



BARNEGAT BAY
PARTNERSHIP
RESEARCH · EDUCATE · RESTORE

Annual Report | 2019 - 2020





Communicating Climate Change: Is a Picture Worth a Thousand Words?

Over the past year, the Barnegat Bay Partnership has been working hard to finish the revised *Comprehensive Conservation and Management Plan for the Barnegat Bay Watershed (CCMP)*, our blueprint for partner efforts over the next ten years. The goals, objectives, and actions in the revised CCMP are organized into four main priorities – Water Quality, Water Supply, Living Resources, and Land Use – and climate change impacts all of them. That’s why during the revision process, we assessed the vulnerability of the actions in the plan to climate change.

However, assessing their vulnerability is not enough. One of our biggest challenges is to effectively communicate the impacts of climate change on our watershed communities and how to prepare for these changes. Yale University’s Program on Climate Change Communication recently summed up a lot of recent research on communicating climate change and found the best ways to understand data are to visualize them, *i.e.* “a picture is worth a thousand words.”

As we prepare for the release of our revised CCMP in 2020, we want to focus on doing and communicating good science. So here are some data and images to help you better understand significant ways in which our bay, the Jersey Shore, and the Northeast U.S. are changing.

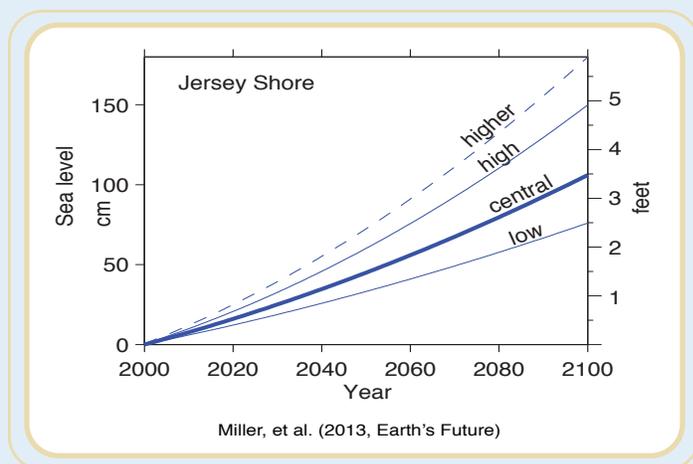


Flooding on Great Bay Boulevard.

The sea level is rising

Global sea levels are rising as warming ocean waters expand and land-based ice continues to melt. Scientists agree that sea level is rising faster at the Jersey shore than the global average, mostly because of regional land subsidence (a gradual downward settling of land) and changes in the Gulf Stream.

How much will it continue to rise here? Most current predictions center around 16 inches by 2050 and 3.5 feet by 2100 (see the figure on the right; Miller *et al.* 2013¹). Predictions vary mostly due to uncertainty about how much humans will do to reduce carbon emissions and otherwise mitigate climate change.



1 K.G. Miller, R.E. Kopp, B.P. Horton, J.V. Browning, and A.C. Kemp, 2013, A geological perspective on sea-level rise and its impacts along the U.S. mid-Atlantic coast. *Earth's Future* 1: 3-18, <https://doi.org/10.1002/2013EF000135>.



Should we worry about sea level rise in New Jersey?

Road closed due to coastal flooding.

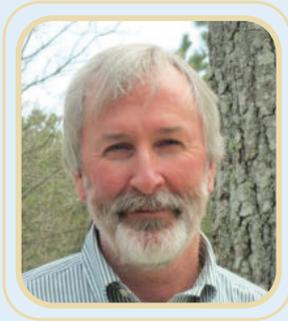
We are already seeing “sunny day” flooding in communities along the back sides of the barrier islands and along the bay’s western shores. As the sea level continues to rise, flooding is likely to become even more frequent and widespread, causing more disruption to our everyday activities and contributing to higher costs of living, unless addressed.

What can we do?

To reduce the impacts of global climate change, we need to decrease our carbon emissions by 1) burning less fossil fuels and 2) protecting and restoring our coastal ecosystems, which act as “carbon sinks.” Salt marshes, seagrasses, and mangroves, though smaller in area than the planet’s forests, sequester (capture and hold) carbon at a much faster rate, providing a natural way of lowering atmospheric carbon levels. Actions in our CCMP specifically target the protection

and restoration of the bay’s seagrasses and coastal wetlands – critical habitats for many reasons, including climate change mitigation. Perhaps the most important thing we can all do is learn more about how to reduce carbon emissions and prepare for the impacts of climate change on our lives – and then share what we know with others. Climate change and sea level rise remain poorly recognized in many parts of the

U.S., including the Jersey Shore². The world’s problems are easier to address if we understand the challenges and all work together!



