New Jersey Wetland Program Plan 2023-2027

Third Iteration, December 2022

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Key Contacts:
New Jersey Department of Environmental Protection
Metthea Yepsen
Metthea.yepsen@dep.nj.gov
(609) 940-4027
New Jersey Pinelands Commission
John F. Bunnell
New Jersey Highlands Council
Kelley Curran
New Jersey Sports and Exposition Authority
Terry Doss

Participants

The following people participated in one or more of the seven Core Element Workshops that were held to develop the 2023-2027 New Jersey Wetland Program Plan:

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division Of Science & Research
Bureau of Environmental Assessment
Metthea Yepsen, Nick Procopio, Brittany Wilburn. Kirk Raper, Josephine Bonventre

Water Resource Management
Bureau of Freshwater & Biological Monitoring
Dean Bryson
Bureau of Environmental Analysis Restoration and Standards
Kimberly Cenno, Biswarup Guha

Watershed And Land Management
Watershed Protection & Restoration
Larry Torok, Susan Lockwood
Land Resource Protection
Ashleigh Windawi, Ryan Anderson

State Parks, Forests & Historic Sites
Bureau of Forest Management
Bill Zipse
Office of Natural Lands Management
Kathleen Walz
State Park Service
Diane Lowrie

Fish And Wildlife
Office of Environmental Review
Kim Springer

Contaminated Site Remediation & Redevelopment Program
Division of Enforcement, Technical & Financial Support
Bureau of Environmental Evaluation and Risk Assessment (BEERA)
Iman Olguin-Lira

Air Quality, Energy & Sustainability
Climate Change, Clean Energy & Sustainability
Tony Rho

Climate Resilience
Climate Resilience Planning
Rebecca Hill

Community Investment & Economic Revitalization
Green Acres
Kimberly Rennick
Natural Resources Restoration
Stacey MacEwan

Department of Information Technology
Bureau of GIS
Steven Jacobus

Commissioner's Office
Office of Environmental Justice
Anna Maria Penaherrera, Nadia Akbar, Kandyce Perry

NEW JERSEY HIGHLANDS COUNCIL
Kelley Curran, Carolyn Klaube

NEW JERSEY SPORTS AND EXPOSITION AUTHORITY
Terry Doss

***Cover photographs listed from left to right, used with permission**: Glacial Bog on the Kittatinny Ridge (photo by Kathleen Strakosch Walz), Pine Barrens Tree Frog (photo by Bob Cunningham), Coastal salt marsh in Great Bay (photo by Ernest Cozens at Photoutback.com), Swamp Pink (photo by Bob Cunningham), and Canoeing on a tidal freshwater marsh (photo by NJ Audubon).*

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Introduction

New Jersey is the most densely populated state in the United States and is expected to be the first state to reach build-out – where all land is either protected or developed. Wetlands are an important feature in New Jersey, covering 17% of the state and providing a plethora of ecosystem services to plant, animal, and human residents.

The state has taken a multi-faceted, comprehensive, approach to managing and protecting freshwater and coastal wetlands. This five-year Wetland Program Plan is an update of the second New Jersey Wetland Program Plan. It provides a framework for the State of New Jersey to strengthen the core elements of its wetland program and to continue to reach the goals listed herein. The steps outlined will serve to direct current and future wetland protection and management efforts along a coordinated path to the benefit of New Jersey's wetland resources and the quality of life for future generations.

The development of the first Wetland Program Plan in 2013 served to integrate the diverse efforts of the NJDEP's multiple programmatic efforts to analyze, assess, preserve, and protect freshwater and coastal wetland resources. The second comprehensive Wetland Program Plan in 2019 incorporated the Pinelands Commission and Highlands Council and added a new core element addressing adaptation, resilience, and mitigation in a changing climate so that it continues to focus New Jersey's public and private resources toward a unified goal of:

> *Improving and protecting the significant ecosystem services and functions provided by wetlands including flood control, shoreline stabilization, coastal storm surge protection, water purification, nutrient cycling, carbon sequestration, sediment retention, provision of habitat for plants and wildlife, reservoirs of biological diversity-supporting food webs, as well as providing meaningful recreation, sustainable economic benefits from tourism and excellent opportunities for environmental education.*

This third iteration of the Wetland Program Plan adds the New Jersey Sports and Exposition Authority (NJSEA), reflecting all that has been accomplished over the past ten years, and outlines goals, actions, and activities for the next five years in New Jersey. In addition, a conscious effort has been made to weave an Environmental Justice component into the six core elements and add it as a seventh core element. Both the State of New Jersey and the USEPA are taking a more active role in improving environmental health. All New Jersey residents, regardless of income, race, ethnicity, color, or national origin, have a right to live, work, and recreate in a clean and healthy environment. New Jersey's low-income communities and communities of color may be facing a disproportionately high number of environmental and public health stressors and, as a result, potentially suffering from increased adverse health effects. New Jersey seeks to identify and correct these outcomes by furthering the promise of environmental justice.

State Agency Overview

The NJDEP's core mission is to protect the air, waters, land, and natural and historic resources of the State to ensure continued public benefit. The NJDEP's mission is advanced through effective and balanced implementation and enforcement of environmental laws to protect these resources and the health and safety of our residents. Paramount to meeting the intent of this mission is to guide our many programs toward a collective goal of comprehensive natural resource management.

In 1979, the New Jersey Pinelands Commission was established as a political subdivision of the State of New Jersey and the regional planning and regulatory agency which oversees development in the Pinelands Area in accordance with the Pinelands Protection Act. The agency's mission is to preserve, protect, and enhance the natural and cultural resources of the Pinelands and to encourage compatible economic and other human activities consistent with that purpose.

The Highlands Water Protection and Planning Council (Highlands Council) is a regional planning agency that works in partnership with municipalities and communities in the Highlands Region to encourage a comprehensive regional approach to the implementation of the 2004 Highlands Water Protection and Planning Act (the Highlands Act). The Highlands Act established the Highlands Council and charged it with the creation and adoption of a Regional Master Plan to protect and enhance the resources within the New Jersey Highlands.

The overall program goal of the New Jersey Sports and Exposition Authority's (NJSEA) wetland program is to preserve, protect, monitor, and assist in the recovery of the more than 4,300 acres of wetlands and other natural habitats that lie within the 30-square mile area known as the Meadowlands District. Formerly known as the New Jersey Meadowlands Commission, NJSEA continues to undertake the founding mandates of the Commission which include protecting the delicate balance of nature.

The seven core elements addressed in this five-year plan are:

1) Monitoring and Assessment
2) Regulation
3) Voluntary Wetland Restoration, Creation, Enhancement, and Protection and Improved Coastal Shoreline Resilience
4) Wetlands Water Quality Standards
5) Adaptation, Resilience, and Mitigation in a Changing Climate
6) Public Outreach and Education
7) Environmental Justice

The first four core elements are defined in the United States Environmental Protection Agency (USEPA) 2009 Core Elements Framework. The fifth core element was to address the State's focus on the critical issue of climate change and resilience as it relates to wetland resources. The sixth core element (formerly core element 5) was added to elevate the importance of cross-program coordination with wetland monitoring, assessment, regulation, restoration, and protection in efforts regarding public outreach and education.

The third iteration of NJ's Wetland Program Plan has revised tables of goals, objectives, and actions for each core element over the five-year period of 2023-2027. A seventh core element, Environmental Justice, is also added in the third iteration to address state and federal efforts to improve the quality of life in overburdened communities that face a disproportionately high number of environmental and public health stressors. The record of what the state has accomplished thus far through the Wetland Program Plan has been moved to the section "Historical Progress on the Core Elements", which can be found at the end of this Plan.

Core Element 1: Monitoring and Assessment

GOAL: To define ways to evaluate wetland condition to understand and preserve important wetland functions and ecosystem services that wetlands provide, including surface-water and ground-water quality, flood control, coastal storm surge detention, nutrient transformation, sediment and particulate retention, carbon sequestration, shoreline stabilization, and provision of plant and wildlife habitat.

OBJECTIVE 1: Develop a monitoring and assessment strategy using a multi-tier approach and testing innovative wetland condition and function assessment protocols.

Action 1: Identify program decisions and long-term environmental outcome(s) that will benefit from a wetland monitoring and assessment program					
ACTIVITY	2023	2024	2025	2026	2027
Update and codify long-term wetland-related environmental goals in agency plans (e.g., DEP Networked Wetland Plan)	X			X	
Continue to identify programs that will ultimately use monitoring data (e.g., track trends, restoration, permitting) and meet with those State programs periodically to share information about progress and components of the strategy	X	X	X	X	X
Identify new ways that wetland data can be used to implement watershed planning, coastal resilience planning, and wetland restoration projects	X	X	X		
Action 2: Define wetlands monitoring objectives and strategies					
ACTIVITY	2023	2024	2025	2026	2027
Coordinate with relevant partners, in federal, state, tribal, and local agencies, universities, conservation organizations, National Estuary Programs, USEPA Regional and National wetland work groups	X	X	X	X	X
Continue participation in the NJ Tidal Wetlands Monitoring Network	X	X	X	X	X
Continue to develop a sustainable long-term monitoring and reference network for freshwater wetlands	X	X	X	X	X
Update wetland monitoring objectives and strategy. Define data needs and applications, including statistical analysis	X	X	X	X	X
Examine how to integrate wetlands monitoring strategy into existing and developing water quality monitoring efforts (e.g., headwaters and other on-stream habitat types, natural and excavated ponds, stormwater basins, riparian floodplain, freshwater wetlands, estuarine tidal systems)	X	X			
Design and implement a consistent monitoring and assessment strategy to evaluate submerged aquatic vegetation (SAV) distribution and abundance in New Jersey (freshwater and tidal)	X				
Action 3: Ensure that monitoring and assessment projects are designed using a site selection method that best serves monitoring objectives (e.g., census, probabilistic survey, rotating basin).					
ACTIVITY	2023	2024	2025	2026	2027
Determine site selection process (probabilistic survey, rotating basin, census)	X	X	X	X	X
Examine other sources for monitoring information within the state and develop data sharing agreements as needed and determine appropriate use of existing relevant data	X	X	X	X	X

Utilize existing monitoring strategies such as, NatureServe's Ecological Integrity Assessment, USEPA NWCA, NJTWMN, and Mid-Atlantic Coastal Wetland Assessment protocols	X	X	X		
Action 4: Select a core set of indicators to represent wetland condition or a suite of functions					
ACTIVITY	2023	2024	2025	2026	2027
Explore the development of new indicators of wetland condition that include wetland-dependent wildlife	X	X			
Add supplemental indicators of condition and/or function as needed, including wetland-dependent wildlife, diatom indices, and those needed to develop Water Quality Standards for Wetlands	X	X			
Ensure that data system is compatible with wetland metrics that may be collected and used in Water Quality Standards for Wetlands	X	X	X	X	X
Evaluate wetland function metrics to be used in the development of a wetland functional assessment	X	X	X		

OBJECTIVE 2: Implement a sustainable monitoring program consistent with the wetlands monitoring strategy.

