANDYWINE DAM REMOVAL

Making strides in conservation



Demolishing historic Brandywine dams could make for healthier future

Maddy Lauria Delaware News Journal | USA TODAY NETWORK

Wilmington residents Hunter Lott and Jim Shanahan have a simple vision for the future of the Brandywine River.

In a few years, they imagine young public school students pressing their noses to the side of a classroom tank, watching fish grow from microscopic zygotes. Then the students might return their swimming friends to the Brandywine to help spawn the next generation of Delaware born and bred fish.

For that vision to become reality, a series of historical dams that date back hundreds of years must be removed, from Market Street in Wilmington into Pennsylvania.

See BRANDYWINE, Page 9A

Demolition continues on the dam and replacement of a water main across the Brandywine in Wilmington, just downstream from the Washington Street Bridge. WILLIAM BRETZGER/THE NEWS JOURNAL

Brandywine

Continued from Page 1A

These sometimes-scenic relics hail from a time when mills were used to power flour, paper, cotton and gunpowder production.

"If we are successful — in this removal of the dams, it would have been 300 years since the fish have been able to swim freely up into the Brandywine and into their historical breeding grounds," Lott said.

The Brandywine Shad 2020 dam removal plan, spearheaded with research by the University of Delaware, is one of 25 conservation projects in Delaware, New Jersey, New York and Pennsylvania that have been awarded more than \$4 million in federal funding. All are within the Delaware River basin.

"Not only is it good for fish... it's good for conservation in general, it's good for the habitat, it's really good for the economy," said Wendy Weber, northeast regional director for the U.S. Fish & Wildlife Service at the grants announcement on Friday. "It's good for the health of the people in the watershed."

Wilmington residents and visitors may have noticed heavy equipment already working on the river banks near Market Street in recent months. Dam No. 1 there will be the first to go, for reasons more than just freeing the waterway's historic roots, city officials said.

In 1894, the concrete dam now surrounded by construction was built to encase the city's water mains. Today, they provide fresh drinking water to more than 100,000 customers every day, officials said.

They literally brought clean water from one side of the river to the other side of the river," said Kelly Williams, Wilmington's public works commissioner.

Now, the time has come to upgrade and replace those mains, and the city is spending \$2.7 million to do so and remove the dam, Williams said.

New water mains are being laid below the bedrock under the creek. Once they're online, the old mains that make up the dam will be removed, she said.

Fish that migrate, such as the American shad and river herring, which live in saltwater but breed in upstream freshwater, will benefit from the dam's removal. Hardened structures are like roadblocks when the fish are trying to swim upstream, said Gerald Kauffman, director of the Water Resources Center at the University of Delaware.

"Now the river is getting healthier, so much so that the fish are returning," Kauffman said. "The obstacles that remain are these 19th and 18th century dams."

The shad that instinctively want to swim upstream to breed the next generation literally get bruises on their noses from bumping into the concrete, Weber said.

Just a few decades ago, those fish couldn't even reach the dam, though, because industrial pollution created dead zones in places like the mouth of the Delaware River. But things have



Crews are relocating a water main under Brandywine Creek as they remove a dam that has been blocking fish passage for 200 years. PHOTOS BY JENNIFER CORRETT/THE NEWS JOURNAL



Removal of the dam is part of the work that is underway on the Brandywine River in Wilmington to restore the waterway to its historic roots.

changed, Kauffman said.

He and his colleagues now will use \$241,000 in federal funding to lay the groundwork needed to remove the dams along 17.6 miles of the Brandywine River.

They will match that money with private funds to study the feasibility of removing most of the remaining intact Brandywine dams left in Delaware. One dam near Hagley Museum will likely remain intact for historical purposes while Dam No. 2 will continue operating as a source of drinking water. That means scientists will have to find another way to help fish get by those obstacles, he said.

Once the remaining dams are removed, area residents could see fewer flooding problems, have additional access to the river through new boat ramps and maybe even enjoy a white-water rafting experience, Kauffman said.

Four years ago, he also was part of the push to remove a colonial-era dam on White Clay Creek that dated back to 1777 when George Washington was march-

ing through, around the time he was planning the Battle of the Brandywine. "Now we're finding the fish are swimming up and spawning, after two centuries," he said. "It's about fish and it's about history, but it's also about water, too. If the quality of the water is good enough for these sensitive fish, that's great news because that's the water we drink."

However, even after Dam No. 1 is removed, the fish will still be blocked by several others that dot the river from Delaware and into Pennsylvania. That includes Dam No. 2, near the headgates of the Brandywine Raceway, which creates the pooling necessary to provide drinking water to people living in the area.

North of the Delaware-Pennsylvania state line, experts have located at least three dams that will need to be studied for removal in a future project, Kauffman said.

Other complications are likely to stymie the romantic story of reconnecting these native creatures to their centuries-old breeding grounds. Some of the larger dams, like Brandywine Falls at Alapocas Run State Park, are beloved scenic features that some residents may want to keep just as they are.

"You're going to get that push back, there's no question," Lott said, noting that an argument was made against removing Dam No. 1. It had historical value by providing a pool of water that would freeze in the winter to create an all-natural ice-skating rink.

"There will be a certain amount of people used to looking at a pool of flat water," said Shanahan, who said he frequently swims in the Brandywine like it's his own backyard pool. "But it's only been like that for 100 years and the river's been there for thousands of years." The plan to remove the Brandywine's

series of Delaware dams is an effort to remove human interference from the Industrial Age and restore the ecology of the river, Shanahan said.

"That abstract, pure aspect of bringing the river back actually has a larger appeal than I anticipated," he said. "Just to bring it back to its natural state really tugs at heartstrings."

The Brandywine Shad 2020 projects and 24 other projects will be partially funded by the Delaware River Basin Conservation Act. It's a relatively new grant and technical assistance program, introduced by Delaware Sen. Tom Carper and Chris Coons, as well as then-Congressman John Carney.

Beyond the Brandywine, that \$41 million in federal funding, matched by \$7.5 million in private funds, will go to projects such as forest management on 4,400 acres, 630 acres of restored wetlands, 550 acres of restored floodplain and more than 1,800 acres of public access that is key to recreation, said Holly Bamford, chief conservation officer for the National Fish and Wildlife Foundation.

Those projects include tidal marsh restoration at the John Heinz National Wildlife Refuge near Philadelphia, shorebird and horseshoe crab restoration in New Jersey and a plan to reduce microplastics in the watershed.

"This protects the river, it provides water quality, water quantity and also protects the community and their economy," Bamford said.

Contact reporter Maddy Lauria at (302) 345-0608, mlauria@delawareonline.com or on Twitter @MaddyML.

Want to know more?

For more, including the full list of projects, go to www.delriverwatershed.org.



