Photo by Kim Cahill

Bombay Hook National Wildlife Refuge, Smyrna, DE

What is the Delaware Estuary?

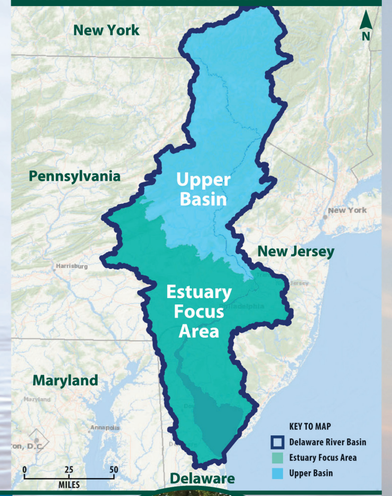
The **Delaware Estuary** is the tidal part of the Delaware River and Bay. Spanning from the fresh waters in Trenton, NJ to the salt waters of Cape Henlopen, DE and Cape May, NJ, the Delaware Estuary is a beautiful, life-sustaining, and productive place. The Estuary supplies drinking water to millions of people and its natural resources contribute $12 billion every year to the economy of the region. The Delaware Estuary and its watershed covers a diverse set of geographies and ecological conditions, with each region supported by unique tributaries. Its natural resources sustain vibrant and diverse communities of fish, wildlife, and people. In addition to the open waters of the Estuary, its watershed includes a variety of land uses and types, including heavily developed and industrial areas, residential areas, agricultural lands, forests, and wetlands.

What is the Comprehensive Conservation & Management Plan for the Delaware Estuary?

The **Comprehensive Conservation & Management Plan (CCMP)** for the Delaware Estuary was written in 1996 to guide the efforts of environmental agencies and organizations in the region to protect the Delaware Estuary. The 2019 revised CCMP streamlines actions from the original CCMP, and includes new and innovative projects and programs organized into 8 goals and 39 strategies in three areas of focus: ***Clean Waters***, ***Strong Communities***, and ***Healthy Habitats***. This plan lays out goals and strategies for continuing the Delaware Estuary's recovery over the next 10 years.

The Core Partners of the Delaware Estuary Program (DELEP) have committed to implement strategies in this plan with support and collaboration from the broader community of local, state, regional, and federal partners, as well as non-profit organizations and the private sector. The tidal portion of the Delaware River Basin is the Estuary Focus Area and the study area for this plan. Some strategies in the plan include actions in the Upper Basin, the nontidal portion of the Delaware River Basin, because of its influence downstream in the Estuary Focus Area.

MAP OF DELAWARE RIVER BASIN



Core Partners of DELEP:

Delaware Department of Natural Resources and Environmental Control
Delaware River Basin Commission
New Jersey Department of Environmental Protection
Partnership for the Delaware Estuary
Pennsylvania Department of Environmental Protection
Philadelphia Water Department
United States Environmental Protection Agency, Region 2 & Region 3

Freshwater mussel monitoring in White Clay Creek, DE

KEYWORDS:

Ecological: Living organisms and their interactions with one another and their environment.
Estuary: Area of a river that is tidal and where fresh and salt water mix together.
Tributary: A waterway that drains to a larger stream or river.
Watershed/Basin: Area of the land that drains to a single water body.

