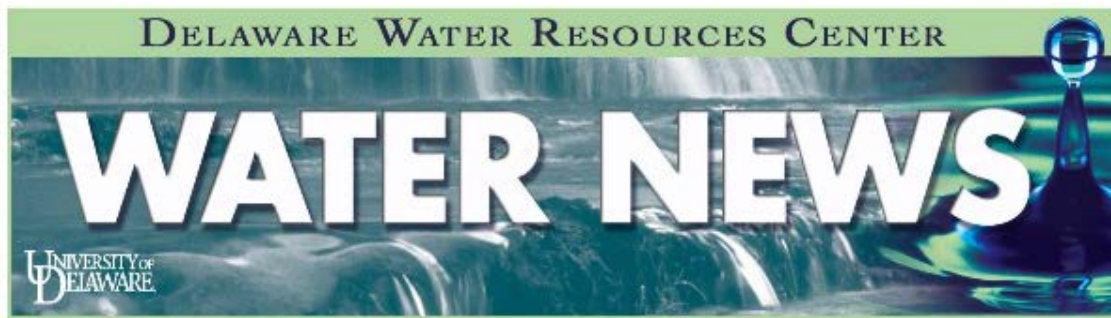


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June 2017

Volume 16

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[View the newsletter online](#)

## DWRC Director's Message

$2\text{H}_2 + \text{O}_2 = 2\text{H}_2\text{O}$ .  $Q = VA$ .  $Q = ciA$

These are the scientific equations that guide the movement of dihydrogen monoxide on Earth. Water is the most valuable chemical in society and it is one of the few compounds in nature that exists in the three forms of matter: solid, liquid, and gas. It's been said that water always flows downhill by gravity, yet it flows uphill toward money. My professor at Rutgers taught us that science is rational, linear, and logical yet policy (or politics) can be irrational, nonlinear, and chaotic. Maybe this explains what is going on these days.

In the week after the November 2016 election, I drove north from sea level in Delaware through the Schuylkill Valley and up and over the ridge through the Appalachian coal fields on the way to the Bucknell symposium on the Susquehanna River. And in towns like Frackville and Minersville, there was the election, downtowns tilted away from the past with economies shackled by the future. And after descending through the valley to the campus by the river on the other side, I realized that the quest for knowledge is an undeniable truth. Science and the classroom have always brought hope for a brighter future to towns just like these throughout America.

So for the first time in 30 years I went to a protest and took the train down from UD to DC to the March for Science on Earth Day on April 22, 2017. Emerging from Union Station I was proud to see on the right the Delaware flag, representing the First State in the Union. It was raining, with lots of water vapor, a perfect day for science. I rode the Citibike over to briefings at the American Association for the Advancement of Science (AAAS) and American Geophysical Union (AGU). A million scientists



Gerald Kauffman attends World Water Day Reception after the White House Water Summit near the Lincoln Memorial and the U.S. Institute for Peace at the George P. Schultz Great Hall.

marched from the Washington Monument, past the White House, and up Constitution Avenue by the Smithsonian museums on the National Mall then over to the Capitol. I never saw science so strong. We marched with kids cured of cancer, biology teachers, physicians, nurses, teachers, a 95-year old astrophysicist, mobilized citizen scientists. You couldn't help get the feeling that there will be more scientists in D.C. by 2018.

At UD we are fortunate to be one of the 54 National Institutes for Water Resources in a science network that stretches from Maine to Micronesia at land grant universities in the 50 states, D.C., and the three island territories of Guam, Puerto Rico, and U.S. Virgin Islands. The 54 NIWR colleges educate over a million students annually and have over 10 million alumni from throughout the U.S. and the world. Over the last 15 years, the DWRC has supported the water research of over 250 young scientists and engineers who have gone on to productive careers in society. With the start of the fall 2017 semester in September, we are excited to be part of the Biden School of Public Policy and Administration and look forward to working with Professor Biden on the cross-cutting environmental sustainability issues of the day.

These are turbulent times. Environmental budgets are being cut. Science funding is under scrutiny. Natural-born rights are being challenged. Yet with all this uncertainty, it's reassuring to know that water always obeys the universal laws of nature. And with science as our foundation, at the University of Delaware Water Resources Center we search for new knowledge and train future scientists in an unfettered way with openness to the policies and viewpoints of all. As I tweeted before, I embrace all on Earth who seek peace and love in this nation of inalienable rights that each are born with and no government may take away.

