

Water Matters



ISSUE 2

February 2006

Dear Friends:

Welcome to the second edition of *Water Matters!* While many of you are familiar with our main facility in Newark, you may not be as familiar with our Lewes office, housed in the College of Marine Studies' Pollution Ecology Lab, just past the Canary Creek Bridge overlooking the scenic Roosevelt Inlet. It may seem like a sleepy



backwater locale, but in fact we've had a good deal of excitement here since the last edition of our newsletter. Besides the normal clatter the seagulls make while breaking open clam shells on the rooftop, we were pleasantly distracted by visitors from Hollywood, who were filming the

movie "Failure to Launch" at the Marine Operations Building next door. Although their visit was short like the Kalmar Nyckel that was docked during the Annual Coast Day event and our annual visit by the green tree frog, the adventure never ends. A deep-sea dolphin was recently biopsied in the Marine Education, Research & Rehabilitation Institute building, just behind us, to determine its cause of death, and brant (goose-like birds) flocked their way to the grasses in front of Cannon Lab. Finally, we have the pleasure of sharing office space with a team of archaeologists, who are examining and cataloging items from what is believed to be a sunken 1760s-era cargo ship just offshore. They have collected pottery, glass, and many other items from the ship during a dredging operation to replenish Lewes Beach.

So, if you are in the state's southern reaches, stop by for a visit. Don't worry that you will get too much excitement; we are still outnumbered by shorebirds and crabs!

Sincerely,
Nicole M. Minni

DE AWRA Annual Meeting

by Martha Corrozi

The Delaware Section of the American Water Resources Association (DE AWRA) held its initial Annual Meeting on November 29, 2005, at the Iron Hill Brewery & Restaurant on Main Street in Newark, Delaware. The group formed in December 2004 and meets throughout the state on Tuesdays from 3:00–4:30 p.m. every other month. The focus of DE AWRA meetings is to

foster information exchange among water-resource students and professionals throughout the state. This is achieved specifically through invited speakers discussing water resource issues throughout the region and through discussions and announcements at the monthly meetings.

The meeting began with a welcome and introductions of the 25 water-resource students and professionals attending from throughout the state. The invited speaker for the occasion was Mr. Gerald Kauffman, Director of the University of Delaware Institute for Public Administration's Water Resources Agency (IPA-WRA). He presented a historical account of the Christina Basin and its unique significance historically, ecologically, economically, and as a water supply. He described the battles in the War for Independence that occurred throughout the watershed and the roles the rivers played in these battles, as well as the watershed's historical and cultural resources, including the gunpowder mills, the Underground Railroad, and the Basin's location at the crossroads of the transportation web. More recent activities in the Christina Basin include the designation of White Clay Creek as a Wild and Scenic River, the EPA's \$1 million award to the Christina Basin Clean Water Partnership, and the recreational, economical, and biological importance of the Basin.

In the coming year, DE AWRA will continue to focus on information exchange among water-resource professionals throughout the state and will also develop a systematic approach that defines the group's values, goals, resources, and benefits. DE AWRA would also like to increase both its student and professional membership. For more information about DE AWRA and upcoming meetings, please visit www.deawra.org or contact DE AWRA president Martha Corrozi (mcorrozi@udel.edu).

MAC AWRA Conference Announcement

The annual conference of the Mid-Atlantic sections of the American Water Resources Association (N.J., N.Y., Pa., Del., and Philadelphia Sections) will be held at Montclair State University's New Jersey School of Conservation, Branchville, N.J. (near the Pa./N.J./N.Y. nexus) on June 14–16, 2006. The theme of the conference is "Stream Restoration and Protection in the Mid-Atlantic Region." More information is available at the conference website: www.awra.org/state/new_jersey/mac2006.

The Delaware River Basin Commission's State of the Basin Report

by Jerry Kauffman

Have you ever wondered about the health of the rivers and streams that make up the watersheds of the Delaware River Basin? The Delaware Basin is a large basin with many contrasting uses and functions. It covers 13,000 square miles in Delaware, New Jersey, New York, and Pennsylvania and extends 300 miles from its headwaters in the Catskills to its mouth at Cape Henlopen.

The Delaware River is a working river as well as an excellent natural resource. It is mighty enough to support the largest port on the east coast and provide the process water for the country's largest oil-refinery complex, yet pristine enough to support a thriving trout, striped bass, and shad fishery, in addition to providing drinking water to over ten million people.

Since its creation by the President, Congress, and the four state governors in 1961, the Delaware River Basin Commission (DRBC) has sought to balance the interests of economics and the environment for the river, sometimes controversially, but always cooperatively, with comity toward the interests of the public and the federal government.

