

ESTUARY NEWS

NEWSLETTER OF THE PARTNERSHIP FOR THE DELAWARE ESTUARY – HOST OF THE DELAWARE ESTUARY PROGRAM

MAKING WAVES

ANOTHER WINNING SUCCESS STORY



This year is not only Partnership for the Delaware Estuary's (PDE) 25th anniversary, this is the 25th anniversary of the Delaware Estuary Program's Comprehensive Conservation Management Plan (CCMP). Last year, PDE ran a contest for the best projects that reflect contributions to the CCMP's themes of clean waters, healthy habitats and strong communities. We featured two projects in the last issue of *Estuary News* that reflect these priorities. PDE proudly features its third winner, which was in the *Greatest Project Benefit/ Highest Impact* category. Thank you to everyone who submitted a project.

CLEAN WATERS • GOAL H1 • STRATEGY W1.2 • STRATEGY W1.4

BRANDYWINE CONSERVANCY

By David Shields, Associate Director

Did you know that trout grow on trees? That's what staff from the Brandywine Conservancy often asks Amish children during trout stocking and other events downstream from their schoolhouse in Honey Brook Township, Pennsylvania.

This is how the conversation starts when educators talk to Amish students on the importance of reforesting stream banks, keeping the soil on the fields, and keeping cows and their manure out of streams in order to have clean and healthy waters. These conversations are part of work that the Brandywine Conservancy has been doing in Chester County, Pennsylvania. The efforts are why the Conservancy won the *Greatest Project Benefit/ Highest Impact* category in PDE's *What's Your Success Story Contest*.

The Amish children, who range in age from 5 to 14, are the next generation of farmers in a predominantly Plain Sect (Amish and conservative Mennonite) community with an active history of dairy and crop farming in Honey Brook Township, Pennsylvania. Not only does the area have some of the finest agricultural soil in the Commonwealth, it is also where the east and west branches of the Brandywine Creek begin, and is the water

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John Goodall from the Brandywine Conservancy releases trout into the headwaters of Brandywine Creek with Amish school children in Honey Brook Township, Pennsylvania.

Middle Township Partners with Local Conservationists to Improve Beaches

Earth Day projects part of ongoing work to protect horseshoe crab habitat

By Sheri Berkery, Account Manager, Laura Bishop Communications

Each spring, the American Littoral Society takes the lead on the intricate work of protecting Middle Township, New Jersey, beaches for residents – and not just the human ones.

Staff from the American Littoral Society, Wildlife Restoration Partnerships, volunteers, and members of environmental groups, blend innovative strategies and manual labor in the fight to protect horseshoe crab habitats at Delaware Bay beaches. Red knots, one of the farthest-migrating bird species in the world, rely on horseshoe crab eggs as an important food supply during their 9,000-mile-long travel from South America to their breeding grounds in the Arctic. One of the birds' stops before their destination are beaches in Middle Township.

Replenishing the sand and rebuilding dunes is essential to saving crab habitats. Storms can wash sand from the shore, leaving naked mud that can either strand horseshoe crabs or leave them in terrain where it's difficult to spawn, thus jeopardizing the egg supply for the traveling shorebirds.

The Littoral Society, a nonprofit conservation organization, plans a variety of cleanup projects and pursues grants to fund sand replenishment. Middle Township government also embraces the



Middle Township Mayor Tim Donohue and Middle Township Business Administrator Kim Krauss volunteer on Earth Day with the American Littoral Society.

“tremendous responsibility” of caring for the area's natural resources, said Tim Dillingham, Executive Director of the American Littoral Society.

On Earth Day (April 22), Middle Township Mayor Tim Donohue and Middle Township Business Administrator Kim Krauss put their hands in the sand and joined volunteers and Littoral Society staff in planting dune grass along South Reed's Beach to protect the horseshoe crab habitat. The day also included a beach cleanup with Township staff hauling away the debris. Larry Niles, a wildlife biologist and owner of Wildlife Restoration Partnerships, oversaw the addition of just under 5,000 tons of sand to repair breaches at Reed's Beach, Pierce's Point, and Kimbles Beach. The Township provided logistical support to help the mission.