Stan Hales • Director

2 J. Marlon, P. Howe, M. Mildenerger, A. Leiserowitz and X. Wang. 2019. Yale Climate Opinion Maps. Yale Program on Climate Change Communication, Yale School of Forestry and Environmental Studies. New Haven, CT. Available online at <https://climatecommunication.yale.edu/visualizations-data/ycom-us/>,

Citizen Science and Stewardship Activities

Much of the work done by the organizations

which make up the Barnegat Bay Partnership would not get done without the participation of hundreds of volunteers. Our volunteers help in so many ways – collecting data as citizen scientists, removing trash from our public lands, restoring native habitats, and educating others about the bay and its watershed – and we appreciate them!

Paddle for the Edge volunteer Don Crawford.

Paddle for the Edge

2019 was the fifth year for this popular BBP citizen science project. Trained volunteers paddle the bay to collect important data about shoreline conditions using a smartphone app. This year was our best so far – 127 Paddle for the Edge volunteers covered 35 miles of shoreline and collected 1,731 data points!

Over the past five years, 397 volunteers paddled a total of 101 miles of shoreline and collected 5,368 data points with their smartphones. The information they collect helps assess current shoreline conditions, predict how shorelines may react to sea level rise, and identify potential shoreline restoration areas.

Barnegat Bay Blitz

In 2019, the BBP took the lead in organizing this annual watershed-wide clean-up, which was started by the NJDEP in 2010. The Blitz engages volunteers in removing litter throughout the watershed in an effort to keep our rivers and the bay trash-free. More than 1,000 volunteers of all ages participated in this past year's Blitz, which was held on June 7th and 8th. Among the organizations participating were scout groups, municipal green teams, county and state agencies, non-profits, and local businesses.

The 2019 Blitz resulted in the removal of more than 40 tons of trash and debris from the watershed!



SUEZ volunteers at the 2019 Blitz.

Watershed Ambassador

The BBP is the host agency for the Barnegat Bay watershed ambassador, one of 20 individuals serving as an AmeriCorp volunteer through the NJDEP's Watershed Ambassador Program. Ray LeChien, the 2018-2019 ambassador, and Haley Kardek, the 2019-2020 ambassador, monitored streams, planted dune grass, presented more than 100 educational programs to schools and community organizations, and partnered with others to complete numerous on-the-ground projects benefitting the watershed.

Great Backyard Bird Count

Scientists use data from the Great Backyard Bird Count (GBBC), an annual citizen science event sponsored by Cornell University and Audubon, to get the "big picture" about what is happening to bird populations around the world. In February, 2019, the BBP partnered with Ocean County Parks and Recreation to host its third annual GBBC event at Cattus Island County Park. Park naturalists led participants on an educational bird walk and count, and the results were uploaded to eBird, an online database of bird observations.



Great Backyard Bird Count.

Science and Research

The Barnegat Bay Partnership is committed to improving our understanding of the Barnegat Bay. Individually or with partners, we support regular and periodic monitoring to better recognize the bay's condition and understand environmental trends. We also support research to increase our knowledge of the estuary, and provide a scientific basis for its management, restoration, and related decision-making.

BBP Wetland Specialist Emily Pirl measures relative elevation change in the marsh.



Dr. Angel Camilo and Edmond Hong help install a new slider track system for the coastal acidification sensors.

Water Quality Research

Ambient Water-Quality Monitoring

The BBP is one of the partners in the New Jersey Department of Environmental Protection's (NJDEP's) Barnegat Bay water-quality monitoring network; we continued to collect water-quality data at sites on two bay tributaries, Mill Creek and Westcunk Creek. Visit the NJDEP's website to view the 2019 data.



Water Quality Specialist Nicole Petersen monitors water quality in Mill Creek.

BBP continuous water-quality monitoring stations

The BBP operates continuous water-quality monitoring stations at three bay sites: Seaside Park Yacht Club, Mantoloking Yacht Club and Morrison's Marina in Beach Haven. Every 15 minutes, data (temperature, salinity, dissolved oxygen, turbidity, and pH) are collected and transmitted in near real-time to the NJDEP's continuous water quality monitoring website where they are archived and available for public downloading and use. In 2019, we collected a total of 59,703 data readings at the three stations.