Partnership for the DELAWARE ESTUARY

Connecting people, science, and nature for a healthy Delaware River and Bay

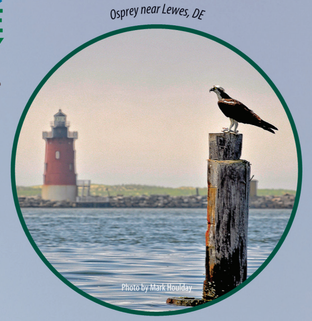


Photo by Mark Houlday

Osprey near Lewes, DE

Partnership for the Delaware Estuary (PDE) is a non-profit organization, established in 1996, to take a leadership role in protecting and enhancing the Delaware Estuary, where fresh water from the Delaware River mixes with salt water from the Atlantic Ocean. PDE is the home of the Delaware Estuary Program, one of 28 congressionally designated National Estuary Programs throughout the coastal United States working to improve the environmental health of the nation's estuaries. PDE's staff works with partners to increase awareness, understanding, and scientific knowledge about the Delaware Estuary, the region's most important cultural, economic, and recreational resource. PDE leads science-based and collaborative efforts to improve the Delaware River and Bay, which spans portions of Delaware, New Jersey, and Pennsylvania.

Acknowledgements

Working in collaboration with other members of the **Delaware Estuary Program (DELEP)** from 2016 to 2018, PDE led a process to revise the **Comprehensive Conservation & Management Plan (CCMP)** for the Delaware Estuary. The success of this effort was made possible by members of DELEP and hundreds of partners representing agencies and organizations, going above and beyond the call of duty by providing their input, insight, and expertise into the development of the revised CCMP. Thank you to all the local partners and stakeholders who attended meetings and workshops, provided comments, and worked with DELEP during the revision process. We are grateful for the William Penn Foundation's generous support of the CCMP revision process.

Photo by Stephanie Bindoch

Butterfly near West Philadelphia, PA

To view this full plan and learn how the Delaware Estuary Program will measure the progress and success of implementing strategies in the revised CCMP, please visit ***DelawareEstuary.org/our-plan***.

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2019 REVISION

The Delaware Estuary

Comprehensive Conservation & Management Plan Summary

Charting the future for the Delaware River and Bay

Photo by Aaron Maffei

CLEAN WATERS

CLEAN WATERS GOAL 1:

Reduce Nutrient Pollution and its Impact

While nutrients are necessary to support a sound and robust aquatic ecosystem, in excess they can impact water quality. Nutrients including nitrogen and phosphorous at high levels can harm fish, wildlife, and drinking water sources. Direct impacts of nutrients include the lowering of dissolved oxygen in the water as well as the stimulation of algae blooms. Nutrients can enter the Delaware Estuary through wastewater and stormwater discharges from sewage treatment plants and non-point source runoff. Fertilizer running off farms and yards into storm drains and streams can also contribute to non-point source pollution.

CLEAN WATERS GOAL 2:

Reduce Other Pollutants and their Impacts

Nutrients are not the only problem in our waterways – other types of pollutants can affect aquatic life and drinking water supply and have implications concerning public health through the consumption of fish. These pollutants include contaminants of emerging concern, road salt, oil, metals, and other contaminants that spill or run off the land. Government agencies establish safe levels for substances that can impact the health of the Delaware Estuary. Government agencies implement fish consumption advisories to protect public health. Many substances, including newly introduced chemicals, do not have standards.

CLEAN WATERS GOAL 3:

Sustain Flow for Drinking Water and Ecosystems

Adequate freshwater flow is needed to support drinking water and ecological needs of the Delaware Estuary. How fresh water and ocean water mix plays an important role in water resources management programs. Water supply and the ecology of the Delaware Estuary can be impacted by high concentrations of saltwater. Aquifer depletion and intrusion of saltwater into groundwater are also concerns in some areas.

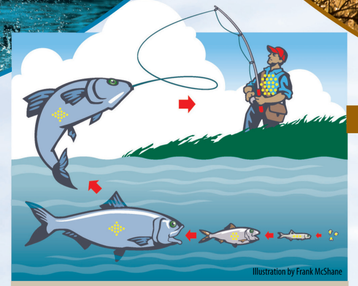
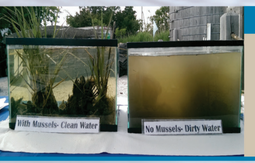


Illustration by Frank McShane

Pollutants can bioaccumulate, or increase in quantity as they move up the food chain. This can happen when a small fish ingests contaminants, a larger fish consumes the small fish, and people catch and eat them. The longer the fish lives, the more time it has to bioaccumuluate pollution.

