U.S. Environmental Protection Agency's National Estuary Program Story Map
Text-only File

1) Introduction

Welcome to the National Estuary Program story map.
Since 1987, the EPA National Estuary Program (NEP) has made a unique and lasting contribution to protecting and restoring our nation's estuaries, delivering environmental and public health benefits to the American people.
This story map describes the 28 National Estuary Programs, the issues they face, and how place-based partnerships coordinate local actions.
To use this tool, click through the four tabs at the top and scroll around to learn about our National Estuary Programs.
Want to learn more about a specific NEP?

1. Click on the "Get to Know the NEPs" tab.
2. Click on the map or scroll through the list to find the NEP you are interested in.
3. Click the link in the NEP description to explore a story map created just for that NEP.

Program Overview

Our 28 NEPs are located along the Atlantic, Gulf, and Pacific coasts and in Puerto Rico. The NEPs employ a watershed approach, extensive public participation, and collaborative science-based problem-solving to address watershed challenges.
To address these challenges, the NEPs develop and implement long-term plans (called Comprehensive Conservation and Management Plans (link opens in new tab)) to coordinate local actions.
The NEPs and their partners have protected and restored approximately **2 million acres of habitat**.
On average, NEPs leverage **$19 for every $1** provided by the EPA, demonstrating the value of federal government support for locally-driven efforts.

View the NEPmap.

What is an estuary?

An estuary is a partially-enclosed, coastal water body where freshwater from rivers and streams mixes with salt water from the ocean.
Estuarine environments are among **the most productive on earth**, creating more organic matter each year than comparably-sized areas of forest, grassland or agricultural land.
The sheltered waters of estuaries support unique communities of plants and animals specially adapted for life at the margin of the sea.

Link to EPA What is an Estuary? Now You Know video:
www.youtube.com/embed/XLumSN4G5P4?wmode=opaque&rel=0

2) Learn the Issues

We love and value our coastal water resources. Over half the U.S. population lives within 100 miles of a coast, and every year more people are moving to these areas.
This rapid population growth adds to the many challenges facing our nation's estuaries. Leading challenges include:

- Water diversion
- Invasive species
- Nutrient pollution
- Severe weather events
- Habitat loss & degradation
- Declines in fish & wildlife populations
- Pathogens
- Stormwater runoff
- Toxics

In general, these challenges translate to declines in commercial and recreational fishing opportunities and in the overall health of many estuaries.
Let's explore these challenges further by viewing where they occur among the 28 NEPs.

Water Diversion

People alter the environment, including how water flows.
Development and water-related infrastructure (e.g., dams, flood control structures, diversions) enable us to change the volume and rate that water runs off the landscape, into the ground and into streams. Increased runoff can result in erosion and sedimentation.
All of these changes can adversely affect shellfish survival, fish nurseries, and, ultimately, fish populations.

Water diversion is a priority issue for 50% of the NEPs: Albemarle-Pamlico, Barataria-Terrebonne, Coastal Bend Bays & Estuaries, Delaware Estuary, Delaware Inland Bays, Maryland Coastal Bays, Massachusetts Bays, Mobile Bay, Morro Bay, New York-New Jersey Harbor, San Francisco Estuary, San Juan Bay, Sarasota Bay, and Tillamook Estuaries.

Invasive Species

As the ease of transporting organisms around the globe has increased, so has the rate of introduction of invasive species to our estuaries.
These invasive species don't belong in our estuaries and they cause ecological, economic and social impacts.
For example, invasive species harm native fish and wildlife in many ways. They can take over native species' habitats, out-compete and prey upon those species and disturb entire food webs.
Invasive species impact coastal communities by:

- Disrupting agriculture, shipping, water delivery, recreational and commercial fishing
- Undermining levees, docks and environmental restoration activities
- Impeding navigation, water-related jobs, and enjoyment of local and regional waterways

Invasive species are a priority issue for 20 out of 28 NEPs: Albemarle-Pamlico, Casco Bay, Charlotte Harbor, Coastal Bend Bays & Estuaries, Delaware Estuary, Delaware Inland Bays, Indian River Lagoon,

Long Island Sound, Lower Columbia River Estuary, Maryland Coastal Bays, Massachusetts Bays, Mobile Bay, Narragansett Bay, Peconic Estuary, Piscataqua Region Estuaries, Puget Sound, San Francisco Estuary, San Juan Bay, Sarasota Bay, and Tampa Bay.

Nutrient Pollution

Nutrients such as nitrogen and phosphorus are necessary for plant and animal growth and support healthy aquatic ecosystems.
In excess, however, nutrients can contribute to fish disease, red or brown tide, algae blooms and low dissolved oxygen.
Sources of nutrients include point and non-point sources, such as the following:

- Sewage treatment plant discharges
- Stormwater runoff
- Faulty or leaking septic systems
- Sediment in urban runoff
- Animal wastes
- Atmospheric deposition originating from power plants or vehicles
- Groundwater discharges

When excess nutrients lead to low dissolved oxygen levels, marine animals must leave the low-oxygen zones for more oxygenated waters.
Areas with extremely low levels of oxygen are known as "dead zones" void of animal life.

Excess nutrients are a priority issue for 23 out of 28 NEPs: Albemarle-Pamlico, Barataria-Terrebonne, Barnegat Bay, Buzzards Bay, Charlotte Harbor, Coastal Bend Bays & Estuaries, Delaware Estuary, Delaware Inland Bays, Indian River Lagoon, Long Island Sound, Maryland Coastal Bays, Massachusetts Bays, Mobile Bay, Morro Bay, Narragansett Bay, New York-New Jersey Harbor, Peconic Estuary, Piscataqua Region Estuaries, Puget Sound, San Juan Bay, Sarasota Bay, Tampa Bay, and Tillamook Estuaries.

Severe Weather Events

Estuaries face unique impacts from changes in the climate.
As sea-levels rise, increased erosion and flooding threaten some coastal wetlands and estuarine habitats.
Rising temperatures can stress estuarine habitats, and fish and wildlife populations.
Severe storms increase polluted runoff, further degrading water quality in estuarine waters.

Severe weather events are a priority issue for 50% of the NEPs: Albemarle-Pamlico, Barataria-Terrebonne, Casco Bay, Delaware Estuary, Delaware Inland Bays, Indian River Lagoon, Long Island Sound, Lower Columbia River, Massachusetts Bays, Narragansett Bay, Puget Sound, San Francisco Estuary, Santa Monica Bay, and Tampa Bay.

Habitat Loss and Degradation

High-quality habitats are critical for the health of estuarine systems and the human economies that depend on them.
A healthy estuarine habitat provides coastal and marine wildlife:

- Food
- Cover
- Migratory corridors
- Breeding/nursery areas

Healthy coastal habitats attract tourism and sustain fisheries vital to coastal economies.
Healthy habitats increase resiliency of coastal areas to storms and sea level rise.
Coastal population growth threatens estuaries due to:

- Development
- Highway construction
- Diking
- Dredging
- Filling
- Bulk heading (building retaining walls along waterfronts)

Habitat loss is a priority issue in 27 out of the 28 NEPs (all NEPs except Morro Bay).

Declines in Fish and Wildlife Populations

The many stresses on estuaries have corresponding impacts on fish and wildlife.
As habitats disappear and water quality degrades, the availability of food fish depend on decreases.
Loss of habitat and estuarine vegetation also reduces the area needed for fish to lay their eggs and develop their young.
Invasive species also add pressure by replacing many of our native plants and animals.

Declines in fish and wildlife populations are a priority issue in 15 out of 28 NEPs: Albemarle-Pamlico Sounds, Barataria-Terrebonne, Buzzards Bay, Casco Bay, Charlotte Harbor, Coastal Bend Bays & Estuaries, Massachusetts Bays, Morro Bay, Narragansett Bay, New York-New Jersey Harbor, Peconic Estuary, Piscataqua Region Estuaries, San Francisco Estuary, Santa Monica Bay, and Tillamook Estuaries.

Pathogens

Pathogens are disease-causing microorganisms such as viruses, bacteria and parasites that can create health risks for people.
Pathogens can be introduced into estuaries from the following sources:

- Inadequately treated sewage
- Runoff from urban areas and animal operations
- Medical waste
- Boat and marina waste
- Combined sewer overflows
- Waste from pets and wildlife

Estuaries afflicted with pathogens pose a health threat to swimmers, divers, and seafood consumers.

Pathogens are a priority issue in 20 out of 28 NEPs: Albemarle-Pamlico, Barataria-Terrebonne, Barnegat Bay, Buzzards Bay, Casco Bay, Coastal Bend Bays & Estuaries, Delaware Estuary, Delaware Inland Bays, Indian River Lagoon, Long Island Sound, Massachusetts Bays, Mobile Bay, Narragansett Bay, New York-New Jersey Harbor, Peconic Estuary, San Francisco Estuary, San Juan Bay, Santa Monica Bay, Tampa Bay, and Tillamook Estuaries.

Stormwater Runoff

Stormwater runoff is generated when precipitation from rain and snowmelt events moves across the landscape without seeping into the ground.
As the runoff flows over the land or impervious surfaces (e.g., paved streets, parking lots and building rooftops), it can accumulate:

- debris
- chemicals
- sediment
- other pollutants

Untreated runoff can harm water quality.

Stormwater runoff is a priority issue in 22 out of 28 NEPs: Albemarle-Pamlico, Barnegat Bay, Buzzards Bay, Casco Bay, Charlotte Harbor, Coastal Bend Bays & Estuaries, Delaware Estuary, Delaware Inland Bays, Indian River Lagoon, Long Island Sound, Lower Columbia River Estuary, Maryland Coastal Bays, Massachusetts Bays, Mobile Bay, Narragansett Bay, New York-New Jersey Harbor, Peconic Estuary, San Francisco Estuary, San Juan Bay, Santa Monica Bay, Sarasota Bay, and Tampa Bay.

Toxics

Certain toxics can be dangerous to human health when consumed in food.
Organisms exposed to certain toxics absorb them and carry them into the food chain.
Wildlife and aquatic plants and animals can be harmed by when exposed to contaminated fish and water.
The following are common toxics that threaten estuaries:

- Metals, such as mercury
- Polycyclic aromatic hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs)
- Pesticides

Toxics can enter waterways through:

- Storm drains
- Industrial discharges
- Runoff from lawns, streets and farmlands

Toxics are a priority issue in 16 out of 28 NEPs: Barataria-Terrebonne, Buzzards Bay, Casco Bay, Coastal Bend Bays & Estuaries, Delaware Estuary, Indian River Lagoon, Long Island Sound, Lower Columbia River Estuary, Mobile Bay, New York-New Jersey Harbor, Peconic Estuary, Puget Sound, San Francisco Estuary, San Juan Bay, Santa Monica Bay, and Tampa Bay.

3) Partnerships Driving Success

By building local partnerships and leveraging scarce funds, the National Estuary Program (NEP) tackles the many challenges our estuaries face.
Read some examples of how the NEPs are addressing these challenges. (See **Get to Know the NEPs** for more details.)

Habitat Restoration in the Albemarle-Pamlico Sounds

Restoration and demonstration projects in the Albemarle-Pamlico Sounds come in many different shapes and sizes.
Projects here include small habitat enhancements such as planting trees; large-scale projects that restore thousands of acres of coastal and upland habitat; constructed wetlands; living shorelines; oyster reef restoration; low-impact development and stormwater retrofits; and water reuse and rainwater harvesting projects.
Many projects also serve as educational tools for the public, and increase the visibility of the work of APNEP and its partners throughout the region.
APNEP engages with a variety of regional partners including local and state government entities, schools, non-profits, and conservation organizations.

Habitat Restoration in Barataria-Terrebonne

To combat habitat loss, new coastal habitats must be re-created or restored.
The Barataria-Terrebonne NEP helped plant **5,000 feet of constructed ridge and adjacent marsh** in partnership with the Greater Lafourche Port Commission, Shell Oil Company, United States Department of Agriculture, Natural Resources Conservation Service, the Terrebonne Bird Club and **thousands of volunteers.** This Fourchon Maritime Forest Ridge and Marsh Restoration project was the first of its kind to use saline sediments to create a maritime ridge for planting trees beneficial to migratory songbirds.
So far, this project has resulted in 5,000 linear feet of habitat space, including more than 100,000 woody and herbaceous plantings which reduce erosion, increase the rate of soil conditioning, and provide nesting habitat for shorebirds.
This project is ongoing in order to increase biodiversity.

Marsh Restoration with Coastal Bend Bays & Estuaries Program

Located along the Nueces Bay Causeway between Corpus Christi and Portland, Texas, Coastal Bend Bay was once a thriving ecosystem that provided essential habitat for fish, shrimp, crabs, and birds.
Construction of a major highway beginning in the 1940s resulted in the loss of about 180 acres of highly productive marsh. An additional 160 acres were lost due to erosion and subsidence. The loss in marsh harmed fish and wildlife and threatened the highway corridor.
Coastal Bend Bays & Estuaries Program's restoration of the Nueces Bay Marsh -- a 160-acre, $5.3-million-dollar effort -- began in 2005 and was completed in 2016.
Features of this project include **volunteer plantings**, an **observation deck**, and educational signs to provide **public access** and information about restoring essential habitat, benefits to the surrounding infrastructure and other functions and values the marsh provides.

View a video of the Nueces Bay Marsh Volunteer Planting from March 2016.

Outreach: Art Contests in the Delaware Estuary

The Partnership for the Delaware Estuary (PDE) has a unique approach to public outreach and engagement. Since 2000, an annual art contest has taught over 18,000 children how to prevent water pollution. In 2014, PDE started installing winning drawings as street art. This, together with an advertising campaign, educates millions annually. And it's all thanks to collaboration between PDE and Philadelphia Water.

Island Restoration in Indian River Lagoon

This project, sponsored by the Indian River Lagoon NEP, removed exotic plant species (Australian pine and Brazilian pepper) along the shorelines of Preachers, Nelsons, and Paul's islands.
Volunteers from the Coastal Conservation Association of the Treasure Coast held 3 workdays on the islands to plant 4,000 cordgrass, 1,000 sea purslane, 1,000 saltwort, and 500 red mangrove plants along 6,750 ft of shoreline on the three islands. Marine Resources Council installed 400 red mangroves on the north side of Paul's island. Staff from the U.S. Fish and Wildlife Service Ecological Services and Florida Department of Environmental Protection staff installed 125 red mangroves.