And as they say in the NIWR, water is clear--it is neither red or blue.

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## DWRC 2017 Annual Update

The past year (2016-2017) has been another productive year for the Delaware Water Resources Center. During the summer of 2016, thirteen DWRC undergraduate water resources interns began work on their research with faculty advisors. In August 2016, our two U.S. Senators, Tom Carper and Chris Coons, visited the offices of the DWRC in Newark, Delaware to discuss water science and policy issues critical to the First State such as coastal flooding, drinking water quality, and water quality impacts on coastal tourism. In November 2016, DWRC Director Gerald Kauffman was invited to present plenary remarks at the 11th Annual Susquehanna River Symposium hosted by the Bucknell University Watershed Sciences and Engineering Program in Lewisburg, Pennsylvania. Also in November, DWRC Policy Scientist Martha Narvaez handed over the gavel as she completed her term as the 51st President of the American Water Resources Association (AWRA). During the fall of 2016, Andrew Homsey was elected to the Board of Directors at the Brandywine Red Clay Alliance, an organization formed in 1946, and the oldest small watershed organization on the U.S. In February 2017, DWRC Director Gerald Kauffman met with institute directors from throughout the United States at the annual National Institutes for Water Resources (NIWR) meeting in Washington, DC to discuss the changing water resources landscape and meeting with our congressional delegation to support the Water Resources Research Act appropriation. On April 28, 2017, the Advisory Panel met for the 52nd annual meeting of the DWRC at the University of Delaware campus in Lewes, Delaware and selected new water resources interns who will start their research during the summer and fall of 2017. On May 5, 2017, the DWRC research interns presented the results of their water resources research at the University of Delaware undergraduate research poster session at the Perkins Student Center on the Newark campus.



Jerry Kauffman speaks at the 11th Annual Susquehanna River Symposium, sponsored by the Watershed Sciences and Engineering Program at Bucknell University.

It is a new world in water with changes in the White House and statehouse but the Delaware Water Resources Center is poised now more than ever to train and educate our students to meet the water science and policy challenges of the future.

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## DWRC Advisory Panel Welcomes New Members

DWRC Director Dr. Gerald Kauffman has appointed Mr. Robert Palmer, Director of the DNREC Division of Watershed Stewardship and Ms. Jennifer Walls, Sussex County Planning and Zoning Office to the DWRC Advisory Panel for a 3-year term.

### DWRC Advisory Panel

- Mr. Jayme Arthurs, USDA Natural Resources Conservation Service
- Mr. Chris Bason, Center for the Inland Bays
- Dr. Afton Clarke-Sather, Dept. of Geography, University of Delaware
- Mr. Tom Coleman, City of Newark, DE
- Mr. Jeff Downing, Mt. Cuba Center
- Ms. Asia Dowtin, Ph.D. Candidate, Dept. of Geography, University of Delaware
- Dr. Mingxin Guo, Dept. of Agriculture & Natural Resources, Delaware State University
- Ms. LeeAnn Haaf, Partnership for the Delaware Estuary
- Mr. Stephen Hokuf, Dept. of Planning, New Castle County, DE
- Dr. Paul Imhoff, Dept. of Civil and Environmental Engineering, University of Delaware
- Dr. Shreeram Inamdar, Dept. of Plant and Soil Sciences, University of Delaware
- Dr. Janet Johnson, Dept. of Political Science, University of Delaware
- Mr. Richie Jones, The Nature Conservancy – Delaware
- Dr. Thomas McKenna, Delaware Geological Survey, University of Delaware
- Mr. Matt Miller, Aqua Pennsylvania
- Ms. Martha Narvaez, Water Resources Center, University of Delaware
- Ms. Ginger North, Delaware Nature Society
- Ms. Betzaida (Betzy) Reyes, U.S. Geological Survey
- Mr. Kash Srinivasan, Kash Srinivasan Group LLC
- Mr. Robert Struble, Brandywine Valley Association
- Ms. Jennifer Volk, Kent County Cooperative Extension, University of Delaware
- Mr. Robert Palmer, Division of Watershed Stewardship, Delaware DNREC
- Ms. Jennifer Walls, Sussex County Planning and Zoning Office