PDE installs storm drain marking artwork with students in Wilmington, DE



Did You Know?

- One adult freshwater mussel can filter up to 10 gallons of water per day, directly improving water clarity and providing more light for bottom plants. These filter feeders also remove substantial amounts of microscopic particles, including many forms of pollutants.
- More than 75% of drinking water in the Delaware River Basin comes from rivers and streams – the rest comes from groundwater. More than 15 million people rely on the Delaware River Basin for their water needs.

KEYWORDS:

Aquifer: An underground sediment layer that can store and move water through the ground.
Dissolved oxygen (DO): The amount of gaseous oxygen (O2) dissolved in the water.
Ecosystem: Plants, animals, and other organisms that live together in their surrounding environment.
Non-point source pollution: Pollution that derives from different sources over a large area, rather than from one identifiable location. Examples include sediment from farms, fertilizers from yards, and pet waste runoff.
Salt line: An estimate of where the 7-day average chloride (salt) concentration equals 250 parts per million (ppm) along the tidal Delaware River.
Saltwater intrusion: The process of saltwater creeping inland gradually as a result of rising sea levels or overuse of groundwater.

For strategies to achieve these goals go to **www.delawareestuary.org/our-plan**

Photo by Kristen Neal

Brandywine Creek in Wilmington, DE

STRONG COMMUNITIES

STRONG COMMUNITIES GOAL 1:

Increase Community Resilience and Access

Communities around the Delaware Estuary rely on clean and healthy streams and natural areas for recreation, health, and overall quality of life. Waterfront communities are especially vulnerable to certain climate change effects, including rising sea levels, and more intense storms and floods. People are beginning to recognize the value of "green infrastructure," such as living shorelines, which can improve shoreline resilience to storms and rising sea levels for waterfront communities. There are many working waterfronts, protected lands, and public access points around the Delaware Estuary, but a number of places need investment to improve and sustain access and ecosystem functions.

STRONG COMMUNITIES GOAL 2:

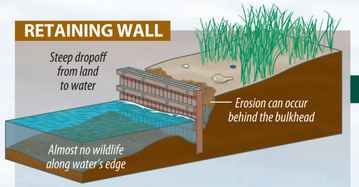
Improve Public Awareness and Stakeholder Engagement

Engaging people is a key component of conservation efforts. Only people aware of the region's resources will be motivated to work towards their protection and enhancement. People of all ages and backgrounds should have access to information about our Estuary in order to generate positive change. Decision-makers and managers must work together across communities, counties, and states to share information, pool resources, and effectively manage the Delaware Estuary. Outreach tactics to improve awareness and engagement also include citizen science projects, teacher workshops, and volunteer activities to connect people to the Delaware Estuary.

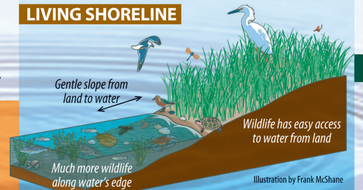
A COMMITMENT TO DIVERSITY AND ENVIRONMENTAL JUSTICE

One overarching challenge faced by those trying to achieve strong communities around the Delaware Estuary is involving underserved communities and those subject to environmental injustice. Core Partners in the Delaware Estuary Program recognize that standard approaches to the way environmental efforts are organized can create barriers to diverse groups' engagement and they are committed to finding ways to remove or overcome these barriers. Involving underserved communities in priority areas and issues in the CCMP is critical. Key activities for doing so are included in the Strong Communities strategies.

Christina River Watershed Cleanup in Wilmington, DE



'Hard' infrastructure like retaining walls abruptly severs the ecological connection between the coast and water.



Not only do living shorelines defend land against destructive waves, but they also provide crucial habitat for fish and wildlife.

Did You Know?