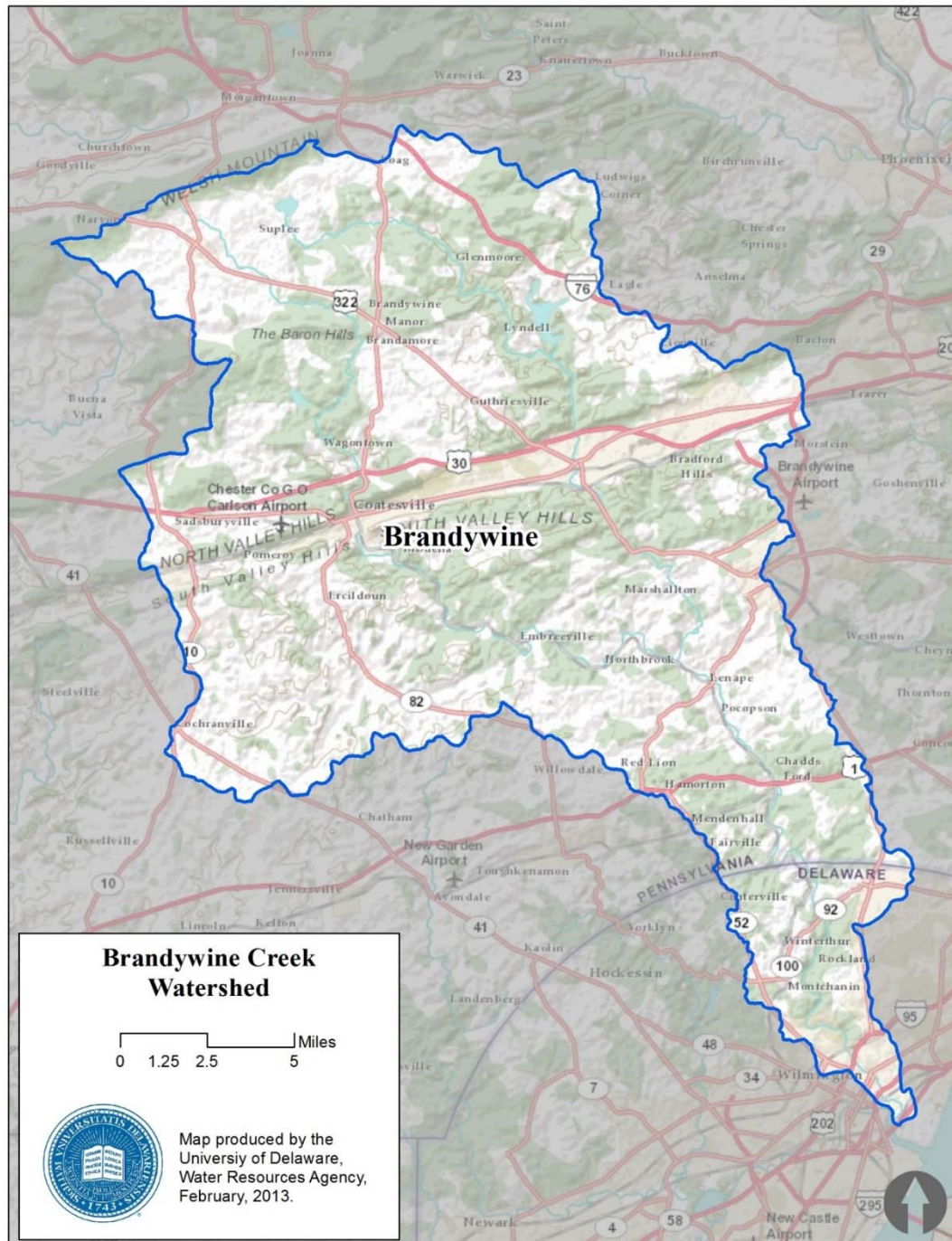
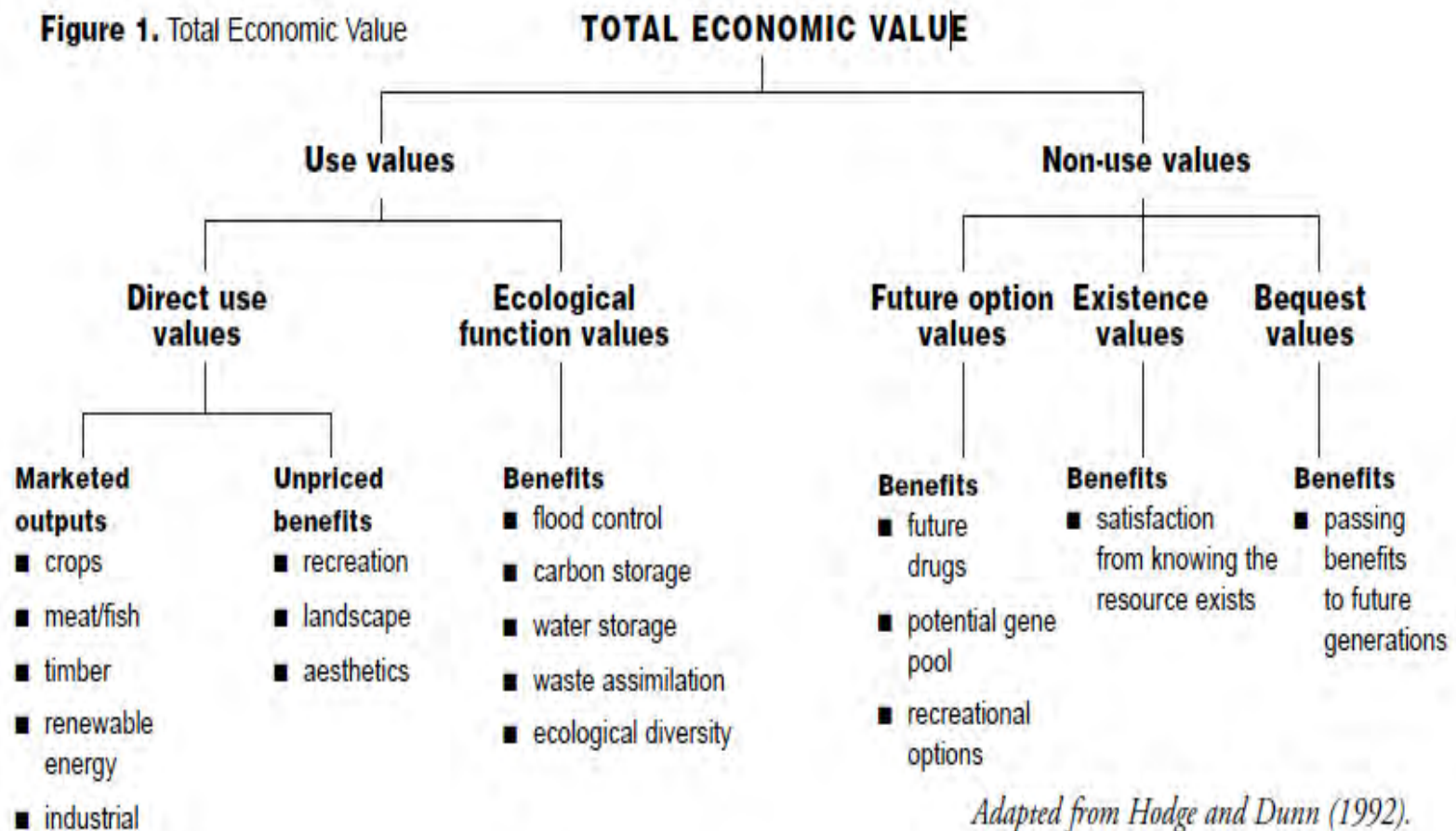
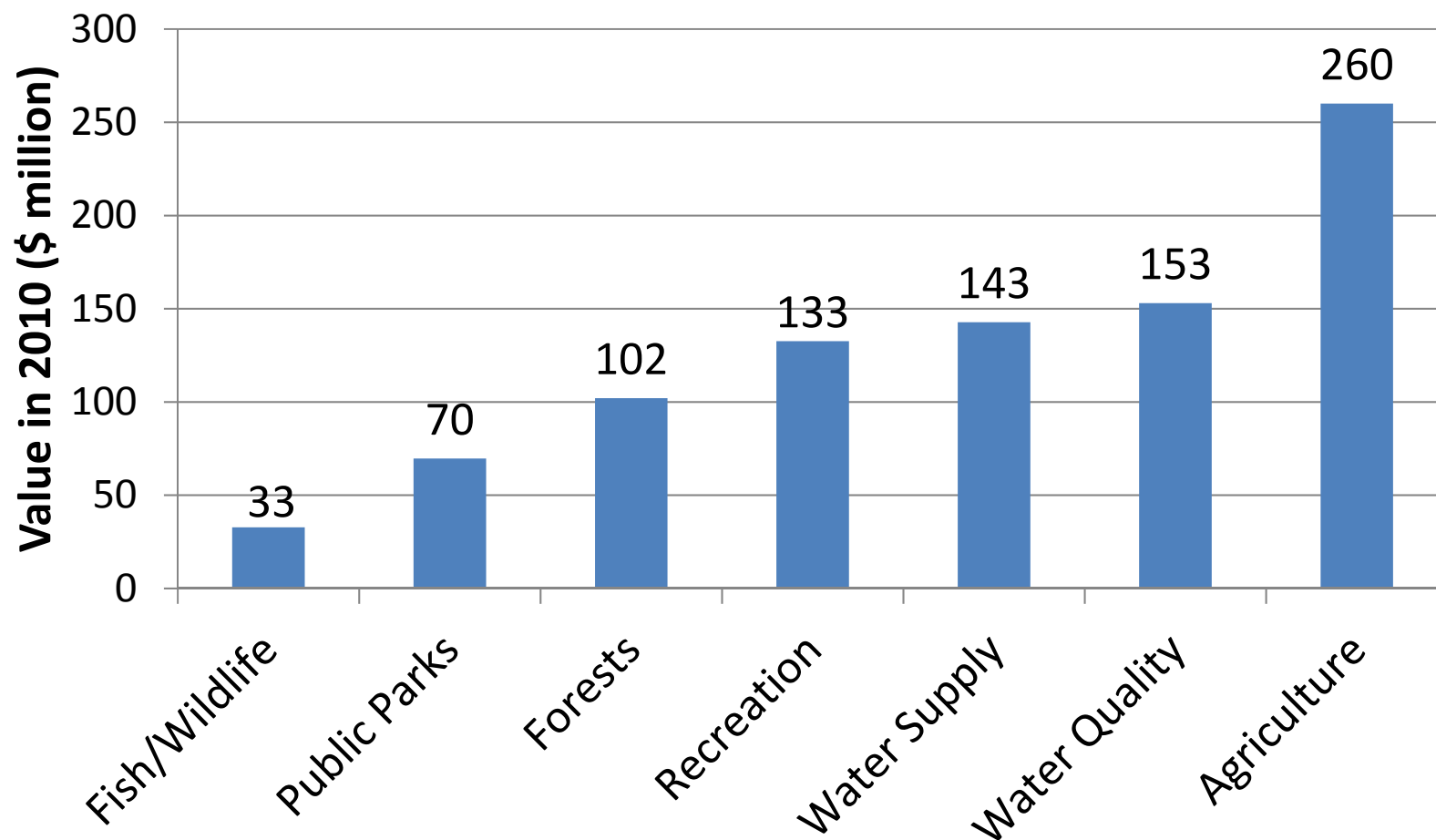


Figure 1. Total Economic Value



Economic Value of Brandywine Creek Watershed by Sector in \$2010



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.