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## 2017-2018 DWRC Research Interns

On April 28, 2017, the Advisory Panel met for the 52<sup>nd</sup> annual meeting of the DWRC at the University of Delaware campus in Lewes, Delaware and selected eight new water resources interns who will start their research during the summer and fall of 2017. The following interns were selected:

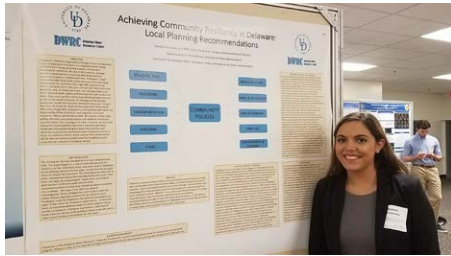
- **Lauren Glinko (Geography)**, Advisor: Dr. Afton Clarke-Sather, *Linking Causes of Irrigation to Available Water Capacity*
- **Lauren Haberstroh (Environmental Engineering)**, Advisor: Dr. Paul Imhoff, *Effectiveness of Bio-Char to Reduce Nitrate Concentration in Storm Water Runoff*
- **Margaret Krauthauser (Geology)**, Advisor: Dr. James Pizzuto, *Quantifying Floodplain Sediment Storage Rates and Identifying Rate-Changing Characteristics in the White Clay Creek Watershed, Pennsylvania*
- **Jack Protokowicz (Biochemistry)**, Advisor: Dr. Shreeram Inamdar, *Nuclear Magnetic Resonance Assessment of Organic Matter Sources in a Small Forested Watershed*

**Nicholas Tobia (Geology)**, Advisor: Dr. James Pizzuto, *Quantifying the Rate of Bank Migration in the White Clay Creek Watershed, Pennsylvania*

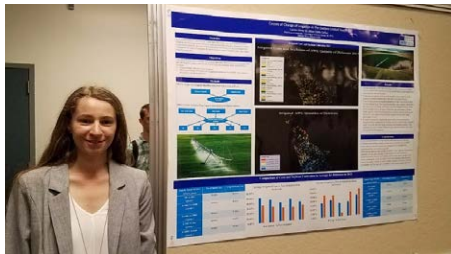
- **Alison Treglia (Plant and Soil Sciences)**, Advisor: Dr. Shreeram Inamdar, *Use of High-frequency, In-situ, Water Quality Sensors to Quantify Sediment and Nutrient Exports in Stream Runoff from Legacy-sediment Watersheds*
  - **Christina Valenti (Environmental Engineering)**, Advisor: Dr. Anastasia Chirnside, *Assessment of the Leaching Potential of Fibrous Plastic Inert Support Material from a Fungal Biocell Reactor*
  - **Colby Williamson (Environmental Engineering)**, Advisor: Dr. Paul Imhoff, *Reducing Stormwater Runoff and Pollutant Loading with Biochar Addition to Highway Greenways*
- 

## 2016-2017 DWRC Research Interns Present at UD Engaged Scholarship Day

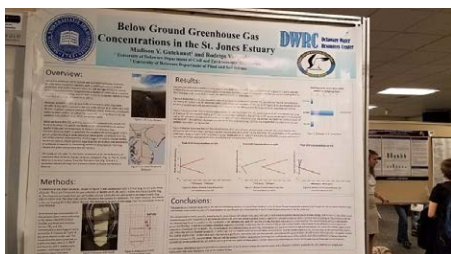
On May 5, 2017, thirteen DWRC students presented research posters at the Celebration of Undergraduate Engaged Scholarship at the University of Delaware Perkins Student Center. DWRC undergraduate water research internships are funded by the U.S. Geological Survey and the State Water Resources Research Institute (WRRRI) Program, authorized by section 104 of the [Water Resources Research Act of 1984](#). The students showcasing their posters and research topics are shown below.