Community Engagement in the Long Island Sound

The Long Island Sound Study partners with the National Fish and Wildlife Foundation to run the Long Island Sound Futures Fund, a grant program that provides funds to municipalities, academic, cultural, and scientific institutions, and local community and environmental groups to implement projects that restore and protect the Sound.
Through 2016, the Futures Fund invested $15 million in 352 projects. With a grantee match of $30 million, the program has generated **$45 million for locally based conservation**. The projects have opened up 157 river miles for fish passage, **restored 1,051 acres** of critical fish and wildlife habitat and open space, treated 101 million gallons of pollution, and **educated and engaged 2.1 million people** from communities surrounding the sound.

Community Partnerships in the Maryland Coastal Bays

Maryland Coastal Bays Program (MCBP) works with the US Army Corps of Engineers, non-profits, government agencies, and local businesses to restore islands previously lost in the Coastal Bays.
In 2009, MCBP began a partnership with the Maryland Department of Natural Resources and a privately owned marina to help replenish an important bird-nesting island by using dredge materials. This project provided a beneficial use for dredge material that in the past had been trucked out to landfills. Since this initial project, there are now several island enhancement projects underway designed to revitalize colonial bird nesting habitats.
These new islands provide a great platform to engage government agencies, municipalities, residents and visitors on the importance of colonial birds and their nesting habitats, and to provide a conduit to communicate just how serious the population decline has become.

Documenting Trends in Massachusetts Bays

Direct funding, technical support, and cross-sector collaboration are three ways in which MassBays has made great strides in supporting monitoring and research efforts across its planning area. Through these efforts, MassBays prioritizes project planning to obtain relevant information, meet monitoring goals,

document comprehensive State of the Bays reports, and prompt new investigations. In fact, MassBays' Delineation and Assessment Report and Viewer (link will open in a new tab) has helped the program define coastal subwatershed boundaries and document existing data sets. This provides a basis for establishing target values for future environmental conditions, at the same time underscoring the need for consistent and reliable monitoring.

Partners Find Solutions to Water Scarcity in Morro Bay

The Morro Bay National Estuary Program supports rainwater harvesting projects big and small. A large-scale project on California Polytechnic State University San Luis Obispo property collects rainwater from rooftops and stores it for cattle during the dry summer months, reducing pumping of nearby wells. Another project funded a community group's installation of a residential-scale rainwater harvesting system in a public park. Inspired by the success of this project, local government introduced an incentive program designed to encourage residents and businesses to install rainwater-harvesting devices. People have taken advantage of the incentive, increasing local rainwater storage capacity by over 4,300 gallons.

Infrastructure Investments Reduce Pollution in the Narragansett

In 2003, low levels of oxygen in Narragansett Bay waters caused a large fish kill. This resulted in a public outcry that accelerated plans to reduce the flow of nutrients into the bay.
Significant investments to reduce nutrient loadings have been made to sewage treatment facilities in the Narragansett Bay watershed. Estimated nitrogen loading from treatment plants in 2000 was more than 11,000 pounds per year and in 2015 the total nitrogen loads dropped to more than 4,800 pounds per year. These investments in plant upgrades resulted in nearly a 60% drop in nitrogen loads into the Bay.

Municipal Action in Stormwater in New Hampshire

In 2015, the Piscataqua Region Estuaries Partnership provided funding for a grant project in Exeter to improve water quality by amending zoning ordinances.
Amendments to the ordinances restricting fertilizer application in the Shoreland Protection District and Aquifer Protection District were developed with Planning Board staff and were unanimously voted to be included in the 2016 Town Warrant. The Healthy Lawns Clean Water Initiative -- a group of concerned citizens and town staff -- worked to build support in the community through outreach efforts including a lawn care forum and lawn care practices workshop.
In March 2016, voters overwhelmingly supported both amendments. These amendments help protect natural resources by requiring development projects of a certain scale to complete a stormwater management plan.

Local Partners Create Green Streets in San Francisco

Pollution from stormwater and urban runoff poses a threat to the health of local waterways and the San Francisco Bay.
San Francisco Estuary Partnership (SFEP) partners with local non-profit organizations, cities, community members and design teams to implement urban greening or Green Streets projects in the Bay Area.
The Serramonte Main Branch Library Water Treatment Gardens Exit in Daly City reduced the delivery of key pollutants like copper, lead and zinc by 98-99 percent.

The Newcomb Avenue Model Block Project [Exit] installed traffic-calming, urban greening and stormwater management facilities in a low-income neighborhood of San Francisco, reducing traffic speeds and peak storm flow discharges.
Early monitoring results of the Hacienda Avenue Green Street Improvement Project in Campbell showed complete elimination of stormwater runoff to storm drain inlets.
SFEP and its partners develop resources for cities and community members, including a green infrastructure planning toolkit [Exit] and a green streets website [Exit].

Trash-Free Waters in Puerto Rico

EPA selected Puerto Rico as a Trash Free Waters (TFW) pilot project in the US Caribbean. The San Juan Bay Estuary Program champions a variety of projects, such as stormwater pollution prevention in Condado Lagoon, cigarette butt and plastic bag litter prevention in Old San Juan, public outreach and education, media campaigns, trash cleanups, and more. Some public resources include a Trash-Free Waters video [Exit] (Spanish narration with English subtitles) and a citizen guide.
Volunteers, corporate partners, and government agencies play an important role in implementing TFW activities. More than 500 volunteers have participated in targeted cleanups, collecting **nearly 3,290 pounds of waste**.

Restoring Kelp Forests in Santa Monica Bay

Kelp forests are the rainforests of the sea. These highly productive ecosystems provide food and habitat to over 700 species of invertebrates, other algae, and fish.
Over the past 100 years, the Palos Verdes Peninsula lost approximately 75% of its giant kelp canopy due to sedimentation, development, urban runoff and storms. At the same time, the loss of key urchin predators and competitors allowed urchins to overrun the reef and devour the remaining kelp.
In 2013, a Santa Monica Bay NEP restoration project began to manually cull the urchin population. In partnership with environmental groups, public aquaria, fishermen and researchers, nearly 7000 hours were spent underwater to restore 39 acres of rocky reef.
The kelp forest community has responded positively to the reduction in sea urchin density, and fish populations have improved. Further monitoring efforts will provide a more accurate understanding of ecosystem responses to this work.

Restoring Robinson Preserve in Sarasota Bay

Robinson Preserve, in northwestern Manatee County where Tampa Bay and Sarasota Bay meet, is a 487-acre coastal preserve. Through the work of many partners and funding sources, this once disturbed farmland has been transformed into incredibly diverse coastal and wetland habitats. Exotic invasive plants have been removed, effectively opening the land for native plants to flourish. The preserve's new waterway system helps restore the tidal flow within the coastal habitats.
Robinson Preserve's amenities include hiking and biking trails, a canoe/kayak launch, observation towers and platforms, picnic areas, and a visitor's center. An additional 165-acres of disturbed upland were recently purchased and are slated to undergo additional restoration to natural coastal ecosystems.

Tillamook's Backyard Planting Program

Tillamook Estuaries Partnership's Backyard Planting Program began in 2003 to encourage private streamside landowners to restore riparian areas in order to improve water quality, reduce erosion and sedimentation and provide key habitat.

Working with 130 private and public landowners, this program has removed invasive species along more than 40 miles of streams, restoring 200 acres of riparian area. **Over 110,000 trees, shrubs and cuttings have been planted**, with survival rates increasing to 92% since 2011. As part of a partnership on agricultural lands, the Tillamook County Soil and Water Conservation District has also installed over 14 miles of livestock exclusion fencing.

This program is funded by a variety of federal, state, local, and private sources and comes at no cost to the landowner.

4) Get to Know the NEPs

Albemarle-Pamlico National Estuary Partnership
The Albemarle-Pamlico estuarine system receives water from 43 North Carolina counties and 38 Virginia counties and cities. To learn more, explore the Albemarle-Pamlico NEP story map.

Barataria-Terrebonne National Estuary Program
The Barataria-Terrebonne National Estuary is located between the Mississippi and Atchafalaya Rivers in south Louisiana. To learn more, explore the Barataria-Terrebonne NEP story map.

Barnegat Bay Partnership
The Barnegat Bay Partnership began in March 1995. Over 450,000 people live within New Jersey's Barnegat Bay watershed, and that number doubles in the summer when people flock to the shore. To learn more, visit the Barnegat Bay Partnership website. Exit

Buzzards Bay National Estuary Program
Buzzards Bay features diverse habitats of sandy beaches, salt marshes, eelgrass beds and urban ports in Massachusetts. To learn more, visit the Buzzards Bay NEP website. Exit

Casco Bay Estuary Partnership
The Casco Bay Estuary Partnership was formed in 1990 to protect the picturesque New England Bay's 578 miles of shoreline in southern Maine. To learn more, visit the Casco Bay Estuary Partnership website. Exit

Charlotte Harbor National Estuary Program
The Charlotte Harbor National Estuary Program commenced in 1995. Located on Florida's west coast, this estuary is home to more than 2,300 animal species, including manatees, sea turtles, and dolphins. To learn more, visit the Charlotte Harbor NEP website. Exit

Coastal Bend Bays & Estuaries Program
Coastal Bend Bays & Estuaries Program protects, researches and restores the bays and estuaries in the 12-county region of the Texas Coastal Bend, along the south-central Texas coastline. To learn more, explore the Coastal Bend Bays & Estuaries Program story map.

Delaware Center for the Inland Bays
Delaware's Inland Bays joined the National Estuary Program in 1988. To learn more, visit the Delaware Center for the Inland Bays website. Exit

Partnership for the Delaware Estuary
The Delaware Estuary stretches from Trenton, New Jersey and Morrisville, Pennsylvania, south to Cape May, NJ and Cape Henlopen, Delaware. To learn more, explore the Partnership for the Delaware Estuary story map.

Galveston Bay Estuary Program
Officially started in 1989, the Galveston Bay Estuary Program is one of two estuary programs in Texas. To learn more, visit the Galveston Bay Estuary Program website. Exit

Indian River Lagoon National Estuary Program

The Indian River Lagoon spans 156 miles of Florida's east coast. To learn more, explore the Indian River Lagoon NEP story map.

Long Island Sound Study
This study area, which runs 110 miles in length, starts in the headwaters of the Connecticut River along the Quebec-New Hampshire border and includes five New England states and New York. To learn more, explore the Long Island Sound Study story map.

Lower Columbia River Estuary Partnership
The Lower Columbia Estuary Partnership was formed in 2000 to protect and restore the lower Columbia River, which runs along the border between Oregon and Washington. To learn more, visit the Lower Columbia Estuary Partnership website. Exit

Maryland Coastal Bays Program
MCBP protects and conserves the watershed of Maryland's five coastal bays located behind Ocean City and Assateague Island. To learn more, explore the Maryland Coastal Bays Program story map.

Massachusetts Bays
The MassBays region covers over 1,000 miles of coastline, from the tip of Cape Cod to the New Hampshire border, and serves 50 coastal communities. To learn more, explore the MassBays story map.

Mobile Bay National Estuary Program
The Mobile Bay National Estuary Program, created in 1995, promotes wise stewardship of the Mobile Bay estuarine system, which covers more than 71,500 square miles along the Gulf of Mexico. To learn more, visit the Mobile Bay NEP website. Exit

Morro Bay National Estuary Program
This NEP encompasses roughly 2,300 acres of mudflats, eelgrass beds, tidal wetlands and open-water habitat on California's south central coast. To learn more, explore the Morro Bay NEP story map.

Narragansett Bay National Estuary Program
The Narragansett Bay watershed is New England’s largest estuary, including more than 1 million acres of land throughout Rhode Island and Massachusetts. To learn more, explore the Narragansett Bay NEP story map.

New York-New Jersey Harbor & Estuary Program
The New York-New Jersey Harbor & Estuary Program was established in 1987 to protect and improve the quality of the estuary for all of its inhabitants. To learn more, visit the New York-New Jersey Harbor & Estuary Program website. Exit

Peconic Estuary Program
Just 80 miles east of the hustle and bustle that is New York City lays the unparalleled beauty and tranquility of Long Island’s East End and the Peconic Estuary. To learn more, visit the Peconic Estuary Program website. Exit

Piscataqua Region Estuaries Partnership

PREP's focus area includes two estuaries, Great Bay and Hampton-Seabrook Harbor, along New Hampshire's Seacoast Region. To learn more, explore the Piscataqua Region Estuaries Partnership story map.

Puget Sound Partnership
Puget Sound encompasses 2,300 miles of shoreline just south of the western border between the US and Canada and is home to more than 200 species of fish and 14 species of marine mammals. To learn more, visit the Puget Sound Partnership website. Exit

San Francisco Estuary Partnership
The San Francisco Estuary, the largest in western North America, covers 60,000 square miles and drains 40 percent of California. To learn more, explore the San Francisco Estuary Partnership story map.

San Juan Bay Estuary Program
The San Juan Bay Estuary, located in Puerto Rico, is one of the many tropical areas trying to harmonize economic development with resource protection. To learn more, explore the San Juan Bay story map.

Santa Monica Bay National Estuary Program
The Santa Monica Bay and its watershed, along the coast of Los Angeles, California, are home to more than 4 million people and 5,000 species. To learn more, explore the Santa Monica Bay story map.

Sarasota Bay Estuary Program
Sarasota Bay is a 50-mile-long, shallow, coastal lagoon on the southwest coast of Florida. Since 1989, SBEP and its partners have had a vision of Sarasota Bay with clear waters, healthy habitat, abundant wildlife and a growing community enjoying the Bay's resources and recreation. To learn more, explore the Sarasota Bay story map.

Tampa Bay Estuary Program
Tampa Bay – Florida's largest open-water estuary – stretches 398 square miles at high tide. After decades of pollution, the Bay is coming back to life, thanks in part to the Tampa Bay Estuary Program. To learn more, visit the Tampa Bay Estuary Program website. Exit

Tillamook Estuaries
Located on the north coast of Oregon, Tillamook Estuaries Partnership is dedicated to conserving and restoring the five Tillamook County estuaries and watersheds. To learn more, explore the Tillamook NEP story map.