“A healthy ecosystem is the Delaware Bay's foundation of economic well-being,” Dillingham said. “People come to see the natural phenomenon from all over the world. Supporting habitats is in everyone's best interest.”

Laura-Bishop Communications is a consultant agency for Middle Township, New Jersey. 💧

HEALTHY HABITATS • GOAL H3 • STRATEGY H3.4

Brandywine Conservancy continued from page 1

source for over 500,000 downstream residents. Since 2005, the Brandywine Conservancy has been working with Plain Sect farmers to help protect their farms from development with agricultural easements and implementing agricultural best management practices (BMPs).

In 2013 the William Penn Foundation began its Delaware River Watershed Initiative (DRWI) and designated the Brandywine-Christina Watershed as

a target site for grant funding. With Stroud Water Research Center and Brandywine Red Clay Alliance as partners, the Conservancy has been able to implement whole-farm BMPs on 46 farms encompassing nearly 3,000 acres. Manure management, barnyard stormwater controls, and field practices are focus areas, and will have the greatest effect in preventing stream pollution, controlling stormwater runoff, and reducing erosion along waterways. 💧

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Meetings conducted by the Delaware Estuary Program's implementation and advisory committees occur on a regular basis and are open to the public. For meeting dates and times, please contact the individuals listed below:

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Estuary News encourages reprinting of its articles in other publications. Estuary News is produced four times annually by the Partnership for the Delaware Estuary, Inc. (PDE), under an assistance agreement (CE-99398515) with the U.S. Environmental Protection Agency (EPA). The purpose of this newsletter is to provide an open, informative dialogue on issues related to PDE. The viewpoints expressed here do not necessarily represent the views of PDE or EPA, nor does mention of names, commercial products or causes constitute endorsement or recommendation for use. For information about PDE, call 1-800-445-4935.

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FOLLOW US ON:



TIMING IS Everything

PDE's shellfish team observes stages and timing of freshwater mussel reproduction

By Kurt Cheng, PDE Shellfish Coordinator

Partnership for the Delaware Estuary's (PDE) shellfish team works with a variety of freshwater and saltwater mussel throughout the year. Lately, the team has been hard at work with something a little new – observing reproductive stages of different freshwater mussels species and the timing of these stages in nature.

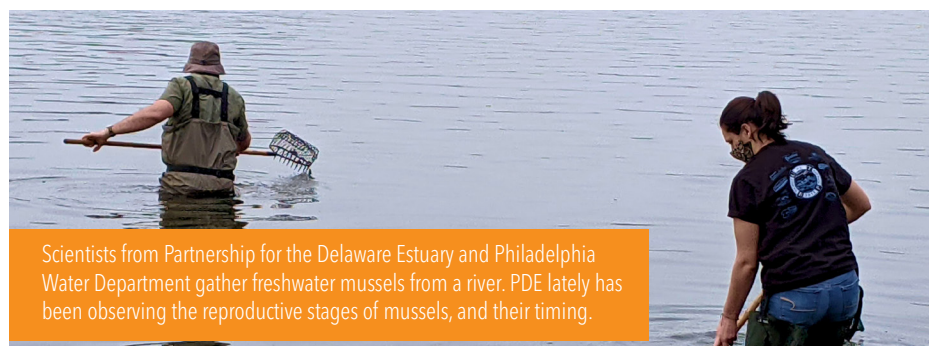
An important part of the freshwater mussel life cycle is the development of mussel larvae, or "glochidia." The timing of when a female mussel's eggs become fertilized and start to develop into glochidia can be different for many species and each stage is unique. In this case, the shellfish team has been working with a common mussel species, the Eastern Elliptio (*Elliptio complanata*). Learning when female mussels are carrying larvae helps the science team produce more mussels in its hatchery in Philadelphia.