**Natalie Criscenzo** (Energy & Environmental Policy and Public Policy), Advisor: Philip Barnes (Institute for Public Administration), *Overcoming Policy and Planning Barriers to Resilient and Sustainable Communities in Delaware*

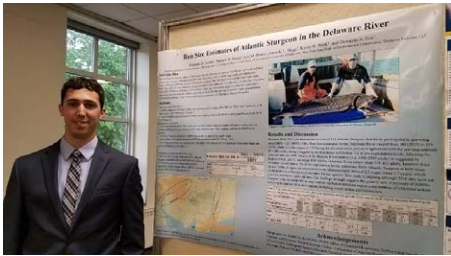


**Lauren Glinko** (Geography), Advisor: Afton Clarke-Sather (Geography), *Causes of Change of Irrigation in the Eastern United States*

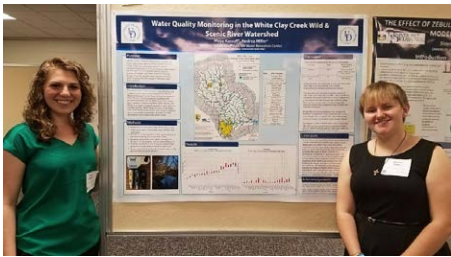


**Madison Gutekunst** (Environmental Engineering), Advisor: Rodrigo Vargas (Plant and Soil Sciences), *Linking Below Ground Greenhouse Gas Concentrations with Water Chemistry in the St. Jones Estuary*

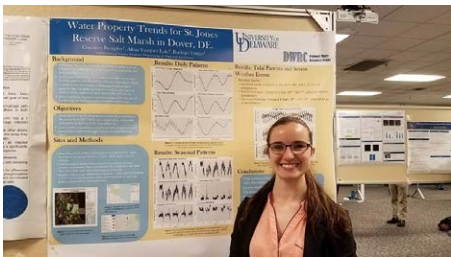




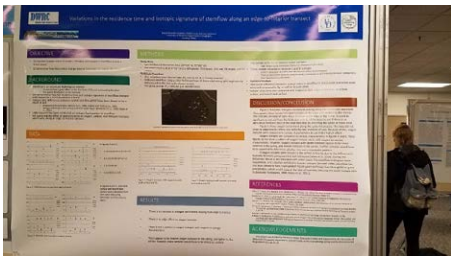
**Benjamin Jenkins** (Delaware State University Natural Resources-Fisheries Management), Advisor: Dewayne Fox (Delaware State University Department of Agriculture and Natural Resources), *Estimating the Spawning Population of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Delaware River*



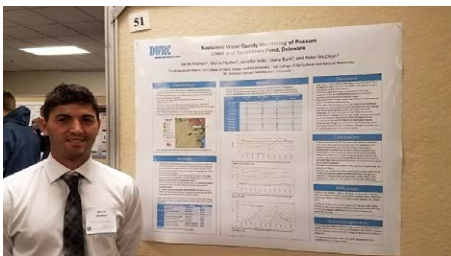
**Maya Kassoff** (Environmental Science) and **Andrea Miller** (Environmental Studies), Advisor: Gerald Kauffman (School of Public Policy and Administration), *Water Quality Monitoring in the White Clay Creek National Wild & Scenic River Watershed*



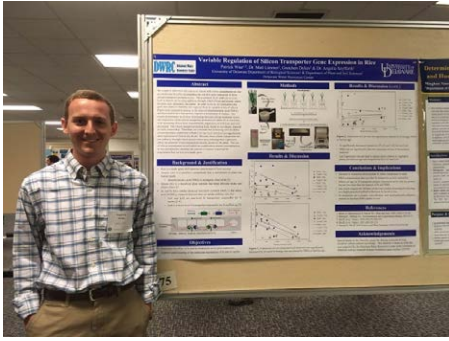
**Courtney Rempfer** (Environmental Science), Advisor: Rodrigo Vargas (Plant and Soil Sciences), *Designing an Automated System to Monitor  $O_2$ ,  $CO_2$  and  $CH_4$  from Sediments in a Salt Marsh*



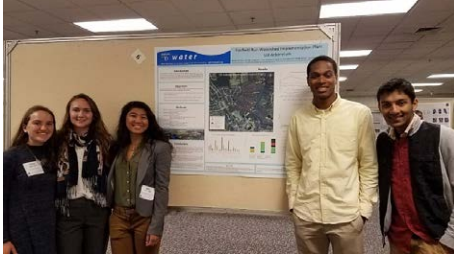
**Ilana Schnauffer** (Chemistry and Environmental Science), Advisor: Delphis Levia (Geography), *Variations in the Residence Time and Isotopic Signature of Stemflow along an Edge-to-interior Transect*