Albemarle-Pamlico National Estuary Partnership

The Albemarle-Pamlico National Estuary Partnership (APNEP) works collaboratively to identify, protect, and restore the significant resources of the Albemarle-Pamlico estuarine system. The APNEP management region is the largest unit in the National Estuary Program, covering 23,803 square miles, an area almost the size of West Virginia. The watershed contains six major river basins draining from 43 counties in North Carolina and 38 counties and cities in Virginia. The management region is largely rural, with big cities in the upper reaches of the watershed.
The regional APNEP ecosystem, located within the Piedmont and Mid-Atlantic coastal plain ecoregions, supports a diverse array of ecological treasures and unique habitats. Six river basins - Chowan, Roanoke, Tar-Pamlico, Neuse, Pasquotank, and White Oak - each containing their own diverse ecosystems, flow into the sounds. The landscape blends a diverse mosaic of upland and freshwater habitats including longleaf pine, oak and hickory forests, freshwater lakes, rivers and streams, cypress gum swamp, forested wetlands, and freshwater tidal wetlands.

What Makes the Albemarle-Pamlico National Estuary Partnership Special?

The estuary and its watershed are teeming with life. The APNEP ecosystem serves as a nursery ground for fish species that migrate up and down the entire Atlantic seaboard from Maine to Florida; as wintering grounds for many species of migratory birds; and provides many benefits to local populations of fish and wildlife. Many of these areas are recognized as local, state and national treasures, and are protected through the network of conservation lands that thread throughout the region.
Partially enclosed by the barrier islands of the Outer Banks, with few open inlets to the Atlantic Ocean, the Albemarle-Pamlico has the distinction of being the nation's largest semi-lagoonal estuary. The estuary is a large interconnected network of two major sounds - the Albemarle and the Pamlico - and six smaller sounds (Back, Currituck, Roanoke, Core, Croatan, Bogue), collectively known as the Albemarle-Pamlico estuarine system.

View a video about APNEP.

The Albemarle-Pamlico Partnership

APNEP is active throughout the Albemarle-Pamlico watershed, with management efforts directed from river headwaters to the sea. The Albemarle-Pamlico estuary was named one of "America's Great Waters" by the America's Great Waters Coalition, joining nineteen other notable national waters including the Great Lakes, Puget Sound, Chesapeake Bay, and the Everglades. This designation includes recognition not only of the ecological and economic significance of the Albemarle-Pamlico system, but also of the efforts to properly manage and protect the region's resources.

Priority Issue: Raising Awareness about the Economic Value of the Albemarle-Pamlico Region

Protection of the Albemarle-Pamlico estuarine system is an enormous undertaking and the resources directly allocated to APNEP are limited.
APNEP commissioned RTI International to conduct an economic valuation to assist efforts in measuring and communicating the societal contributions provided by the resources of the region. The report was the first of its kind to quantify the array of diverse resources supported by both the land and waters of Albemarle-Pamlico watershed and estuarine system.

Quantifying the value of the resources is only a first step, however. Ultimately, APNEP seeks to work with its partners to develop and implement a strategy to improve policy and decision-maker's understanding of the costs and benefits of environmental protection, restoration, planning and monitoring.

Priority Issue: Submerged Aquatic Vegetation Mapping and Monitoring

North Carolina has greater acreage of submerged aquatic vegetation (SAV) than any state on the Atlantic coast except Florida. Around 99% of that acreage is in the Albemarle-Pamlico embayment. For over a decade, APNEP has supported a collaboration among partners that aims to promote the conservation of SAV along the entire coast of North Carolina and southeastern Virginia. Initially, the Partnership focused on identifying the SAV resources through mapping efforts and establishment of sentinel monitoring stations. Moving forward, the group will build upon those efforts by also developing protection and restoration strategies, and establishing indicators that can be measured to determine success.

North Carolina Oyster Blueprint

Oysters provide unique and substantial benefits to both estuarine ecosystems and the regional economy, yet populations have declined as a result of overharvest, habitat loss, shellfish disease and poor water quality. North Carolina is unique in that it is the only state that has both deep water, sub-tidal oyster reefs and intertidal reefs fringing salt marshes along our estuarine shorelines.
APNEP has joined a diverse group of partners, led by the North Carolina Coastal Federation, working to implement a comprehensive plan to develop restoration, management and economic development strategies known as the North Carolina Oyster Blueprint. The North Carolina Oyster Blueprint website Exit serves as a clearinghouse for oyster habitat restoration, planning, education/outreach and research. Recent accomplishments include increased legislative funding for oyster restoration and aquaculture, and the release of a cost-benefit study commissioned by APNEP, which demonstrated that every $1 invested in the coastal habitat enhancement and restoration programs yields $4 in benefits, and a regional economic development strategy incorporating coastal restoration.

Coastal Habitat Protection Plan

North Carolina's Fisheries Reform Act, passed by the General Assembly in 1997, required the development of the N.C. Coastal Habitat Protection Plan (CHPP) and Fishery Management Plans for various marine species. The CHPP, first adopted in 2005, is the guidance document that addresses habitat and water quality efforts needed to protect, enhance, and restore fish habitat in North Carolina.

APNEP is closely involved in implementing the CHPP, including ensuring integration with the CCMP and coordination of complimentary efforts including the Oyster Blueprint and Submerged Aquatic Vegetation Partnership. The overarching goal of the plan is long-term enhancement of coastal fisheries through habitat protection and enhancement efforts.

Success Story: National Coastal Condition Assessment Intensification Effort

During the summer of 2015, APNEP participated in a nationwide estuarine monitoring effort known as the National Coastal Condition Assessment (NCCA). EPA organizes this coastal monitoring program every five years to collect water, sediment, macro-invertebrate and fish tissue samples to help determine the

overall health of the nation's estuarine systems. Some of the key indicators of estuarine health include nutrients, chlorophyll-a, dissolved oxygen, salinity, pH, algal toxins, pathogens, organics and metals. EPA originally assigned a set of 33 randomly distributed sites in the North Carolina Sounds for the national study. In order to provide statistically significant findings about the Albemarle-Pamlico estuarine system, APNEP worked with EPA to double the original number of sites for sampling in the estuary. APNEP is the first estuary partnership to participate in the NCCA since 2003. Results of the 2015 study will inform decision makers about the quality of the estuary system as a whole.

View a video about the National Coastal Condition Assessment.

Success Story: Conservation Initiatives and Restoration Projects

Since its inception, APNEP has led or contributed to scores of conservation efforts in the region. APNEP's first CCMP called for the creation of several environmental initiatives that came to fruition in the form of the Partnership for the Sounds' Estuarium, the Center for Geographic Analysis, and the N.C. Clean Water Management Trust Fund. Annual restoration and demonstration projects have improved habitats and water quality throughout the estuarine system.
Restoration and demonstration projects are diverse, and range in scale from habitat enhancement projects that involve planting trees on a few acres in state parks and on conservation lands, to large-scale hydrologic restoration projects designed to restore thousands of acres of coastal and upland habitat while reducing runoff into the sounds. Other efforts include water reuse and rainwater harvesting, constructed wetlands, low-impact development and stormwater retrofits, living shorelines, and oyster reef restoration. Through these efforts, APNEP has engaged with a variety of partners throughout the region including local and state government entities, schools, non-profit and conservation organizations. Many projects also serve a dual purpose as educational tools for the public, and increase the visibility of the work of APNEP and its partners throughout the region.

Success Story: Environmental Education and Engagement

APNEP has a long history of supporting environmental education initiatives, including over a decade of funding for a yearly summer teacher institute, hands-on learning programs and educational materials for schools such as river basin booklets, and projects such as establishment of nature trails and outdoor classrooms. These efforts are designed to foster environmental stewardship and increase community awareness and knowledge about the challenges facing the Albemarle-Pamlico ecosystem.
Feature: Shad in the Classroom
Rivers in the APNEP region and their floodplain habitat are important spawning grounds for anadromous fish, including the American shad. For the past 6 years, APNEP has partnered with the North Carolina Museum of Natural Sciences to sponsor the Shad in the Classroom program, a collaborative project that also involves the U.S. Fish and Wildlife Service, N.C. Wildlife Resources Commission, and educators. This project allows students to gain hands-on experience raising American shad from egg to releasable fry while learning about conservation science, water quality, food webs, river basins, and fisheries biology. Teachers are enthusiastic about the project and impressed by the impact left on their students, noting the real-life connections they are able to make to the resources of the region they live in.
Watch a video of the release
Feature: At Water's Edge Teacher Institute
Every summer since 2002, APNEP has supported an institute for teachers that blends watershed, estuarine and water quality education. During this intensive workshop, 8th-12th grade science teachers actively participate in a variety of learning sessions designed to build knowledge of watershed science

and to promote awareness of curricula and online resources that help students explore their local watershed. Teachers engage with scientists, researchers, and environmental educators and participate in hands on field activities in estuarine habitats. Using environmental education curricula such as Project Wet and its North Carolina-specific companion curriculum, It's Our Water, teachers are provided with tools and activities they can take back to the classroom and share with colleagues. Feedback from the institute is consistently positive, with teachers indicating that the training was effective at increasing their content knowledge and their confidence level in teaching watershed science.

Watch a video about the Mano al Hermano Summer Literacy Project.

For More Information:

Albemarle-Pamlico National Estuary Partnership
1601 Mail Service Center
Raleigh, NC 27699-1601
(919) 707-8633
apnep@ncdenr.gov
www.apnep.org Exit

Barataria-Terrebonne Estuary Program

The mission of the Barataria-Terrebonne National Estuary Program (BTNEP) is to preserve and restore Louisiana's congressionally valued estuarine system.
BTNEP strives to rebuild and protect the estuary for future generations by implementing a science-based, consensus-driven comprehensive conservation and management plan that utilizes partnerships focused on the estuary's cultural, economic and natural resources. This management plan protects the land, water, and people that generate the valuable economics of things as diverse as commercial fisheries, oil and gas production, agriculture, shipbuilding, and recreational hunting and fishing.
The Barataria-Terrebonne National Estuary is located between the Mississippi and Atchafalaya rivers in south Louisiana. Bayou Lafourche separates this complex into two basins, the Barataria Basin to the east and the Terrebonne Basin to the west.

What Makes Barataria-Terrebonne Estuary Special?

No other place on Earth is disappearing as quickly as the Barataria-Terrebonne Estuary System (BTES) in Louisiana, where a football field of coastal land turns to open water every hour. In the process, we are losing not only valuable resources but also a natural flood-protection system that absorbs stormwater before it can harm our low-lying communities and the natural water purification that healthy wetlands provide.
The BTES contains some of the most diverse and fertile habitats in the world. The wedge-shaped area between the Mississippi and Atchafalaya rivers contains levees, forests, swamps, marshes, barrier islands, bays, bayous, and other habitats. With each habitat comes an assortment of wildlife and plant life that are in delicate balance with their environment. The BTES feeds and shelters millions of migrating birds and supports a commercial harvest of over 600 million pounds of fish and shellfish each year.
Barataria-Terrebonne's annual abundance of shellfish is highly dependent on water quality. Shrimp and oysters depend on proper water salinity and temperature, and crayfish depend on local rainfall, river stage and temperature. Unfortunately, coastal land loss and barrier island retreat are directly threatening Louisiana's shrimp, oyster, blue crab, and finfish resources.

Priority Issues: Habitat Loss

Land loss is caused by a variety of factors including human alterations to hydrology, subsidence of the delta, salt water intrusion, sea level rise, hurricanes, repeated flooding and deforestation. **Louisiana's wetlands are disappearing at the average rate of a football field every hour.**
Ridges and maritime forests are important physical and ecological features of Louisiana's coastal landscape. They stand out, giving vertical relief in the otherwise flat terrain of coastal plains, marshes and barrier islands. They also act as speed bumps in slowing storm surge during tropical events and provide critically important habitat for many species of shorebirds and migratory songbirds. As these landforms are lost, so are the critical habitats for over 338 migrating bird species that depend upon traveling the Mississippi Flyway each spring and fall.

Success Story: Fourchon Maritime Forest Ridge and Marsh Restoration

To combat habitat loss, new coastal habitats must be created or restored. The Fourchon Maritime Forest Ridge and Marsh Restoration project was the first of its kind to use saline sediments to create a maritime ridge for trees beneficial to migratory songbirds.

BTNEP partnered with the Greater Lafourche Port Commission, Shell Oil Company, USDA, Natural Resources Conservation Service, the Terrebonne Bird Club, and thousands of volunteers to vegetate 5,000 feet of constructed ridge and adjacent marsh. Areas were constructed from sediment dredged for new slips created for the expansion of the adjacent Port Fourchon facility that services oil and gas rigs in the Gulf of Mexico. Herbaceous species were planted to reduce erosion, increase the rate of soil conditioning, and provide nesting habitat for shorebirds.
Throughout this project, volunteers planted over 100,000 woody and herbaceous plants on the ridge.

Success Story: Piping Plover Surveying & Monitoring

The Piping Plover lost its wintering habitat grounds due to habitat loss.
In 2013, Louisiana Coastal Protection and Restoration Authority (CPRA) Caminada Headlands Beach & Dune Restoration Project began in Lafourche Parish to address the loss of land on the Louisiana coastal headlands.
This project is designed to protect and preserve the structural integrity of the barrier shoreline to sustain unique coastal habitats important to the threatened and endangered populations of Piping Plover and many other birds found in Louisiana's shorelines. Approximately 3,300,000 cubic yards of sand were dredged to create and enhance 303 acres of dune and beach.
Little is known about the impacts on avian populations associated with this type of construction. BTNEP collaborates with CPRA to monitor the distribution and abundance of Piping Plover during construction activities. Numerous surveys have been completed since 2013 and continue to this day.

For More Information:

Barataria-Terrebonne National Estuary Program
320 Audubon Drive
N. Babington, Hall, Rm. 105
Thibodaux, LA 70301
985-447-0868
info@BTNEP.org
http://www.btnep.org/ Exit

Coastal Bend Bays & Estuaries Program

The Coastal Bend Bays & Estuaries Program (CBBEP) is a local non-profit 501(c)(3) organization dedicated to researching, restoring and protecting the bays and estuaries of the Texas Coastal Bend. This includes all bays, estuaries and bayous in the Copano, Aransas, Corpus Christi, Nueces, Baffin and upper Laguna Madre bay systems.