Action 1: Ensure the scientific validity of monitoring and laboratory activities					
ACTIVITY	2023	2024	2025	2026	2027
Participate in local, regional, and national wetland monitoring discussions and explore options for convening a formal Wetlands Council	X	X			
Review Quality Management Plans (QMP) for compliance with the USEPA	X	X	X	X	X
Draft and update Quality Assurance Project Plans for wetland monitoring projects	X	X	X	X	X
Update wetland mapping methods for LULC	X				
Action 2: Monitor wetland resources as specified in the strategy					
ACTIVITY	2023	2024	2025	2026	2027
Establish a sustainable non-tidal wetland monitoring network in order to research, monitor, and document trends	X	X	X		
Participate in USEPA National Wetland Condition Assessments (NWCA)				X	
Identify and train staff to monitor wetland assessment indicators	X				
Develop a schedule for monitoring wetland resources including repeat sampling at long-term monitoring sites	X				
Monitor streams for Stream Classification Upgrades, identify streams with groundwater influence for freshwater fisheries, crayfish, and herpetofauna in headwater streams of northwest NJ watersheds, and monitor native fish species in lakes and rivers in the Pinelands	X	X	X	X	X
Encourage AmeriCorps NJ Watershed Ambassador Program volunteers to include wetlands in water monitoring projects as feasible	X	X	X	X	X
Continue to coordinate and standardize wetland monitoring and assessment efforts in New Jersey across sectors.	X	X	X	X	X
Add new standardized metrics to NJTWMN protocols (water quality, water level, soils, improving geospatial precision, edge erosion)	X	X	X	X	X
Develop digital survey app(s) for standardized data collection	X	X	X	X	X
Action 3: Establish reference condition					
ACTIVITY	2023	2024	2025	2026	2027
Review and update the process for identifying reference standard condition (e.g., reference sites, historical data, sediment core diatoms) for tidal and non-tidal wetlands	X	X			

Continue to add monitoring data to the Riparia Reference Wetland Database, the New Jersey Tidal Wetlands Monitoring Network Database and NatureServe EcoObs Database and use this data for determining reference condition	X	X	X	X	X
Explore the use of foraminifera to reconstruction sea-level rise rates in coastal zones going back 2000 years and compare to current trends	X	X	X	X	X
Fill gaps in NJTWMN information by collecting the following at long-term monitoring stations: determine absolute elevations (NAVD88), water level change trends, carbon storage rates	X	X	X	X	X
Action 4: Track monitoring data in a system that is accessible, updated on a timely basis, and integrated with other state water quality data					
ACTIVITY	2023	2024	2025	2026	2027
Continue to add monitoring data to the Riparia Reference Wetland Database, the New Jersey Tidal Wetlands Monitoring Network Database and NatureServe EcoObs Database and use this data for determining reference condition. Expand database to house new monitoring data.	X	X	X	X	X
Administer and update data system so that state or tribe can use it for analysis	X	X	X	X	X
Coordinate data metric definitions and data management system with wetland monitoring research in-state and cross-state with collaborators and partners	X	X	X	X	X
Integrate wetland data with other water quality data systems (e.g., state watershed planning databases) as possible	X				
Aggregate wetland related map layers in NJGeoweb	X	X	X	X	X
Action 5: Analyze monitoring data to evaluate wetlands extent and condition/function or to inform decision-making					
ACTIVITY	2023	2024	2025	2026	2027
Evaluate changes in native vegetation over time utilizing maps and vegetation cover data on native versus invasive species in wetlands to track changes in aerial extent of *Phragmites australis* and other non-native species in freshwater and tidal wetlands	X	X	X	X	X
Use baseline statewide wetland condition assessment results to inform decision making	X	X	X	X	X
Analyze changes in wetland extent or condition/function relative to baseline conditions over time; continue to add data and trends to the NJTWMN and other databases and websites	X	X	X	X	X
Analyze changes in coastal wetland extent or condition/function in response to sea-level rise and other climate stressors	X		X		X
Monitor freshwater wetland impacts relating to climate change, including effects of temperature and precipitation change, that impact functions relating to water chemistry, water volume, soils, and biological activity.	X		X		
Regularly report wetlands status and trends, including the Statewide Integrated Water Quality Assessment Reports to the EPA, a DEP status and trends report for wetlands, and others (Meadowlands, Highlands, and Pinelands). Work towards integrating these reports.	X	X	X	X	X
Action 6: Public Education and Outreach					
ACTIVITY	2023	2024	2025	2026	2027
Develop a wetland monitoring and assessment education program for state and local watershed groups	X				
Provide web-based information to the public on wetland condition and function, available wetland monitoring protocols and assessment tools	X	X	X	X	X
Present monitoring findings and new monitoring techniques at conferences and in peer-reviewed publications	X	X	X	X	X
Explore the development of a citizen science wetland monitoring program and partnering with other groups	X	X	X	X	X

OBJECTIVE 3: Conduct research to fill knowledge gaps not covered in existing wetlands monitoring and assessment programs.

Action 1: Identify and Fill Data Gaps					
ACTIVITY	2023	2024	2025	2026	2027
Keep track of data gaps identified by NJDEP Programs, Pinelands Commission, Highlands Council, The New Jersey Sports and Exposition Authority, the Science Advisory Board, New Jersey State Mosquito Control Commission, and external partners	X	X	X	X	X
Conduct new research to inform wetland science based on data gaps	X	X	X	X	X
Design and implement a study to determine the impact of groundwater withdrawal on wetland hydrology, vegetation, soils, water chemistry, and other environmental parameters	X	X			
Design and implement a hydrology study to better understand the relationship of tidal hydrology (amplitude, frequency, and duration) on wetland vegetation, soils and water chemistry and resilience to sea-level rise	X	X	X	X	X
Conduct static occupation of long-term monitoring sites in tidal wetlands to look at deep subsidence	X	X	X	X	X
Explore the use of drones to replace traditional field-based assessments	X	X	X	X	X
Create habitat models for marsh birds to determine which tidal wetlands are being utilized by various species	X	X	X	X	X
Study the movement of trace metals through wetlands (cycling, capture, release), trace metals exposure to humans via shellfish consumption	X	X	X	X	X
Study selenium cycling in wetlands and relationship to fish/shellfish accumulation; potential impacts to human consumption and risk	X	X	X	X	X
Develop a mechanism to evaluate pre-and post-implementation water quality for sites that undergo mitigation	X	X	X	X	X
Action 2: Improve Decision Making by Developing New Map Layers and Map Based Tools					
ACTIVITY	2023	2024	2025	2026	2027
Improve mapping of wetlands. Particularly peatlands and oligohaline marshes. Consider assigning HGM, Anderson, and Cowardin. Improve methods for tracking change in wetland area overtime.	X	X			
Develop the NJWRAP Tool and update the CERAP Issues of Concern maps	X	X	X	X	X
Create a spectral library for wetland plant species	X	X			
Update head of tide map layer		X	X		

OBJECTIVE 4: Incorporate monitoring data into agency decision-making.

Action 1: Evaluate monitoring program to determine how well it is meeting the State's monitoring program objectives					
ACTIVITY	2023	2024	2025	2026	2027
Develop schedule to evaluate monitoring programs; including regular meetings with regulators to develop list of monitoring and research needs to support regulatory changes	X	X	X	X	X
Cultivate new technology for monitoring and assessment (e.g., drones, remotely sensed data, eDNA, and diatom identification)	X	X	X	X	X
Ensure assessment methods are providing the necessary information and make changes if needed	X	X	X	X	X
Review other wetlands program elements with respect to monitoring and assessment (e.g., regulation, restoration, water quality standards, adaptation, resilience and mitigation in a changing climate)	X				X

Biannual workshops to present on monitoring activities and results (wetland monitoring council)	X	X	X	X	X
Develop and execute a plan for wetland protection based on current gaps and needs by the Land Acquisition Review Committee (LARC), which includes NJDEP intra-agency representatives to advise Green Acres on land acquisition for recreation and conservation pruposes	X	X	X	X	X
Action 2: Share findings from state monitoring programs					
ACTIVITY	2023	2024	2025	2026	2027
Develop a status and trends report for wetlands of the state	X		X		
Continue to hold regular meetings of the DEP Wetland Team	X	X	X	X	X
Continue the DEP's What's Happening in NJ's Wetlands seminar series	X	X	X	X	X
Continue to fill leadership roles in the NJTWMN	X	X	X	X	X
Meet with other state partners to share monitoring data results	X	X	X	X	X
Present study results at NJWMC, NWMAWG, MAWWG, MACWA and other wetland related meetings[1]	X	X	X	X	X
Maintain the NJTWMN Website	X	X	X	X	X
Action 3: Evaluate the environmental consequences of a federal or state action or group of actions; modify programs as needed based on M&A data					
ACTIVITY	2023	2024	2025	2026	2027
Modify mitigation reporting protocol and standards as needed based on tested monitoring and assessment tools	X	X	X	X	X
Provide comments on USACE Back Bay Study	X	X	X	X	X
Provide comments on changes to federal wetland regulations and wetland definitions	X	X	X	X	X
Action 4: Improve the site-specific management of wetland resources					
ACTIVITY	2023	2024	2025	2026	2027
Encourage the use of reference sites in restoration planning	X	X	X		
Establish ecologically meaningful benchmarks for gauging restoration success	X	X	X	X	X
Evaluate the performance of compensatory mitigation sites as well as voluntary restoration and protection sites	X	X	X	X	X
Evaluate the functions provided by individual wetlands or types of wetlands to determine best management options	X	X	X		
Evaluate the ecosystem services provided by individual wetlands or types of wetlands to determine best management options	X	X	X		
Evaluate upland buffers to wetland habitats for wetland-dependent wildlife and ecological functions	X				
Explore the potential for wetland ponds to act as sources for HABs	X	X	X		
Action 5: Develop geographically defined wetland protection, resilience, restoration, and management plans					
ACTIVITY	2023	2024	2025	2026	2027
Advance regional research to generate modeling and ArcGIS maps to guide conservation efforts, identify and prioritize management areas for restoration and enhancement (e.g., identify vulnerable wetlands, prioritize restoration potential, prioritise wetland acquisition and project funding)	X	X	X	X	X
Incorporate wetlands into comprehensive Watershed Management Plans that serve state water quality management needs	X	X	X	X	X