Table 1. Economic value of agricultural operations in Chester County, Pennsylvania.
(Chester County Agricultural Development Council, USDA National Agricultural Statistics Service)

Industry	Economic Value	Rank
Dairy farming	\$73 million	6 th in PA
Horse farming	\$5.2 million	22 nd in U.S.
Nursery, greenhouse, floriculture	\$79 million	1 st in U.S.
Row crops	\$8.7 million	7 th in PA
Mushroom farming	\$412 million	1 st in U.S.

Value per Year of Natural Goods and Services by Ecosystem in the Brandywine Creek Watershed

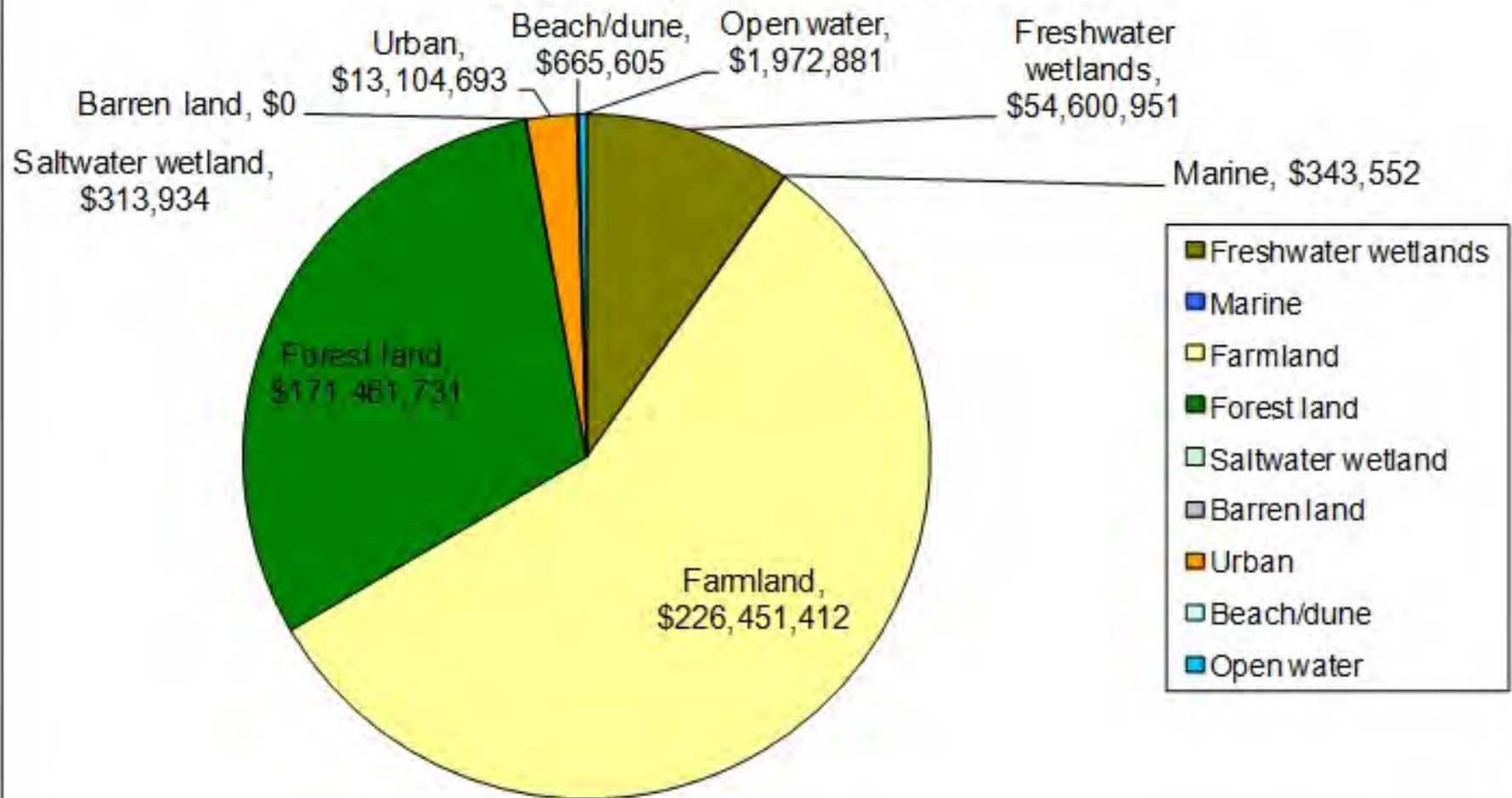


Table 28. Employment in the Brandywine Creek Watershed in 2010

County	County ¹ Population	Watershed ¹ Population	County ² Employment	Watershed ³ Employment
Chester County, Pa.	498,886	201,496	249,515	100,777
New Castle County, Del.	538,479	44,087	261,530	21,412
Total	1,037,365	245,583	511,045	120,983

1. US Census 2010. 2. US Bureau of Labor Statistics 2011. Scaled by ratio of watershed population to county population and multiplied by county employment.

⊕ **Table 27.** Jobs and wages directly and indirectly related to the Brandywine Creek watershed

Sector	Jobs	Wages (\$)	Data Source
Direct Watershed-Related	23,208	1,205,450,000	U.S. Census Bureau (2010)
Indirect Watershed-Related	27,850	964,360,000	U.S. Census Bureau (2010)
Coastal	781	15,615,496	National Coastal Econ. Program (2009)
Farm	3,453	136,431,483	U.S. Dept. of Agriculture (2011)
Fishing/Hunting/Birding	1,121	36,810,167	U.S. Fish and Wildlife Service (2008)
Outdoor Recreation	1,299	42,663,057	
Watershed Organizations	124	5,952,000	WRA and DRBC (2010)
Water Supply Utilities	175	9,723,929	Delaware Tourism Office (2008)
Wastewater Utilities	58	2,322,400	WRA and DRBC (2010)
Total	> 50,000	> \$2 billion	



"Sixteen Delicious, Buzzy
Craft Beers..."
Feb. 16, 2011



Nationwide Rivers Inventory

National Park Service
U.S. Department of the Interior



This is a listing of more than 3,200 free-flowing river segments in the U.S. that are believed to possess one or more "outstandingly remarkable" values.



2020 AD

Brandywine River National Wild and Scenic River?

WATER RESOURCES

IMPACT

September 2018 | Volume 20 | Number 5

GREAT AMERICAN MEGABASIN: CHESAPEAKE AND DELAWARE



The Great American Megabasin

Chesapeake and Delaware

Gerald J. Kauffman and Carol Collier

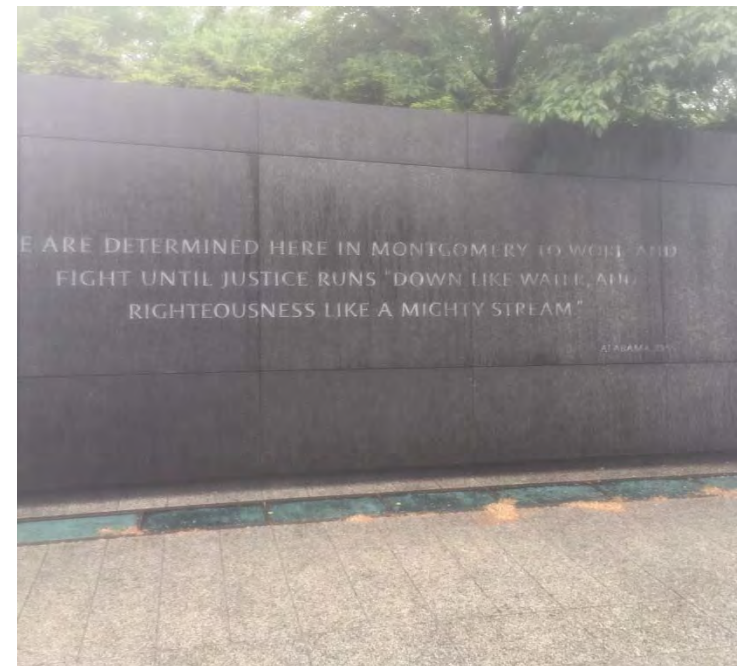
Linked by hydrology at the crossroads of American history, the Chesapeake and Delaware megabasin stretches 400 miles along the Atlantic seaboard in the most populous watershed in the United States (Figure 1). The American Revolutionary War and Civil War were fought along its rivers and John F. Kennedy, Richard M. Nixon and Barack H. Obama adopted federal programs to protect its rivers and watersheds.