The mission of the CBBEP is the implementation of the Coastal Bend Bays Plan, which is to protect and restore the health and productivity of the bays and estuaries while supporting continued economic growth and public use of the bays. The Program originally started as a federal and state agency effort during the planning phase. However, participants wanted to localize and take ownership of the Program moving forward into the Bays Plan implementation. Hence, the creation of a non-profit organization led by a local Board of Directors.

What Makes Coastal Bend Bays & Estuaries Program Special?

The Program area encompasses 11,500 square miles along the south-central Texas coastline and includes 12 counties of the region known as the Coastal Bend, extending from the land-cut in the Laguna Madre, through the Corpus Christi Bay system, and north to the Aransas National Wildlife Refuge.

The Coastal Bend is blessed with three of the seven Texas Estuaries - the Aransas, Corpus Christi, and Upper Laguna Madre estuaries. Broad belts of mostly flat coastal prairies, chaparral pastureland, and farmlands adjacent to expansive bays characterize the transition zone between the mid and lower-coast. A nearly unbroken string of barrier islands provides definition to the bays, estuaries, and one of only three hypersaline lagoons in the world.

More than 490 species of birds and 234 species of fish attest to the regions enormous biological diversity. The region is one of the premier bird watching spots in the world. Several major habitat types underlie this display of wealth, but seagass meadows are of special significance and central to the high productivity of these estuaries. The Coastal Bend harbors 40 percent of the state's total seagrass acreage.

Priority Issue: Freshwater Inflows

Freshwater inflows are critical to the health and productivity of estuaries. They perform three essential functions: (1) they blend with the Gulf’s seawater to provide a range of salt concentrations that support the life stages of many estuarine species; (2) they bring nutrients essential to the total productivity of estuarine ecosystems; and (3) they bring sediments that form muddy deltas and sandy barrier islands that help create and maintain back bays and coastal marshes.

Coastal Bend estuaries are unique in that freshwater inflows vary greatly from year to year. They are affected by naturally occurring droughts and increasing human demand, and must be better understood for future water planning.

Priority Issue: Habitat Loss

The Coastal Bend is comprised of eight major tidally-influenced habitat types essential to native living resources and a productive estuarine ecosystem. These habitats are coastal marshes, wind tidal flats, seagrass meadows, open bays, oyster and serpulid worm reefs, barrier islands, and freshwater marshes. They provide diverse benefits, such as storm buffering, nurseries and habitat for commercially important species, and stopover or wintering habitats for migratory species such as the endangered Whooping Crane.

These valuable habitats are being eliminated or degraded by development, agriculture, reduced freshwater inflows, erosion, sea level rise, subsidence, and invasive species in the Coastal Bend. The continued preservation and restoration of these habitats is fundamental to the health and productivity of native flora and fauna.

Success Story: Nueces Delta Preserve

The Nueces River Delta is a unique mosaic of highly productive wetlands, islands, prairie, open water, and shorelines. To preserve and protect this area, CBBEP acquires land to create the Nueces Delta Preserve.
The Preserve conserves more than 10,500 acres of contiguous estuarine habitat for endangered and threatened wildlife species.
CBBEP and partners manage and monitor freshwater inflows to the Nueces and Corpus Christi Bays to improve water quality and preserve essential habitats.
CBBEP's environmental education program, Delta Discovery, provides unique field-based experiences to around 9,000 students in grades K-12 annually.
Habitat restoration projects restore the Preserve's historical ranch land to a natural state. CBBEP hosts volunteer opportunities for nearby organizations to foster environmental stewardship and responsible planning.
The Nueces Delta Preserve is a tremendous conservation effort with benefits reaching far beyond its boundary.

Watch a video of CBBEP's Delta Discovery

Success Story: Nueces Bay Marsh Restoration Project

The Nueces Bay marsh was once a thriving ecosystem that provided essential habitat for fish, shrimp, crabs, and birds.
In the 1940s, construction of a major highway resulted in the loss of about 180 acres of highly productive marsh. Another 160 acres were lost due to erosion and subsidence. The loss in marsh harmed fish and wildlife and threatened the highway corridor.
CBBEP's Nueces Bay Marsh is a 160-acre, $5.3-million-dollar restoration effort. In 2016, the finishing touches were placed on the project (which CBBEP started in 2005) with volunteer plantings, an observation deck, and educational signs that provide information habitat restoration, benefits to the surrounding infrastructure, and other functions and values the marsh provides.

Watch a Nueces Marsh Flyover
Watch a Nueces Marsh Volunteer Planting

For More Information:

Coastal Bend Bays & Estuaries Program
615 N. Upper Broadway, Suite 1200
Corpus Christi, Texas 78401
361-336-0304
www.cbbep.org Exit

Indian River Lagoon National Estuary Program

The Indian River Lagoon National Estuary Program (IRLNEP) was established in 1990. This 156-mile-long waterway is home to a rich array of plants and animals and is heralded as the most biologically diverse estuary in North America. To protect this unique resource, the IRLNEP strives to attain and maintain water and sediment quality that supports a healthy ecosystem, which in turn, supports fisheries, commerce and recreation, and threatened and endangered species.
IRLNEP achieves heightened public awareness and interagency management of the Indian River Lagoon ecosystem and identifies and seeks out long-term funding sources for prioritized projects and programs to preserve, protect, restore, and enhance the Indian River Lagoon.

What Makes Indian River Lagoon Special?

The Indian River Lagoon (IRL) occupies approximately 40% of Florida's east coast. It is one of the most biologically diverse estuaries in the continental United States. The IRL is home to more than 4,000 species of animals and plants, as well as 53 threatened or endangered species. The IRL system includes 3 main water bodies: Mosquito Lagoon, Banana River, and the Indian River Lagoon. Despite the use of "River" in their names, none of these water bodies are actually rivers. The IRL is a particular type of estuary called a lagoon: a shallow estuary separated from the ocean by barrier islands.
The IRL is a beloved recreation destination with world-class fishing, boating, and paddling opportunities for tourists and seasonal visitors, as well as for the residents of the 5 counties and 50 cities that border the lagoon. The IRL is an economic driver of the regional economy, providing approximately $3.7 billion in economic benefits annually.

Priority Issue: Algae Blooms

The IRLNEP uses seagrass coverage as a barometer of health. In recent years, an unprecedented algal "superbloom" in the northern portion of the IRL killed as much as 60% of its seagrasses. The northern and central portions of the IRL continue to struggle with persistent, severe algae blooms of both pico-cyanobacteria and the Texas brown tide organism Aureoumbra lagunensis. Some areas have shown a small degree of seagrass recovery since the superbloom, but large-scale recovery has not occurred.
In late 2015, a winter bloom of green algae was followed by a secondary bloom of A. lagunensis, in the northern IRL and Banana River. This bloom spread south through the central IRL and persisted until mid-March 2016. In the southern IRL, discharges of nutrient-laden freshwater from Lake Okeechobee to the St. Lucie Estuary have caused chronic issues, including a massive toxic cyanobacteria (Microcystis) bloom in 2016.

Priority Issue: Fish Kills

Collapse of the algae bloom triggered the most massive fish kill in recent memory in the Banana River in 2016. Water quality sensors in this area recorded oxygen levels dropping to almost zero in the hours before the first fish mortalities were observed. It is estimated that more than 30 species of fish in all size classes and many invertebrate species were impacted. A volunteer effort helped remove over 600 tons of dead fish from the water for disposal into local landfills.

Priority Issue: Stormwater Runoff and Freshwater Releases

Stormwater runoff continues to be a chronic problem for the IRL. Rapid population growth and intense coastal development began in the 1950s and continues today. A wide range of features, from small backyard ditches to large stormwater conveyances, direct runoff to the IRL and coastal waters.
Seasonal discharges of high-nutrient freshwater from Lake Okeechobee enter the St. Lucie River and flow into the southern IRL. These discharges occur to prevent flooding when water levels in Lake Okeechobee rise above safe levels. Discharge water is highly colored and often contains potentially toxic cyanobacteria, forming miles-long dark plumes and fueling harmful algae blooms in the IRL. County health departments frequently issue warnings to avoid contact with water.

Priority Issue: Muck

"Muck" is a fine-grained mix of silt, clay, sediments, and decaying organic materials that resembles black mayonnaise.
Muck materials originate on land and are carried through stormwater runoff to the IRL. As much as 15% of the lagoon bottom is covered in muck, with deposits more than 10 feet deep in some places.
Muck is easily resuspended. Each time it is, nutrients can be re-released into the water column. The State of Florida, in partnership with regional and local government agencies, has initiated muck dredging programs to remove legacy loads of muck from the lagoon bottom.

Priority Issue: Groundwater and Septic Tanks

Scientific studies show that waterfront homes and those with aging or failing septic systems may be contributing more nutrient pollution to the IRL than had been previously thought.
Septic systems are not the only source of nutrient loads to groundwater. Other sources include aging wastewater treatment plant infrastructure, surface water loading from sludge land spreading, and other surface to groundwater interchanges.

Success Story: Basin 4 and 11 Stormwater Improvements Projects

Bioretention swales and curb inlet baskets were installed in Melbourne Beach to reduce the volume of runoff to the Indian River Lagoon and to improve the quality of the stormwater that is discharged to the IRL. A nutrient separating baffle box was installed upstream of the Town's Driftwood Avenue outfall to the Indian River Lagoon.

Success Story: Pelican Island National Wildlife Refuge Spoil Island Restoration

For this restoration project, EarthBalance and Marine Resources Council treated and removed exotic plant species (Australian pine and Brazilian pepper) along the shorelines of Preachers, Nelsons, and Paul's islands. The plants were cleared by chainsaw and mulched, and the stumps were sprayed with herbicide to prevent further infestation.
Volunteers from the Coastal Conservation Association of the Treasure Coast held 3 workdays to install 4,000 cordgrass, 1,000 sea purslane, 1,000 saltwort, and 500 red mangrove plants along 6,750 ft of shoreline on the three islands. Marine Resources Council and staff from the U.S. Fish and Wildlife Service Ecological Services and Florida Department of Environmental Protection also installed over 400 red mangroves on the north side of Paul's island.

For More Information:

Indian River Lagoon National Estuary Program
1235 Main Street
Sebastian, FL 32958
772-742-2858
irlcouncil.org Exit

Long Island Sound Study

The Long Island Sound Study (LISS) is a pioneer in the effort to identify and solve the causes of pollution in the Nation's estuaries. In 1987, LISS - a program of EPA, Connecticut and New York with strong support from local partners - joined three other estuary programs as inaugural members of the newly-established EPA National Estuary Program. The LISS Comprehensive Conservation and Management Plan addresses emerging concerns in its ongoing mission to restore and protect the Sound.

What Makes Long Island Sound Special?

Long Island Sound has been described as "the Urban Sea." It is a vital economic and recreational resource for the millions of people who boat, fish, swim, and enjoy shoreline activities each year. The Sound is a national treasure with beautiful seascapes and abundant and diverse wildlife, including more than 1,200 species of invertebrates, 170 species of fish, and dozens of species of migratory birds. The area of land from which waters drain to Long Island Sound is diverse and large, encompassing more than 16,000 square miles. It starts in the headwaters of the Connecticut River along the Quebec-New Hampshire border, and includes five New England states and New York. The Sound's 110-mile length, surrounded by the Connecticut and New York shoreline, stretches from the Western Sound and "Narrows" in New York City, with its fine sediment bottom and shallow waters, to "the Race" in the Eastern Sound, with its deep and rocky bottom and fast moving currents. Long Island Sound also is a "sound," meaning that it has two connections to the sea, from the west and the east.

Priority Issue: Loss of Tidal Wetlands

Even with LISS's success in restoring and protecting habitats, the loss of tidal wetlands remains one of the greatest threats to marine and coastal animal life in Long Island Sound. According to a recent study conducted by the US Fish and Wildlife Service and LISS about a third of the Sound's 25,000 acres of wetlands documented from the 1880s have disappeared. Although federal and state legislation now protect wetlands from being filled in, recent increases in sea level may be contributing to a loss in wetland vegetation. Setting goals to protect a publicly desired level of wetland condition and function around the Sound, addressing site-specific threats, and securing the public's support for large-scale restoration can help change the course of wetland loss in Long Island Sound.

Priority Issue: Reducing Nitrogen Pollution

Despite progress being made to reduce nitrogen, more needs to be done. For example, nitrogen from urban stormwater, on-site septic systems, and turf fertilizer have remained steady or increased. New scientific research and monitoring is also revealing that nitrogen pollution can contribute to harmful algal blooms, loss of tidal wetlands and eelgrass, coastal acidification, and hypoxia in local harbors, coves, bays, inlets and other embayments that make up Long Island Sound. The keys to reducing nitrogen will be developing innovative nutrient removal technologies and encouraging communities to reduce fertilizer use.

Success Story: Reducing Nitrogen Pollution

In Long Island Sound, nitrogen pollution contributes to dangerously low levels of dissolved oxygen (or hypoxia), which can harm fish and other aquatic life. Excess nitrogen can also contribute to harmful

algae blooms, loss of tidal wetland and eelgrass habitat, coastal acidification, and nuisance seaweed growth.
Due to a bi-state/EPA effort to upgrade wastewater treatment plants in Connecticut and New York, the yearly discharge of nitrogen to the Sound has been reduced by 42 million pounds. Nitrogen has also been reduced through air emission controls and farm fertilizer practices. Water quality in the Sound appears to be responding, with a 40 percent reduction in the average area of hypoxia from 2001 to 2015 compared from 1991 to 2000. The Sound has also seen an increase in eelgrass, which is sensitive to nitrogen pollution.

Success Story: Restoring and Protecting Habitats

Estuaries provide some of the most productive habitats on Earth. LISS has responded to the need to protect these vital resources through its Habitat Restoration and Stewardship Initiatives. Between 1998 and 2016, LISS and its partners have restored 1,827 acres of habitat, 91 percent of the goal to restore at least 2,000 acres of habitat by 2020. LISS and its partners have also protected more than 5,000 acres of habitat though acquisitions and easements, and through the US Long Island Sound Stewardship Act, have identified 33 coastal Stewardship Areas as places with exceptional ecological and recreational value.