[1] NJWMC (New Jersey Water Monitoring Council), NWMAWG (USEPA National Wetland Monitoring and Assessment Work Group), MAWWG (Mid-Atlantic Wetland Work Group), MACWA (Mid-Atlantic Coastal Wetland Assessment)

Incorporate wetlands into resilience planning and NJWRAP	X	X	X	X	X
Participate in the development of EPA Watershed Restoration Registry tool for New Jersey	X	X	X	X	X
Identify important wetlands valuable to vulnerable or rare wetland-dependent wildlife and plants	X	X	X	X	X
Use information obtained on wetland-dependent plants and animals to better inform the development of wetland management plans, such as state forest natural resource stewardship plans	X	X	X	X	X
Incorporate environmental justice communities into watershed and wetland management plans	X	X	X	X	X
Meet with wetland scientists at NJDEP, New Jersey Pinelands Commission, New Jersey Sports and Exposition Authority, Rutgers University Meadowlands Environmental Research Institute, Highlands Water Protection and Planning Council and New York-New Jersey Harbor Estuary Program to explore collaboration and cooperation opportunities in wetlands research, monitoring, assessment, protection, restoration, and management	X	X	X	X	X

Core Element 2: Regulation

GOAL: To avoid and minimize wetland loss; preserve wetland function; replace unavoidable or un-authorized losses with healthy wetlands that are equivalent or greater in size and which function similar to or better than the lost wetlands; wherever possible, increase the quantity and quality of wetlands through creation and enhancement projects; and to take a proactive approach in increasing meaningful involvement and communication with overburdened communities to ensure fair and equitable resource protection and enhancement.

OBJECTIVE 1: Continue to improve upon existing wetland protection efforts under our assumed freshwater wetland program and coastal zone management program.

Action 1: Evaluate regulatory activities and determine environmental results					
ACTIVITY	2023	2024	2025	2026	2027
Continue to monitor wetland mitigation sites for compliance and/or success rates	X	X	X	X	X
Continue the process of integrating and coordinating Statewide habitat preservation and land acquisition activities (e.g., through the Land Acquisition Review Committee)	X	X	X	X	X
Assess values of wetland or riparian buffers to resource health based on water quality indicator research	X	X	X		
Identify and document secondary impacts on wetland and floodplain resources	X	X	X		
Evaluate storm damage assessments and integrate sustainable development practices where possible (e.g., using wetlands as buffers to address flooding resulting from increased extreme rainfall events and other climate change threats)	X	X	X	X	X
Evaluate the effectiveness of the Coastal Wetlands Act of 1970 with respect to identifying, protecting, and restoring coastal wetlands	X	X	X	X	X
Identify properties suitable for mitigation statewide.	X	X	X	X	X
Continue to study the effectiveness of wetland restoration projects to inform regulations	X	X	X	X	X
Review and update past designations of sensitive areas within Barnegat Bay and explore the feasibility of designating unique protections and/or restrictions on use for identified ecologically sensitive areas	X	X	X	X	X
Coordinate cross-program with other State, Federal, and Local Agencies	X	X	X	X	X
Establish goals and needs to support intra- and inter-agency exchange of wetland research information	X	X	X	X	X
Annually evaluate wetland research results, reports, and wetland permitting data relative to their application to regulatory needs and goals	X	X	X	X	X

OBJECTIVE 2: Improve regulatory permit and data management processes to maximize efficiency and transparency, and increase attention on mitigation processes, protocols, and monitoring.

Action 1: Improve program efficiency, transparency, and regulatory guidance					
ACTIVITY	2023	2024	2025	2026	2027
Continue to enhance the Electronic Letter of Interpretation (E-LOI) process to make it more functional and easier to use	X	X	X	X	X

Make the E-LOI process mandatory; in the interim, provide incentives for the electronic submission of wetland data	X	X			
Update wetland mitigation-related data and incorporate other mitigation actions to create a comprehensive mitigation GIS resource	X	X	X	X	X
Continue review of all inter- and intra-agency memorandums of agreement (MOAs)	X	X	X	X	X
Continue improvements to Department database reporting and data analysis capabilities	X	X	X	X	X
Develop and evolve Department programmatic websites	X	X	X	X	X
Continue to refine the NJEMS "Programs Interest" and NJEMS "Sites" GIS layer for internal use by regulatory staff	X	X	X	X	X
Action 2: Improve wetland regulations, policies, or guidelines					
ACTIVITY	2023	2024	2025	2026	2027
Identify and evaluate practical and science-based methods of approach to regulatory decisions using a watershed approach.	X	X	X		
Regularly review wetland regulations and develop a centralized list of recommended changes	X	X	X	X	X
Identify and evaluate needed updates to the Freshwater Wetland Rules and Coastal Zone Management rules and investigate alternate coastal wetland delineation methodology and regulatory implementation	X	X	X	X	X
Prepare and up-date Department listed species protocols and survey standards	X	X	X	X	X
Review and keep current on research/literature, especially as it relates to new technologies and a changing climate.	X	X	X	X	X
Engage communities and seek feedback on the wetland regulatory program, including habitat mitigation and regulations.	X	X	X	X	X
Evaluate and implement revisions to upland buffer distances to wetlands and waters based on factors such as wetland and water-dependent species and water quality. These revisions will include a review of research and literature, as well as the incorporation of stakeholder feedback.	X	X	X		
Establish a consistent policy on the regulatory protection provided to vernal habitats and explore expanding regulatory or legislative language to achieve this goal	X	X	X	X	X
Investigate the regulation of activities that affect wetland hydrology but originate outside of the wetland of interest and its associated wetland buffers	X	X	X	X	X

OBJECTIVE 3: Strengthen coordination between federal, state, and local agencies around permitting and enforcement activities; develop and implement public outreach services; and develop support services for underserved and overburdened communities.

Action 1: Enhance public education and outreach specific to mitigation and other regulatory frameworks					
ACTIVITY	2023	2024	2025	2026	2027
Develop and implement a wetland public education program including formal workshops and public outreach	X	X	X	X	X
Continue development of Department websites to improve information access and educational outreach	X	X	X	X	X
Develop and implement a more strategic plan for wetland public education, including community engagement and rule workshops for environmental consultants and state and local officials.	X	X	X	X	X
Develop guidance documents to provide the public with targeted, in-depth information on specific aspects of wetland values, protection, and regulation.	X	X	X	X	X

Conduct outreach and education around the Mitigation Technical Manual and incorporate risk management and adaptive management frameworks to ensure climate resilience.	X	X	X		
Develop education, outreach, and IT assistance for E-LOI submission (e.g., video tutorials) to ensure equal opportunity and to reduce knowledge and resource barriers	X	X			
Foster and enhance current efforts to combine LOI submissions with current wetland delineation work to produce accurate wetland maps for inquiring landowners	X	X	X	X	X
Ensure that all wetland educational materials, including mitigation and regulatory information is accessible to all (i.e., multiple language formats, video tutorials, infographics, paired documents using laymen's terms, etc.)	X	X	X	X	X

OBJECTIVE 4: Improve coordination between wetland monitoring, data analysis, research and regulation programs to ensure alignment and optimization.

Action 1: Link research and monitoring to regulations					
ACTIVITY	2023	2024	2025	2026	2027
Develop a Statewide non-tidal wetland monitoring network and expand/coordinate efforts towards the existing NJ Tidal Wetland Monitoring Network	X	X	X	X	X
Define parameters that effectuate wetland protection activities consistent with the water quality goals and objectives of comprehensive watershed management.	X	X	X		
Foster and enhance intra- and interagency exchange of wetland research	X	X	X	X	X
Quarterly/Annual meetings between regulatory, monitoring and research staff to ensure continued alignment. . Identify opportunities for optimization of efforts through enhanced community data sharing (e.g., periodic newletter or subject matter expert contact list), joint research and analysis, and coordinated data management.	X	X	X	X	X
Continue What's Happening in NJ's Wetlands seminar series	X	X	X	X	X

Core Element 3: Voluntary Wetland Restoration, Creation, Enhancement, and Protection and Improved Coastal Shoreline Resilience

GOAL: To implement programs for voluntary ecological restoration and protection of wetlands through land acquisition, watershed planning, and assistance to public and private stakeholders; with a focus on enhancing wetlands and fostering resilience.

OBJECTIVE 1: Clearly and consistently define restoration and protection goals					
Action 1: Establish goals that are consistent or compatible across relevant stakeholders					
ACTIVITY	2023	2024	2025	2026	2027
Develop/continue to support networks related to restoration, creation, enhancement, and protection efforts	X	X	X	X	X
Improve mapping of wetlands, particularly peatlands and oligohaline marshes, with consideration of assigning hydrogeomorphic, Anderson, and Cowardin classifications. Additionally, improve methods for tracking change in wetland areas over time.	X				
Establish criteria for viable and sustainable projects and produce guidance documents	X	X	X	X	X
Continue to incorporate environmental justice into project selection and prioritization	X	X	X	X	X
Action 2: Consider watershed planning, wildlife habitat, water quality, carbon sequestration, and other objectives when selecting restoration/creation/enhancement/protection sites					
ACTIVITY	2023	2024	2025	2026	2027
Identify rare, vulnerable, or important wetlands and habitats important for wetland-dependent plants and wildlife and prioritize for restoration/protection	X	X	X	X	X
Identify critical ecosystem services that inform location and type of wetland restoration and protection	X	X			
Apply/develop tools (e.g., GIS, color-infrared photography, mapping, modeling, field inspection of soil, vegetation, and hydrologic conditions) to identify projects and inform watershed planning; examples include the NJWRAP application and updating the CERAP Issues of Concern maps	X				
Share priorities and approaches with other organizations Statewide	X	X	X	X	X
Contribute information to NRCS for use in Ecological Sites Description projects	X	X	X	X	X
Action 3: Establish common success measures for restoration, enhancement, and creation projects					
ACTIVITY	2023	2024	2025	2026	2027
Maintain a resilient coastal shoreline program, including the establishment of a network of partners for the development and implementation of the statewide resilient coastal shorelines plan; coordination of living shoreline practitioners; establishment of a website containing relevant information; and development of a shoreline inventory	X	X	X	X	X
Develop a freshwater wetland resilience program and network of partners	X	X			
Develop guidance and training on the creation of resilient coastal and freshwater wetlands	X	X	X	X	X
Establish common measures of success for wetland restoration, enhancement, and creation projects	X				

OBJECTIVE 2: Protect wetlands from degradation or destruction.