While sharing similar geography and climate, these contiguous mid-Atlantic basins have contrasting demographic characteristics (see Table 1 on page 9). The Chesapeake and Delaware megabasin covers just 2% of the contiguous United States, yet is home to 8% of the nation's population and the nation's fifth- and seventh-largest metropolitan economies, the U.S. Capitol and five state capitals.

The Chesapeake watershed (64,000 square miles) is four times larger than the Delaware watershed (13,500 square miles), which suggests the challenges of governing the nation's largest estuary are correspondingly complex. The Chesapeake is home to 16 million people — twice that of the Delaware basin — but the Chesapeake's population density (250 people per square mile) is less than the

Delaware basin (590 people per square mile), which suggests less pressure per unit area from human pollution and water withdrawals.

Though each river is more than 300 miles long, the Chesapeake/Susquehanna and Delaware are merely the 42nd and 55th longest rivers in the United States. The Chesapeake is the longest estuary in the country (194 miles) and the Delaware estuary (96 miles) is the nation's third-longest navigable tidal river. Both estuaries are drowned river systems that evolved from rising sea levels that began 20,000 years ago during the end of the last ice age. While both estuaries have similar ratios of watershed to estuary surface area (18:1), the hydraulic retention time (HRT), measured by volume divided by median flow, is quite different. The approximate HRT of the Chesapeake is 812 days and that of the Delaware Bay is 443 days.





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



**Joint Mid-Atlantic Regional Meeting
NOAA Sea Grant College Programs & USGS Water Resources Research Institutes**

Feb. 27-28, 2019

The Wharf Intercontinental Washington D.C. Hotel
Marina Room
801 Wharf St SW, Washington, DC 20024

Wednesday, Feb. 27, 2019: 1:45 PM – 6:00 PM (Reception 6:30 – 8:30 PM, Mi Vida Restaurant)

Thursday, Feb 28, 2019: 8:00 AM – 4:30 PM

Overall meeting goal: To explore connectivity, synergy, and leveraging among Mid-Atlantic region programs of the NOAA Sea Grant College Program and institutes and centers of the USGS Water Resources Research Act Program.

Meeting objectives:

- Enhance understanding of the missions and mandates of Sea Grant Programs and Water Institutes and Centers.
- Enrich knowledge of current and planned work of Sea Grant Programs and Water Institutes and Centers.
- Increase awareness of existing collaborations among Sea Grant Programs and Water Institutes and Centers.
- Foster collaboration among Sea Grant Programs and Water Institutes and Centers to enhance and amplify outcomes.

WORKING AGENDA

Wednesday Feb. 26, 2018

1:45 – 2:00 PM: **Gather: Meet and Greet**

2:00 – 2:30 PM: **Welcome and Introductions** (Dr. Darren Lerner)

2:30 – 2:50 PM: **Building Partnerships** (Dr. Lerner)

2:55 – 3:10 PM: **The USGS Water Resources Research Act Program** (Dr. Earl Greene)

3:15 – 3:30 PM: **The NOAA National Sea Grant College Program** (Dr. Jon Pennock)

3:35 – 3:50 PM: **The National Institutes for Water Resources (NIWR)** (Dr. Daniel Devlin)

3:50 – 4:10 PM: **Break**

4:10 – 4:25 PM: **The Sea Grant Association (SGA)** (Dr. Fredrika Moser)

Individual Sea Grant and WRRRI Presentations

4:30 – 4:45 PM: **Virginia Sea Grant** (Dr. Troy Hartley)

4:50 – 5:05 PM: **Virginia Water Resources Research Center** (Dr. Stephen Schoenholtz)

5:10 – 5:40 PM: **North Carolina (NC) Sea Grant and NC Water Resources Research Institute**
(Dr. Susan White)

5:45– 6:00 PM: **Wrap-up Day 1** (Dr. Lerner and Dr. Mary Donohue)

6:30– 8:30 PM: **Networking Reception** (Mi Vida Restaurant, next door to hotel)

Thursday, Feb. 27, 2018

8:00 – 9:00 AM **Networking Breakfast Buffet** (Marina Room)

9:00 – 9:10 AM: **Day 2 Welcome** (Drs. Lerner and Donohue)

Individual Sea Grant and WRRRI Presentations

9:15 – 9:30 AM: **Maryland Water Resources Research Center** (Dr. Kaye Brubaker)

9:35 – 9:50 AM: **Maryland Sea Grant** (Dr. Moser)

9:55 – 10:10 AM: **Delaware Water Resources Center** (Dr. Gerald Kauffman)

10:15 – 10:30 AM: **Delaware Sea Grant** (Dr. Kathryn Coyne)

10:30 – 11:00 AM: **Break**

11:00 – 11:15 AM: **New Jersey Water Resources Research Institute** (Dr. Christopher Obropta)

11:20 – 11:35 AM: **New Jersey Sea Grant Consortium** (Dr. Peter Rowe)

11:40 – 11:55 AM: **Pennsylvania Water Resources Research Center** (Mr. Brian Redder for Dr. Elizabeth Boyer)

12:00 – 12:15 PM **Pennsylvania Sea Grant** (Dr. Sarah Whitney)

12:20 – 1:30 PM **Working Lunch** (Marina Room)

WELCOME



Welcome to the AWRA 2018 ANNUAL CONFERENCE

Baltimore, MD | November 4 - 8, 2018

On behalf of National AWRA, the Conference Planning Committee, and our hosts the Delaware State Section of AWRA, in partnership with members of the New Jersey and National Capitol State Sections, I would like to welcome you to AWRA's 53rd Annual Water Resources Conference in charming downtown Baltimore, MD!

As we progressed through our year-long planning process we were reminded of the importance of our profession and field of study. We saw the devastations of historic hurricanes (Harvey, Maria and Florence), flooding (Ellicott City), wildfires, contaminated drinking water supplies, and toxic red tide to name just a few events directly connected to water resources.

And with each event what continually comes to mind is, how do we, as water resource practitioners, researchers and students provide the tools and knowledge for others to understand the impacts of these historic events and the state of our water resources now and into the future? This is why this year we decided to kick off the conference on Monday morning with our plenary session, "Navigating New Waters - Communicating Science in Today's World". Secretary Ben Grumbles, Maryland Department of the Environment, will kick off this session followed by an interactive discussion with panelists from prominent media and communication organizations including E&E News, Politico, The Baltimore Sun/Bay Journal, WHY? and Water Words that Work, moderated by Steve Sobieszczek from the U.S. Geological Survey (USGS).

With 66 technical sessions and technical committee meetings, the conference will explore today's water resources issues and challenges, including global issues such as resiliency, data, science, engineering, governance, public policy, communication, and education, as well as local topics such as the Chesapeake Bay and Delaware River watersheds and eastern water law. Lightning talks, a poster session and student presentations are also part of the conference's technical program.

And while the conference is full of technical content, we will also engage in social events that include an evening reception on Monday with a silent auction to benefit AWRA's student scholarships, a "Bounty of the Bay" reception on Tuesday night with local cuisine and nonprofit organizations, a 5K fun run around the Inner Harbor on Tuesday morning and the student and young professionals' career night on Wednesday evening.

And in your free time, don't forget to try famous Maryland blue crab in the local eateries, visit the Visionary Museum and the Baltimore Aquarium and check out the many local sights surrounding the Baltimore Harbor. I look forward to meeting many of you and encourage you to engage with your colleagues on all things water while in Baltimore.