- The sea level in the Delaware Estuary has risen by approximately 1 foot in the last century.
- Along the 330 miles of the Delaware River and Bay, there are approximately 150 access points, including public lands and private marinas.
- Recreational fishing is valued at $52 million annually in the Delaware Estuary.

KEYWORDS:

Green infrastructure: A suite of tactics that use natural systems to solve water management problems, including runoff, erosion, and/or local waterways' pollution.
Living shoreline: A method of shoreline stabilization that uses natural materials, such as coconut fiber logs, oyster shells, and native plants, to provide shoreline protection and other ecosystem services.
Resilience: The ability to recover or adapt after a disaster occurs.
Citizen science: The collection and analysis of data relating to the natural world by members of the public, typically as part of collaborative projects with scientists.

For strategies to achieve these goals go to **www.delawareestuary.org/our-plan**

HEALTHY HABITATS

HEALTHY HABITATS GOAL 1:

Prevent Wetland Loss

Wetlands are one of the Delaware Estuary's most important and characteristic habitats. Many scientists consider wetlands to be the 'kidneys' of a waterway, helping to absorb pollutants, contaminants, and carbon. Wetlands can also protect coastal communities, acting as sponges that absorb floodwater and storm surge. Wetlands are a shifting habitat that move and respond to natural conditions. Rising sea levels and storms are submerging and eroding wetlands. Once wetlands become eroded, they provide fewer benefits.

HEALTHY HABITATS GOAL 2:

Stem Forest Loss

Natural lands, such as forests, provide benefits that developed lands typically do not. They can absorb and filter more water and support more wildlife than developed lands. When forested land is converted to lawns, buildings, and paved areas, we lose many benefits, and water quality downstream is negatively impacted. Forests also produce clean air, absorb rainfall, inhibit erosion, and provide food and habitat for wildlife. In order to meet growing human population needs, forest loss will continue unless forested lands are protected and forest conservation and management practices are used.

HEALTHY HABITATS GOAL 3:

Increase and Improve Fish and Shellfish Habitat

The Delaware Estuary is home to a host of fish and shellfish. Oysters and mussels filter water for food, and in the process clean the water. Horseshoe crabs rely on healthy bay beaches to lay their eggs, feeding millions of shorebirds that stop at the Delaware Bay during their annual migration. Fish including sturgeon and shad require healthy estuary waters to live and spawn. Despite recent improvements, populations of aquatic species throughout the Delaware Estuary are still far lower than historic levels, and there is more work needed to help them recover.

Intertidal oyster beds at the Mispillion Harbor in Milford, DE

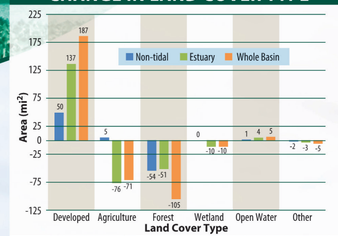
Eastern Oyster
Crassostrea virginica

KEYWORDS:

Habitat: The natural environment or home of a plant, animal, or other organism.
Wetlands: Land that is saturated with water constantly or seasonally and includes marshes (tidal or non-tidal), bogs, and swamps.

For strategies to achieve these goals go to **www.delawareestuary.org/our-plan**

CHANGE IN LAND COVER TYPE



This graph from the 2017 Technical Report for the Delaware Estuary and Basin shows the change in land cover type in different parts of the Delaware River Basin between 1996 and 2010, showing that forest is the land cover type with the greatest acreage lost.

Photo by Carol Brightbill

French Creek in East Coventry, PA

Did You Know?

- Every baby oyster needs an old oyster shell to attach to in order to survive. The Partnership for the Delaware Estuary recycles oyster shells from local restaurants and returns them to the Delaware Bay. This activity creates critical habitat and saves valuable space in our landfills.
- Forests make up more than 48% of the Delaware River Basin's land area and play an important role in the water quality and water supply for streams, wetlands, and people.