



**BARNEGAT BAY
PARTNERSHIP**

RESEARCH EDUCATE RESTORE

Annual Report | 2020 - 2021



From the Director's Desk



With grant funding provided by the New Jersey Department of Environmental Protection (NJDEP), the BBP began work earlier this year on two Watershed Protection and Restoration Plans (WPRPs), one for the Toms River watershed and one for the



BBP field techs conducting a visual stream assessment.

Cedar Creek/Oyster Creek/Forked River watershed complex. Several people have asked me why, after revising the BBP's *Comprehensive Conservation and Management Plan* (CCMP), the BBP would want to spend time developing these two plans. The answer lies in the spatial scale of the different plans.

While the CCMP is a plan of action for the entire Barnegat Bay-Little Egg Harbor watershed, WPRPs focus on much smaller drainage areas, typically 12-Digit Hydrologic Unit Codes (HUCs) classified by the U.S. Geological Survey. Each of these smaller drainage areas, or subwatersheds, has a unique mix of land use types, which affect the quality and quantity of the water flowing through and under it in different ways. Very simply, a Watershed Protection and Restoration Plan identifies the water-quality problems within a particular subwatershed and creates strategies for local stakeholders to tackle them.

WPRPs must conform to the U. S. Environmental Protection Agency's nine key elements for reducing pollution. Each plan includes the following: 1) a description of the geography, ecology, and hydrology of the drainage area; 2) causes and/



Tributary of the Toms River

or sources of pollution and recognized impairments; 3) data gaps related to watershed conditions; and 4) pollutant load estimates for the receiving waters. Each WPRP also 5) sets pollution reduction goals and 6) identifies potential solutions or management measures to achieve those goals.

A WPRP provides 7) an implementation program that includes a schedule, interim milestones, ways to measure or monitor progress, and an education/outreach plan and 8) identification of technical and financial resources needed to ensure implementation program success. Finally, a WPRP lays out 9) a monitoring program and potential adaptation measures to assess success and guide future corrective actions, if needed.

Once a WPRP is developed and approved, EPA Clean Water Act Section 319 grants to states prioritize the plan's implementation, thus making substantial funding available regularly and ensuring that pollution reduction efforts are based on the best available science and mesh with the state's overall water-quality program goals.