Monitoring for coastal acidification

The Beach Haven station has additional high-precision sensors to continuously monitor water acidity (pH) and carbon dioxide (CO₂) levels in the Barnegat Bay. Climate change-related increases in CO₂ and acidity in the world's oceans and estuaries impact the ability of marine life to build shells, bones, and other body structures. In 2019, the Ocean County College Student Maker's Club, led by Dr. Angel Camilo and Edmond Hong, assisted the BBP with designing and building a new slider track system for the coastal acidification sensor, and the Berkeley Township Underwater Search and Rescue Squad helped to install it.

BBP laboratory

The BBP maintained laboratory certification for 4 parameters in 2019: temperature, conductivity, pH, and dissolved oxygen. With this certification, we are now able to analyze samples and report the results to state agencies for use in watershed health assessments. This past year we collected 294 water-quality samples by certified methods.



BBP continuous water-quality monitoring station.



Living Resources

Juvenile eel monitoring

Low population numbers of American eel (*Anguilla rostrata*) up and down the Atlantic coast remain a concern, so BBP researchers continued to monitor the ingress of juvenile American eels into the Barnegat Bay watershed. From February to May, we monitored eels at 5 watershed locations, completing 356 monitoring events and measuring a total of 9,779 eels.

Long-term juvenile fish and nekton sampling

The BBP's long-term monitoring project assesses variations in the abundance and distribution of juvenile fishes and jellyfishes in the bay. From May to October, we seined at 15 bay locations, identifying 72 different taxa (9 gelatinous zooplankton, 5 crabs, 1 turtle, 57 fishes) and counting 74,836 individuals (including over 34,000 menhaden and 12,000 silversides).

Mid-Atlantic Coastal Wetlands Assessment (MACWA)



The BBP has been a MACWA partner for the past decade, monitoring the condition of coastal wetlands in the Barnegat Bay and the impacts of sea level rise on our tidal marshes. Coastal wetlands provide critical services (*e.g.*, flood protection, maintenance of water quality, carbon and nutrient sequestration,

and fish and wildlife habitat); thus, it is imperative that we monitor, manage, and enhance vulnerable wetlands as the sea level continues to rise.

In 2019, BBP continued its long-term monitoring of four marsh sites in the bay – Reedy Creek, Island Beach State Park, Dinner Point, and Horse Point. We collected 864 measurements from 12 surface elevation tables (SETs), which measure very specific relative elevation change in the marsh. We also took 144 marker horizon measurements, which measure vertical increases (accretion) or decreases (erosion) in sediment deposition. By combining data from both of these methods, we are getting a clearer picture of how much and how fast the marsh is accreting or eroding.

Nature-based shoreline projects

The BBP assisted the NJDEP Division of Fish and Wildlife and Marine Fisheries Administration in 2019 with the installation of a living shoreline at the Sedge Island Natural Resource Education Center. This project was designed to use only natural materials to mitigate shoreline erosion under the caretaker's house at the Center. BBP staff will continue to monitor the project and assist NJDEP with shoreline projects.

Using MACWA-based metrics, the BBP has also begun shoreline pre- and post-monitoring for nature-based shoreline projects in the bay. Current projects being monitored include Iowa Court in Little Egg Harbor and Green Street in Tuckerton Borough. This monitoring was funded through the NJ Corporate Wetlands Restoration Partnership. The BBP produced a time lapse video of these two projects, which can be viewed on the BBP's YouTube channel.



Research Technician Dave Ambrose and Stockton student Jacob Simone bring up an oyster reef sample.



BBP Field Tech Shannon Vasquez measures changes in marsh sediment deposits.

Oyster restoration project

In 2016, the BBP funded a successful Stockton University partnership project to establish an oyster restoration program in the bay. In 2019, the BBP awarded a second grant to Stockton University to enlarge the oyster reef established in the southern part of the bay (called the Tuckerton reef) and to continue monitoring it. Stockton researchers are assessing fish and invertebrate use of the reef and collecting more long-term water quality data to better understand the impacts of these oysters on water filtration and nutrient removal in the bay.

Education and Outreach

Guided by the Barnegat Bay Partnership's

Communication and Outreach Plan, our staff and partners reach out to watershed residents and visitors to increase public understanding of the human impacts on the bay's ecology, promote stewardship of the bay and its resources, and grow public participation in its protection and restoration.



Native plant sale at the Jersey-Friendly Yards conference.

Jersey-Friendly Yards Conference

Jersey-Friendly Yards is a BBP website that offers a wealth of practical information about how to landscape for a healthier environment and cleaner water in New Jersey. Partnering with the Ocean County Soil Conservation District and Rutgers Cooperative Extension of Ocean County, we hosted the third annual Jersey-Friendly Yards conference at Ocean County College on October 19, 2019.