In September 2004 the governors of the four states and the federal representative from the U.S. Army Corps of Engineers approved the Water Resources Plan for the Delaware River Basin (Basin Plan), which recommended developing a set of indicators to assess baseline conditions and measure progress toward objectives that can be published in a state of the basin report. The purpose of this report is to describe the condition of water resources and water-related resources throughout the Delaware River Basin to the general public and policy makers. The

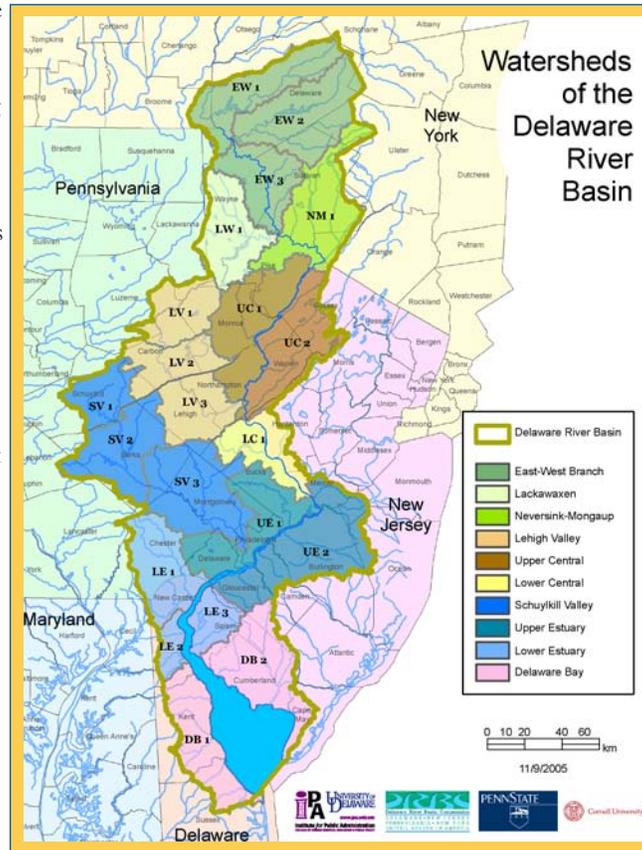
overall goal is to establish baseline environmental conditions in the Basin, assemble and assess information that would characterize status and trends, and establish environmental-quality indicators in a watershed framework.

DRBC has successfully used environmental

The State of the Basin Report will mark the first time since JFK signed the DRBC compact that the four land-grant universities of the states in the basin (Cornell, Delaware, Rutgers, and Penn State) are collaborating together with DRBC, the Delaware Estuary Program (DELEP) and the federal Environmental Protection Agency. Since September 2005 the water-resources institutes for the four land-grant universities have been meeting on a monthly basis to collaborate on the development of a watershed framework and narrow down the list of environmental indicators to 33 (see table on facing page for a list of chosen indicators). They have been researching appropriate and readily available water-resource data and associated land-use and socioeconomic information on a watershed basis. Ongoing work consists of collecting existing data for each environmental indicator and then selecting a grading method to report this complex information to the public. Potential grading methods include a report card approach (A, B, C, etc.), numerical scale (0 to 100), or a qualitative scale (excellent, good, fair, poor). A draft of the State of the Basin Report is scheduled for submission to DRBC by September 2006. DRBC and DELEP are

providing funding for the research. Each of the universities is relying heavily on undergraduate and graduate research assistants to conduct the research and publish the State of the Basin Report. The University of Delaware Institute for Public Administration's Water Resources Agency has been designated by DRBC to serve as coordinator for this yearlong project.

Aside from the exciting intellectual objective of quantifying the health of the Delaware River Basin through scientific research and analysis, the potential for future collaboration with our sister land-grant institutions and water-resources institutes makes for a promising future indeed.



indicators in the past to positively impact water quality. At one time along the stretch of the river from Wilmington, Del., through Philadelphia, Pa., to Trenton, N.J., the oxygen levels were so low that migrating fish like shad could not swim up the river from the Atlantic because of the dead zone there. Due to water quality standards mandated by DRBC and wastewater-plant improvements required by the 1970s-era Clean Water Act, the oxygen levels are now so high that a thriving shad and striped bass fishery is supported. For those interested in a keystone environmental indicator, please refer to www.drbc.net for a photo of a monster 45-pound striped bass collected by the Pennsylvania Boat Commission near the mouth of the Schuylkill in fall 2005. Now that's a success story!