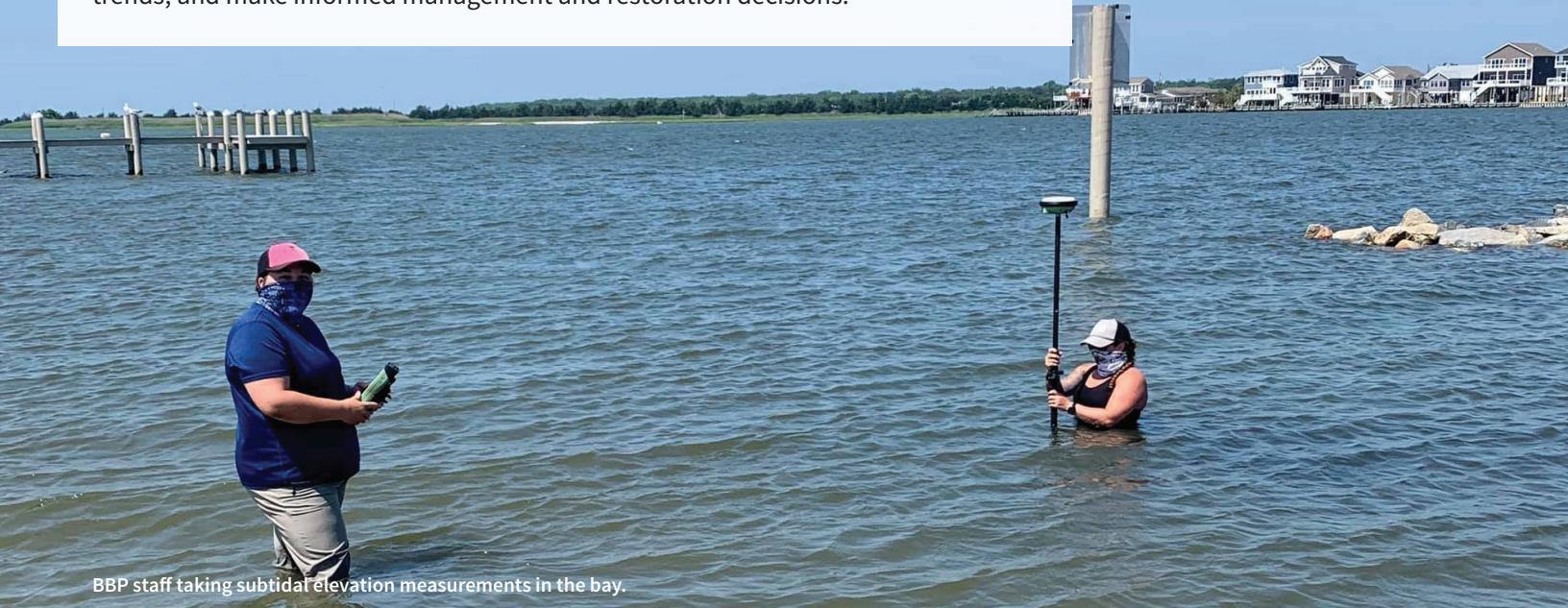
Development of a WPRP requires detailed local information about the problems (e.g., stormwater basins that don't infiltrate water, flooded neighborhood intersections after heavy rains) and possible solutions (e.g., vegetated parking lot swales, retrofitted stormwater basins), so we need participation by local officials, community groups, environmental commission and planning board members, and others to help make these plans effective. To share information with us or join one of the Stakeholder Advisory Committees guiding development of the plans, contact Ceili Pestalozzi, our Watershed Specialist, at cpestalozzi@ocean.edu.




Stan Hales • Director

Science and Research

The Barnegat Bay Partnership is committed to increasing our knowledge of the bay and its watershed. Individually or with partners, we support research and regular and periodic monitoring to help us better understand the bay's condition and environmental trends, and make informed management and restoration decisions.



BBP staff taking subtidal elevation measurements in the bay.

While fieldwork looked different this year due to the COVID-19 pandemic, the BBP staff were able to continue a number of projects through careful planning, social distancing, and modified field procedures. This was particularly important for our long-term monitoring projects, where a break in the time series could present significant issues when the data are analyzed.

Water Quality

Ambient water-quality monitoring

The BBP is one of the partners in the NJDEP's Barnegat Bay water-quality monitoring network. We continued to collect water-quality data at sites on two bay tributaries, Mill Creek and Westecunk Creek, in 2020. Sampling was put on hold in April and May as a result of the state's COVID-19 shutdown and resumed in June with enhanced safety protocols. Visit the [NJDEP's website](#) to view the 2020 data.

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, instruments collect and transmit water temperature, salinity, dissolved oxygen, turbidity, and pH data in near real-time to the [NJDEP's continuous water quality monitoring website](#), where they are archived and available for public downloading and use.

This past year we performed maintenance work at the Beach Haven station, removing the deployment tube (where the instrument sits in the bay) for a thorough cleaning and new coat of anti-fouling paint before placing it back in the water. Making sure these PVC tubes are free of biofouling (such as

barnacles, sponges, algae and others) ensures that the readings are accurate.

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 bay. Climate change-related increases in CO₂ and pH levels in the world's oceans and estuaries impact the ability of marine life to build shells, bones, and other essential body structures. We were able to deploy our CO₂ sensor in 2020 for a longer period than previous years due to improvements in anti-fouling technologies and a revised cleaning schedule. More time in the water means more data collected and a better understanding of coastal acidification impacts on the bay.