Action 1: Establish long-term wetland protection through acquisition and other mechanisms					
ACTIVITY	2023	2024	2025	2026	2027
Continue to acquire conservation easements or acquire land in fee that includes wetlands as well as associated uplands for wetland-dependent wildlife	X	X	X	X	X
Partner with local communities to establish land stewardship programs when State acquisition is not feasible	X	X	X	X	X
Continue to pursue grant opportunities for wetland acquisition and land stewardship programs	X	X	X	X	X
Explore ways to protect marsh migration areas from development and tidal restriction	X	X	X	X	X
Establish a working committee of Department staff and representatives of local communities (e.g., agricultural, urban, etc.)	X	X	X	X	X
Coordinate and complete "Outside, Together!" to capture the State's open space and recreation needs and priorities to create the New Jersey 2023-2027 Statewide Comprehensive Outdoor Recreation Plan	X	X	X	X	X
Action 2: Manage threats and stressors to wetland integrity					
ACTIVITY	2023	2024	2025	2026	2027
Control non-native invasive species and pests in wetlands to improve and maintain integrity and resilience	X	X	X	X	X
Protect wetlands from herbivory and extreme bioturbation	X	X	X	X	X

OBJECTIVE 3: Increase wetland acres and improve wetland condition and function.

Action 1: Increase wetland acreage and function through wetland restoration, creation, and enhancement.					
ACTIVITY	2023	2024	2025	2026	2027
Maintain a list of existing projects and their associated goals (e.g., dam removals, resilient shoreline projects, blue carbon, wetland restoration, creation, or enhancement)	X	X	X	X	X
Develop site-specific plans for wetland restoration, creation, and enhancement projects and monitor completed projects	X	X	X	X	X
Evaluate tracking of 1) acres of wetlands restored, created, and enhanced and 2) the level of or improvements in function/condition based on wetland indicators	X	X	X	X	X
Action 2: Improve resilience of coastal shorelines					
ACTIVITY	2023	2024	2025	2026	2027
Develop site-specific plans to improve coastal shoreline resilience consistent with guidance and monitor completed projects	X	X	X	X	X
Develop methods to track length of shoreline improved and associated acres of wetlands restored, created, and enhanced as well as how many are implemented in environmental justice communities	X	X	X	X	X
Continue to provide technical assistance for coastal shoreline resilience projects as needed	X	X	X	X	X
Action 3: Establish partnerships to leverage more wetland restoration, creation, and enhancement					
ACTIVITY	2023	2024	2025	2026	2027
Share restoration, creation, and enhancement priorities with partners. Include projects that advance wetlands restoration, and meet funding eligibility requirements, as a priority for award of funds under 319(h)	X	X	X	X	X
Provide technical assistance to partners as needed	X	X	X	X	X

Action 4: Increase carbon sequestration in wetlands (blue carbon)					
ACTIVITY	2023	2024	2025	2026	2027
Develop guidelines on developing blue carbon projects	X	X	X	X	X
Develop a project pipeline for RGGI funding	X	X	X	X	X
Develop site specific plans to protect and increase carbon sequestration capacity of peatlands, tidal wetlands, and submerged aquatic vegetation, monitor completed projects	X	X	X	X	X
Develop methods to track the net carbon sequestration of blue carbon projects	X	X	X	X	X
Action 5: Improve restoration, enhancement, creation, and protection project success					
ACTIVITY	2023	2024	2025	2026	2027
Review monitoring results in order to take measures to improve project success as necessary and adapt techniques as necessary	X	X	X	X	X
Support long-term monitoring of pilot projects that test new restoration and protection techniques	X	X	X	X	X
Collect monitoring results and lessons learned from projects in the region and use what was learned to inform the selection and development of future projects	X	X	X	X	X
Share monitoring results and lessons learned from projects within the State (e.g., papers, presentations, trainings, workshops)	X	X	X	X	X
Develop best management practices for wetland restoration, enhancement, and creation projects	X	X	X	X	X
Share best management practices documents with public for identifying, designing, constructing, and monitoring these restoration projects	X	X	X	X	X
Considering highly ditched tidal marshes in New Jersey, evaluate hydrologic restoration activities for improving habitat condition and ecosystem functioning	X	X	X	X	X

OBJECTIVE 4: Public Education, Outreach, and Training

Action 1: Improve guidance on landowner-driven restoration, creation, and enhancement projects					
ACTIVITY	2023	2024	2025	2026	2027
Develop a Department publication outlining the benefits of preserving and enhancing wetland resources	X	X	X	X	X
Provide training and other communications materials for property owners outlining options related to restoration, creation, enhancement, or protection	X	X	X	X	X
Enhance existing training on wetland restoration and protection for municipalities	X	X	X	X	X
Develop guidance documents on restoration near superfund or other explicitly restricted sites	X	X	X	X	X
Develop guidance document on the restoration of flood-prone properties to enhance community resilience after acquisition	X				
Develop guidance on unintended consequences; establish a process that explores possibilities of harmful effects from projects before projects are started	X	X	X	X	X
Action 2: Provide technical assistance to landowners interested in spearheading restoration, creation, and enhancement projects					
ACTIVITY	2023	2024	2025	2026	2027
Identify funding opportunities DEP can apply for to create a property owner grant program	X	X	X	X	X
Provide opportunities or funding for training for the public (e.g., SER training, CERP certification, etc.)	X	X	X	X	X

Work with Sustainable Jersey to provide an additional incentive for property owners to undertake/choose restoration over other options	X	X	X	X	X
Provide assistance for applicants navigating regulatory requirements	X	X	X	X	X
Provide training and other communications materials to help property owners understand options	X	X	X	X	X
Create, distribute, and maintain an updated list of funding opportunities available to landowners interested in restoration, creation, and enhancement projects	X	X	X	X	X
Action 2: Increase community involvement and sense of ownership in restoration, creation, and enhancement projects					
ACTIVITY	2023	2024	2025	2026	2027
Host forums with communities to ensure that needs are directly addressed in local projects	X	X	X	X	X
Recruit volunteers for restoration projects to increase hands-on experiences, community building, and the feeling of ownership; look to other examples of successful community education and partnership programs (e.g., Masonville Cove Environmental Justice Initiative in Maryland)	X	X	X	X	X
Create programs for urban communities to enhance education regarding urban restoration and climate change	X	X	X	X	X
Produce guidance documents that provide clear options and steps to follow to for restoration, creation, enhancement, and protection of wetlands	X	X	X	X	X
Identify funding opportunities DEP can apply for to partner with education outreach groups	X	X	X	X	X

Core Element 4: Wetlands Water Quality Standards

GOAL: To protect, maintain, and restore the quality of New Jersey wetlands in accordance with the Clean Water Act by setting benchmarks for condition and/or function by wetland type. Wetland Water Quality Standards will evolve as Monitoring and Assessment programs collect and analyze data using a reference-based approach to define wetland quality along a stressor and condition gradient.

OBJECTIVE 1: Develop wetland-specific water quality standards.

Action 1: Gather information that would inform standards development					
ACTIVITY	2023	2024	2025	2026	2027
Gather information on wetland water quality standards utilizing guidance and templates developed by the USEPA and the Association of State Wetland Managers and existing standards developed by other states	X	X			
Participate in meetings, calls, and webinars of interstate organizations including the Association for Clean Water Administrators and the Association of State Wetland Managers	X	X	X	X	X
Evaluate hydrogeomorphic characterization as a potential tool to evaluate wetland ecosystem functions in New Jersey	X	X			
Develop wetland condition ratings by tidal and non-tidal wetland types using existing Floristic Quality Assessment tools		X	X	X	
Continue to utilize diatom identification tools and site diversity assessments in coastal and freshwater wetlands to determine if there is a relationship between wetland condition and diatom diversity or species composition	X	X	X	X	X
Conduct research on the relationship between groundwater quality and wetlands, and the influence of wetlands on downstream water quality	X	X	X	X	X
Define stressors to wetland water quality in the context of condition, function, and ecosystem services	X	X			
Develop new research projects as needed	X	X	X	X	X
Action 2: Begin to define wetland ecosystem functions and services by type					
ACTIVITY	2023	2024	2025	2026	2027
Explore options for differentiating and mapping wetland types by their functions and ecosystem services		X	X		
Define and map wetlands by their designated uses (i.e., functional attributes) (e.g., flood protection, water storage, biodiversity and habitat conservation, carbon storage, etc.)		X	X	X	X
Develop updated wetland, wetland buffer, and riparian zone mapping.	X	X	X		
Develop and field test a wetland and riparian zone rating methodology.		X	X	X	X
Action 3: Consider options for developing wetland water quality standards informed by a monitoring and assessment strategy utilizing available data					
ACTIVITY	2023	2024	2025	2026	2027
Consider options for wetlands-specific quality standards (narrative and numeric) through collective exploration involving NJ DEP Natural and Historic Resources, Science and Research, Land Use Management, Water Resource Management, as well as the Pinelands Commission and Highlands Council	X	X	X	X	X
Develop a monitoring and assessment strategy to help inform the development of potential wetland water quality standards		X	X		

Evaluate existing indices and examine the potential to develop new indices that are relevant to water quality impacts on wetlands	X	X			
Inventory existing datasets and complete a literature search to help set thresholds of wetland-specific water quality standards	X	X			
Compile wetland water quality reference criteria by wetland function and type. Determine if there is a need to sample more wetlands to improve the representation of “poor,” “fair,” or “good” wetland water quality		X	X	X	X
Evaluate the nexus between water quality standards for wetlands and existing mechanisms to protect, maintain, and restore the wetlands			X	X	

Core Element 5: Adaptation, Resilience and Mitigation in a Changing Climate

GOAL: To reduce and respond to climate change by improving wetland, aquatic, and riparian ecosystem resilience, maximizing carbon sequestration in wetlands, and implement resilience plans and policies that prioritize effective use of ecosystems for habitat value, community resilience, and other ecosystem services.

OBJECTIVE 1: To improve ecosystem resilience and adaptation in the face of changes in precipitation, drought, storm events, sea-level rise, saltwater intrusion, and threats to natural infrastructure.