Martha C. Narvaez
Conference Chair



Martha C. Narvaez
Conference General Chair
Water Resources Center,
University of Delaware
Newark, DE



Kathy Hale
Technical Program Chair
New Jersey Water Supply Authority
Clinton, NJ



Kelly Mott Lach
Technical Program
U.S. Forest Service
Phoenix, AZ

Final Program

AWRA

PRESIDENT'S RECEPTION



AWARDS PRESENTED AT THE PRESIDENT'S RECEPTION SUNDAY, NOVEMBER 4, 2018

2018 PRESIDENT'S AWARD FOR OUTSTANDING SERVICE

Christine McCrehin

Director of Membership and Marketing
American Water Resources Association
Middleburg, Virginia

AWRA 2018 OUTSTANDING STATE SECTION AWARD

National Capital Region Section

Accepted by

Elisabeth Eveleigh - President and

Lana Sinder - President-Elect

AWRA 2018 N. EARL SPANGENBERG OUTSTANDING STUDENT CHAPTER AWARD

University of Delaware Student Chapter

Accepted by

Maggie Capocci

AWRA BOARD OF DIRECTORS SERVICE AWARDS

Rafael E. Frias III

Past President

Noel Gollehon

Secretary/Treasurer

Betsy Cody

Director

Laurel E. Stadjuhar

Director



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AWRA AWARDS RECIPIENTS (continued)

OUTSTANDING STATE SECTION AWARD (continued)

Utah State Section	1983
Florida State Section	1984
New Jersey State Section	1985
Louisiana State Section	1986
Colorado State Section	1987
Florida State Section	1988
Arizona State Section	1989
Alabama State Section	1990
Tennessee State Section	1991
Florida State Section	1992
Florida State Section	1993
Michigan State Section	1994
Florida State Section	1996
Florida State Section	1997
Florida State Section	1998
Washington State Section	1999
Montana State Section	2000
Alaska State Section	2001
Florida State Section	2002
Florida State Section	2003
Florida State Section	2004
Washington State Section	2005
New Jersey State Section	2006
Indiana Water Res Association	2007
Colorado State Section	2008
Alaska State Section	2009
Indiana Water Res Association	2010
Alaska State Section	2011
Florida State Section	2012
Colorado State Section	2013
Florida State Section	2014
Washington State Section	2015
Florida State Section	2016
Florida State Section	2017
National Capital Region	2018

N. EARL SPANGENBERG OUTSTANDING STUDENT CHAPTER AWARD | This Award is presented to the AWRA Student Chapter which has been most active in advancing water resources knowledge in their respective Chapter, State, and Section. Recipients are:

Univ. of Wisconsin-Stevens Point	1983
University of Arizona	1984
Univ. of Wisconsin-Stevens Point	1985
University of Arizona	1986
University of Minnesota	1987
Northern Illinois University	1988
Univ. of Wisconsin-Stevens Point	1989
Utah State University	1990

Pennsylvania State University	1991
Pennsylvania State University	1992
Univ. of Wisconsin-Stevens Point	1993
University of Nevada-Reno	1994
Univ. of Wisconsin-Stevens Point	1995
University of Nevada-Reno	1996
Cahaba/Warrior Student Chapter (University of Alabama)	1997
Penn State	1998
Univ. of Wisconsin-Stevens Point	1999
University of Florida	2000
University of Washington	2001
Salt City (SUNY-ESF)	2002
Salt City (SUNY-ESF)	2003
Virginia Tech	2004
University of Wisconsin-Stevens Point	2005
University of Washington	2006
University of Wisconsin-Stevens Point	2007
University of Florida	2008
University of Wisconsin-Stevens Point	2009
University of Utah	2010
Southern Illinois University Carbondale	2011
Oregon State University	2012
Oregon State University	2013
Texas A&M University	2014
University of Delaware	2015
University of Florida	2016
University of Delaware	2017
University of Delaware	2018

2018 AWRA BOARD OF DIRECTORS

Brenda Bateman	President
Lisa Beutler	President-Elect
Rafael Frias	Past-President
Noel Gollehon	Secretary/Treasurer
Laurel Stadjuhar (2016-2018)	Director
Betsy Cody (2016-2018)	Director
Jerad Bales (2017-2019)	Director
Sharon Megdal (2017-2019)	Director
Scott Kudlas (2018-2020)	Director
Lisa Engelman (2018-2020)	Director



December 2018

Volume 17

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[View the newsletter online](#)

DWRC Director's Message

Why study water? Because it's not just good for our ecology, it's also the foundation of our economy. Established on campus in 1965 after Lyndon Baines Johnson signed the Water Resources Research Act during the golden era of water resources in the United States, the University of Delaware Water Resources Center is one of 54 National Institutes for Water Resources (NIWR) situated at land grant universities stretching across the Atlantic and Pacific from Maine to Micronesia. The 54 NIWR institutions of higher learning have graduated over 50 million alumni who hold jobs in the sciences, engineering, arts and humanities (STEAM) that support our national economy. We're finding that the byproducts of our NIWR universities - data and knowledge - are priced differently and worth much more now in the new economy and the old supply and demand curves just don't quite capture the true economic value of water.

The WRR/NIWR research program invests in water resources that support a \$100 billion economy in the United States. In 2005, surface waters monitored by the USGS stream gage network totaled 260 billion gallons per day for irrigation, industry, thermoelectric power, and drinking water uses with an instream value estimated by the University of Delaware of over \$21 billion in 2010 dollars. Ecosystem services and wetland habitat in the National Wildlife Refuges maintained by the U.S. Fish and Wildlife Service totaled \$27 billion in 2008 dollars. The American Water Works Association (AWWA) calculated the U.S. gains \$220 billion in economic activity and generates 1.3 million jobs by investing in water and wastewater infrastructure. Every new water sector job adds an additional 3.7 jobs to the U.S. economy and every dollar invested in infrastructure generates \$6.00 in returns. The U.S. Fish and Wildlife Service estimates clean water provides \$157 billion in annual expenditures including \$46 billion for fishing, \$35 billion for hunting, and \$76 billion for bird/wildlife watching.

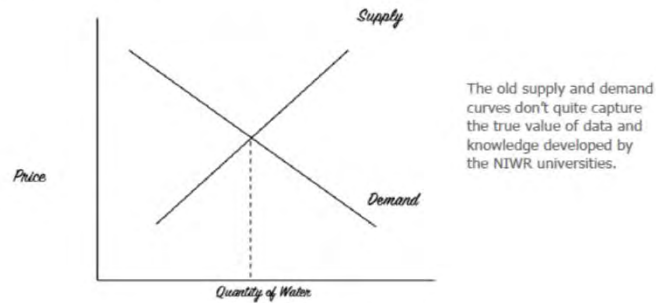
The Outdoor Industry Association estimates the outdoor recreation economy totals \$140 billion nationally for water sports such as boating, paddling, and sailing. The University of Delaware found the Delaware River in Delaware, New Jersey, New York, and Pennsylvania supports \$22 billion in annual economic activity and 600,000 direct/indirect jobs. The University of Maryland estimated the nation's largest estuary, the Chesapeake, supports a trillion-dollar economy. The Nature Conservancy concluded the



DWRC Director Gerald Kauffman (right) with David Shields

Colorado River drives a \$1.4 trillion economy and 16 million jobs in California, Arizona, Nevada, Utah, Colorado, New Mexico and Wyoming or almost 10% of the U.S. gross domestic product (GDP). Investments in NIWR universities such as the University of Delaware by federal, state, and local governments are paying off handsomely in terms of jobs, careers, and GDP.

(Brandywine Conservancy), Collin O'Mara (National Wildlife Federation), and Jim Jordan (Brandywine Red Clay Alliance) at the Bi-State Solution: Clean Water in the Brandywine-Christina Watershed conference in Mendenhall, PA on May 3, 2018.



DWRC Faculty and Scientists

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. DWRC faculty and scientists include:

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



DWRC faculty and scientists gather with Senator Tom Carper outside the Water Resources Center.

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 [here](#).

2018-2019 DWRC Research Interns

DWRC works with undergraduate and graduate students studying water resources to develop research projects that reflect their unique interests. The DWRC Research Interns for the 2018-2019 school year are:

Meet the DWRC Graduate Research Fellows



Kelly Jacobs

Kelly is a first-year Master's student in the Energy and Environmental Policy program. She is from Dallas, Pennsylvania and received her Bachelor's degree in Economics from Lebanon Valley College. Kelly has worked on various projects for DWRC including the City of Newark's Source Water Assessment, field work for White Clay Wild and Scenic, and Brandywine-Christina Cluster Water Quality and Communication. She is specifically interested in research related to hydraulic fracturing and its impact on water quality.