BBP laboratory

The BBP maintained laboratory certification for four parameters in 2020 – temperature, conductivity, pH, and dissolved oxygen – and continued to analyze samples and report the results to state agencies for use in watershed health assessments. The lab assists all BBP research projects by providing support with water-quality monitoring, methods development, and a Quality Control Program that ensures reliable data is collected and analyzed.



BBP staff seining for the juvenile fish and nekton study.

Watershed protection and restoration plans

In 2020, the BBP received funding from the NJDEP to develop two Watershed Protection and Restoration Plans (WPRPs), one for the Toms River watershed and one for the Cedar Creek/Oyster Creek/Forked River watershed complex. During the past year, the BBP conducted over 90 stream visual assessments throughout the two watersheds and collected two rounds of water-quality samples. This data will help identify causes of pollution and inform development of the plans.

Living Resources

Juvenile eel monitoring

Low population numbers of American eel (*Anguilla rostrata*) remain a concern up and down the Atlantic coast. 2020 was our ninth year of monitoring the ingress of juvenile American eels into the Barnegat Bay watershed. From February to April, we monitored eels at four locations, completing 231 monitoring events and measuring a total of 757 eels, less than in previous years. We may have missed peak ingress at our two most productive sites when we had to end our sampling effort earlier than usual due to the state's COVID-19 shutdown.

Long-term juvenile fish and nekton sampling

The BBP has been assessing variations in the abundance and distribution of juvenile fishes and jellyfishes in the bay since 2012. From May to October 2020, we seined at 15 bay locations, identifying 65 different taxa (6 gelatinous zooplankton, 4 crabs, 1 turtle, and 54 fishes) and counting 55,282 individuals. The data collected will help identify trends in the populations of many recreationally and commercially important species,

and help us assess the effects of changes in water quality, habitat, and climate on the bay's fauna.

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 to enlarge the oyster reef established in the southern part of the bay (Tuckerton reef) and to continue monitoring it. During 2020, Stockton researchers assessed fish and invertebrate use of the reef and collected water-quality data to better understand the impacts of these oysters on water filtration and nutrient removal in the bay.



Juvenile striped bass captured in our seine net.



Typical tidal wetlands species, including salt hay, growing on an island in the bay.



Mid-Atlantic Coastal Wetlands Assessment

Wetlands research and monitoring

Coastal wetlands provide critical services (e.g., flood protection, maintenance of water quality, carbon and nutrient sequestration, and fish and wildlife habitat) and are vulnerable to sea level rise, climate change, and other human activities. Thus, the BBP and other partners established MACWA over a decade ago to monitor and assess wetlands to guide future wetland management and restoration.

In 2020, we continued long-term monitoring at four marsh sites: Reedy Creek, Island Beach State Park, Dinner Point, and Horse Point. Employing COVID-19 protection protocols, we collected more than 500 measurements from surface elevation tables and marker horizon plots, which together, enable us to assess changes in marsh elevation and determine if marshes are keeping pace with sea level rise.

Working with several EPA programs and the Academy of Natural Sciences at Drexel University, the BBP staff collected samples of wetland plants, invertebrates, fishes, soils, and water at 25 separate locations to assess impacts of nutrient enrichment and marsh fragmentation. We also assisted the USDA Natural Resources Conservation Service with the collection of soil cores at the 25 locations to assess rates of carbon sequestration in the bay's wetlands.

Building on an effort begun in 2019 to prioritize bay islands for restoration, staff from BBP and the USFWS Edwin B. Forsythe National Wildlife Refuge collected baseline data across all eligible islands throughout the bay. This information will be integrated into a prioritization tool, which will be used to identify islands that would most benefit from restoration or enhancement.

Nature-based shoreline projects

In 2019, the BBP assisted the NJDEP Division of Fish and Wildlife and Marine Fisheries Administration with installation of a living shoreline at the Sedge Island Natural Resource Education Center to mitigate shoreline erosion. In fall and winter of 2019-2020, the BBP collected elevation and other data to assess damage from several large storms and help identify the best materials and other strategies to ensure a resilient shoreline project. We will continue to track changes over the next several years to inform decision-making for this project and improve designs for future projects.