List of Environmental Indicators

Water Quality:

Dissolved Oxygen, salinity line/chloride, chlorophyll-a, nitrogen/phosphorus, total suspended solids, fish-consumption advisories, toxics, 303(d) designated use-attainment and impairment, specific conductivity

Water Quantity:

Source-water condition and source-water supply and demand

Hydrology and Geomorphology:

Surface water flow, groundwater availability, flooding, dams (hydrologic impairment/modification)

Living Resources:

Macro-invertebrates, shellfish (oyster, horseshoe crab, blue crab, freshwater mussels, zebra mussels), fish (shad, trout, American eel, sturgeon, fish passages), birds (breeding-bird index/important bird areas, shorebirds—red knot, bald eagle), endangered species

Land Uses/Landscape Conditions:

Tidal wetlands, tidal-wetland buffers, total wetlands, development, land use, forest health, population, contaminated/superfund sites

Miscellaneous:

National Wild and Scenic Rivers, number of monitoring stations over time, public access points, pollutant loads discharged above permitted levels

GIS Happenings at IPA-WRA

by Andrew Homsey

Despite the winter chill, this is a busy time of year for the GIS Services Group! As always, the provision of mapping and cartographic services in support of the comprehensive-planning process in Delaware has been ongoing, spearheaded by Nicole Minni, the manager of our Lewes office. She has also been very busy updating the statewide Water Resource Protection Area (WRPA) maps for DNREC, in addition to taking a lead role in the Delaware GIS in Education Working Group while remaining active in the NEMO and the Three College Initiatives.

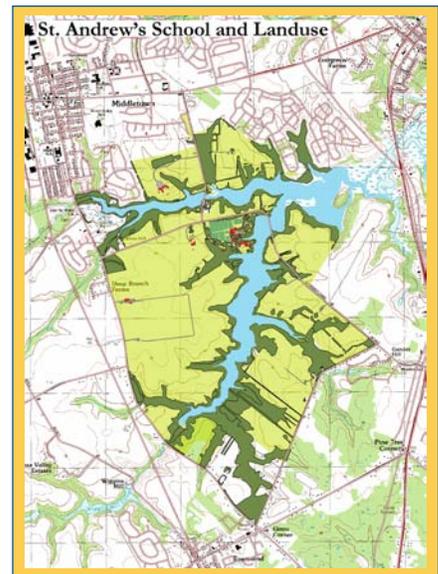
Collaboration with other like-minded groups continues to be important for us. For example, we are working with the University of Delaware's Center for Historic Architecture and Design (CHAD) on projects that include the mapping of historic bridges and culverts around the state and cartographic analysis of the historic Philadelphia Pike corridor. Additionally, we have teamed up with the University's Department of Occupational Health and Safety to create a campus-wide drainage-system model. We also look forward to continuing our relationships with the University's Delaware Water Resources Center (DWRC) and Center for Remote Sensing (CRS).

Our research efforts continue with IPA-WRA staffer Lori Schnick's finalization of the GIS portion of the watershed-health assessment in southern New Castle County.

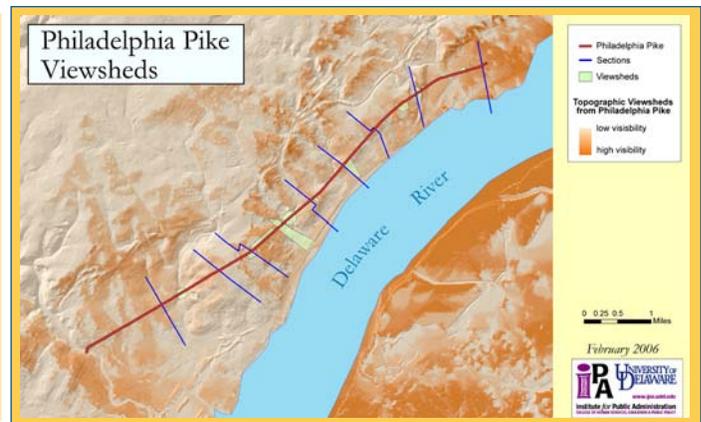
This portion includes an in-depth assessment of various methods for quantifying the effects of impervious cover. Lori has presented her findings at professional conferences, and an EPA scientist has requested them for publication on his website. We are also serving on a committee to develop a set of metrics for a watershed-based health assessment of the entire Delaware River Basin, which comprises parts of five states, bringing together researchers from a variety of universities, research institutes, and federal agencies. As a whole, the GIS group is also in the process of drafting a document to serve as a roadmap for the implementation of GIS within local government organizations.