Two hundred individuals from around the state attended the conference to learn how they can use nature-based landscaping practices for a healthier environment.



Education and Outreach Retreat

The BBP's annual Retreat brings together Barnegat Bay watershed educators to exchange information and ideas and collaborate on outreach efforts. Fifty-five participants met at Island Beach State Park on March 20th for the 2019 event. With the theme "Interpretation – More Than Just Information," the Retreat included sessions about how to create an interactive exhibit, make a documentary, and use drones as an outreach tool.

Watershed Outreach Events

In addition to hosting our own events, the BBP educates residents and visitors about the Barnegat Bay during events offered by our partners and other stakeholder groups. In 2019, we exhibited at 31 different events, reaching out to more than 14,000 attendees. Participation in events gives us the opportunity to engage the public through displays and interactive models (such as the EnviroScope) and distribute BBP and partner publications that encourage watershed stewardship.

Barnegat Bay Volunteer Master Naturalist Program

The BBP offered the Master Naturalist training course twice in 2019 through the Ocean County College Continuing Education Department, adding a total of 25 individuals to the ranks of previous graduates. Participants visit parks and nature centers throughout the watershed to learn more about the bay and its incredible resources.

Since the BBP established this volunteer service program in 2010, Master Naturalists have contributed thousands of hours throughout the watershed by presenting educational programs, assisting with scientific research, and participating in stewardship projects such as maintaining nature trails. Over the past year, the Barnegat Bay Master Naturalists completed a total of 1,335 volunteer hours.



Drone demonstration by Dr. Morris Enyeart at the 2019 Retreat.

Jersey Shore Chapter of the Native Plant Society of New Jersey

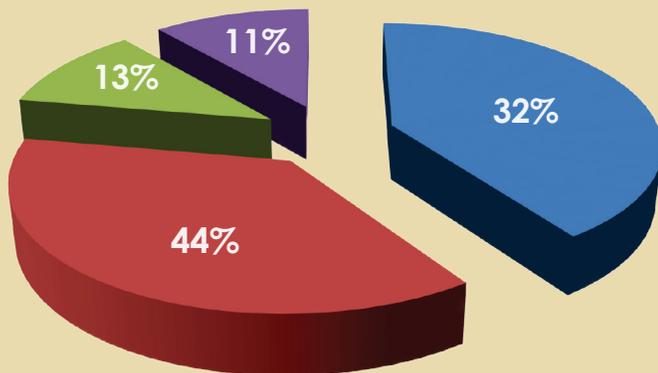
BBP staff provides leadership to the local chapter of New Jersey's Native Plant Society (NPS), a statewide non-profit organization dedicated to protecting New Jersey's native flora. Restoring healthy habitat by planting native species is critical to sustaining the wildlife in our watershed. Volunteers from the Jersey Shore Chapter educate the public about the benefits of native plants and help maintain demonstration native plant gardens at Jakes Branch County Park.



Fall 2019 Master Naturalist students visit Sedge Island Natural Resource Education Center.

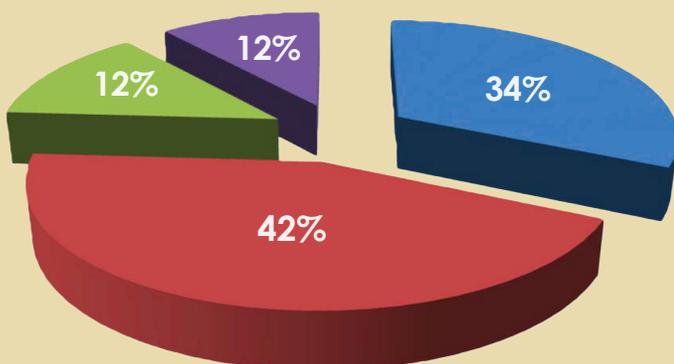
As a National Estuary Program established pursuant to the Clean Water Act (33 U.S.C. 1330; PL 100-4, et seq.), the Barnegat Bay Partnership receives section 320 grant funding from USEPA. The County of Ocean, through the Ocean County Natural Lands Trust and Ocean County College, provides the annual matching funds required for the grant. Through the BBP work plan and related activities, the BBP and its partners are able to leverage other investments to protect and restore the watershed. During the federal fiscal year 2020, the total amount leveraged was \$2.95 million, which resulted in a 5.5 to 1 total return on investment. We thank Ocean County College and all of our partners for their continuing support of our efforts to protect the bay.