In 2020, the BBP completed initial assessments at the Iowa Court and Green Street shoreline stabilization projects in Little Egg Harbor. The NJ Corporate Wetlands Restoration Partnership funded both projects; the Township of Little Egg Harbor has provided funding to monitor during future years. We teamed up with the NJDEP Office of Information Technology to use drone technologies for the collection of high resolution imagery to monitor the project structures and quantify changes in vegetation communities and shoreline position. The BBP produced a [video](#) about the two projects, which can be viewed on the BBP YouTube channel.

Citizen Science and Stewardship Activities

Much of the work done by the organizations in the Barnegat Bay Partnership would not be accomplished without the participation of hundreds of volunteers. Our volunteers help in 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 Volunteers

Paddle for the Edge

Despite the challenges of COVID-19, 2020 was another successful year for the BBP's citizen science project, [Paddle for the Edge](#). After completing virtual training, which included submitting an online "knowledge check," socially distanced volunteers collected data using a smartphone app as they kayaked the bay. In 2020, 124 volunteers paddled 23 miles of shoreline and collected data from 1,200 locations around the bay! Over the past six years, 400+ volunteers have paddled a total of 125 miles of shoreline and collected data at 6,568 locations. The information they gather helps us assess current shoreline conditions and identify potential shoreline restoration areas.

Barnegat Bay Volunteer Master Naturalists (BBVMNs)

The [Master Naturalists](#) provide hundreds of volunteer hours each year as educators, citizen scientists, and stewards of the bay. In 2020, these dedicated individuals continued volunteering despite the challenges presented by COVID-19. A group of masked and socially distanced BBVMNs removed hundreds of invasive plants at John C. Bartlett County Park, giving native species a chance to move in and take hold again. Another group planted American beachgrass on the dunes at Island Beach State Park. In addition to their [Facebook](#) page, the BBVMNs have started a newsletter, "The Naturalist," to stay connected with each other and the many organizations they assist.

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](#). Haley Karddek, 2019-2020 ambassador, and Emily McGuckin, 2020-2021 ambassador, assessed stream health, planted dune grass, monitored microplastics, organized

clean-ups, and partnered with others to complete numerous on-the-ground projects throughout the watershed.

Great Backyard Bird Count

Scientists use data from the [Great Backyard Bird Count](#), 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 2020, the BBP partnered with Ocean County Parks and Recreation to host the fourth annual bird count at Cattus Island County Park. Data from the 2020 count were uploaded to eBird, an online database of bird observations.



Master Naturalist Jackie Hayduk removing invasive plants at Bartlett County Park.

Education and Outreach

Guided by the Barnegat Bay Partnership's Communication and Outreach Plan, Partnership staff engage watershed residents and visitors in activities to increase understanding of the human impacts on the bay's ecosystem, promote stewardship of the bay and its resources, and grow public participation in its protection and restoration.



Dr. Elizabeth Lacey of Stockton University monitoring seagrass in the bay.

Communication and Education Committee (CEC)

With in-person programs and events curtailed due to the COVID-19 pandemic, BBP staff and Communication and Education Committee members adapted by switching almost entirely to virtual educational activities in 2020. Our partners were able to offer many of their usual programs virtually, including rain barrel workshops, seining demonstrations, open houses, teacher workshops and trainings, school programs, clean-ups and other events. CEC meetings provided forums for our partners to share ideas and information with each other about their virtual outreach. In 2020, the CEC also began a revision of the BBP's Communication and Education Plan with the goal of supporting the objectives and actions in the recently revised *Comprehensive Conservation and Management Plan for the Barnegat Bay Watershed*.

Citizen Representative to the Policy Committee

The BBP's Citizen Representative reaches out to watershed citizens to gain their perspective on issues of importance to the Barnegat Bay and reports their concerns to our Policy Committee. In 2020, the BBP added three new Alternate Citizen Representatives to assist the current Citizen Representative, George Murnyak, with his duties – Matthew Garamone, Murray

Rosenberg, and Susan Slim. Mr. Murnyak and the Alternates have been meeting monthly and planning how to grow their efforts. They can be contacted at bbpcitrep@gmail.com.