Jillian Young

Jillian is originally from Sidney, NY where she obtained her Bachelor's degree from SUNY Oneonta in Meteorology. She is currently a second-year Master's student in the Water Science and Policy program. While working on her degree, Jillian conducts research for DWRC where she interns for the White Clay Creek Wild and Scenic River Group, leads field work projects, assists with watershed reports, and presents to groups on the importance of clean water. Outside of school, Jillian's main interest is training her horse named Ace.

The AWRA Outstanding Student Chapter Award Goes To...

For the second year in a row, the American Water Resources Association (AWRA) selected the University of Delaware (UD) Student Chapter as the AWRA Outstanding Student Chapter for 2018. This award is presented to the AWRA Student Chapter which has been most active in advancing water resources knowledge in their respective Chapter, State, and Section. The UD Student Chapter also won the award in 2015. In 36 years there have been just four 3-time

champions of the AWRA Outstanding Student Chapter Award:

Univ. of Wisconsin-Stevens Point – 1983, 1985, 1989, 1993, 1995, 1999, 2005, 2007, 2009
Pennsylvania State University – 1991, 1992, 1998
University of Florida – 2000, 2008, 2016
University of Delaware - 2015, 2017, 2018
The UD Student Chapter Executive Board accepted the award on Sunday, November 4, 2018 during the AWRA President's Reception in Baltimore, Maryland. Members of the Executive Board, pictured with current AWRA President Brenda Bateman, include Maggie Capoori (President), Jillian Young (Vice President), Lauren Mosesso (Secretary), and Nathan Sienkiewicz (Treasurer).

The Student Chapter of the Delaware Section of the American Water Resources Association is a non-profit professional association dedicated to the advancement of women and men in water resources management, research, and education. The 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.

In addition to the UD Student Chapter winning this award for the third time, the University of Delaware Water Resources Center's policy scientist, Martha Narvaez, was this year's conference chair and also served as AWRA President in 2016.



The UD Student Chapter Executive Board (left to right: Maggie Capoori (President), Jillian Young (Vice President), Lauren Mosesso (Secretary), and Nathan Sienkiewicz (Treasurer)) receives the Outstanding Student Section award from AWRA President Brenda Bateman.

Clean Water: A Bi-State Solution

Over 160 people joined together on May 3, 2018 to educate, learn, and celebrate the Brandywine-Christina Watershed at the *Clean Water: A Bi-State Solution* conference. The conference focused on the collaborative efforts made to improve the watershed health, ongoing projects, and the next steps to ensure the health of the watershed.

The conference was held by the Brandywine-Christina Cluster Partners: Brandywine Conservancy & Museum of Art, Brandywine Red Clay Alliance, Natural Lands, Stroud Water Research Center, The Nature Conservancy of Delaware and the University of Delaware Water Resources Center. These are six nonprofit organizations funded by the William Penn Foundation through the Delaware River Watershed Initiative (DRWI).

The morning started off with Andrew Johnson, the Program Director at The William Penn Foundation, speaking about the DRWI and how over the past seven years, they have distributed over \$100 million dollars for clean water in the Brandywine-Christina watershed. Despite these efforts, he said, "It's still not enough." More funds are needed to help the water's health.

A joint talk included the Secretary of the Delaware Department of Natural Resources and Environmental Control (DNREC), Shawn Garvin, and Secretary of the Pennsylvania Department of Environmental Protection (PA DEP), Patrick McDonnell. Together, they spoke about the importance of the watershed health because the watershed incorporates the two states. Most of the land in the watershed is in Pennsylvania, but the majority of the population in Wilmington receives their drinking water from the headwaters in Pennsylvania.



Brandywine-Christina Cluster Partners gather with Secretary Shawn Garvin (DNREC) and Secretary Patrick McDonnell (PA DEP).

Following these talks, Dr. Gerald Kauffman, Director of the University of Delaware Water Resources Center, spoke about the important history of the watershed which supported life for early settlers. He discussed the history of the mill dams on the river and how today, people can no longer ice skate on the Brandywine because of the climate's warming temperatures.

Two panel sessions included presentations about water quality and collaborative work in the watershed. The first panel included Dr. John Jackson, Senior Research Scientist at the Stroud Water Research Center who discussed the influences of agriculture on the watershed, showing which streams are impaired and which areas are showing reductions in sediment loads. Four more presentations followed on topics including agricultural conservation practices, stream restoration projects, municipal ordinances, and the Brandywine-Christine Healthy Water Fund.

The second panel session provided an overview of projects from the federal and local government perspective. The panel included Shane Morgan, the Watershed Coordinator for the White Clay Creek Wild and Scenic River Program, who talked about how joint projects on land protection, outreach, education, and water quality monitoring, coupled with federal funding all help protect and keep the White Clay Creek healthy. Other panelists spoke about projects to protect Wilmington, Delaware's water source and land preservation in Honey Brook Township, Pennsylvania.

The keynote speaker was Collin O'Mara, President and CEO of the National Wildlife Federation

DWRC Water Research Students



2018-2019 DWRC Undergraduate Research Interns

- **Michaella 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.

**FY18-19 Delaware Water Resources Center
Graduate Students**

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. Effect of Marcellus Shale Gas Drilling on the Delaware River Watershed/ White Clay Creek National Wild and Scenic River Program.

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

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](#).



**U.S. Geological Survey
Department of the Interior**

**STATE WATER RESOURCES RESEARCH INSTITUTE PROGRAM
ANNUAL BASE GRANTS FISCAL YEAR 2019 REQUEST FOR APPLICATIONS
under Section 104 of the
Water Resources Research Act of 1984, as Amended**

**ANNOUNCEMENT G19ASXXXXX
Revised November 01, 2018**

**CLOSING DATE
JANUARY 17, 2019
5:00 P.M. Eastern Standard Time**

OMB Number: 1028-0097
Expiration Date: 2/29/2020

PAPERWORK REDUCTION ACT STATEMENT: In accordance with the Paperwork Reduction Act (44 USC 3501), an agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid Office of Management and Budget control number. OMB has reviewed and approved this information collection and assigned OMB Control Number 1028-0097. You may submit comments on any aspect of this information collection, including the accuracy of the estimated burden hours and suggestions to reduce this burden. Send your comments to: Information Collections Clearance Officer, US Geological Survey, gs-info_collections@usgs.gov.



Water Resources Research Act Program
National Competitive Grants Program

Fiscal Year 2019 Announcement

Announcement No. G19ASXXXX
under Section 104(g) of the
Water Resources Research Act of 1984, as Amended
November 1, 2018

Closing Dates

5:00 PM, Eastern Time, February 15, 2019 (Preproposals)
5:00 PM, Eastern Time, May 31, 2019 (Institutes)

Department of the Interior
U. S. Geological Survey

National Institutes for
Water Resources

OMB Number 1028-0097

Expiration Date: Pending: 2/29/2020

PAPERWORK REDUCTION ACT STATEMENT: In accordance with the Paperwork Reduction Act (44 USC 3501), an agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid Office of Management and Budget control number. OMB has reviewed and approved this information collection and assigned OMB Control Number 1028-0097. You may submit comments on any aspect of this information collection, including the accuracy of the estimated burden hours and suggestions to reduce this burden. Send your comments to: Information Collections Clearance Officer, US Geological Survey, info_collections@usgs.gov.

National Competitive Grant (104g) Preproposal Form – RFP G18AS00009

Number assigned by USGS: _____

TITLE: Measurements and modeling to improve prediction of vulnerability of coastal water resources and ecosystems to salinization by storm surges and sea-level rise

PROPOSED INITIATION DATE: September 1, 2018

PROPOSED COMPLETION DATE: August 31, 2021

WATER RESOURCES RESEARCH INSTITUTE OR CENTER: University of Delaware

FUNDING LEVEL (Cap of \$250,000 federal funds and a maximum of a 3 year duration)

(A) FEDERAL FUNDS REQUESTED: ____ \$195,215 ____

(B) PROPOSED COST SHARING: __195,215____

FOCUS CATEGORIES. GROUNDWATER, WATER QUALITY, MODELS

RESEARCH CATEGORY. Climate and Hydrologic Processes

KEYWORDS. Coastal groundwater quality, seawater intrusion, storm surges, variable-density groundwater modeling, sea-level rise

PRINCIPAL INVESTIGATOR(S). Holly A. Michael, Associate Professor, University of Delaware, hmichael@udel.edu, 302-831-4197

CO-PRINCIPAL INVESTIGATOR(S). Xuan Yu, Postdoctoral Researcher, University of Delaware, xuan@udel.edu, 302 831-1393; Glen Carleton, Hydrologist, USGS NJ Water Science Center, carleton@usgs.gov, 609-771-3921.