Action 1: Identify threats to wetlands posed by sea-level rise, changes in salinity, increased precipitation, coastal and inland flooding, stochastic and severe storm events, loss of trees to windfall, drought, increased fire					
ACTIVITY	2023	2024	2025	2026	2027
Develop research projects as needed to fill data gaps on threats to wetlands and identify characteristics of wetland habitat resilience	X	X	X	X	X
Identify inland freshwater wetlands susceptible to coastal sea-level rise, storm surge, changes in salinity, and other climate change factors	X	X			
Update maps of areas susceptible to coastal edge loss and areas prone to flooding (inland and coastal)					
Establish new areas of long-term monitoring in reference wetlands across the state as benchmarks to evaluate change over time with a focus on metrics that address climate change impacts	X				
Identify areas of greatest potential for wetland system resilience using tools such as The Nature Conservancy's 2017 "Resilient Coastal Sites for Conservation in the Northeast and Mid-Atlantic US" report and interactive map, and the Coastal Ecological Resilience and Adaptation Plan; including TNC's Climate Resilient and Connected Landscapes mapping	X				
Develop a watershed-based planning tool to evaluate wetland function, for example NJWRAP and WRR	X				
Identify threats to submerged aquatic vegetation as a result of climate change					
Evaluate the effects of climate change on invasive and pest species					
Action 2: Monitor identified threats to wetlands posed by changing climate					
ACTIVITY	2023	2024	2025	2026	2027
Continue existing long-term monitoring in reference wetlands across the state as benchmarks to evaluate change over time with a focus on metrics that address climate change impacts	X	X			
Develop regular trend reports on wetland condition and function relative to climate change using NJ Tidal Wetland Monitoring Network and Non-tidal Wetland Monitoring Network (once developed) data	X	X			
Continue and build on long term monitoring in springs and headwater streams influenced by groundwater for water quality and biological resources with respect to climate related changes in precipitation and temperature	X	X	X		
Refine statewide SLAMM models using state specific monitoring data (local accretion rates)	X	X	X	X	X

OBJECTIVE 2: Implement strategic initiatives that increase carbon sequestration in wetlands such as the Natural and Working Lands Strategy and RGGI Strategic Funding Plan

Action 1: Identify the components of wetland systems that enhance carbon sequestration					
ACTIVITY	2023	2024	2025	2026	2027
Review the Natural and Working Lands Strategy and Regional Greenhouse Gas Initiative Strategic Funding Plan and update as needed	X	X	X	X	X
Research non-tidal wetland capacity for net carbon sequestration, including fungal networks, by soil type (peat vs mineral) and wetland type (hydrology and vegetation)	X	X	X	X	X
Develop a baseline map of carbon sequestration in NJ wetlands	X	X	X	X	X
Study the net sequestration provided in marsh migration areas and non-tidal wetlands	X	X	X	X	X
Obtain a better understanding of methane fluxes in different wetland types (soils, vegetation, hydrology, salinity, etc.)	X	X	X	X	X
Develop a map showing projected increase in net sequestration rate if restoration were to take place	X	X	X	X	X
Update salinity maps with new data and better extrapolation over marshes	X	X	X	X	X
Support and participate in NRCS's efforts to better map tidal wetland soils in New Jersey and evaluate blue carbon potential	X	X	X	X	X
Develop new tools to identify, design, construct and monitor blue carbon projects	X	X	X	X	X
Work with partners to implement, learn from, and improve blue carbon projects	X	X	X	X	X
Study the carbon sequestration effectiveness of RGGI funded Natural Climate Solutions Grant projects	X	X	X	X	X
Incorporate fungal networks into carbon sequestration calculations	X	X	X	X	X
Study the increased extent of non-tidal wetlands as a result of saltwater intrusion	X	X	X	X	X
Apply optimization modeling to analyzing land management options when prioritizing carbon to inform plans and targets	X	X	X	X	X
Use the USFS Forest Inventory and Analysis National Program system as a way of monitoring forested wetland carbon sequestration rates and factors influencing rates, as well as carbon storage and species composition	X	X	X	X	X
Examine wetland contributions to other greenhouse gas fluxes	X	X	X	X	X
Action 2: Implement the Natural and Working Lands Strategy and RGGI Strategic Spending Plan					
ACTIVITY	2023	2024	2025	2026	2027
Use existing maps and tools to identify areas where future impacts may compromise the carbon sequestration potential and identify where protection, restoration or enhancement may increase sequestration. Develop or amend existing maps and tools to cover the entire state and wetland types that have not been included in previous maps/tools	X	X	X	X	X
Work with partners to develop a project pipeline of carbon sequestration projects (especially in tidal wetlands), calculate/estimate timeline and cost to plan, design and implement these projects	X	X	X	X	X
Identify areas best suited to wetland protection based on carbon sequestration value and climate model predictions of habitat change over time	X	X	X	X	X
Develop a Blue Carbon Action Plan as described in the 80x50 Report	X	X	X	X	X
Develop blue carbon and Natural and Working Lands Strategy case studies to provide lessons learned for future projects and other states	X	X	X	X	X
Restore 10,000 acres of Atlantic White Cedar in 10 years	X	X	X	X	X

OBJECTIVE 3: Develop and implement resilience planning and actions that prioritize ecological-based community and habitat resilience.

Action 1: Pilot ecologically based hazard mitigation strategies, develop guidance and monitor the success of these ecologically based resilience techniques.					
ACTIVITY	2023	2024	2025	2026	2027
Implement and update the Statewide Climate Resilience Strategy as a blueprint for protection of property, lives, infrastructure, and natural environments by guiding policies, regulations, resources and funding	X	X	X	X	X
Ensure that the best possible science on wetlands is used to inform the update of the Statewide Climate Resilience Strategy	X	X	X	X	X
Work with partners to implement, learn from, and improve ecologically based hazard and mitigation strategies. Update and develop best management practices.		X	X	X	
Explore restoring, enhancing, and increasing the size of wetland buffers for carbon sequestration and flood storage and prevention	X	X	X	X	X
Restore historical floodplain wetlands to improve carbon sequestration and stormwater management	X	X	X	X	X
Prioritize the implementation of ecology-based hazard mitigation and resilience projects in overburdened communities in places disproportionately affected by climate change	X	X	X	X	X

OBJECTIVE 4: Increase the public awareness and knowledge of the value of wetlands for climate change mitigation and resilience.

Action 1: Develop an education and outreach program related to climate change mitigation and resilience					
ACTIVITY	2023	2024	2025	2026	2027
Seek resources and partners to train professionals/contractors/local and regional officials in the relationship of wetland functions and ecosystem services to climate resilience	X	X	X	X	X
Encourage development of school curriculum modules for wetland ecological values to climate change resilience	X	X	X	X	X
Develop and implement a public relations and education campaign for citizens of the state in value of ecological systems including wetlands to community and habitat resilience	X	X	X	X	X
Partner with indigenous communities to strengthen the sharing of traditional knowledge and values of land stewardship	X	X	X	X	X

Core Element 6: Public Outreach and Education

GOAL: To encourage and develop State practices, partnerships, and programs that increase understanding, awareness, and appreciation of wetlands through education, information, outreach, and involvement.

OBJECTIVE 1: To improve and expand upon efforts to educate the general public on wetlands functions, benefits and values; increase opportunities for passive and active recreational interaction, raise awareness of the foundations and justification for regulatory practices and seek to develop a general appreciation of the role wetlands play in maintaining the health and stability of the existing and future landscape environment.

Action 1: Communicate the value of wetlands, in particular their functions and ecosystem services, and provide public education opportunities					
ACTIVITY	2023	2024	2025	2026	2027
Convene a wetlands outreach and education committee composed of NJDEP and outside partners twice a year to keep each other informed and find opportunities to collaborate	X	X	X	X	X
Increase the opportunities for school children to have positive hands-on experiences in and around wetlands, thus, fostering meaningful connections to the resource	X	X	X	X	X
Correlate, identify, and create publicly available wetlands curricula and suggest wetland curricula be included in Statewide core curricula on climate change (e.g., Wonders of Wetlands, NJ Climate Education Hub) for NJ public schools	X	X	X	X	X
Partner with other education programs and create new wetlands curricula based on different age groups	X	X	X	X	X
Increase public programming at state parks, forests, WMAs, etc., especially in the field and hands-on experiences, about wetlands values and functions	X	X	X	X	X
Seek out funding for and start a social media campaign that has the objective of changing attitudes towards “wetlands” and other content. Share content among wetland organizations to reach a larger audience. Consider focusing on Wetlands Month/Day	X	X	X	X	X
Increase the capacity for public and school education programming by increasing staffing levels of educators and interpretive specialists	X	X	X	X	X
Implement a Wetland Public Opinion Survey in NJ for protection of water and habitat quality following the guidance of the EPA’s Development of User Perception Surveys to Protect Water Quality from Nutrient Pollution primer. A survey developed by NJDEP could be utilized to reach out to residents to improve awareness of the need for water and habitat quality protection	X	X	X	X	X
Coordinate communication and public outreach about New Jersey’s work on the USEPA core elements (Monitoring and Assessment; Regulation; Voluntary Wetland Restoration, Creation, Enhancement, and Protection and Improved Coastal Shoreline Resilience; Wetlands Water Quality Standards; Adaptation, Resilience, and Mitigation in a Changing Climate; Public Outreach and Education; and Environmental Justice)	X	X	X	X	X
Develop public education programs on wetlands, their ecosystem services (e.g., flood abatement, carbon sequestration, water filtration, habitat provision), and threats to their functions (e.g., climate change, eutrophication, etc.) that can be used in training workshops and as exhibits at local events	X	X	X	X	X
Include wetland education in climate resilience and mitigation planning	X	X	X	X	X

Publicize the value of wetlands at wetland associated events, recreational, and volunteer opportunities	X	X	X	X	X
Develop/enhance current outreach, education, and signage for the Sedge Island Conservation Zone and other Environmentally Sensitive Areas	X	X	X	X	X
Develop and maintain webpages dedicated to wetlands that will share reports, tools, and other work on wetlands	X	X	X	X	X
Develop a Story Map about wetlands in NJ	X	X	X	X	X
Provide support for the development of wetland-related educational exhibits, kiosks, waysides, and signs (e.g., aboveground/belowground/water diorama-type showcase exhibit)	X	X	X	X	X
Create/enhance citizen science programs related to wetlands to increase access and hands-on experiences in and around wetlands	X	X	X	X	X
Action 2: Communicate the practices of wetland monitoring, restoration, enhancement, creation, and protection in the state					
ACTIVITY	2023	2024	2025	2026	2027
Sponsor workshops and training opportunities for the public on wetland restoration and best management practices	X	X	X	X	X
Publicize case studies in wetland restoration projects	X	X	X	X	X
Develop a Story Map about wetland restoration and enhancement, particularly with respect to coastal resilience in New Jersey	X	X	X	X	X
Write peer reviewed papers, white papers, and brochures for the public about wetland restoration in New Jersey	X	X	X	X	X
Develop, update, and enhance new and existing web-based tools for the public to use in assessing and monitoring wetlands	X	X	X	X	X
Provide opportunities for the public to engage in monitoring of restoration projects	X	X	X	X	X
Encourage/fund interpretive waysides and signs at restoration sites	X	X	X	X	X

OBJECTIVE 2: To improve, expand, and ensure long-term outreach, collaboration, and knowledge-sharing with the public, with special consideration of underserved groups and individuals including tribal and overburdened communities (OBC).