A key term comes into play with this work – gravidity. Gravidity is a term for fish, amphibians, and freshwater mussels to differentiate between females with eggs or larvae inside of them and those without them. Sometimes, it can be difficult or even impossible to tell the difference between a male and female mussel unless the female is carrying eggs or larvae.

Females carrying young have inflated, or gravid gills, because their eggs are stored there. PDE's scientists assess a mussel's reproductive status by gently opening a mussel's shell to take a quick peek at its gills. If the gills are inflated, the team carefully collects a sample of the contents and view them with a microscope. The contents of the gills are often a mixture of mussel eggs, immature mussel larvae, developing mussel larvae, and mature mussel larvae.

There are still many unknowns to explore in mussel reproduction and many factors to discover such as the ratio between males and females, but knowing will help to preserve mussel populations.💧

HEALTHY HABITATS • GOAL H3 • STRATEGY H3.3



Scientists from Partnership for the Delaware Estuary and Philadelphia Water Department gather freshwater mussels from a river. PDE lately has been observing the reproductive stages of mussels, and their timing.

STUDENT SCIENCE & ENVIRONMENTAL SUMMIT POSTER AND PRESENTATION WINNERS

At every biennial Delaware Estuary Science and Environmental Summit, PDE gives awards to students for the best oral and poster presentations. At the 2021 Summit held in March, Elizabeth Bouchard won the award for Best Student Poster Presentation and Firas Gerges won an honorable mention award for Best Oral Presentation. Janine Barr won the student award for Best Oral Presentation. PDE ran a story called *Measuring Oyster Filtration* about her project in the last issue of *Estuary News*. Congratulations to these student winners!

STRONG COMMUNITIES • GOAL C2 • STRATEGY C2.5

HORSESHOE CRABS, RED KNOTS, AND OYSTER FARMS IN THE DELAWARE BAY Conflict or Co-existence?

By Elizabeth Bouchard, Best Student Poster Presentation
Bouchard is pursuing a Master's Degree in Ecology and Evolution at Rutgers University.

Since September 2020, I have been part of a collaborative research project between conservation and aquaculture researchers, ornithologists, and marine biologists. The goal is to assess how horseshoe crab eggs are distributed in relation to Delaware Bay oyster farms and whether or not the farms alter the distribution of eggs or access to the eggs by a threatened migratory shorebird, the red knot.

The Delaware Bay hosts the world's largest spawning population of horseshoe crabs. Each spring, horseshoe crabs swarm to the beaches and lay their eggs, creating a cornucopia of food for red knots that stop during their annual migration to the Arctic. However, the overharvesting of horseshoe crabs in the 1990s corresponds with a drastic decline in red knots.

A local concern in the New Jersey Cape Shore region of the Delaware Bay is whether oyster farming might also be hindering species recovery of the red knot. Many New Jersey oyster farms are in a two-mile area of tidal flats adjacent to spawning and foraging habitat in the Delaware Bay. Regulations



Technician Alexandria Ambrose, left; master's student Emily Manuel; and technician Jennifer Gilmore collect sediment samples at an oyster farm to look for horseshoe crab eggs. Photo Courtesy of Elizabeth Bouchard.

restrict oyster farms to this area, which routinely has fewer red knots than in the rest of the Bay. The wide tidal flats provide ample space for oyster farming and reduce the potential for farms to disturb birds. However, the proximity of these species and activities has caused friction among conservationists and oyster farmers who want to sustain a healthy ecosystem. Resolving this type of conflict requires an in-depth understanding of ecological relationships and how they intersect with the economy and society. By investigating the three-way interaction between oyster farms, horseshoe crabs, and red knots, this project will help inform management decisions. 💧