Delaware FY 19 Sec 104g Pre-proposals

1. Draining the landscape: Will dam removals result in increased nitrogen leakage and exports from watersheds? (Dr. Inamdar)
2. Paradigm Shift: Groundwater as a point source of pollutants to Piedmont streams (Dr. McKenna)
3. An Integrated Water-Energy Resource Planning Model for the PJM Region: Leveraging Big Data and Machine Learning for Polycentric Governance Systems (Dr. Agbemabiese et al.)
4. Evaluation of the Design and Operational Characteristics of a Fungal Bioreactor as a Novel Technology to Remove Pathogens and Antibiotics From Dairy Waste Streams (Dr. Chirnside)



2018 ANNUAL MEETING
"Determining Priorities and Finding New Opportunities"
February 25 – 28, 2108
All events take place at the Phoenix Park Hotel Ballroom unless otherwise noted

PROGRAM

SUNDAY, FEBRUARY 25, 2018

5:00 to 7:00 pm Board meeting with light dinner provided

MONDAY, FEBRUARY 26, 2018

7:00 am to 5 pm Registration Desk Open

7:30 am Breakfast Buffet Available

8:00 am New Directors' Breakfast

Sam Fernald (NM), NIWR President
All NIWR directors are welcome

9:00 am Welcome, Meeting Overview, Introductions and NIWR Update

Meeting Overview and Introductions: NIWR President-Elect Dan Devlin (KS)
NIWR Update: NIWR President Sam Fernald (NM)
Reflections on NIWR 2016-2017: NIWR Past-President Stephen Schoenholtz (VA)

10:00 am Coffee Break

10:15 am Comments and Update from Van Scoyoc Associates

Leslee Gilbert, Van Scoyoc Associates

10:45 am United States Senator Jerry Moran (KS)
(invited)

11:15 am UCOWR-NIWR Partnership Update

Doug Parker (CA) and Sharon Megdal (AZ)

11:30 am National Water Priorities

Panel Discussion: Reagan Waskom, Water Priorities in the West
Rick Cruse, Water priorities in the Midwest
John Fear, Water priorities in the Southeast
Gerald Kauffman, Water priorities in the Northeast

12:30 pm NIWR Networking Lunch – Regional Groups

1:30 pm USGS Opportunities and Priorities

Understanding and Working with Your USGS Water Center

Eric Reichard, California Center Director
Stephen Anthony, Pacific Islands Center Director
Mark Bennett, Virginia/West Virginia Water Center Director

Overview and Priorities of USGS Programs

Gary Rowe, Program Coordinator for the National Water Quality Program
Mike Woodside, Acting Program Coordinator for the Groundwater and Streamflow Information Program
Mindi Dalton, Acting Program Coordinator for the Water Availability and Use Science Program

3:15 pm Coffee Break

3:30 pm US House of Representative Ken Calvert (CA)

invited)

4:00 pm USGS WRRP Program Updates

Earl Greene, Program Coordinator, Water Resources Research Act Program, USGS

4:45 pm NIWR. Net Update

Earl Greene (USGS) and Mark Newman (FL)

5:50 pm Wrap-Up and Adjourn for the Day

- **MEMO**
- **To:** Dan Devlin, NIWR Board President
- **From:** Leslee Gilbert, VSA
- **Date:** December 17, 2018
- **RE:** Action Plan for 2019
-
- The following represents an action plan for NIWR for the coming year and Congress.
- ***Goals***
- Secure an authorization for the WRRRA program at USGS.
- Increase FY2020 appropriations for the WRRRA program. Aim at \$10 million in FY20, \$15 million in FY21, and \$20 million in FY22.
-
- ***Objectives***
- Authorization Objectives
- Determine if the current text of the WRRRA authorization needs further changes, including goals and funding amount. Draft revised text
- Work with previous sponsors and potential new sponsors to introduce and advance the legislation.
- Build on existing relationships with House Democratic Members on the Natural Resources Committee to advance the legislation. Garner support from new Members.
- Continue current strong support in Senate to advance the legislation.
-
- Appropriations Objectives
- Prepare FY20 appropriations' request for WRRRA program.
- Garner support from new House Majority Members and staff for program. Build on existing relationships.
- Educate new Members on the value of WRRRA in their states and districts.
- Partner with coalitions to work to increase USGS baseline.
-
- ***Action Items***
- Authorization Action Items
- Draft potentially new WRRRA reauthorization to reflect desire of the NIWR board for programmatic and funding changes. This needs to be done by late January.
- In Senate, meet with Sen. Boozman and Cardin's offices about reintroducing the authorization. Discuss with the office the possibility of increasing the authorization amount in the bill.



School of Public Policy
& Administration
INSTITUTE FOR PUBLIC ADMINISTRATION
WATER RESOURCES CENTER

DGS Annex
261 Academy Street
Newark, DE 19716-7380
Phone: 302-831-4929
Email: jerryk@udel.edu

March 8, 2019

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

Re: Water Resources Research Act (WRRRA)
Fiscal Year 2020 Interior, Environment and Related Agencies Appropriations Bill

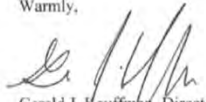
Dear Senator Carper:

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 \$10 million for the W program in the Fiscal Year 2020 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 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 on campus 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 solving the significant water resources issues of the day in Delaware, the Delaware Valley, and the Nation.

Please don't hesitate to contact me at jerryk@udel.edu or cell 302-893-1571 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

www.wrc.udel.edu | www.ipa.udel.edu | www.sppa.udel.edu



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DGS Annex
261 Academy Street
Newark, DE 19716-7380
Phone: 302-831-4929
Email: jerryk@udel.edu

March 8, 2019

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

Re: Water Resources Research Act
Fiscal Year 2020 Interior, Environment and Related Agencies Appropriations Bill

Dear Senator Coons:

Delaware Water Resources Center, I wish to thank you for your support of the Water Resources Research Act (WRRRA) program and respectfully request your support of the Senate Subcommittee to provide \$10 million for the W program in the Fiscal Year 2020 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 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 on campus 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 solving the significant water resources issues of the day in Delaware, the Delaware Valley, and the Nation.

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

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 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 on campus 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 solving the significant water resources issues of the day in Delaware, the Delaware Valley, and the Nation.



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261 Academy Street
Newark, DE 19716-7380
Phone: 302-831-4929
Email: jerryk@udel.edu

March 8, 2019

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

Re: Water Resources Research Act
Fiscal Year 2020 Interior, Environment, and Related Agencies Appropriations Bill

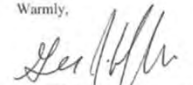
Dear Congresswoman Blunt Rochester:

As Director of the University of Delaware Water Resources Center, I wish to respectfully request your support of the House Subcommittee to provide \$10 million for the Water Resources Research Act program in the Fiscal Year 2020 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 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 on campus 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 solving the significant water resources issues of the day in Delaware, the Delaware Valley, and the Nation.

Please don't hesitate to contact me at 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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DGS Annex
261 Academy Street
Newark, DE 19716-7380
Phone: 302-831-4929
Email: jerrykgudel.edu

March 8, 2019

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

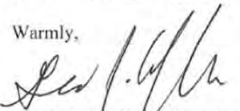
Dear Senators Murkowski and Udall:

Thank you for the Subcommittee's continuing support for the Water Resources Research Act (WRRRA) program. I write to urge your continued support for the WRRRA and a request for an FY20 appropriation of \$10 million. The WRRRA is a proven and effective program in effect 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 WRRRA 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, 100 federal offices, and more than 165 local and municipal offices. In each year, Federal dollars are leveraged to support nearly 300 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 FY20 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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DGS Annex
261 Academy Street
Newark, DE 19716-7380
Phone: 302-831-4929
Email: jerrykgudel.edu

March 8, 2019

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

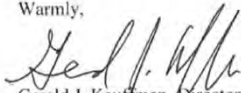
Dear Chairwoman McCollum and Ranking Member Joyce:

I write to urge your continued support for the Water Resources Research Act (WRRRA) program in FY 2020 and a request for an FY20 appropriation of \$10 million. The WRRRA is a proven and effective program in effect 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.

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 WRRRA 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, 100 federal offices, and more than 165 local and municipal offices. In a given year, Federal dollars are leveraged to support nearly 300 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 FY19 Interior, Environment, and Related Agencies bill.