Ask a Barnegat Bay Scientist

This past year, the BBP offered a new series of *Ask a Barnegat Bay Scientist* programs presented by local scientists conducting various research projects in the bay. A key feature of the programs was the opportunity to ask the scientists questions about their research. Dr. Paul Jivoff kicked off the series in February with a presentation at Ocean County College about his studies of blue crabs in the Barnegat Bay. Due to the COVID-19 pandemic, we offered the rest of the *Ask a Barnegat Bay Scientist* programs in 2020 as webinars. Participants in the four webinars heard about seagrasses from Dr. Elizabeth Lacey of Stockton University, fisheries from Dr. Douglas Zemeckis of Rutgers Cooperative Extension (RCE) of Ocean County, diamondback terrapins from Dr. John Wnek of Project Terrapin, and oyster reef restoration from Dr. Christine Thompson of Stockton University. Links to recordings of these webinars are available on our [website](#). A total of more than 125 people attended the *Ask a Barnegat Bay Scientist* programs, which will be continued in 2021.



A Jersey-Friendly Yard

Jersey-Friendly Yards

The BBP's [Jersey-Friendly Yards](#) website has a wealth of practical information about how to landscape for cleaner water and a healthier environment in New Jersey. For the past three years, the BBP has partnered with the Ocean County Soil Conservation District and RCE of Ocean County on JFY educational programs, workshops, and an annual conference. In early 2020, we collaborated with the Jacques Cousteau National Estuarine Research Reserve to offer a series of in-person JFY workshops for local homeowners. Attendees learned how to maintain soil health, conserve water outdoors, and select "the right plant for the right place."

After cancelling the JFY conference in 2020 due to the pandemic, we replaced it with a series of *Wild About Jersey-Friendly Yards* webinars. Attended by nearly 900 people, the seven webinars featured expert speakers who shared practical information about creating healthy wildlife habitat at home. Participants learned how to plant native species to support pollinators, birds, and other wildlife; replace invasive plants with native alternatives; provide habitat for native bees; compost for wildlife; and "leave the leaves" and plant stems for overwintering wildlife. Links to recordings of most of the webinars are available on [JerseyYards.org](#).

Barnegat Bay Stewardship Certification Program

In 2020, the NJDEP awarded a grant to the BBP to develop a comprehensive Barnegat Bay stewardship program. The goal of the new program is to engage both individuals and communities in a series of actions to manage stormwater, reduce pollution, and conserve resources in the Barnegat Bay watershed. Over the next three years, the BBP will develop and launch three distinct stewardship certification programs, one each for residents, schools, and municipalities. Participants who successfully complete the actions in the program standards will be certified and publicly recognized as stewards of the Barnegat Bay.

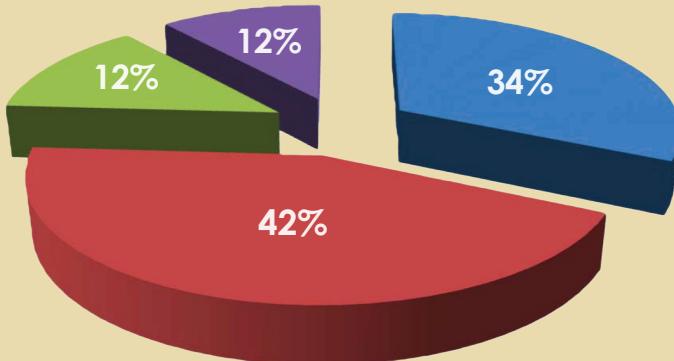


Ruby-throated hummingbird sipping nectar from a Cardinal flower.