HEALTHY HABITATS • GOAL H3 • STRATEGY H3.5

AN INTRINSIC INDEX FOR COMMUNITIES

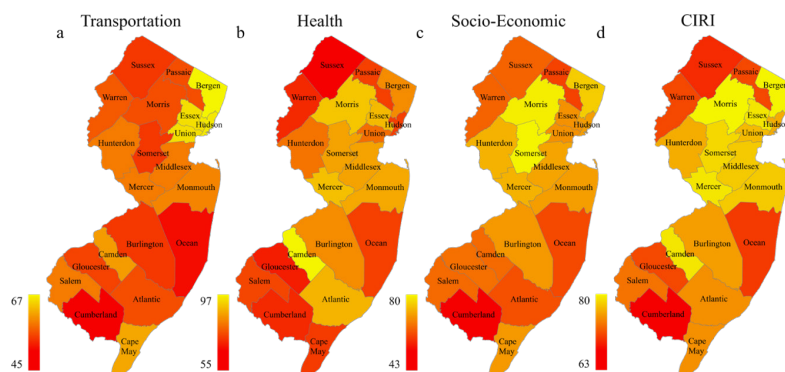
Adaptation of Resilience to the Stress Level

Firas Gerdes, Honorable Mention, Best Student Oral Presentation

Gerdes is a Ph.D. candidate in Computer Science, at the New Jersey Institute of Technology. He works as a research assistant at the Center for Natural Resources.

Environmental impacts of climate change are more apparent today with the continuous sea level rise and increased storm severity. Scientists are predicting a severe surge of such impacts over the next century. Different methods of facing these challenges have emerged as a way for a state, county, municipality, or other entity to enhance their preparedness and capacity to absorb natural disasters. My project is one of these methods. I started working on this project in mid-2019 alongside Michel Boufadel, Ph.D., a professor of environmental engineering and director of the Center for Natural Resources at the New Jersey Institute of Technology. We started this project given the urgency we have today in building more resilient communities, especially in coastal areas that are facing increasing threats because of climate change.

With additional input and guidance from Hani Nassif, Ph.D., a professor in the Civil and Environmental Engineering Department at Rutgers University, we created a web platform called Community Intrinsic Resilience Index (CIRI), which provides practitioners and policy makers with the ability to quantify and assess resilience to natural disasters of any geographical area in New Jersey. This resilience



These maps show the resilience values of each community sector and the CIRI for NJ counties. Red means least resilient and yellow means most resilient. Graphic Courtesy of Firas Gerdes.

depicts the level to which a community should prepare for, absorb, and recover from a disaster.

The platform computes resilience level in four crucial sectors – transportation, energy, health, and socio-economic. Other platforms exist for communities overall, but they are only relative based on comparison between entities. They do not account for the stress level on resilience. CIRI, on the other hand, is absolute. It measures the resilience level of a community as a standalone metric, without the need for comparison. The resilience of these sectors is based on different attributes that affect a community's ability to endure a natural hazard. We populated the GIS platform with the data needed to compute CIRI, eliminating the need for practitioners to perform expensive and extensive data collection and processing. 💧

STRONG COMMUNITIES • GOAL C2 • STRATEGY C1.2

SAVE THE DATES

DELAWARE RIVER FESTIVAL
ONLINE AND IN-PERSON
September 24 to October 3, 2021

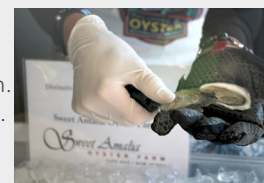
Save time in your schedule this fall for the annual Delaware River Festival! Plans are in the works for another celebration of the mighty Delaware River with online and in-person festivities that will be great for the whole family! Stay tuned for updates by clicking [here](#).



PDE'S 25TH ANNIVERSARY CELEBRATION DINNER

October 7, 2021
Vie, Philadelphia

Celebrate the Partnership for the Delaware Estuary's 25th anniversary at the Experience the Estuary Celebration. This year's event will take place on Oct. 7, 2021 at Vie in Philadelphia. Details are coming soon! Keep checking for updates by clicking [here](#).