Success Story: Restoring Fish Passage

Dams and culverts on the tributaries and main rivers in Connecticut and New York have prevented migratory fish in Long Island Sound from reaching thousands of miles of habitat in upstream waters. Thanks to another Habitat Restoration Initiative, LISS and its partners have reopened 375 miles of river and stream corridors to fish passage between 1998 and 2016, far surpassing the original goal of restoring 100 miles by 2008. Projects have included removing dams and other obstructions or creating bypasses and fish ladders.
Photo: A common shiner feeding over newly exposed gravel beds in the stretch of a newly restored steam formerly occupied by Ed Bills Pond on the East Branch of the Eightmile River in Lyme, CT. This native minnow thrives in free-flowing streams. The pond had been formed by a dam that was removed by The Nature Conservancy in 2015 as part of a project to open up 8.3 river miles and restore six acres of floodplain and wetland, and 0.5 miles of riparian habitat. The project's funders included the Long Island Sound Futures Fund. Credit: Sally Harold, TNC.

Success Story: Community Engagement

Since 2005, LISS has partnered with the National Fish and Wildlife Foundation to run the Long Island Sound Futures Fund, a grant program that provides funds to municipalities, academic, cultural, and scientific institutions, and local community and environmental groups to implement projects that fulfill LISS's mission to restore and protect the Sound. Through 2016, the Futures Fund has invested $15 million in 352 projects. With grantee match of $30 million, the program has generated $45 million for locally based conservation. The projects have opened up 157 river miles for fish passage, restored 1,051 acres of critical fish and wildlife habitat and open space, treated 101 million gallons of pollution, and educated and engaged 2.1 million people from communities surrounding the sound.

For more information:

Long Island Sound Study

EPA Long Island Sound Office
Stamford Government Center
888 Washington Boulevard
Stamford, CT 06904
203-977-1541
www.longislandsoundstudy.net Exit

Maryland Coastal Bays National Estuary Program

The Maryland Coastal Bays Program (MCBP) was established in 1999. The watershed includes more than 189,000 acres of land, 71,000 acres of water, 248 miles of shoreline, and nearly 35,000 acres of wetlands. Living within its boundaries are a variety of wildlife, including 108 rare, endangered, or threatened species, and 360 different types of birds.
MCBP is a consensus non-profit that works with the community and its partners to protect and preserve the five coastal bays located behind Ocean City and Assateague Island, Maryland, through restoration, education, and outreach.

What Makes the Maryland Coastal Bays Special?

The Maryland Coastal Bays is one of the most diverse estuaries on the eastern seaboard. It consists of five bays; Assawoman Bay, Cape Isle of Wight Bay, Chincoteague Bay, Newport Bay, and Sinepuxent Bay. Each bay faces significant challenges, as these bays are connected to Maryland's largest resort where the population grows from 7,000 off-season to over 400,000 during peak season.
During peak season, visitors enjoy recreational activities from fishing, clamming, and crabbing to boating, paddling, personal watercraft, and a variety of other recreational watersport activities. These waterways also provide commercial fishing opportunities for Maryland Blue Crabs, oysters, rockfish, and flounder.

Priority Issue: Nutrient Reduction

High nutrient loads and intensive land use from development and agriculture contribute to poor water quality, brown tides, high sediment toxicity values, and a reduction in seagrasses and other habitats. Data shows that low water quality, living resources, and habitat indicator values threaten watershed health and habitats.

Priority Issue: Seagrasses Suffered Major Declines in 2015

Seagrass acreage decreased from 2014 to 2015, with little or no bay grass documented above the Ocean City Inlet. The 2015 abundance was better than 2013 (the lowest seagrass acreage in two decades), but elevated nutrients, high water temperatures, and prolific macroalgae (seaweeds) limited recovery. Water temperatures in some areas exceeded the seagrass temperature threshold of 30 degrees Celsius (86 Fahrenheit) for nearly 25 days during the growing season.
Chincoteague Bay has lost nearly 9,000 acres of seagrass since 2001, totaling 55 percent of its 2001 acreage.

Priority Issue: Habitat Reduction

Island loss in the Coastal Bays is an important factor driving declines in colonial nesting birds that require barren sand. A significant shortage of island nesting habitat with barren sand now occurs throughout the Coastal Bays and declines in terns and skimmer populations are continuing. In the past quarter century, more than 300 acres of islands have disappeared. Only three of the seabirds' original 29 islands remain for breeding and nesting.
As a result, the black skimmer population in the Coastal Bays has declined from 87 pairs to just six pairs since 2000. Common terns have declined 86 percent and royal terns have declined by 60 percent since the early 1990s. All three species are now listed as endangered in Maryland.

Success Story: Bishopville Dam

The St. Martin River was rated the most polluted watershed in the Coastal Bays. Historically, pollutants entered the river from the local wastewater treatment plant and the Bishopville Processing Plant. The Bishopville dam was removed to minimize nutrient and point source pollution to the river.
Elimination of the Bishopville dam provides seven miles of the St. Martin River to freshwater-spawning ocean fishes. These include alewife, blueback herring, white perch, and many resident species that were previously swept over the dam.
The new design replaced the dam with a series of pools, runs, and weirs to create a more natural waterway with improved ecosystem functions, including fish passage and nutrient pollution reduction.

Success Story: Island Restoration

MCBP, in coordination with the US Army Corps of Engineers and other partners, has been helping restore islands previously lost from the Coastal Bays.
Starting in 2009, MCBP partnered with the Maryland Department of Natural Resources and a privately-owned marina to replenish an important bird-nesting island with dredge materials from the navigation channels. The project saved thousands of dollars and provided a beneficial use for dredge material that in the past had been trucked out to landfills. Since this initial project, there are now several island enhancement projects underway to revitalize colonial bird nesting habitat opportunities.
As an added benefit, the restored islands provide a platform to engage government agencies, municipalities, residents, and visitors on the importance of colonial birds, their nesting habitats, and how serious their population decline has become.

For More Information:

Maryland Coastal Bays Program
8219 Stephen Decatur Highway
Berlin, Maryland 21811
410-213-2297
mcbp@mdcoastalbays.org
www.mdcoastalbays.org Exit

Massachusetts Bays National Estuary Program

The Massachusetts Bays National Estuary Program (MassBays) is dedicated to protecting, restoring, and enhancing the estuarine resources of Ipswich Bay, Massachusetts Bay, and Cape Cod Bay. MassBays envisions a network of healthy and resilient estuaries, sustainable ecosystems that support the life and communities dependent upon them. Through local, state, and federal partnerships, MassBays prompts action and stewardship by convening stakeholders on the local and regional level, providing a scientific basis for management decisions, and working with decision makers to identify problems and solutions. Hosted by the Massachusetts Office of Coastal Zone Management, MassBays is one of six NEPs in New England.

What Makes the Ipswich Bay, Massachusetts Bay and Cape Cod Bay Special?

Long before these three Bays were designated estuaries of national significance under the National Estuary Program, they were recognized for their abundant natural resources and historic importance. Famous landmarks include Plymouth Rock and the sites of the Boston Tea Party and Salem witch trials. Today, the three Bays continue to provide natural resources, recreational opportunities, and marine livelihood. For example, Ipswich Bay's Great Marsh is the largest continuous salt marsh in New England; Boston Harbor serves as a model for urban harbor restoration; and sandy Cape Cod Bay serves up increasing numbers of tasty oysters as aquaculture expands within the region.

Priority Issue: Stormwater Management

Expanding coastal development in Massachusetts has led to an increase in impervious surfaces that direct rainwater to local rivers, streams, and coastal waters.
Contaminated runoff degrades the water quality of the resources by introducing nutrients, oils and metals, and silt.
Models predict more frequent and intense storms in this region, which will increase water quality impacts if stormwater flows without controls in place.

Priority Issue: Barriers to Streamflow and Tidal Flushing

Diadromous fish were once a staple food for native tribes of Massachusetts. However, as mill-dams and other control structures were installed and fish passage became restricted in more than two-thirds of the MassBays planning area, fish numbers decreased dramatically.
MassBays works with partners to facilitate migration and promote preservation of continuous habitat for all species, but proposals for additional coastal armoring and tide-water controls continue to be brought forward to prepare for rising sea level rises and extreme weather events.

Priority Issue: Documenting Conditions and Trends

The sheer geographic extent and geologic diversity of the Bays requires significant investment in monitoring and data analysis to document the status and trends within the MassBays planning area. MassBays has historically relied on government and nonprofit partners to carry out that work. Unfortunately, data gathered by a plethora of partners over differing time scales and with varying quality assurance and protocols are difficult to interpret and compare across the Bays. The State of the Bays reporting has therefore generally been incomplete and reliant on data collected on the basis of others' needs.

Success Story: Stormwater Management

MassBays' Regional Coordinators are actively working alongside municipal managers to implement best management practices for stormwater—by sharing the MassBays/EPA Coastal Stormwater Management Handbook; convening stakeholders to share examples of successful low-impact development; and establishing the Greenscapes program, an online resource for both citizens and facility managers. In Kingston Bay (within Cape Cod Bay), MassBays supported local officials as they strategized and then secured funding to reduce stormwater impacts to the Bay, ultimately allowing local shellfish beds to be reopened for harvest.

Success Story: Barriers to Streamflow and Tidal Flushing

MassBays is a key player in dam removal, stream flow restoration, and diadromous fish population assessments in coastal communities.
To gain information about the extent of restrictions to tidal flow, MassBays partnered with the National Oceanic and Atmospheric Administration to inventory tide gates in the three Bays (available on the mapping tool, MORIS). The results enabled state and federal agencies to consider alternatives for managing 132 gates in various states of disrepair.
The Herring River dam removal (in Cape Cod Bay) and the Third Herring Brook system dam removal (in Massachusetts Bay) are successful restoration efforts. Success is seen in the steadily increasing herring migration and even crayfish moving back into previously isolated streams. A modeling project in Ipswich Bay characterizes tidal reach and determines impediments to flow in the Great Marsh, and was one in a suite of resiliency efforts coordinated by MassBays.

Success Story: Documenting Conditions and Trends

MassBays supports monitoring and research efforts across the planning area, including:

- Launching the Massachusetts River Herring Network and mapping eelgrass to estimate carbon storage potential.
- Providing technical support and cross-sector collaboration via a Citizen Monitoring Coordinators' Network.

MassBays' Estuary Delineation and Assessment Report and Viewer has helped MassBays define coastal subwatershed boundaries and document existing data sets, providing a basis for establishing target values for future environmental conditions - and at the same time underscoring the need for consistent and reliable monitoring.

For More Information:

MassBays National Estuary Program
251 Causeway Street
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Boston, MA 02114
617-626-1204
www.mass.gov/eea/agencies/mass-bays-program Exit

Morro Bay National Estuary Program

Freshwater from Los Osos and Chorro Creeks mixes with the saltwater of the sea to form the Morro Bay estuary. A naturally occurring sandspit protects Morro Bay from the harsher currents of Estero Bay and the open ocean beyond, and iconic Morro Rock sits at the north end of the harbor mouth. Originally an island, the Rock was connected to land by a permanent causeway in 1933.
Morro Bay was designated as a State Estuary in 1994 and an Estuary of National Significance in 1995. The Morro Bay National Estuary Program protects and restores the Morro Bay estuary for people and wildlife.

What Makes Morro Bay Special?

Morro Bay is one of the best-preserved estuaries in central and southern California. Its shallow, gentle waters support bountiful life. Eelgrass beds provide a place for juvenile fish and invertebrates to grow. Mammals like sea otters and harbor seals thrive here, and the waters are clean enough to support shellfish farming. The estuary is also an indispensable stop on the Pacific Flyway—a migration route used by thousands of birds each year. More than 200 bird species can be found in Morro Bay during the winter, all of them in need of the food and shelter that the estuary provides.

Priority Issue: Sedimentation

Sediment naturally accumulates in estuaries over time, but it is entering the Morro Bay estuary at an accelerated rate. In 2001, local studies estimated that the estuary would fill in within a few hundred years, rather than the thousands of years that would be expected at normal rates. Sediment enters the bay through a variety of sources, including the creeks that drain into it and stormwater runoff. Certain land uses can exacerbate erosion and lead to increased sedimentation. The Morro Bay Estuary Program works to address these land uses, reduce erosion, and trap sediment before it reaches the bay.

Priority Issue: Bacteria and Pathogens

Elevated levels of bacteria in the water present potential health risks for those who recreate on the bay, as well as the marine mammals that inhabit it. Bacteria enters the bay through a variety of sources including urban and rangeland runoff, domestic and wild animal waste, and leaking or inadequate waste disposal systems from boats in the bay. The Morro Bay National Estuary Program works to reduce this input by partnering with ranchers to promote best practices, educating boaters about proper waste disposal, and running the Mutts for the Bay program that provides free dog waste bags to the public.

Priority Issue: Scarce Freshwater Resources

The Morro Bay area's Mediterranean climate, variable precipitation patterns, and dry conditions in the Western United States all limit the amount of freshwater that enters local creeks and flows to the bay. The freshwater that is available is essential to the health of the system. The salt marsh requires regular freshwater flows, and creeks must have adequate flow for water-dependent plants and animals to survive. Freshwater is critical for a variety of land uses as well, including farming, ranching, and urban living. Balancing these competing uses is important for the health of bay and the well-being of the people and animals that live here.

Success Story: Reducing Erosion from Rural Roads

In the summer of 2016, the Morro Bay National Estuary Program completed a three-year project to restore rural roads from the WWII era in the watershed. The steep terrain and erosive soils in this area can lead to road failure, delivering sediment to nearby streams and into the estuary. Working with partners including California Polytechnic State University San Luis Obispo, the U.S. Forest Service, and Army National Guard Base Camp San Luis Obispo, MBNEP used state Water Board funding to repair 58 areas spanning a total of 11.4 miles of road. The project will prevent 1,225 tons of sediment erosion from roads each year over the next decade.

Reducing Bacteria Flows from Creeks into the Estuary

Between 2002 and 2008, E. coli levels at San Luisito Creek exceeded safe levels for swimming 84% of the time. Monitoring revealed that private ranching operations were likely contributing bacteria through cattle waste. The Morro Bay National Estuary Program partnered with the Coastal San Luis Resource Conservation District and the landowner to fence cattle out of the creek and provide alternate water sources. The project, completed in 2009, protected over 10,000 feet of the creek. Bacteria levels dropped dramatically within the fenced area where cattle were no longer allowed. A healthy riparian corridor also improves overall water quality, including temperature and dissolved oxygen levels.