Action 1: Effectively partner with external groups to increase engagement around wetlands					
ACTIVITY	2023	2024	2025	2026	2027
Regularly meet with tribes and OBC to exchange information and collect/document and support wetland-related needs	X	X	X	X	X
Ensure that tribes and OBC are invited to participate in work related to all Core Elements of the NJ Wetland Program Plan	X	X	X	X	X
Develop Wetland Program Development Grants with tribes and OBC to help make NJ's Wetland Program more equitable and effective	X	X	X	X	X
Invite stakeholder feedback on the New Jersey Wetland Program Plan	X	X	X	X	X
Partner with non-profits in New Jersey to help develop education programs, stakeholder outreach, expand public awareness, adopt a wetland program, lead workshops and trainings, etc.	X	X	X	X	X
Provide financial support for partners doing education and outreach	X	X	X	X	X
Find mechanisms to alert the public to wetland related funding opportunities and provide technical assistance in writing and submitting applications	X	X	X	X	X

Core Element 7: Environmental Justice

GOAL: To provide and ensure equal access for overburdened communities to the benefits provided by wetlands and to follow a customized approach to assistance that enables and supports equitable access to and participation in the wetland programs provided by the State.

OBJECTIVE 1: Enact principals of environmental justice in all facets of NJDEP wetland-related efforts					
Action 1: Utilize monitoring and assessment of local wetlands to build connections and opportunities for overburdened communities to access, benefit from, and contribute to State-related resources and information					
ACTIVITY	2023	2024	2025	2026	2027
Participate in local, regional, and national wetland monitoring discussions and explore options for convening a formal Wetlands Council with specific consideration to representation of overburdened communities and/or members of the Environmental Justice Advisory Council within the Wetlands Council	X	X	X	X	X
Explore the development of a community science wetland monitoring programs within overburded communties and partnering with local education groups to ensure equitable access to scientific opportunities	X	X	X	X	X
Consider overburdened communities when developing watershed and wetland management plans	X	X	X	X	X
Provide opportunities to increase involvement of overburdened communities (e.g., provide incentives, resources, and training; community science programs; summer enrichment programs; etc.)	X	X	X	X	X
Partner with local organizations and identify gaps of monitoring around underserved communities	X	X	X	X	X
Develop a plan to incorporate overburdened communities in monitoring and assessment activities	X	X	X	X	X
Provide additional resources for communities that face a higher risk due to high industrial activity or other impacts to wetland quality	X	X	X	X	X
Increase targeted assessment and enforcement of regulations within overburdened communities to prevent water quality degradation and/or habitat and health destruction	X	X	X	X	X
Action 2: Ensure holistic support, understanding, and production of wetland regulations by incorporating overburdened communities in development of regulations and policies					
ACTIVITY	2023	2024	2025	2026	2027
Evaluate and implement revisions to upland buffer distances to wetlands based on factors such as wetland-dependent species, water quality, and overburdened communities. These revisions will include a review of research and literature, as well as incorporation of stakeholder feedback, particularly from residents of overburdened communties and EJ advocacy leaders.	X	X	X	X	X
Strengthen language regarding mitigation regulations and policies in overburdened communities to ensure EJ areas are not disproportionately impacted by wetland mitigation (e.g., removal of wetlands in local areas but replaced in an area outside the EJ area)	X	X	X	X	X
Explore ways to incorporate overburdened communities into the process of forming regulations, creating multiple routes of involvement, so that they are not restricted to stakeholdering	X	X	X	X	X

Explore requirement for permit applicants to hold direct conversations with overburdened communities as part of their impact evaluation of their proposed project	X	X	X	X	X
Actively incorporate multiple routes of language interpretation and translation and other aspects of outreach materials/meetings (e.g., producing materials in layman terms, ensuring information is provided in multiple languages, developing multi-media materials for information sharing, etc.)	X	X	X	X	X
Action 3: Enhance consideration of overburdened communities regarding access to protected wetlands and corresponding ecosystem services and benefits, as well as provide equitable opportunities and information regarding voluntary wetland restoration, creation, enhancement, and protection					
ACTIVITY	2023	2024	2025	2026	2027
Prioritize overburdened communities when selecting projects for restoration, creation, enhancement, and protection of wetlands	X	X	X	X	X
Share priorities and approach towards wetland protection in overburdened communities with local communities and organizations to increase knowledge sharing and standardization	X	X	X	X	X
Establish a working committee of Department staff and representatives of overburdened communities, and host forums with overburdened communities to ensure that needs are directly addressed in local projects	X	X	X	X	X
Develop methods to track length of shoreline improved and associated acres of wetlands restored, created, and enhanced, as well as how many are implemented in overburdened communities	X	X	X	X	X
Develop guidance documents regarding restoration near superfund or other explicitly restricted sites	X	X	X	X	X
Provide assistance for overburdened communties for navigating the regulatory requirements	X	X	X	X	X
Recruit volunteers from overburdened communities for restoration projects to increase hands-on experiences, community building, and stewardship; look to other examples of successful community education and partnership programs (e.g., Masonville Cove Environmental Justice Initiative in Maryland)	X	X	X	X	X
Create programs for overburdened communities to enhance education regarding restoration and climate change	X	X	X	X	X
Produce training and guidance documents for overburdened communities that provide clearl options and steps for restoration, creation, enhancement, and protection of wetlands	X	X	X	X	X
Identify funding opportunities DEP can apply for to partner with education outreach groups	X	X	X	X	X
Action 4: Develop and utilize wetland water quality standards with consideration of environmental health and exposure of environmental justice communities					
ACTIVITY	2023	2024	2025	2026	2027
Hold workshops to interview stakeholders in overburdened communities regarding changes in wetland coverage and quality	X	X	X	X	X
Action 5: Protect overburdened communities from the severe and debilitating effects of climate change through adaptation, resilience and mitigation					
ACTIVITY	2023	2024	2025	2026	2027
Update and distribute maps of overburdened community areas susceptible to coastal edge loss and areas prone to flooding (inland and coastal)	X	X	X	X	X
Prioritize the establishment of new long-term wetland monitoring sites in gaps located in overburdened communities for the New Jersey Tidal Wetland Monitoring Network	X	X	X	X	X
Implement the community grant program, which provides technical and financial assistance to local communities to build localized climate action resilience plans; provide extra technical support to overburdened communities	X	X	X	X	X

Prioritize the implementation of ecology-based hazard mitigation and resilience projects in overburdened communities in places disproportionately affected by climate change	X	X	X	X	X
Partner with indigenous tribes to strengthen the sharing of traditional knowledge and values of land stewardship	X	X	X	X	X
Align work with the Justice40 Initiative (in development under Executive Order 14008[2]) to ensure disadvantaged communities receive 40% of federal investments and benefits	X	X	X	X	X
Action 6: Enhance public outreach and education					
ACTIVITY	2023	2024	2025	2026	2027
Convene a wetlands outreach and education committee composed of NJDEP and outside EJ partners twice a year to keep each other informed and find opportunities to collaborate	X	X	X	X	X
Coordinate communication and public outreach about New Jersey's work on the USEPA core elements (Monitoring and Assessment; Regulation; Voluntary Wetland Restoration, Creation, Enhancement, and Protection and Improved Coastal Shoreline Resilience; Wetlands Water Quality Standards; Adaptation, Resilience, and Mitigation in a Changing Climate; Public Outreach and Education; and Environmental Justice)	X	X	X	X	X
Publicize the value of wetlands at wetland associated events, recreational, and volunteer opportunities	X	X	X	X	X
Create/enhance community science programs related to wetlands to increase access and hands-on experiences in and around wetlands	X	X	X	X	X
Regularly meet with tribes and overburdened communities to exchange information and collect, document, and support wetland-related needs	X	X	X	X	X
Ensure that tribes and overburdened communities are invited to participate in work related to all Core Elements of the NJ Wetland Program Plan	X	X	X	X	X
Develop Wetland Program Development Grants with tribes and overburdened communities to help make NJ's Wetland Program more equitable and effective	X	X	X	X	X
Invite stakeholder feedback on the New Jersey Wetland Program Plan	X	X	X	X	X
Partner with non-profits in New Jersey to help develop education programs, stakeholder outreach, expand public awareness, adopt a wetland program, lead workshops and trainings, etc.	X	X	X	X	X
Provide financial support for partners doing education and outreach	X	X	X	X	X
Find mechanisms to alert the public to wetland related funding opportunities and provide technical assistance in writing and submitting applications	X	X	X	X	X
Actively incorporate multiple routes of language interpretation and other aspects of outreach materials/meetings (e.g., producing materials in layman terms, ensuring information is provided in multiple languages, developing multi-media materials for information sharing, etc.)	X	X	X	X	X
Seek out funding for field-specific (e.g., fisheries, land management, etc.) training for State employees regarding culturally sensitive communications	X	X	X	X	X

[2] Federal Register :: Tackling the Climate Crisis at Home and Abroad

Historical Progress on the Core Elements

Core Element 1: Monitoring and Assessment

The NJDEP has been engaged in wetland monitoring and assessment for more than four decades. Mapping of tidal wetlands was completed for the first time in the 1970's, and freshwater wetlands were first mapped in the 1980's. Since 1986, the State has classified land use/land cover and produced maps based on aerial photography. These NJDEP Bureau of Geographic Information Systems (BGIS) map products are available as NJDEP Digital Data Downloads and interactive GeoWeb mapping tool online. The GIS data have allowed the State, academia, and other research organizations to evaluate changes in land use and wetlands over time. The Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA) and Rowan University Geospatial Research Lab have used this NJDEP land use/land cover data to document changes in land use between 1986 and 2015[3]. Finer scale wetland mapping efforts by the NJDEP Division of Land Use Regulation Program began in 2014. Since the finer scale wetland mapping done by the NJDEP regulatory program is based on field verified delineations, it will continue to provide the most accurate site-specific wetland maps available. However, to document statewide wetland populations, mapping done as part of the land use/land cover updates will continue to provide much of the information on wetland distributions throughout the state. In this regard, BGIS in conjunction with the NJDEP Division of Science and Research and Office of Natural Lands Management has undertaken a pilot study in which several different mapping methodologies using combinations of automatic image processing steps, LiDAR point cloud processing, and visual photo-interpretation are being compared to determine if these processes result in improved wetland delineations. Field work is presently being done by staff to verify the outputs of each data set. The results of the field studies will be used to determine which methodologies produce the most accurate wetland delineations and to determine if those steps can be incorporated into future land use/land cover mapping updates to improve wetland delineations statewide.