25 EASY WAYS TO CELEBRATE PDE'S 25TH ANNIVERSARY

As Partnership for the Delaware Estuary celebrates its 25th year of working with partners from the region to improve the health of the Delaware River and Bay, please join us in taking some of these simple steps that help the environment.

1 Eat Local Seafood

The Delaware Estuary has great local seafood, especially oysters. Go to your local seafood market and ask for local oysters, crab and fish – caught in New Jersey, Pennsylvania or Delaware.

2 Shop for Local Produce

Shop for produce from local farmers to support small businesses in the region. This will help to reduce greenhouse gas emissions and support the local economy.

3 Plant Native Species

There are all kinds of beautiful plants that are native to the mid-Atlantic and the Delaware Estuary. Some examples are blue flag iris, wild columbine, marshmallows, and butterfly weed.

4 Reduce, Reuse, and Recycle

Sounds like a broken record, but it's true. Reduce your waste by buying in bulk, reusing what you can, and recycling what you can't.

5 Invest in a Reusable Water Bottle

Instead of buying plastic bottles, stick with one bottle that you can wash, carry with you, and reuse.

6 Go Paperless with Your Bills

Utility and other bills can come to you via email rather than snail mail, and cut the amount of paper you use.

7 Pass on Plastic Straws

A big part of trash that ends up in landfills, beaches, and in our waterways is plastic straws! There are plenty of reusable options from soft silicone straws to aluminum. You can enjoy a beverage without the straw too.

8 Pick Up After Your Pooch

Think of the millions of dogs in Delaware, Pennsylvania and New Jersey. Now think of a rainstorm washing their waste into rivers, ponds, or the Delaware Bay. Yuck! Dog waste is NOT fertilizer. Pick up after your dog's waste and dispose of it properly in the trash.

9 Pick up Litter in Your Neighborhood

Get some exercise by spending some time picking up stray bottles, cans, candy wrappers, cigarette butts, and food containers on the street. This keeps your community looking nicer and keeps litter from washing into our local waterways.

10 Leave No Trace

Speaking of trash, always dispose of your own trash properly. Make sure your trash cans are tightly covered so no stray litter can escape.

11 Wash Your Clothes with Cold Water

Washing your clothes with cold water not only helps your clothes last longer, it uses less energy. You lower your bills and do something for the earth.

12 Fix That Leaky Faucet or Shower Head

This one has the benefit of saving water and utility costs. No more annoying drip, drip, drip.

13 Reduce Fertilizer and Pesticide Use

Stormwater will carry surface chemicals from these products down local storm drains, which often lead directly to a local stream or river.

14 Compost

Composting organic items such as food waste, tea bags, plant and grass cuttings, or leaves is a great way to reduce the waste that ends up in landfills AND create your very own soil and mulch!

15 Be Water Smarter

Be careful when you water your lawn or plants. Avoid watering on windy days or at the hottest part of the day.

16 Collect Rainwater

You can collect rainwater by installing a rain barrel. Use the water for plants and other non-potable (not for drinking) uses. Always check with your local municipality before investing in a rain barrel; some municipalities have rules about collecting water!

17 Flush Only Toilet Paper

Wipes (even "flushable" "biodegradable" ones), paper towels, or other paper products not intended for use in wastewater systems can lead to sewer backups and plumbing issues. Improper disposal can also lead to problems in the sewer system.

18 Keep Fat, Oil, and Grease Out of the Drain

Avoid putting fat and grease down your drain, as they lead to buildups in sewers and water systems.

19 Commute Clean

Take public transportation, walk, or bike to reduce carbon emissions from a personal vehicle. What's good for clean air is good for clean water.

20 Switch to Energy-Efficient Lightbulbs

If you haven't invested in them already, these bulbs use less energy and generally last longer.