Education remains an important part of the GIS mission at IPA-WRA. Our current graduate research assistants Stephanie, Susie, and Jonathan are busy learning and providing substantive help with all of our projects. Two courses in GIS are also being offered by our members: a one-credit

overview course in the fall taught by Nicole and Lori, and a three-credit course with a public-policy focus offered in the spring by IPA staff member Troy Mix and me. Additionally, we plan to continue to periodically provide training in GIS to municipal officials and members of the public.



This map depicts two kinds of viewsheds from the Philadelphia Pike laid over the topography. The areas in a dark orange are visible from the pike, whereas the areas in bright orange are not visible due to the topography. The raster layer does not consider elements like trees or houses, so it does not represent "real" viewsheds. The green areas are viewsheds considering those additional elements.



GIS in the K–12 Curriculum

by Nicole Minni

If a child's educational experience could be inspired and brought to a higher level of spatial thinking in multiple disciplines, wouldn't you want them to have that opportunity? It would be a chance for them to explore a variety of geographic information, ask questions, find answers, create solutions based on what they have learned, and even apply their findings in and around their community. A powerful tool called Geographic Information Systems (GIS) can be used to understand the physical world and the processes affecting it. GIS incorporates computer software and hardware, data sources, people, and organizational structures in a system that allows for the storage, retrieval, analysis, and display of information about a specified area of the earth. People and organizations worldwide use this technology to facilitate and enhance their daily work and studies. Dominoes Pizza, the U.S. Postal Service, UPS, Conectiv, realtors, emergency-management and environmental agencies, and state and local governments are just a few of the organizations using GIS today. Also, CBS used GIS during its 2004 presidential-election coverage, and the CBS show *The District* used GIS in every episode to help fight crime.

For the past eight years, the Geographic Information Systems Education Working Group (GISEWG), a subcommittee of the Delaware Geographic Data Committee (DGDC), has been working diligently with K–12 teachers and educators to welcome them to the world of GIS. GISEWG comprises approximately 12 GIS professionals in the state who use GIS within their daily job functions. GISEWG believes that this multidisciplinary technology is an essential element that would enhance today's teachings.

With hands-on GIS experience, children will develop critical spatial-thinking skills that can be applied in all disciplines and everyday life. According to the Environmental Systems Research Institute (ESRI), "Geographic information systems can help learners of all ages understand the world around them. GIS helps students and teachers engage in studies that promote critical thinking, integrated learning, and multiple intelligences, at any grade level. In classrooms across the country and around



the world, educators are using GIS in the study of topics as varied as Environmental Studies, History, and Economics."

Delaware is very fortunate to have compiled many types of state geographic data. GISEWG can help teachers working on curriculum with geographic references or those who have utilized the GPS Lab at the Delaware Center for Educational Technology (DCET) and want to incorporate their data into GIS. We can gather geographic data, provide free downloadable mapping software called ArcExplorer (Mac- and PC-compatible), create mapping projects to meet a teacher's specific needs, and present information to your class on mapping or geospatial information related to a class's current curriculum.

GISEWG projects have included: creating a watershed map for the seventh-grade watershed unit, working with DCET in the development of a GPS Lab, creating ArcExplorer projects for a fourth grade's land and water unit, and working with the Outdoor Education Center at Ingram Pond to incorporate GPS locations of bluebird nesting boxes into a GIS. In fall 2005 GISEWG held its first inservice GIS workshop for teachers' professional development day; it was very well received.

Members have also given presentations for Geography Awareness Week, as well as for the Democracy Project cluster and upcoming Watershed cluster, both through the University of Delaware.

A student contest is held each year at Delaware's Annual GIS Conference. Entries have ranged from posters, transparent-overlay maps, 3D models, to slide presentations. Previous themes have been "What does Geography Mean to you?," "Building a Map - One Layer at a Time," and "Putting a Face on Disaster - The Impact Natural Disasters Have on

People." This year's theme is "Migration, Change to the Human Situation - The Effect that Migration Has on People." There is also an Annual GIS in Education Award, presented by GISEWG to honor individuals who have been instrumental in furthering the use of spatial information in Delaware, inside or outside the classroom, through geographic information systems (GIS). The award is open to any K–12 teacher or youth leader working with the children of Delaware.

GISEWG is very passionate about what it does and looks forward to working with you to further your students' educational experiences. For information on members of GISEWG and resources that are available, please contact Chairman John Laznik (jlaz@udel.edu) or me (nminni@udel.edu).

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