**Jacob Shelton** (Environmental Studies), Advisor: Maria Pautler (Plant and Soil Sciences), *Sustained Water Quality Monitoring of Possum Creek and Noxontown Pond, Delaware*



**Patrick Wise** (Biological Sciences and History), Advisor: Angela Seyfferth (Plant and Soil Sciences), *Variable Regulation of Silicon Transporter Gene Expression in Rice*



**Shailja Gangrade** (Environmental Engineering), **Natale Depase** (Environmental Science), **Catherine Medlock** (Environmental Science), Advisor: Andrew Homsey, Gerald Kauffman (UD Water Resources Center), *Restoration of the Fairfield Run Watershed at the UD Arboretum*

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## UD Welcomes the Biden Institute

The DWRC looks forward to working with the Biden Institute, part of the Biden School of Public Policy and Administration (SPPA) in the fall 2017 semester. On February 7, 2017 the University of Delaware's President Dennis Assanis announced a new partnership with Joe Biden and the School of Public Policy and Administration. Joe Biden, US Senator from Delaware for 36 years, 47th Vice President of the United States and UD alumnus (class of 1965), will serve as the founding chair of UD's Biden Institute. This partnership establishing the Biden Institute will build upon Biden's long-time work in domestic policy issues with the University's strengths and more specifically those of SPPA in public policy education and research. UDaily noted "the Biden Institute will be a new research and policy center focused on developing public policy solutions on issues ranging from economic reform and environmental sustainability to civil rights, criminal justice, women's rights and more. The institute will also convene thought leaders on the most important issues of the day." At DWRC we look forward to future opportunities to collaborate and work with the Biden Institute on environmental and water resource public policy issues.



Martha Narvaez attends the SPPA launch of the Biden Institute at UD, March 2017.

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## University of Delaware AWRA, Repeat National Champions!

The American Water Resources Association (AWRA) Board of Directors and members recently selected the University of Delaware Student Chapter as the AWRA Outstanding Student Section

for 2017. The UD AWRA also won the national award in 2015. Past award winners include:

- University of Florida (2016)
- University of Delaware (2015)
- Texas A&M University (2014)
- Oregon State University (2013)
- Oregon State University (2012)

In the award letter, AWRA President, Rafael Frias III, noted that the number of student chapters as well as their activities has increased significantly and that "the Delaware AWRA Student Chapter demonstrated innovation in its programs and has done an excellent job." The student chapter was led by Amanda Doremus (President), Chelsea Krieg (Vice President), Briana Diacopoulos (Treasurer) and Erin Johnson (Secretary). The chapter will be presented the award at the AWRA President's Reception on Sunday, November 5, 2017. The event will be held in conjunction with the 2017 AWRA Annual Water Resources Conference at the Red Lion Hotel on the River-Jantzen Beach in Portland, Oregon.



L to R, Chelsea Krieg (Vice President), Amanda Doremus (President), Erin Johnson (Secretary) and Briana Diacopoulos (Treasurer) attend the 2016 AWRA Mid Atlantic Conference.

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. More information can be found at the chapter's website [here](#).

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## Delaware Byways Program

The Delaware Byways Program began in 2000 when the Delaware General Assembly passed [Senate Bill 320](#) authorizing DeIDOT to establish what was then known as the Delaware Scenic and Historic Highways Program. Eventually, the program would be re-branded to what is known today as the Delaware Byways Program. According to the Delaware Department of Transportation (DeIDOT), the goals of the Delaware Byways Program include the identification, promotion, preservation and enhancement of Delaware roadways with at least one of the following intrinsic qualities: scenic, historic, natural, cultural, recreational and archaeological. Six Delaware Byways have been designated:

- Brandywine Valley National Scenic Byway
- Harriet Tubman Underground Railroad Byway
- Historic Lewes Byway, Gateway to the Bayshore
- Delaware Bayshore Byway
- Red Clay Valley Scenic Byway
- Nanticoke Heritage Byway

The Washington-Rochambeau Revolutionary Route is a National Historic trail, which is also included. In the southern part of the state and located on the Delaware Bay, the Historic Lewes Byway, Gateway to the Bayshore can be reached from New Jersey on the Cape May - Lewes Ferry, and from other Delaware roads that take you to this picturesque and historic community by the sea. The stunning views by land and sea capture Lewes' natural beauty, maritime origins,



and rich history from native Lewes Byway settlements and early European settlements to agricultural and marine industries to present day resorts and recreational facilities. The [Historic Lewes Byway, Gateway to Bayshore](#), is a continuous transportation network that captures the 383-year history of the greater Lewes area. The segments of the route include New Road, Pilottown Road/Front Street, Savannah Road, Kings Highway, Gills Neck Road, and Cape Henlopen Drive. DWRC is proud to have been involved in helping bring this project to life: for more information on this program and to view other byway story maps visit the [project website](#).