Since 1996, the USEPA's Wetland Program Development Grants (WPDG) have been utilized by the NJDEP to conduct inventory, classification, mapping, condition assessment and baseline monitoring for freshwater and coastal wetland types throughout the State. Additional research has been conducted since 2000 to develop a wetlands mitigation rapid assessment tool[4], a wetland quality and function assessment tool[2], a multi-tiered ecological integrity assessment protocol[5], a floristic quality assessment tool for vascular and moss species, a tool to define reference conditions for tidal wetlands using diatoms as indicators[2] and wetlands biological indicators for forested riparian wetlands in the Highlands[2]. Additionally, in 2020, the NJDEP Division of Science and Research, in collaboration with Montclair State University, released a report outlining the structural and functional baseline traits of tidal wetlands on a watershed-scale.[6] One current grant funds the NJDEP's Division of Science and Research and Natural Heritage Program to work with Penn State University in the development of the New Jersey Reference Wetland Tool, conduct additional monitoring to fill data gaps in reference standard tidal wetlands, develop an identification guide for diatoms of tidal wetlands[7], and hold trainings on the Ecological Integrity Assessment method. Through another current USEPA grant, the Division of Science and Research is working with university partners to study the relationship of watershed condition to tidal wetland productivity in Great Bay, New Jersey as a nursery for fisheries and is developing a method to

[3] https://crssa.rutgers.edu/projects/lc/
[4] https://www.nj.gov/dep/dsr/wetlands/
[5] http://www.natureserve.org/conservation-tools/projects/ecological-integrity-assessment-wetlands
[6] https://www.nj.gov/dep/dsr/wetlands/developing-watershed-baseline-tidal-wetlands.pdf
[7] https://www.nj.gov/dep/dsr/publications/Diatom_Flora_of_the_New_Jersey_Coastal_Wetlands_Final%20Report.pdf

use remotely sensed data to predict productivity. The NJDEP, National Estuary Programs, Rutgers University, the United States Fish and Wildlife Service, and others have established long-term tidal wetland monitoring sites with Surface Elevation Tables to monitor changes in marsh surface elevations, accretion rates, sediment chemistry, water quality and vegetation.

In 2018, the New Jersey Tidal Wetland Monitoring Network was formed to improve the resilience of coastal communities and ecosystems by identifying current conditions and trends of tidal wetlands in New Jersey to better prioritize restoration efforts and inform management decisions. The Network is now composed of more than fifteen entities that collect long-term monitoring of tidal wetlands in New Jersey. The current focus of NJTWMN efforts has been towards standardizing and collecting data related to the 200+ Surface Elevation Tables positioned across the State of New Jersey. To this end, NJTWMN established standardized protocols and data sheets for measurements of Surface Elevation Tables, Marker Horizon plots, vegetation plots, and tidal datums, with more to come. Additionally, NJTWMN updated the Multi-tier Umbrella Mid-Atlantic Coastal Wetland Assessment quality assurance project plan (in review) and created additional best practice and guidance documents outlining the preferred procedures and data collection methods to be used by the organizations involved in the Network. Data has so far been collected annually through 2022 from nearly all established Surface Elevation Tables and associated Marker Horizon and vegetation plots, and new monitoring sites were established in Raritan Bay and Tuckahoe River in 2019 and 2021, respectively. Surface Elevation Table data outputs from NJTWMN since 2018 include hydrogeomorphology metrics, diatom communities, and associated marsh parameter correlations (tidal exposure index, salinity, nutrient concentrations). Currently in development are a new Enterprise Database, an app that would enable electronic data collection from members of the Network and a publicly available website and ArcGIS Hub Environment to display Statewide trends (e.g., elevation, accretion, vegetation) as they relate to relative sea-level rise. While all wetlands are valued under State law regardless of value and function, these assessments and assessment tools of tidal wetlands will help evaluate the condition of coastal wetlands at various scales as well as set restoration targets.

Beginning in 2002, the USEPA required states to integrate their 305(b) and 303(d) water quality monitoring reports. These reports are used by Congress and the USEPA to establish program priorities and funding for federal and state water resource management programs. New Jersey's Integrated Water Quality Monitoring and Assessment Reports for 2002, 2004, 2006, 2008, 2010, 2012, and 2014 have provided data on wetlands acreage and updates on NJDEP's activities in wetlands research, protection, wetlands mitigation and wetlands program development, and support the required integration of the 305(b) and 303(d) water quality monitoring reports. New Jersey has employed a rotating regional approach to integrated water quality assessment since 2014. Under this approach, New Jersey conducts a streamlined assessment of statewide water quality along with a more comprehensive, detailed assessment of water quality in one of the state's five water regions – Atlantic Coastal, Raritan, Lower Delaware, Upper Delaware, and Northeast. This rotating regional approach will produce a comprehensive assessment of the entire state every ten years.

New Jersey participated in the first National Aquatic Resource Surveys for Wetlands in the 2011 National Wetland Condition Assessment (NWCA), as well as the following 2016 and 2021 NWCA. Both USEPA surveys were supported through USEPA monitoring initiative NCWA grant funding to the NJDEP's Division of Water Monitoring and Standards and were conducted by wetland scientists in the NJDEP. The Division of Water Monitoring and Standards provided field and lab support for these scientists. Wetland assessment tools developed for the NWCA using the USEPA 3-tiered multi-scale approach (landscape remote sensing, rapid field, and intensive field assessment) were used in conjunction with NatureServe's Ecological Integrity Assessment Protocol by the Natural Heritage Program to assess the condition of freshwater and tidal wetlands statewide and by watershed utilizing a Region 2 intensification Wetland Program Development Grant to supplement the NWCA for New Jersey. Results from these studies will continue to be presented at New Jersey Water Monitoring Council meetings and USEPA

national and regional wetland conferences. Scientists at the Pinelands Commission completed an Ecological-Integrity Assessment of the New Jersey Pinelands in 2008. Wetland habitat monitoring is also occurring as part of the United States Fish and Wildlife Service's Section 6 grant projects to monitor and assess Federally designated endangered, threatened, and candidate plant and animal species that depend upon wetlands. Inter- and intra-agency collaboration between State and Federal partnerships has strengthened this wetland monitoring and assessment work.

The NJDEP continues to participate in national and regional wetland monitoring and assessment forums including the Mid-Atlantic Wetland Workgroup, the Mid-Atlantic Coastal Wetland Assessment, the National Wetland Monitoring and Assessment Work Group, the National Water Quality Monitoring Council conferences and meetings, The New Jersey Tidal Wetland Monitoring Network, and the New Jersey Water Monitoring Council. Cooperation between the NJDEP and USEPA National Estuary Programs including the Barnegat Bay Partnership, Partnership for the Delaware Estuary, New York-New Jersey Harbor Estuary Program, and the Jacques Cousteau National Estuarine Research Reserve (a National Oceanic and Atmospheric Administration program administered through Rutgers University) on coastal wetland monitoring and assessment projects continues to improve our data and understanding of these critical natural resources, particularly in the face of sea-level rise. The NJDEP is currently in the beginning stage of developing plans for a non-tidal freshwater wetland monitoring network to research, monitor, and document trends pertaining to climate change, including greenhouse gas emissions, the nexus between water supply and hydrology, carbon sequestration, etc., with the goal of mapping non-tidal wetlands, particularly peatlands, and advancing regional research to generate modeling to guide conservation efforts. The AmeriCorps Watershed Ambassador Program is an environmental community service program funded by the Corporation for National and Community Service through a grant to the NJDEP to raise public awareness about water and watershed issues and to promote watershed stewardship through direct community involvement. The watershed ambassadors work with local governments and watershed groups on volunteer projects including water quality monitoring, wetland assessment and restoration, and provide a crucial educational service about water, wetlands, and watersheds to the public.

The Natural Heritage Program housed within the NJDEP State Parks, Forestry, and Historic Sites and the Endangered and Nongame Species Program housed within Fish and Wildlife maintain the Biotics Database on occurrences of elements of biodiversity in the State, including rare wetland and water-dependent plant and animal species, as well as wetland ecological communities and wildlife habitat systems. Both programs, as well as the Pinelands Commission, conduct monitoring and assessment of selected rare species and associated wetland habitats in the State. The Pinelands Commission provides data on the location of rare plants to the Natural Heritage Program and rare and more common animals to the Endangered and Nongame Species Program and maintains a data sharing agreement with the Endangered and Nongame Species Program to share data on rare animal species for regulatory purposes.

Wetland hydrology monitoring has been conducted by the Office of Natural Lands Management, Natural Heritage Program, in several rare wetland types in the Kittatinny Valley, Pine Barrens, and coastal regions. Scientists at the Pinelands Commission have conducted long-term hydrology monitoring in selected wetland habitats including natural and created ponds in the Pine Barrens[8]. They have also developed vegetation models to predict the effect of groundwater withdrawals on forested wetlands as part of the larger Kirkwood-Cohansey project[9]. Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA) also conducted landscape-level modeling to understand the potential effect of groundwater-level declines on forested wetlands[10]. New Jersey Fish and Wildlife, Bureau of Freshwater Fisheries, is monitoring native brook trout (the State's only salmonid) populations and classifying and

[8] https://www.nj.gov/pinelands/science/complete/wetlands/
[9] https://www.nj.gov/pinelands/science/complete/kc/
[10] https://crssa.rutgers.edu/projects/kc/Model_Final_Report.pdf

identifying streams with high groundwater influence in watersheds in northwest New Jersey. The cold-water streams and associated spring-fed headwater riparian habitat serve as resilient strongholds to protect this fish species.