Success Story: Harvesting Rainwater to Preserve Scarce Freshwater Resources

The Morro Bay National Estuary Program has supported rainwater harvesting projects big and small. A large-scale project on California Polytechnic State University San Luis Obispo property collects rainwater from rooftops and stores it for cattle during the dry summer months, reducing pumping of nearby wells. Another project funded a community group's installation of a residential-scale rainwater harvesting system in a public park. Inspired by the success of this project, local government introduced an incentive designed to encourage residents and businesses to install rainwater-harvesting devices. People have taken advantage of the incentive, increasing local rainwater storage capacity by over 4,300 gallons.

For More Information:

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staff@mbnep.org
www.MBNEP.org Exit

Narragansett Bay Estuary Program

The Narragansett Bay Estuary Program was launched in July of 1985 as one of the pilot programs that led to the creation of the National Estuary Program. Narragansett Bay is New England's largest estuary and includes 196 square miles of estuarine waters. The entire watershed spans 1,705 square miles and is home to 2 million residents in more than 100 towns in both Rhode Island and Massachusetts.
The mission and vision of the Narragansett Bay Estuary Program is to protect, restore, and preserve Narragansett Bay and its bi-state watershed through partnerships that conserve and restore natural resources, enhance water quality, and promote community involvement and stewardship.

What Makes the Narragansett Bay Special?

Narragansett Bay has a varied and extensive coast and, with the Bay's many islands, the coastline is more than 560 miles long, farther than a roundtrip car ride between Boston and New York. The Bay provides 37 public beaches that attract tourists who can also enjoy boating, shellfishing, finfishing, and a world renowned cuisine.
Narragansett Bay is fed by three major river systems - the Blackstone River (which was designated as the Blackstone River Valley National Historic Park in 2014), the Pawtuxet River, and the federally designated wild and scenic Taunton River.

Priority Issue: Declining Salt Marshes

Since the 1800s, Narragansett Bay has lost 4,000 acres of its salt marsh (more than 50%), mostly due to industrialization and development.
Shorelines that are hardened by roads and development limit opportunities for marshes to naturally migrate landward. This threatens the ecosystem as well as people living along the coast because marshes protect land and infrastructure from flooding and storm surge. Researchers are tracking how sea level rise and severe weather are slowly drowning the remaining acreage of salt marsh.

Priority Issue: Stormwater Pollution Threatens Water Quality

Stormwater pollution is a major water quality issue in the Narragansett Bay watershed. Impervious surfaces cover 14.2% of the watershed and is magnified along the shoreline of Narragansett Bay. Development puts pressure on the watershed through increased pollutants from stormwater runoff, including urban runoff, animal waste, lawn fertilizers, oil and grease, pesticides, agricultural runoff, construction debris, and failing septic systems.
The Narragansett Bay Estuary Program assists municipalities in the watershed through grant funding under EPA's Southeast New England Program to help reduce stormwater pollution. Examples include the City of East Providence's work to limit bacterial levels at an urban beach, the City of Warwick's bioretention basins at Oakland Beach, and the work of the Town of Halifax to protect East and West Monponsett Ponds.

Success Story: Reducing Nutrient Pollution

Nutrients, such as nitrogen and phosphorus, enhance phytoplankton blooms. As the phytoplankton die off, bacterial decomposition consumes dissolved oxygen from the water. Oxygen depletion can cause water to suffer from hypoxia (low oxygen) or even anoxia (no oxygen). As a result, fish and other marine animals may suffer or die.

In 2003, low levels of oxygen in Bay waters caused a large fish kill, resulting in public outcry that accelerated plans to reduce the flow of nutrients into the Bay. Significant investments were made to reduce nutrient loadings from sewage treatment facilities in the Narragansett Bay watershed. Estimated nitrogen loading from treatment plants dropped from more than 11,000 pounds per year in 2000 to less than 5,000 pounds per year in 2015. These investments in plant upgrades resulted in nearly a 60% drop in nitrogen loads into the Bay.

Success Story: Building Tunnels to Limit Sewer Overflows

There are two big cities at the top of Narragansett Bay: Providence and Fall River. Both cities share a rich industrial history as well as a similar system where their stormwater and sanitary sewers are combined. When heavy rains fall, these combined systems can result in raw sewage overflows.
In Providence, the Narragansett Bay Commission built a 3-mile tunnel hundreds of feet below the City. The tunnel stores 65 million gallons of untreated wastewater and stormwater. The City of Fall River built a tunnel which holds 38 million gallons of untreated water and sewage. After rain events, the water in the tunnels is pumped to treatment facilities to remove pollutants.
These large investments in water quality reduced a significant amount of pollution to the upper portions of Narragansett Bay. Fixing combined sewer overflows limits the discharge of pathogens that impact beaches and shellfishing beds. The construction of these tunnels led to the possibility of opening urban beaches in the Upper Narragansett Bay.

Little Narragansett Bay and the Southwest Coastal Ponds

The Narragansett Bay Estuary Program's study area also includes Little Narragansett Bay and the Southwest Coastal Ponds:
Little Narragansett Bay Watershed
This watershed encompasses a 317-square mile area in southern Rhode Island and southwestern Connecticut. The National Fish and Wildlife Federation, through Department of the Interior, recently funded a two-year project to develop a watershed-wide management plan for resiliency. To learn more about the watershed, visit the Wood-Pawcatuck Watershed Association.
Southwest Coastal Ponds Watershed
The Southwest Coastal Ponds Watershed extends along the south shore of Rhode Island and encompasses the 6 coastal lagoons, or salt ponds. To learn more about coastal salt ponds, visit the Salt Pond Coalition.

For More Information:

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www.nbep.org Exit

Partnership for the Delaware Estuary

The Partnership for the Delaware Estuary (PDE) was established in 1996. It connects people, science, and nature for a healthy Delaware River and Bay. PDE is the only organization focusing on the tidal River, from the head of tide at Trenton to the mouth of the Bay at the Atlantic Ocean. PDE focuses on science, encourages collaboration, and implements programs that help restore the natural vitality of the river and bay, benefiting the plants, wildlife, people, and businesses that rely on a healthy estuary.

What makes the Delaware Estuary special?

Many plants and animals — and almost 7 million people — rely on a healthy environment in the Delaware River and Bay. The Estuary provides a unique home for fishes, birds, crustaceans, shellfish, insects, and plants. People throughout southeastern Pennsylvania, southern New Jersey, and Delaware rely on the Estuary for clean drinking water, economic and business activity, and recreation. The Estuary's wetlands help protect communities against storms and hurricanes, and remove carbon from the air. A healthy estuary environment is a foundation of the region's quality of life.

Priority Issue: Polluted Runoff

The Delaware River and Bay's largest source of pollution is rain and snow runoff. Runoff collects pollutants, such as fertilizer, litter, and motor oil while flowing across parking lots, roads, driveways, and lawns. These pollutants can end up in waterways.
PDE is combating this by using education, rain gardens, outreach, storm drain marking, and more.

Priority Issue: Wetland Loss

The tidal Delaware River and Bay are losing an acre per day of coastal wetlands to erosion. That is almost a football field every day! This has three main causes: rising sea levels, a lack of accretion (marsh expansion), and poor wetland health. This afflicts 95% of all local wetlands, putting every coastal community at risk. But help is on the way thanks to PDE's long-term study and experimentation (see below).

Priority Issue: Shellfish Scarcity

The Lower Delaware River Basin was once home to 12 or more species of freshwater mussels. The Delaware Bay was once known as the "oyster capital of the world." Yet today, all but one species of freshwater mussel is rare, and diseases have left wild oyster beds depleted. This is bad news considering that each shellfish can filter 10 to 50 gallons of water every day. Fortunately, PDE is replenishing both, thanks in large part to cleaner waters.

Success Story: Wetland Monitoring

PDE has studied more than 350 wetland sites since 2008. That is when it collaborated with partners in three states to launch the Mid-Atlantic Coastal Wetland Assessment program. PDE and its partners study causes of wetland loss and possible solutions. PDE developed a planning tool for land managers called Marsh Futures.

Success Story: Biennial Summit

The land affecting the Delaware River and Bay is divided into four states. This makes collaboration difficult, so PDE came up with a solution: The Delaware Estuary Science & Environmental Summit. This allows experts from all over to meet, discover each other's work, and partner for greater impact.

Success Story: Annual Art Contest

PDE has used an art contest to teach over 18,000 children how to prevent water pollution since 2000. In 2014, it started installing winning drawings as street art. This, together with an advertising campaign, educates millions annually. And it's all thanks to collaboration between PDE and Philadelphia Water.

For more information:

Partnership for the Delaware Estuary
110 South Poplar Street, Suite 202
Wilmington, DE 19801
(800) 445-4935
http://www.delawareestuary.org/ Exit

Piscataqua Region Estuaries Partnership

Piscataqua Region Estuaries Partnership (PREP; previously called the New Hampshire Estuaries Project) was formed in 1995 to protect New Hampshire's estuaries – the Great Bay Estuary and Hampton-Seabrook Estuary.

In 2007, the PREP Management Committee expanded the area of focus to the entire Great Bay Estuary watershed: the focus area now encompasses 1,086 square miles. This shift was a critical step toward achieving the watershed-wide goals of improving water quality and protecting and restoring important habitats.

Great Bay and Hampton-Seabrook Harbor feature approximately 220 miles of estuarine shoreline between Maine and New Hampshire. Seven rivers flow into the Great Bay Estuary. About 337,350 people live in the 52 towns that make up the two estuaries.

What makes the Piscataqua Region special?

The Great Bay and Hampton-Seabrook estuaries are often called "New Hampshire's hidden coastlines." Seawater from the Gulf of Maine travels 15 miles inland before flowing into Great Bay, one of the nation's most recessed estuaries. The Piscataqua River is the second fastest flowing river in the US (averaging 4 knots on an outgoing tide). There are 169 bird, fish and plant species that use the Great Bay Estuary, and 23 of these species are threatened or endangered.

Human history of the Great Bay region extends back over 11,000 years when Native American tribes lived as hunter-gatherers on the natural treasures found in the estuary. Presently, five million metric tons of cargo is moved through the Port of Portsmouth Harbor each year.

Hampton-Seabrook Harbor is a smaller estuary situated behind barrier beaches and surrounded by over 5,000 acres of saltmarsh. It has the last remaining sand dunes in coastal New Hampshire, and the most productive clam flats in the state.

Priority Issue: Development & Land Use Issues

With Boston only 60 miles to the south, the Seacoast region of New Hampshire and Southeastern Maine is a hot spot for new development. Impervious surface cover throughout the Region has rapidly increased at an average rate of 1,500 acres per year over the last 15 years.

Highly developed watersheds in the Piscataqua Region experience further degradation of water quality due to increased stormwater volume and pollutant loading.

In 2009 and 2013, PREP completed the Piscataqua Region Environmental Planning Assessment (PREPA), a comprehensive survey of municipal regulations and management efforts aimed to protect the estuaries. PREPA results provide a snapshot of current practices and serve as a baseline for evaluating successes from land use and conservation initiatives. Based on assessment results, PREP develops strategic targets for improving the quality and consistency of environmental protection throughout the Region.

Priority Issue: Stormwater Runoff & Management

Development increases the amount of impervious land cover. This pressure increases stormwater runoff, which has significant negative impacts on the channel stability of the Region's streams and on the quality of water resources.

Controlling the volume and peak rates of stormwater runoff will decrease the threat of flooding and increase the volume of water available to recharge groundwater.

Priority Issue: Water Quality

Like many coastal watersheds along the Eastern Seaboard, Piscataqua Region watersheds are significantly impacted by land use. Primary water quality issues of concern are:

- Excess nutrients (nitrogen and others)
- Sedimentation and water clarity
- Bacteria
- Salt from road de-icing
- Low levels of dissolved oxygen
- Toxic contaminants, especially mercury and polycyclic aromatic hydrocarbons (PAHs)
- Hazardous constituents in groundwater

Priority Issue: Understanding Nutrient Loading

The Great Bay Estuary is at risk of impacts from nitrogen loading due to increased population growth and development within the watershed as well as the loss of the assimilative capacity previously provided by eelgrass, oysters, and other filter feeders.
Since 2010, PREP's annual data sets have contributed to understanding nutrient loading and potential impacts on the Great Bay Estuary ecosystem. Loading levels are high enough (compared with other estuaries) to cause problems, but light attenuation issues and the unusual hydrodynamics of the Great Bay Estuary need to be better understood to fully assess whether reducing nutrient levels will address problems with decreasing eelgrass and increasing seaweed.

Priority Issue: Shoreland Buffers

Development and other land use practices can negatively impact natural vegetation buffers along waterways, and decrease their ability to filter pollutants and retain stormwater. Erosion of unvegetated or sparsely vegetated buffers can increase the sediment load of streams and rivers that ultimately drain to estuaries.
As marsh and coastal wetland boundaries change and as storm surges increase, shoreland buffer protection is increasingly important.

Priority Issue: Land Protection

In the Piscataqua Region, land protection efforts have been robust. By the end of 2011, over 88,747 acres of land in the Region (13.5% of total area) were protected from development.
Regional land protection planning efforts have established conservation focus areas at the coastal watershed scale. In 2011, 28% of the core priority areas in New Hampshire and Maine were conserved.

Success Story: Collaborative Monitoring & Science Transparency

PREP coordinates monitoring activities taking place in Great Bay and its tributaries among state, federal, municipal, and academic partners. In 2013, PREP initiated the Piscataqua Region Monitoring Collaborative, which has raised $350,000 for priority monitoring projects over the last three years.
In addition, PREP is committed to expanding its Technical Advisory Committee to solicit more feedback on its data, research, and science work. PREP is committed to continuous improvement in the areas of transparency, inclusive process, and stakeholder communication.

Success Story: Spruce Creek Non-Point Source Pollution Hot Spot Study

PREP funded a study in Spruce Creek, a tributary to the Piscataqua River, to identify the source of chronic bacteria problems by using K-9 Detection, fecal coliform and optical brightener testing.
As a result, immediate repairs were made to a school septic system and a residential neighborhood was further assessed.

Success Story: Municipal Action on Stormwater

As part of the 2015 publication of the Piscataqua Region Environmental Planning Assessment, PREP provided funding for a grant project in Exeter to amend zoning ordinances. The goal of this project was to increase water quality protections by restricting fertilizer application in the Shoreland Protection District and Aquifer Protection District.
The Healthy Lawns Clean Water Initiative - a group of concerned citizens and town staff - worked to build support in the community through outreach efforts including a lawn care forum and lawn care practices workshop. In March 2016, ballot voters overwhelmingly supported amendments to reduce fertilizer application.