FISCAL YEAR 2019



- Habitat Acquisition, Protection, and Restoration
- Monitoring and Research
- Education, Outreach, and Stewardship
- Program Administration

FISCAL YEAR 2020



Funding during Fiscal Year 2019 (July 1, 2018–June 30, 2019)

US Environmental Protection Agency (USEPA)

Clean Water Act Cooperative Agreement:

| | |
|--|--------------------|
| National Estuary Program | \$615,000 |
| Ocean County Natural Lands Trust | |
| Funding Match | \$572,500 |
| Ocean County College Funding Match | <u>\$ 42,500</u> |
| Total | \$1,230,000 |

USEPA Region 2 Wetland Program Development Grant:

Using MACWA to Quantify Wetlands Ecosystem Services in New Jersey Coastal Communities

| | |
|----------------------------------|-----------|
| \$ 25,000 | |
| Ocean County Natural Lands Trust | |
| Funding Match | \$ 10,000 |

New Jersey Corporate Wetlands Restoration Partnership Grant:

Barnegat Bay Partnership: Wetlands/Living Shoreline Monitoring – Little Egg Harbor/Tuckerton

| |
|------------------|
| \$ 21,266 |
|------------------|

New Jersey Department of Environmental Protection Contract:

Long-term Wetland Monitoring and Regional MACWA Meeting Coordination

| |
|------------------|
| \$ 14,000 |
|------------------|

USEPA Atlantic Ecology Division (AED)

Regional Applied Research Efforts Grant:

The Role of Eutrophication in Coastal Wetland Fragmentation, Barnegat Bay, New Jersey

| |
|------------------|
| \$ 60,000 |
|------------------|

| | |
|--|------------------|
| AED Office of Research and Development Support | \$ 40,000 |
| Natural Resources Conservation Service Support (In-kind) | <u>\$ 80,000</u> |
| Total | \$180,000 |

FY19 Total

Funding during Fiscal Year 2020 (July 1, 2019–June 30, 2020)

USEPA Clean Water Act Cooperative Agreement:

| | |
|--|--------------------|
| National Estuary Program | \$600,000 |
| NEP Supplemental Funding (Storm–Rapid Response Monitoring) | \$ 25,000 |
| Ocean County Natural Lands Trust | |
| Funding Match | \$527,466 |
| Ocean County College Funding Match | <u>\$ 97,554</u> |
| Total | \$1,250,000 |

Donation

USEPA Region 2 FY 19-20 Wetlands Program Development Grant:

Quantifying Local and Meteorological Drivers of Inundation in Coastal Wetlands of New Jersey

| |
|------------------|
| \$120,678 |
|------------------|

Partnership for the Delaware Estuary

Funding Match

Ocean County Natural Lands Trust

Funding Match

Total

New Jersey Sea Grant Contract:

NJDEP Barnegat Bay Model Evaluation Group

FY20 Total

Grand Total

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OCEAN
COUNTY COLLEGE

Jon H. Larson, Ph.D.
President



The Ocean County Board of Chosen Freeholders

Freeholder Liaison, Joseph H. Vicari



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Our Partners

American Littoral Society
Barnegat Bay Foundation
Brick Township Municipal Utilities Authority
Clean Ocean Action
Conserve Wildlife Foundation of New Jersey
Georgian Court University
Jersey Coast Anglers Association
Long Beach Island Foundation of the Arts and Sciences
Marine Trades Association of New Jersey
Monmouth County Division of Planning
Monmouth University
National Oceanic and Atmospheric Administration,
National Marine Fisheries Service
NJ Department of Environmental Protection
NJ Department of Transportation
NJ Pinelands Commission
NJ Sea Grant Consortium
Ocean County Board of Chosen Freeholders
Ocean County College
Ocean County Department of Parks and Recreation
Ocean County Health Department
Ocean County Mayors Association
Ocean County Planning Department
Ocean County Soil Conservation District
Ocean County Utilities Authority
Ocean County Vocational Technical School
Pinelands Preservation Alliance
ReClam the Bay
Rutgers Cooperative Extension of Ocean County
Rutgers University:
Jacques Cousteau National Estuarine Research Reserve
Save Barnegat Bay
Stockton University
Trust for Public Land
US Army Corp of Engineers
US Department of Agriculture,
Natural Resources Conservation Service
US Environmental Protection Agency
US Fish and Wildlife Service
US Geological Survey

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BARNEGAT BAY PARTNERSHIP

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Annual Report | 2019-2020

One of 28 National Estuary Programs, the Barnegat Bay Partnership comprises federal, state, county, municipal, academic, business, and private stakeholders working together to help restore, maintain, protect, and enhance the water quality and natural resources of the Barnegat Bay estuary and its contributing watershed.