Warmly,


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

Cc: The Honorable Lisa Blunt Rochester

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115th Congress

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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)
M. Michael "Mike" Rounds (R-SD)
LTC Joni K. Ernst, ARNG (Ret) (R-IA)
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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)

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Daniel S. "Dan" Sullivan, USMCR (R-AK)
Richard C. Shelby (R-AL)
John A. Barrasso (R-WY) *Ex Officio, Non-Voting*

Minority Members

Benjamin L. "Ben" Cardin (D-MD) *Ranking Member*
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Sheldon Whitehouse (D-RI)
Jeff Alan Merkley (D-OR)
Kirsten Elizabeth Gillibrand (D-NY)
Edward J. "Ed" Markey (D-MA)
LTC Ladda Tammy Duckworth, ARNG (Ret) (D-IL)
Thomas R. "Tom" Carper (D-DE) *Ex Officio, Non-Voting*

115th 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)
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Marco Rubio (R-FL)

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Dianne Feinstein (D-CA)
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Jon Tester (D-MT)
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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)

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 2018 Funding Received:** \$6.5 million
- **Fiscal Year 2019 Funding Received:** \$6.5 million
- **Level of Funding Requested for Fiscal Year 2020:** \$ 20 million

Water Resources Research Institute Program Funding History

Fiscal Year	Budget Request	House Bill	Senate Bill	Enacted
FY 2014	\$1,000,000	Supportive Language	\$6,500,000	\$6,500,000
FY 2015	\$3,500,000	\$6,500,000	\$6,500,000	\$6,500,000
FY2016	\$6,500,000	\$6,500,000	\$6,500,000	\$6,500,000
FY2017	\$6,500,000	\$6,500,000	\$6,500,000	TBD
FY2018	\$0	\$6,500,000	\$6,500,000	TBD

DWRC Water Resources Research and Education Priorities

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

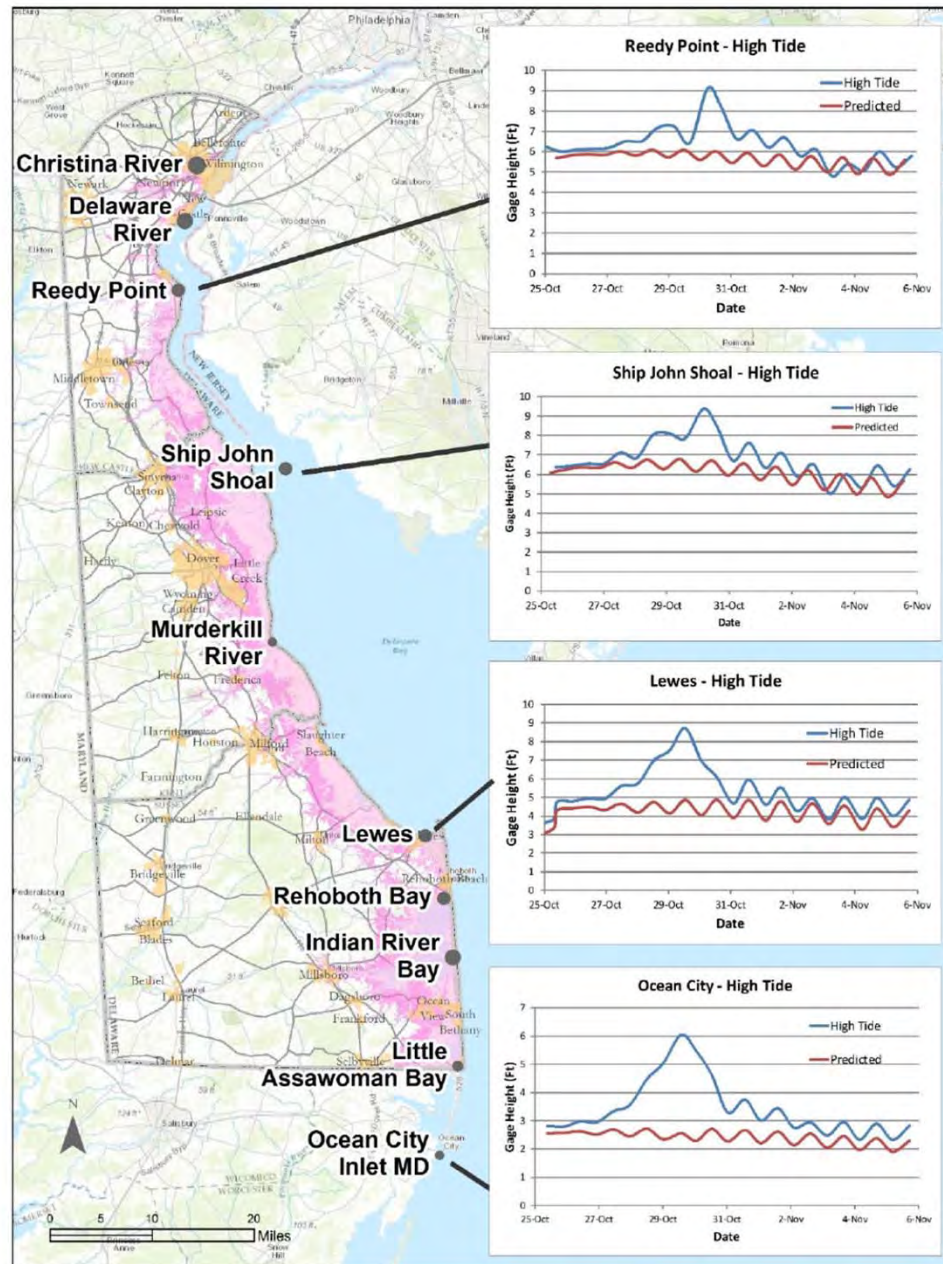


Figure 6.4 Tide levels at NOAA gages, Delaware Bay and River, Superstorm Sandy (October 2012)

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



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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 Aug 19, 2017 0



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 MELLON



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DWRC Advisory Panel

Jayne Arthurs
USDA Natural Resources Conservation Service
Dover, DE 19904

Mr. Chris Bason
Center for the Inland Bays
39375 Inlet Rd.
Rehoboth, DE 19971

Mr. Tom Coleman, City Manager
City of Newark
220 S. Main St.
Newark, DE 19711

Mr. Jeff Downing
Mt. Cuba Center
3120 Barley Mill Rd.
Wilmington, DE 19707

Dr. Asia Dowtin
Department of Forestry, [Natural Resources Building](#)
[480 Wilson Rd.](#)
[East Lansing, MI 48824](#)

Dr. Mingxin Guo
Department of Agriculture and Natural Resources
Delaware State University, 1200 N. DuPont Highway
Dover, DE 19901

Ms. LeeAnn Haaf
Partnership for the Delaware Estuary
110 S. Poplar St., Suite 202
Wilmington, DE 19801

Mr. Stephen Hokuf
Dept. of Planning, New Castle County Government Center
87 Reads Way
New Castle, DE 19720

Dr. Shreeram Inamdar
Department of Plant & Soil Science
University of Delaware, Townsend Hall
Newark, DE 19716

Dr. Paul Imhoff
Department of Civil and Environmental Engineering
University of Delaware, 344A DuPont Hall
Newark, DE 19716

Mr. Richie Jones
The Nature Conservancy – Delaware
Community Building
Wilmington, DE

Dr. Thomas McKenna
University of Delaware
223 Delaware Geological Survey
Newark, DE 19716

Mr. Matt Miller
Aqua Pennsylvania
762 W. Lancaster Ave.
Bryn Mawr, PA 19010

Ms. Martha Narvaez
Water Resources Center
University of Delaware, DGS Annex
Newark, DE 19716

Ms. Ginger North
Delaware Nature Society
P.O. Box 700
Hockessin, DE 19707

Ms. Betzaida (Betzy) Reyes
U.S. Geological Survey
1289 McD Drive
Dover, DE 19901

Mr. Kash Srinivasan
603 E. Matson Run
Wilmington, DE 19802

Mr. Robert Struble
Brandywine Valley Association
1760 Unionville-Wawaset Rd.
West Chester, PA 19382

Ms. Jennifer Volk
Kent County Cooperative Extension, University of Delaware
69 Transportation Circle
Dover, DE 19904

Mr. Robert Palmer
Delaware DNREC, Division of Watershed Stewardship
89 Kings Highway
Dover, DE 19901

Ms. Jennifer Walls
Delaware DNREC, Division of Watershed Stewardship
89 Kings Highway
Dover, DE 19901

Christian Hauser, Associate Director, Delaware Sea Grant College Program
College of Earth, Ocean, and Environment, University of Delaware
102 Robinson Hall
Newark, DE 19716

March 26, 2019

Dear:

As Director of the University of Delaware Water Resources Center, I am pleased to invite you to serve on the DWRC Advisory Panel for a three-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 begun by my predecessor Deputy Dean Dr. Tom Sims that has supported over 250 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 me at 302-831-4929 or jerryk@udel.edu. Thank you for considering.

Warmly,

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



Future University of Delaware Water Resources Center Building

Questions?