## Flooding and Coastal Inundation in Delaware

Delaware is small but vital; it has a vibrant and diverse economy, vital work force, and varied and beautiful landscapes. It is also one of the lowest lying states in the union. This situation means that the state is quite vulnerable not only to riverine flooding, but also to coastal inundation from coastal storms with potentially devastating impact. As the climate warms and seas rise, this threat is exacerbated.

DNREC, in response to this, has established the Delaware Sea Level Rise Advisory Committee, which was tasked with assessing future scenarios of sea level rise and the state's vulnerability to a changing climate. On September 12<sup>th</sup>, 2013, almost a year after Superstorm Sandy had devastated a swath of the mid-Atlantic coast, Governor Jack Markell signed Executive Order 41, setting forth a cross-departmental vision for addressing potential climate impacts and promulgating fresh ideas for moving toward a low-carbon economy.

The University of Delaware Water Resources Center, with the Center for Applied Demography and Survey Research (CADSR), was recently funded by DeIDOT (through the UD Delaware Center for Transportation) to assess the threat to DeIDOT's infrastructure and assets from coastal and riverine flooding.

We performed a full inventory of the roads vulnerable to flood and inundation threats, determining which routes would be affected (impassable or damaged) based on a series of storm scenarios. While flooding is a rare event, when it occurs it has huge impacts. By looking at how bridges respond to stream flooding, and the predicted extent of current inundation scenarios, as well as future scenarios with expected sea level rise, we can determine the physical impacts of





flooding and inundation. By mapping and inventorying the location and costs of DeIDOT assets likely to be affected by these events we are also able to quantify the financial costs to the state, and allow for realistic budgeting scenarios.

The road buckles as a result of severe flooding during Tropical Storm Henri, September 2003.

Superstorm Sandy largely left Delaware with only minor damage, but could have been much worse, if the eye of the storm had hit just a few miles farther south. We demonstrated the inundation potential and infrastructure impacts of that potentially devastating possibility. Such “worst-case” planning helps us envision and plan for the next “Big One.”

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## City of Wilmington Green Jobs Program

July 2017 will kick-off the 7th year of the City of Wilmington Green Jobs Program. The program, coordinated by DWRC's Martha Narvaez and the City of Wilmington's Department of Parks and Recreation, is a six-week employment program for City-residents that provides participants with hands-on outdoor environmental work, career exploration, exposure to environmental issues, and a mentoring component.

This summer the program will kick-off on July 5th with Delaware State University's Andrew Wetherill, College of Agriculture, Extension Educator introducing the youth to interactive agriculture series. The following days and weeks will include a variety of environmental topics hosted by program partners including:

- City of Wilmington
- Delaware Center for Horticulture
- Delaware Department of Natural Resources and Environmental Control (DNREC)
- Delaware Nature Society
- Delaware State University
- Filasky Farm
- Mid-Atlantic Youth Anglers & Outdoor Program
- Partnership for the Delaware Estuary
- PSE&G
- RK&K
- Springmill Community
- The Nature Conservancy, Delaware Chapter
- University of Delaware College of Agriculture
- University of Delaware Water Resources Center
- 93.7 WSTW



City of Wilmington Green Jobs Program interns, led by the Delaware Nature Society's Jim White, conduct a stream assessment

The program partners work hard to ensure the interns exit the six-week program with a greater understanding of the local environment, how to improve it, and their individual impacts on it (both positive and negative). The program partners are critical to the program's success.

Program participants are 14-18 years old, work 25 hours per week and earn minimum wage. Recruiting for the Green Jobs Program typically begins in February. Applications are available at the City of Wilmington Department of Parks and Recreation. More information about the program can be found [here](#).