21 Reduce Your Shower Time

An average shower uses anywhere from two to seven gallons of water per minute. One minute less will save 1,000 gallons of water per year or more!

22 Install Water-Conserving Appliances

Low-flow faucets and showerheads reduce the flow of water and therefore reduce the total amount of water used. Installing just one of these can save over 7,600 gallons of water per year!

23 Hike or Bike on Your Local Trails

These activities are good for your health and your mind.

24 Spread the Word

Advocate for nature by educating others. Spread knowledge to friends and fellow outdoor enthusiasts about practices that enhance water quality and overall conservation.

25 Donate to Partnership for the Delaware Estuary

Any donation helps PDE's mission to connect people, science, and nature for a healthy Delaware River and Bay. Click [here](#) to donate. 💧

STRONG COMMUNITIES •
GOAL C2 • STRATEGY C2.3

Celebrate Horseshoe Crab Spawning Season with a New Delaware License Plate or Horseshoe Crab Plushie

Happy Horseshoe Crab Spawning Season!

Each spring, horseshoe crabs line the shores of the Delaware Bay for their spawning season.

If you live in Delaware, celebrate living fossils by updating your license plate to the new horseshoe crab design. Each purchase benefits PDE and the Center for the Inland Bays. Funds help both non-profit organizations with their research and work toward a better environment.

This special license plate comes with a one-time \$50 fee. [Order yours today](#) or stop by any Delaware Department of Motor Vehicles.

Already have a license plate? How about a horseshoe crab plushie? Horseshoe crab stuffed animals are just \$16 and make a great, unique gift for anyone. Purchases benefit PDE and its work toward clean waters, healthy habitats, and strong communities. Order yours by clicking [here](#). 💧

HEALTHY HABITATS •
GOAL H3 • STRATEGY H3.4





City of Wilmington 2021 Earth & Arbor Day Celebration Shared Wisdom via Webinars

Plants, clean commuting, watersheds, trees, and youth were all a part of the 2021 City of Wilmington's Earth and Arbor Day Celebration.

This virtual event, held April 19 to 23, included a week of safely-

distanced activities from story readings to webinars. These activities can be viewed by clicking on the links below.

Plant-Powered Monday kicked the week off with a [YouTube playlist](#) of gardening videos and ended with a webinar about community gardening called "[The Dirty Secrets of Community Gardens.](#)"

Transportation Tuesday focused on clean transportation and air quality. There were links to children's

storybook readings for [Why is Coco Orange?](#) and [The Safety Champs Wild West Adventure](#), read by a staff member from Nemours/A.I. duPont Hospital for Children. The day concluded with a webinar, "[Go Green & Commute Clean](#)" about more environmentally friendly ways to commute.

Activities for the rest of the week included "[A Droplet's Adventure,](#)" a choose-your-own-adventure style activity that follows a droplet of rain through Wilmington, and an evening Earth Day webinar, "[A Conversation with Tomorrow's Change Makers,](#)" where youth discussed their views on environmental issues, and various ways for people to learn about and appreciate trees.

If you missed any of the online activities or webinars, or want to see them again, they are available on PDE's website at DelawareEstuary.org/EarthandArbor.💧

**STRONG COMMUNITIES •
GOAL C2 • STRATEGY C2.2**

THE PARTNERSHIP FOR THE DELAWARE ESTUARY CONNECTING PEOPLE, SCIENCE, AND NATURE FOR A HEALTHY DELAWARE RIVER AND BAY

The Partnership for the Delaware Estuary, Inc. (PDE), is a private, nonprofit organization established in 1996. PDE is the host of the Delaware Estuary Program and leads science-based and collaborative efforts to improve the tidal Delaware River and Bay, which spans Delaware, New Jersey, and Pennsylvania. To find out how you can become one of our partners, call PDE at (800) 445-4935 or visit our website at www.DelawareEstuary.org.

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