Finances

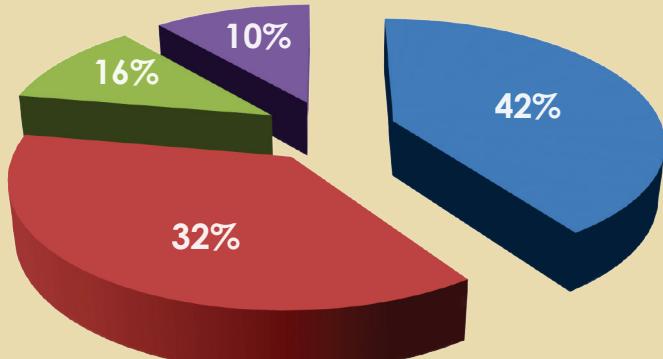
As a National Estuary Program established pursuant to the Clean Water Act (33 U.S.C. 1330; PL 100-4, et seq.), the Barnegat Bay Partnership receives section 320 grant funding from USEPA. The County of Ocean, through the Ocean County Natural Lands Trust and Ocean County College, provides the annual matching 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 2021, the total amount leveraged was \$23.9 million, which resulted in a 21 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 2020



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

FISCAL YEAR 2021



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

US Environmental Protection Agency (USEPA)

NEP Cooperative Agreement:

NEP Base Funding	\$ 600,000
NEP Supplemental Funding (Storm-Rapid Response Monitoring)	\$ 25,000
Ocean County Natural Lands Trust	
Funding Match	\$ 527,446
Ocean County College Funding Match.....	\$ 97,554
Total \$ 1,250,000	

USEPA Region 2 FY20 Wetlands Program Development Grant:

Quantifying Local and Meteorological Drivers of Inundation in Coastal Wetlands of New Jersey.....	\$ 120,678
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Partnership for the Delaware Estuary

Funding Match	\$ 20,001
Ocean County Natural Lands Trust	
Funding Match	\$ 20,037
Total \$ 160,716	

New Jersey Sea Grant Contract:

NJDEP Barnegat Bay Model Evaluation Group.....	\$ 49,500
FY20 Total.....	\$ 1,460,216

Funding during Fiscal Year 2021 (July 1, 2020–June 30, 2021)

USEPA NEP Cooperative Agreement:

NEP Base Funding	\$ 662,500
Ocean County Natural Lands Trust	
Funding Match	\$ 551,447
Ocean County College Funding Match.....	\$ 111,053
Total\$ 1,325,000	

Little Egg Harbor-Tuckerton Shoreline Monitoring Project

Contract for NJDEP Restoration, Enhancement and Protection Grant: Continuation of Post-Construction Monitoring for Iowa Court (Little Egg Harbor) and S. Green Street (Tuckerton) Shoreline Resiliency Projects.....	\$ 81,200
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NJDEP Restoration, Enhancement and Protection Grant:

Watershed Restoration and Protection Plan for Cedar Creek, Oyster Creek, and Forked River	\$ 456,093
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NJDEP Restoration, Enhancement and Protection Grant:

Watershed Restoration and Protection Plan for the Toms River Watershed	\$ 751,675
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NJDEP Restoration, Enhancement and Protection Grant:

Bay Friendly Stewardship Program	\$ 100,000
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NJDEP Division of Fish and Wildlife Stream Crossing

Inventory for Barnegat Bay	\$ 32,512
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Richard Stockton University Benthic Macroinvertebrate

Assessment for Sunflower Island	\$ 13,464
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FY21 Total	\$ 2,759,944
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FY20 & 21 Grand Total	\$ 4,220,160
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Our Staff

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The Ocean County Board of Commissioners

Commissioner Liaison, Joseph H. Vicari



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Our Partners

American Littoral Society

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 Commissioners

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

Photo credits

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Page 8: Photo of Dr. Lacey courtesy of Stockton University.

Page 9: Photo of Jersey-Friendly Yard by Becky Laboy; photo of hummingbird by Bill Buchanan, USFWS.

Back cover: Photo by Haley Kardek.

BARNEGAT BAY PARTNERSHIP

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Annual Report | 2020-2021

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.