Success Story: Convening for Clean Water Solutions

In recognition of PREP's role as a convener with a watershed-wide focus, the NH Charitable Foundation approached PREP in 2013 to develop a collective impact initiative and a blueprint for action to move the needle in the Great Bay.
The Great Bay 2020 is a growing and successful collaborative effort to raise $20 million in 5 years to address critical needs in 4 priority areas: Building a Culture of Stewardship; Collaborating to Reduce Pollution; Connecting Science to Action; and Protecting/Restoring Critical Lands and Habitats. In the first full year working on these four goals, PREP and partners have secured nearly $4 million.

Success Story: Land Protection - Thompson Farm

A 2015 partnership with the Town of Durham and the Southeast Land Trust of New Hampshire enabled PREP to support the protection of the Thompson Farm through a purchase. This 43-acre farm sits along the Lamprey River, which is a designated Wild and Scenic River and a major tributary to the Great Bay Estuary. This project adds to a block of 1,650 acres of contiguous conserved land, protects a drinking water supply for the University of NH and the Town, and protects nearly a mile of pristine waterfront along the Lamprey River.
The farm is located in the Lamprey River Conservation Focus Area, a highest priority area for land protection in the Great Bay watershed. Three state endangered species are present: Blandings turtle, and black racer and blue spotted salamanders. The farm is open to the public for recreation, education, and interpretive programs, and links users directly to the University College Woods trail system.

For more information:

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www.PREPEstuaries.org Exit

San Francisco Bay NEP

The San Francisco Estuary Partnership (SFEP) is a collaboration of federal, state, and local agencies, research organizations, and NGOs working to protect and restore water quality and the natural resources of the San Francisco Estuary. SFEP manages $100 million for partners for regional restoration, water quality, and resiliency efforts.
SFEP implements and facilitates projects and directly manages dozens of important efforts, such as reducing impacts from aquatic invasive species, urban pesticides, and sewage discharge by recreational boaters.
SFEP's extensive education efforts include publishing ESTUARY News magazine, producing State of the Estuary reports, organizing conferences and periodic symposia on timely issues, and publishing relevant fact sheets, videos, and other materials that educate the public and decision-makers about the Estuary.

What Makes the San Francisco Estuary Special?

The San Francisco Estuary, the largest in western North America, encompasses San Francisco Bay and the Delta of the Sacramento and San Joaquin rivers in California. The Estuary's watershed, which extends from the ridgeline of the Sierra Nevada mountains to the Golden Gate, encompasses nearly 40% of California.
The San Francisco Estuary provides a productive nursery for juvenile fish and shellfish, a year-round home for a diversity of plants and animals, and critical winter feeding habitat for over a million migratory birds along the Pacific Flyway.
The San Francisco Estuary is a designated site of Hemispheric Importance by the Western Hemisphere Shorebird Reserve Network, is part of UNESCO's Golden Gate Biosphere Reserve, and is under international treaty protection through the Ramsar Convention on Wetlands of International Importance. For residents, the Estuary symbolizes home and the quality of life that makes it a world-class destination.

Priority Issues: The State of the Delta, Impairment of Physical Processes, and Resiliency

The 2015 State of the Estuary Report is the most comprehensive health report for the Estuary. Highlights include:
● Human activities severely alter physical processes that create and maintain estuarine habitats, including freshwater inflows, beneficial floods, and sediment delivery.
● Loss of habitat contributes to unproductive food webs, declining native fish and wildlife populations, and the dominance of invasive species.
● The upper Estuary (Suisun Marsh and Delta) is in fair to poor condition and getting worse, while the lower Estuary (San Francisco Bay) is in better health but jeopardized by storm surges and rising sea levels.
Moving forward, management actions must occur in the context of change. Sustaining a healthy Estuary while addressing prolonged drought, increased storms, and rising seas requires collaboration, flexibility, and resilience among all engaged communities and agencies.

Success Story: Green Streets

Stormwater and urban runoff pollution threaten the health of local waterways and the Bay. Green infrastructure protects water resources from the impacts of urban runoff while enhancing the urban environment.
SFEP partners with local non-profit organizations, cities, community members, and design teams to implement Green Streets projects around the Bay Area. Individual projects have reduced the delivery of key pollutants and, in one low-income neighborhood, resulted in significantly reduced traffic speeds and peak storm flow discharges. Green infrastructure retrofits at sites in 7 cities along a busy traffic corridor create public gathering places and treat over 8 acres of impervious surface runoff. The Serramonte Main Branch Library Water Treatment Gardens reduced the delivery of pollutants like copper, lead, and zinc by 98%.
SFEP and its partners develop extensive resources for cities and community members to implement Green Street and green infrastructure projects. Visit http://www.sfestuary.org/greenstreets/ for more information.

Success Story: Historic Ballot Measure to Restore Wetlands

In June 2016, voters around the San Francisco Bay passed Measure AA, a first-of-its-kind regional ballot initiative to generate $500 million for restoration of wetlands over the next twenty years. The “Clean and Healthy Bay” ballot measure passed with over 70% support.
This revenue source will fund restoration efforts in all nine counties, including marshes along the edges of the Bay to serve as buffers from sea-level rise and protect upland areas from flooding during high tides and severe storms. The San Francisco Bay Restoration Authority distributes the funds, with support from SFEP, through grants aimed at multi-benefit projects that improve water quality, restore wildlife habitat, provide flood protection, and increase public access along the shoreline.

For More Information:

San Francisco Estuary Partnership
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Oakland, CA 94612
510-622-2304
http://www.sfestuary.org/ Exit

San Juan Bay Estuary Program

The San Juan Bay Estuary is located on the north end of Puerto Rico (a Caribbean island under U.S. jurisdiction) and flows into the Atlantic Ocean. The San Juan Bay Estuary system includes San Juan Bay, Condado Lagoon, San José Lagoon, Los Corozos Lagoon, La Torrecilla Lagoon and Piñones Lagoon, as well as the interconnecting Martín Peña and San Antonio Channels and the Suárez Canal.
The San Juan Bay Estuary was designated an estuary of national significance in 1993. The San Juan Bay Estuary Program (SJBEP) provides assistance in the implementation of the Comprehensive Conservation and Management Plan. The SJBEP is governed by a Management Conference or Consortium composed of representatives from government agencies and the community.

What Makes the San Juan Bay Special?

The San Juan Bay Estuary (SJBE) ecosystem is highly diverse, providing habitat to over 160 species of birds, 300 species of plants, 87 species of fish and 20 species of amphibians and reptiles. Of these species, at least 16 are considered endangered, threatened, endemic to Puerto Rico, and/or rare.
The SJBE is the only NEP located in a tropical geographic region and outside the mainland United States. Its tropical nature is evidenced by the diversity of habitats and species within the estuary. Its multiple openings increase the influences on and from nearby coastal zones.
Fresh water flows into the San Juan Bay Estuary (SJBE) system from the creeks and rivers in the upper watershed. Ocean water enters the system through three openings: Boca del Morro at San Juan Bay, El Boquerón at Condado Lagoon and Boca de Cangrejos in Piñones.

Priority Issue: Water Contamination in the Martin Peña Channel

The Martin Peña Channel (MPC) connects San José lagoon to San Juan Bay. It is home to perhaps one of the greatest environmental justice issues in Puerto Rico today.
During the large migration from the countryside to the city in the early 1900s, settlement began along the channel's banks. Mangroves were filled with garbage, and families built their houses on this filled space on the banks of the channel. As the channel became narrower, the flow of water was obstructed from San José Lagoon to San Juan Bay, concentrating pollutants and increasing flooding. Proper sanitary systems were not in place.
Around 3,000 structures discharge sanitary waste into the MPC, and the eastern part of the channel remains obstructed by debris and sediments. During heavy rains, streets flood with sewage-contaminated water that threatens the health and properties of 26,000 residents. Dredging the channel will ameliorate the environmental issues and community living conditions.

Priority Issue: Vulnerability of Coasts

Extreme weather events, coastal erosion, and chemical changes in the ocean directly impact estuarine ecosystems. The San Juan Bay Estuary is susceptible to these impacts, some of which are already causing evident changes in the Estuary's systems. Integrating science into SJBEP's platform of activities is critical to better understand the risks posed by these changes.
In 2013, the SJBEP completed a study that identified 68 risks, 28 of which were classified as priority. Some of these priority risks include excess rainfall, which could lead to increased flooding and septic system failures; and shoreline erosion, which could lead to the loss of beaches, wetlands and salt marshes. These negative effects have already been observed, but are expected to increase due to extreme weather events.

Priority Issue: Highly Developed Urban Watershed

The San Juan Bay Estuary watershed is highly developed and urbanized. The island's main airport is located within the watershed and most ocean freight and tourist cruises arrive at San Juan Bay. Over 700,000 people live in the area. The main businesses that move the economy co-exist with the estuarine biodiversity.
Every year, more construction occurs, more development is planned and less natural resources are available. Development, ships in port and the Martin Peña channel are sources of pollution that reach San Juan Bay. In addition, Caribbean currents carry floating trash into the Bay. This aquatic debris not only affects the aesthetic value of the estuary, but poses health and environmental risks to humans, animals and plant life.

Success Story: Dredging of Martin Peña Channel

The dredging of the Martin Peña Channel is one action to restore the flow of water between the San José lagoon and the San Juan Bay. The SJBEP provides technical support to further the dredging of the channel by offering comments on feasibility reports, fostering networking and tech-transfer opportunities including promoting visits from federal and decision-making stakeholders to the study area, and supporting community and educational initiatives.
The SJBEP collaborates with its partners to construct a vacuum sewer system and conventional sanitary technologies that connect over 1,200 homes that discharge raw sewage directly into the Martin Peña and the San Juan Bay.

Success Story: Building Resiliency

The SJBEP initiated a coastal dune restoration program which includes bamboo fences to trap sand and native trees to stabilize the dunes. Red mangroves are also planted, as a part of the program’s coastal restoration initiatives. In 2012, several stations were installed to measure changes in water levels in the San Juan Bay Estuary.

Success Story: Restoring the Urban Watershed

The SJBEP supports initiatives to protect areas of the San Juan Bay Estuary from development, educate urban communities about their impact on ecosystems, and create natural reserves. This work includes designating Condado Lagoon and Cucharillas Marsh as Natural Reserves.
Condado Lagoon was severely degraded by urban growth during the 1930s-1960s. The SJBEP worked with partners to eradicate the sewage discharge from the Colomer Pump Station, which had a long history of sewage bypasses. Eliminating this pump station improved the levels of fecal coliforms in the lagoon. SJBEP also worked with the environmental justice community of Juana Matos in the Catano municipality developing projects for the enhancement and restoration of the Cucharillas Marsh (e.g., purchasing land, planting trees, and mangroves).

Success Story: Trash Free Waters

EPA selected Puerto Rico as a Trash Free Waters (TFW) pilot project to prevent and reduce the amount of trash entering watersheds and the marine environment. SJBEP has championed: a stormwater pollution prevention pilot project in the Condado Lagoon, cigarette butt and plastic bag litter prevention

in Old San Juan, public outreach and education, media and public campaigns, trash cleanups, and a microplastics citizen science pilot project that provides data on the impacts of this pollutant within the SJBE.
On December 25, 2015, the Governor of Puerto Rico signed into law an island-wide plastic bag ban that prevents the entry of plastic bags into the San Juan Bay Estuary watershed for years to come.
Volunteers, corporate partners and government agencies play an important role in the implementation of the TFW activities. More than 500 volunteers have participated in targeted cleanups, and nearly 3,290 pounds of the waste collected will not become marine trash in the SJBE.

Success Story: Water Quality Volunteer Monitoring Program

The San Juan Bay Estuary Program's Water Quality Volunteer Monitoring Program (WQVMP) is one of its greatest successes. This program, which began in 2008, monitors 25 stations across the watershed monthly for 8 water quality parameters, and tests them bi-annually (once during the wet season and once during the dry season) in the laboratory for 11 additional parameters.
The WQVMP is run with the help of trained volunteers. In addition to the monthly monitoring, it includes a school-based Guardians of the Estuary Program and an island-wide yearly Water Quality Monitoring Day. The data, which is publicly available, is analyzed and the results presented in SJBEP publications such as the State of the Bay Report. The Puerto Rico Environmental Quality Board has also been using the data for decision-making. This long-term data has allowed the San Juan Bay Estuary Program to document the positive results of wastewater infrastructure improvement projects, and track long-term trends in the quality of the major bodies of water in the Estuary.

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Santa Monica Bay National Estuary Program

The Santa Monica Bay National Estuary Program (SMBNEP) is a private-public partnership dedicated to the preservation and restoration of coastal Los Angeles. The program works across the diverse landscape of the Santa Monica Bay watershed to inform and implement the Bay Restoration Plan, which outlines the steps needed to ensure a high quality of life for the 5,000 species and 4,000,000 people that call the Bay and its watershed home.
SMBNEP is comprised of The Bay Foundation (non-profit), Santa Monica Bay Restoration Commission (non-regulatory state entity), and the Santa Monica Bay Restoration Authority (Joint Powers Authority). In 2008, The Bay Foundation established the Center for Santa Monica Bay Studies at Loyola Marymount University to increase applied research of the bay's ecosystems.

What Makes Santa Monica Bay Special?

Santa Monica Bay has 55 miles of coastline containing some of the world's most loved beaches. California surf culture was born on the beaches of Malibu and no trip to Los Angeles is complete without a walk down Venice Beach. Over 72,000,000 people visit the beaches of Los Angeles County each year. The diversity of this coastal landscape is also enjoyed through hiking, biking, and trail riding in the Santa Monica Mountains. Walking the coastal trail along 150-foot-tall bluffs of Palos Verdes provides a great opportunity to watch gray whales and their calves migrate to their feeding grounds in Alaska. Year round, thousands of people surf, boat, fish, sail and SCUBA dive in Santa Monica Bay.
All of these visitors take a toll on Santa Monica Bay. SMBNEP works comprehensively to reduce pollution, enhance and restore habitats, and invest in the built environment to create green space that improves public health while purifying water and providing habitat for thousands of species.