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## In the News



October 2016, DWRC's Andrew Homsey was elected to the Brandywine Red Clay Alliance Board of Directors.



May 18, 2017, DWRC's Jerry Kauffman (left) and Martha Narvaez (right) awarded Laura Askin (left center) and Briana Diacopoulos (right center) the School of Public Policy and Administration Excellence in Water Resources Scholarship Award.



The 3rd Annual Clean Water Rally on June 6, 2016 was a huge success! Led by the Delaware Nature Society, close to 200 people attended, including 40 that met with Governor Carney.



UAPP 411/611 Regional Watershed Management students survey remnants of Dam No. 1 (circa 1777) along the White Clay Creek National Wild and Scenic River.

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## Jobs and Internships in Water Resources

Delaware Center for the Inland Bays (CIB)

## *Watershed Coordinator*

The Delaware Center for the Inland Bays invites applications for its Watershed Coordinator who will coordinate with partner organizations the implementation, tracking, and progress reporting for the Inland Bays Comprehensive Conservation and Management Plan including the Inland Bays Pollution Control Strategy. The Watershed Coordinator will have as their first primary responsibility coordinating the five year update of the Inland Bays Comprehensive Conservation and Management Plan including a climate vulnerability analysis of the plan. More details can be found [here](#).

**UD College of Agriculture and Natural Resources** - Jobs and internships are listed [here](#).

**UD College of Earth, Ocean, and Environment** - Jobs and internships are listed [here](#).

**Delaware Environmental Institute (DENIN)** - Jobs and internships are listed [here](#).

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## **Upcoming Water Conferences and Events**

### **2017 AWRA Summer Specialty Conference, June 25-28, 2017**

The conference will be held in Tysons, VA and will focus on *Climate Change Solutions: Collaborative science, policy and planning for sustainable water management*. Conference details can be found at the conference website [here](#).

### **2017 AWRA International Conference, September 10-11, 2017**

The conference will be held in Tel Aviv, Israel and will focus on *Cutting Edge Solutions to Wicked Water Problems*. Conference details can be found at the conference website [here](#).

### **UD Annual Water Symposium, September 29, 2017 at 3 p.m.**

Drs. Dorothy Merritts and Robert Walter will be the invited plenary speakers at the Annual Water Science and Policy Graduate Program's Symposium. They will discuss the impacts of millpond legacy sediments on streams, water, and the health of the Chesapeake Bay. This is a topic of considerable interest (both science and policy) in the Chesapeake Bay and elsewhere.

### **UD Coast Day, October 1, 2017**

The event will be held on October 1, 2017 at the University of Delaware Lewes Campus. The theme this year is *Discoveries...on land, in air, by sea*. More info [here](#).

### **2017 Mid-Atlantic Water Resources Conference, October 12-13, 2017**

The conference will be held at the National Conservation Training Center, Shepherdstown, West Virginia. The theme for the conference is "Water Research: Building Knowledge and Innovative Solutions". Researchers from colleges and universities, state and federal agencies, private organizations, consulting firms, industry and students are invited to submit abstracts for consideration for oral and poster presentation. The event is hosted by the West Virginia Water Research Institute, Delaware Water Resources Center, New York State Water Resources Institute, Pennsylvania Water Resources Research Center, Virginia Water Resources Research Center, and the West Virginia Department of Environmental Protection. More info [here](#).

### **2017 AWRA Annual Conference, November 5-9, 2017**

The conference will be held in Portland, OR. Conference details can be found at the conference website [here](#).

### **Delaware Wetlands Conference, January 31- February 1, 2018**

The conference will feature themes such as coastal preparedness and risk reduction, wetland restoration, wetland wildlife, interactive workshops, education and outreach, modeling and mapping, wetland monitoring and assessments. Call for presenters will be in August 2017 and

registration in November 2017.

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## Water Resources Information and Training

The Delaware Section of the American Water Resources Association events information can be found [here](#).

The Delaware Student Section of AWRA - activities can be found [here](#).

The DENIN events calendar is found [here](#).

The State of Delaware public meeting and workshop information is found [here](#).

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Welcome new subscribers! Contributions, comments and questions are always appreciated. Water News serves citizens interested in topics on Delaware water resources and is published by the Delaware Water Resources Center, University of Delaware.

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