Priority Issue: Monitoring Ocean Chemistry

The impacts of a changing ocean are already being felt across West Coast systems and are projected to grow rapidly in intensity and extent. An increasing number of studies are documenting the progression of ocean chemistry changes and its effects on local taxa, such as sea urchins, corals, mussels, coralline algae, and calcareous planktons.
To contribute to monitoring of Santa Monica Bay, a high precision instrument package for pH, dissolved oxygen, and pCO_2 was deployed in 2016. This instrumentation will provide valuable time-series information on pH and hypoxia and advance research on the effects of chemistry changes on biological communities in the Bay.

Priority Issue: Sea Level

Severe storms have significant impacts on local communities, and preparation must be made to address these impacts. Local tide records show that the sea has been rising in Santa Monica for decades. Higher water level combined with high tides and storm events increase the risk of coastal flooding.
In September 2016, SMBNEP completed a comprehensive risk-based vulnerability assessment for all objectives in the Bay Restoration Plan. The assessment informs future updates to the Bay Restoration Plan.
SMBNEP promotes comprehensive sediment management and other "soft" and "living" measures to address the impact of higher water levels on the beach and adjacent ecosystems. The Santa Monica Beach Restoration Pilot Project restores several acres of sandy coastal habitats on the beaches of Santa Monica to establish a native fore-dune plant community. This project will determine the effectiveness of

this approach to provide habitat for wildlife while increasing the capacity of the beach to retain sediment and gain elevation.

Success Story: Palos Verdes Kelp Forest Restoration

Kelp forests are the rainforests of the sea. These highly productive ecosystems provide food and habitat to over 700 species of invertebrates, fish and algae, many of which are popular with sport and commercial fishermen and recreational divers.
Over the past 100 years, the Palos Verdes Peninsula lost approximately 75% of its giant kelp canopy due to sedimentation, development, urban runoff and storms. The loss of key urchin predators and competitors allowed urchins to overrun the reef and devour the remaining kelp.
In 2013, The Bay Foundation started to manually cull the urchin population to allow the recovery of giant kelp. In partnership with environmental groups, public aquaria, fishermen and researchers, nearly 7000 hours were spent underwater to restore 39 acres of rocky reef.
The kelp forest community responded positively to the reduction in sea urchin density and fish populations have improved. Further monitoring efforts will provide a more accurate understanding of ecosystem responses.

Success Story: Restoring Malibu Lagoon

Malibu Lagoon was long labeled an impaired water body by the EPA. The Lagoon was filled in by excess sediment and suffered from low dissolved oxygen levels within the channels, which threatened fish and wildlife.
Between the summer of 2012 and spring of 2013, California Department of State Parks led the effort to restore Malibu Lagoon by removing contaminated soil and decades of built-up trash, and re-contouring the channels to improve water flow and circulation.
This joint effort involved many partners. The Bay Foundation is responsible for the post-restoration Lagoon monitoring, which provides valuable data to determine restoration success.

For More Information:

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Sarasota Bay National Estuary Program

The Sarasota Bay Estuary Program (SBEP), established in 1989, is a partnership of local, state, and federal governments and agencies. SBEP is dedicated to restoring the region's greatest and most important natural asset – Sarasota Bay.
SBEP and its partners focus on addressing five critical actions: wastewater treatment, stormwater runoff, wetland restoration, fisheries and resource management, and recreational use. Major goals include improving water transparency, reducing stormwater runoff, restoring seagrass, restoring/managing fisheries and other living resources, increasing access to the Bay, and educating the public on issues facing Sarasota Bay.

What Makes the Sarasota Bay Special?

Sarasota Bay is a 50-mile-long, shallow, coastal lagoon on the southwest coast of Florida. It is comprised of one large and four smaller interconnected embayments, with four passes connecting it to the Gulf of Mexico. It is home to abundant seagrass meadows, productive oyster bars and mangrove wetlands, and highly-prized recreational fisheries.
A healthy Sarasota Bay contributes positively to the local economy and adds to the quality of life for residents and visitors alike. Recreational fishing is popular and the Village of Cortez remains one of the last working commercial fishing centers in Florida. Other recreational and outdoor activities, such as kayaking and boating, birding, diving, hiking, and camping, are plentiful throughout the watershed and add nearly $500 million to the local economy each year. The value of Sarasota Bay resources is estimated at $11.8 billion. There is a lot at stake in conserving and restoring Sarasota Bay resources.

Priority Issue: Nitrogen Pollution

Excess nitrogen reaches Sarasota Bay primarily through wastewater discharges, stormwater runoff, and atmospheric deposition. Nitrogen loading can cause an overabundance of algal growth, which reduces sunlight penetration to submerged seagrass and depletes dissolved oxygen available for fish and other aquatic life.
Wastewater discharge was recognized early on as a major contributor to nitrogen pollution to Sarasota Bay. Other contributors included numerous small treatment plants and septic tanks. Nitrogen from septic system drain fields can be transported by groundwater into tributaries that deliver it to the Bay. The SBEP set a goal in 1997 to reduce nitrogen pollution by 48 percent.

Success Story: Wastewater Treatment and Reclamation

In the 1990s, regional wastewater plants began upgrading their facilities to meet water quality standards required by state legislation. Achieving advanced wastewater treatment standards at the City of Sarasota's plant reduced its nitrogen load to the Bay by 80 to 90 percent. In 2015, the City completed a deep-well injection system, and along with Manatee County wastewater systems, eliminated all surface water discharges to the Bay.
Sarasota County began purchasing small treatment plants in 1999 and converted them into pumping stations to transport wastewater to regional treatment facilities. The last small plant is scheduled to be converted into a pumping station by 2018.
Sarasota County implemented a multi-million-dollar septic-to-sewer replacement program along Phillippi Creek, the watershed's largest drainage area. The program has reduced total nitrogen (and bacteria) in the watershed, and Phillippi Creek is no longer impaired for nutrients.

Success Story: Celery Fields Regional Stormwater Treatment System

The Celery Fields Regional Stormwater Facility is a 400-acre property located near the headwaters of the Phillippi Creek Watershed. Once a large sawgrass marsh, the rich soil was used for farming in the 20th century, most notably in the production of celery. Celery Fields now prevents flooding by attenuating runoff from over 3,000 acres of land upstream. In addition, it improves downstream water quality and captures sediment.
Celery Fields is a nationally recognized birding site, is popular with recreation and fitness enthusiasts, and is used for environmental education field trips.

Success Story: Water Quality Improvements and Seagrass Recovery

Due to wastewater and stormwater improvements over the past twenty years, nitrogen load to Sarasota Bay has been reduced by an estimated 64%. This, in turn, resulted in declining chlorophyll concentrations in all segments throughout the Bay.
The result of these long-term water quality improvements has been the remarkable recovery of seagrass throughout the system. The total seagrass coverage is now more than 50% higher than historical (1950) levels.

Watch a video on seagrass recovery.

Priority Issue: Habitat Loss

The SBEP watershed has lost nearly fifty percent of its total wetland acreage since 1950, while the average wetland size has shrunk from 22 to six acres. As wetlands shrink and become fragmented, their susceptibility to weeds, pests, and other infestations increases.
The SBEP developed a comprehensive wetland restoration plan to prioritize habitat restoration projects within the watershed. The goal is to restore or create 18 acres of inter-tidal wetlands and 11 acres of non-forested freshwater wetlands annually.
Healthy wetlands provide numerous environmental benefits to Sarasota Bay and its watershed. Healthy wetlands provide food and shelter for aquatic life, birds and wildlife.

Success Story: Robinson Preserve

Robinson Preserve, located in northwestern Manatee County where Tampa Bay and Sarasota Bay meet, is a 487-acre coastal preserve. With the help of many partners and funding sources, this once disturbed farmland has been transformed into incredibly diverse coastal and wetland habitats. Numerous exotic invasive plants have been removed, effectively opening the land for native plants to flourish. The preserve's new waterway system helps restore the tidal flow within the coastal habitats.
Robinson environmental activities include hiking and biking trails and a canoe/kayak launch. Additional amenities include observation towers and platforms, picnic areas, and a visitor’s center.

Success Story: Palma Sola Scenic Highway Corridor

There are several interconnected preserves in northwest Manatee County that make this part of the watershed an exceptional example of nature and development existing side-by-side. Volunteers from the Sarasota Bay Guardians, the Tampa Bay Estuary Program, and Manatee County were integral to

carrying out the restoration of these interconnected preserves which include Robinson, Perico, Bayou Interconnect, and Neal.
Highlights in the Neal and Perico Preserves include boardwalks, an observation tower, shell trails, and a bird blind for viewing and photographing wildlife. Neal Preserve (120 acres) includes both coastal habitats and upland pockets of oak hammock. Perico Preserve (176 acres) transformed farmland to a beautiful mix of natural habitats, including coastal wetlands, scrub hills and upland areas that hearken back to historical coastal Manatee County. The Highway 64 corridor has undergone beautification and transformation with extensive removal of exotic trees and replanting of more natural vegetation.

For More Information:

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Tillamook Bay National Estuary Program

The Tillamook Bay National Estuary Program was established in 1999 and is hosted by the Tillamook Estuaries Partnership (TEP), a 501(c)(3) non-profit. TEP partners with a wide variety of federal, state, local, and private entities to implement the Tillamook Bay Comprehensive Conservation and Management Plan to restore and conserve all of Tillamook County's estuaries and watersheds in their entirety.
This ecologically rich estuary includes the Tillamook, Nehalem, Netarts, Sand Lake, and Nestucca bays, and receives freshwater from five major rivers.

What Makes the Tillamook Estuary Special?

Tillamook Bay is home to many diverse fish and wildlife species including Coho, Chinook, Chum, steelhead, cutthroat trout, Pacific lamprey, Dungeness crab, seals, migratory birds, and many more. Tillamook Bay is also an important layover for the Pacific Flyway, which extends north-south from Alaska to Patagonia.
With several small cities and farms at its borders, the bay plays a vital role in the economic and social health of surrounding communities. It is also a major recreational destination for paddling, hiking, bird-watching, and fishing.

Priority Issue: Key Habitat Loss

Salmonids (ray-finned fish such as salmon, whitefish, and trout) and other important aquatic organisms have declined due to habitat loss and degradation. Important riparian, instream, large wood, freshwater off-channel, tidal slough, and estuarine habitats are especially important for these species.
Fishery practices, such as management of natural production, hatcheries, and harvest, also contribute to this decline.

Priority Issue: Water Quality

Bacteria and pathogens from point and non-point sources present a principal water quality concern. Bacterial pollution threatens public health and results in frequent closure of commercial shellfish harvesting areas. People who come in direct contact with contaminated water, or who ingest contaminated shellfish or water, may become sick.
Many stream reaches in this watershed do not meet water quality criteria for bacteria or temperature, and exceed recommended concentrations of suspended solids. Dissolved oxygen and nutrient concentrations do not appear to adversely impact water quality in this watershed, except in lowland sloughs.

Priority Issue: Erosion and Sedimentation

Past and present human activities and land uses increase sediment loading to the environment. Erosion and sedimentation in the watershed can adversely impact the human and natural environment. Impacts may include the loss of salmonid spawning and rearing habitat in both fresh and salt water, degradation of other estuarine habitats, changes in the Bay's depths and water circulation patterns, and flooding. Reducing instream sediments will improve the productivity of spawning salmonids, survival of juveniles, and availability of prey.

Priority Issue: Flooding

The interaction of human activities with dynamic natural systems has increased the magnitude, frequency, and impacts of flood events.
Each time a significant flood occurs, water quality and aquatic wildlife are negatively impacted by erosion and contaminants from industry, agriculture, and sewage.

Success Story: Southern Flow Corridor - Landowner Preferred Alternative

The primary goal of Southern Flow Corridor-Landowner Preferred Alternative Project is to remove man-made impediments to flood flows in the lower Wilson River floodplain. The project accomplishes this through extensive removal of existing levees and fill.
Working with a diverse set of partners, Tillamook County has permanently protected and restored 522 acres of tidal marsh habitats at the confluence of the Bay's two most productive salmon systems, the Wilson and Trask Rivers.
The site contains an expansive mosaic of tidal wetlands, disconnected freshwater wetlands, and drained pasture. Once restored to a tidal regime, the resulting range of habitats, such as mud flats, aquatic beds, and forested wetlands, will provide substantial habitat and water quality benefits to threatened Coho, as well as chum and Chinook salmon, cutthroat trout and many other species.

Success Story: Recreational Standards Met in the Wilson and Kilchis Rivers

TEP has a cadre of water quality monitoring volunteers. These citizen scientists take samples twice a month at over 70 locations throughout our study area of 5 estuaries, and have nearly 20 years of data and over 20,000 samples. The TEP lab analyzes for Escherichia coli (E. coli) bacteria. This data is used by TEP and partners to focus restoration efforts, specifically in the riparian areas, to address areas of concern.
The Wilson and Kilchis Rivers are meeting recreational standards for E.coli. The most impacted watershed, the Tillamook River, displays high bacteria levels but all sites are improving, as are 45% of sites across the Tillamook Bay watershed itself. These improvements are a result of enhanced Best Management Practices, fencing and riparian restoration projects, and increased awareness.

Success Story: Backyard Planting Program

The TEP's Backyard Planting Program began in 2004 to encourage private streamside landowners to engage in riparian restoration with the goal of improving water quality, reducing erosion and sedimentation, and providing key habitat.
Working with 130 private and public landowners, the program has removed invasive species in over 40 miles of streams, restored 200 acres of riparian area, and planted over 110,000 trees and shrubs. As part of a partnership on agricultural lands, the Tillamook County Soil and Water Conservation District also installed over 14 miles of livestock exclusion fencing.
This program is funded by a variety of federal, state, local, and private sources and comes at no cost to the landowner.

Success Story: Northwest Oregon Restoration Partnership

The Northwest Oregon Restoration Partnership (NORP), a program of TEP, engages community members of all ages in the propagation of locally adapted native plants to restore riparian, wetland, and upland landscapes in northwest Oregon.
NORP supports the restoration efforts of more than 35 organizations, including watershed councils, land trusts, schools and local communities, by coordinating the propagation and distribution of over 75,000 native plants annually for landscape-scale watershed restoration projects implemented by its partners on private, state, and public lands in Oregon.

For More Information:

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