The NJDEP Division of Science and Research, Climate Resilience Planning, and National Estuary Program partners have been conducting a number of innovative coastal marsh monitoring and assessment projects including Mid-Atlantic Coastal Wetlands Assessments by the NJDEP, the Academy of Natural Sciences of Drexel University, the Partnership for the Delaware Estuary and the Barnegat Bay Partnership; the Marsh Futures project using scientific survey tools to assess local salt marsh vulnerability and chart the best management practices and interventions; the Marsh Migration Index, which is a series of maps representing an analysis that will assist in showing where coastal marshes will retreat in response to rising sea levels; Citizen Science Monitoring Projects funded by the National Fish and Wildlife Foundation; Coastal Resilience and Community Assessments by township; a Coastal Vulnerability Index Mapping Tool with layers of geomorphology, slope, flood data, storm surge, soils-drainage and erosion; a Building Ecological Solutions to Coastal Community Hazards guide addressing coastal hazards in four NJ ecosystems – developed lands, beaches and dunes, coastal forests and shrublands, and tidal marshes – with an overview of the ecosystems, protective values, key vulnerabilities, and ecological solutions to hazards; Coastal Vulnerability Assessments; and Mapping Shoreline Change to Inform Coastal Restoration Projects.

The State of New Jersey has been monitoring mosquitos and practicing mosquito control in wetlands and waters of the state since the early 1900s, working with government agencies at the municipal-, county- and State-level. The State Mosquito Control Commission was established in 1956 and is responsible for the monitoring of mosquito control activities in the state. NJDEP Fish and Wildlife, Office of Mosquito Control Coordination, established in 1976, has developed standards and best management practices for mosquito control in freshwater wetlands[11] and Open Marsh Water Management[12] for salt marsh mosquito control. A study on the effect of Open Marsh Water Management on sedimentation, hydrology, and porewater chemistry in salt marshes in Barnegat Bay was conducted by wetland scientists at the Academy of Natural Sciences of Drexel University.[13] Other studies on the ecological function of tidal wetlands in Barnegat Bay, including Open Marsh Water Management sites, have been conducted for the NJDEP.[14]

The NJDEP Division of Science and Research worked with Drexel University and the United States Geological Survey to investigate nutrient and carbon fluxes along salinity gradients in Barnegat Bay marshes.[15] The goal of the project was to provide additional data for the United States Geological Survey Water Quality Analysis Simulation Program and determine how marsh creeks impact nutrient loading into Barnegat Bay.

The Division of Science and Research is working on a study to identify coastal wetland diatoms and develop a calibration set for salinity and nutrient models based on these diatom species. This data is being used to reconstruct reference conditions and evaluate the impact of natural and anthropogenic disturbances on New Jersey coastal wetlands. A forthcoming guide for the identification of diatoms in New Jersey coastal ecosystems will help ensure the accurate identification of diatom species for use in monitoring and assessment of reference conditions in New Jersey coastal wetland sites. Other work on freshwater wetland diatoms[16] used to develop nutrient criteria may be useful in determining indicators of

[11] https://www.nj.gov/dep/mosquito/docs/bmp_complete.pdf
[12] https://www.nj.gov/dep/mosquito/docs/omwm_full.pdf
[13] https://doi.org/10.1029/2019JG005187
[14] https://www.nj.gov/dep/dsr/barnegat/final-reports/ecosystem-services-tidal-wetlands-year2.pdf
[15] https://www.nj.gov/dep/dsr/publications/nutrient-flux-report.pdf
[16] https://www.nj.gov/dep/dsr/wq/TDI%20Nutrient%20Criteria.pdf

water quality for wetlands. The Division of Science and Research is additionally partnering with the Academy of Natural Sciences of Drexel University to investigate the genetic mapping of diatom species from ponds within the Pinelands. This work builds on previous diatom surveys conducted at 60 Pinelands natural ponds, excavated ponds, and stormwater basins as part of an EPA-funded microorganism project.[17]

Barnegat Bay

The Barnegat Bay Restoration, Enhancement, and Protection Strategy is built upon the data, modeling results, and research generated by the Barnegat Bay Ten-Point Plan (Phase One) announced in 2010. This strategic plan identifies objectives and actions aimed at restoring areas of concern (Restoration), enhancing areas wherever possible (Enhancement), and protecting healthy areas (Protection) of the Barnegat Bay and its watershed. NJDEP will also continue monitoring throughout this process to assess the effectiveness of implementation on water quality and biodiversity within Barnegat Bay and the Barnegat Bay watershed (Assessment).

Phase Two of the strategy is Moving Science into Action which includes 1) Restoration to develop Watershed Restoration/Protection Plans for Barnegat Bay Tributaries, 2) Enhancement of Submerged Aquatic Vegetation Restoration, and 3) Protection to Preserve and Restore Wetlands to Provide Nutrient Reductions and Resilience & Protect Environmentally Sensitive Areas in the Bay. One of the core goals of the strategy is "Assessment and Effectiveness Monitoring: Develop Biological Indices for Barnegat Bay and Establish Routine Biological Monitoring Program."

The NJDEP Division of Science and Research is working with partners to monitor the Sedge Island Conservation Zone, one of 16 environmentally sensitive areas in Barnegat Bay identified by the NJDEP and Rutgers University Center for Remote Sensing and Spatial Analysis in 2011[18] as part of the Barnegat Bay Ten-Point Plan. The goal of this monitoring effort is to assess long-term trends in aquatic species/resource types, abundance, and distribution within and outside of the Sedge Island Conservation Zone, as well as record changes to habitat over time. Efforts are needed to implement a consistent submerged aquatic vegetation resource assessment and monitoring strategy including quantitative evaluation of submerged aquatic vegetation distribution and abundance of the Barnegat Bay and Great Bay - Little Egg Harbor estuaries. The Bureau of Watershed Management is currently managing over 15 projects, funded by the 319 Program, focusing on these actions. These projects include three Watershed Restoration Plans, SAV enhancement work with Stockton and Montclair University, and five living shorelines throughout the watershed.

Pinelands

In the early 1990s, the Pinelands Commission initiated a long-term environmental-monitoring program[19] to characterize the effect of existing land use patterns on aquatic and wetland resources and to monitor long-term changes in these resources. Components of the program are water level monitoring in wetland forests and coastal plain ponds; tracking water quality conditions at a network of representative stream sites; monitoring frogs and toads using call surveys; and using vegetation[20], fish[21] , and frog and toad

[17] https://www.nj.gov/pinelands/science/current/micro/
[18] https://nj.gov/dep/dsr/barnegat/final-reports/#Sedge_Island
[19] https://www.state.nj.us/pinelands/science/
[20] https://www.jstor.org/stable/2996598
[21] https://doi.org/10.1890/1051-0761(1998)008[0645:UORSFA]2.0.CO;2

assemblages[22] to assess the ecological integrity[23] of streams and impoundments throughout the Pinelands. The Division of Fish and Wildlife, Bureau of Freshwater Fisheries, is assessing fisheries in lakes and Pineland streams to identify those waters supporting entirely native fish species.

Since 1993, the Pinelands Commission has utilized USEPA Wetland Program Development Grants to augment its environmental monitoring program by conducting individual studies to characterize and better understand the composition of wetland-dependent and aquatic plant and animal assemblages and the potential impacts of land use on these assemblages. Specifically, research has been conducted to compare community attributes of Atlantic White Cedar swamps between watersheds with different land uses excluding development and agriculture[24], assess pond-breeding frog and toad communities[25], evaluate dragonfly and damselfly assemblages in relation to surrounding land use,[26] and characterize breeding bird assemblages in upland and wetland forest complexes[27]. Studies have also been completed to evaluate water quality and diatom, vegetation, fish, and frog and toad assemblages in stream impoundments along a watershed land-use gradient[28] and to assess the potential impacts of wetland cranberry agriculture on stream hydrology[29], wetland landscapes[30], and various wetland and aquatic communities[15].

More recent research funded by Wetland Program Development Grants has focused on mapping, surveying, and determining the vulnerability of open-water, off-stream wetlands[15]. On-the-ground and aerial photograph surveys have been conducted to determine the physical impacts of off-road vehicles to both natural coastal plain ponds and human excavated ponds in the region. Both types of wetlands are protected in the Pinelands. Models were developed to estimate the vulnerability of these wetlands to future off-road vehicle impacts. The Pinelands Commission and NJDEP have worked together to directly protect some of the more heavily damaged ponds by installing wooden barriers across vehicular access points[31]. The vulnerability of natural and excavated ponds to future development was assessed by comparing current land-use conditions surrounding these wetlands to conditions at buildout. Other recent research conducted by the Pinelands Commission in collaboration with scientists from the United States Geological Survey and NJDEP Division of Science and Research, Division of Water Monitoring and Standards, and Bureau of Freshwater and Biological Monitoring includes investigating nutrient and pesticide concentrations in natural ponds, excavated ponds and stormwater basins[32] and characterizing diatom, phytoplankton, zooplankton, vegetation, fish, and frog and toad communities found in these three wetland types[15]. Currently, the Pinelands Commission is researching eastern kingsnakes with Wetland Program Development Grant funding. Commission scientists are using radio telemetry to determine the activity range; upland and wetland habitat use; and timing of shedding, denning, and potential nesting of this wetland-dependent species. A report was recently submitted to the EPA in fulfillment of the WPDG, "Comparability of Natural and Created Wetlands - Part II".

[22] https://www.jstor.org/stable/1565417
[23] http://dx.doi.org/10.1016/j.ecolind.2005.08.027
[24] https://doi.org/10.1007/BF03161731
[25] https://www.jstor.org/stable/1447594
[26] https://www.nj.gov/pinelands/science/current/ponds/index.shtml
[27] Laidig, K. J. 1997. Breeding birds along wetland and upland complexes in the New Jersey Pinelands. Final report submitted to the U. S. Environmental Protection Agency. Pinelands Commission, New Lisbon, New Jersey, USA.
[28] https://doi.org/10.1016/j.ecolind.2009.06.001
[29] https://doi.org/10.1111/j.1752-1688.2010.00432.x
[30] https://doi.org/10.1007/s10980-008-9235-6
[31] https://www.nj.gov/dep/newsrel/2017/17_0013.htm
[32] https://pubs.er.usgs.gov/publication/ofr20181077

Highlands

The Highlands Region provides some or all of the drinking water for approximately 70% of New Jersey's residents. Wetlands within the region play an important role in both water quality and water quantity. The resources of the region are protected through a combination of development restrictions, enhanced regulatory provisions and the goals, policies and guidance contained in the Highlands Regional Master Plan (RMP) In addition to the contributions towards protecting the state's drinking water supplies, the region's wetlands serve to mitigate the impacts of extreme precipitation events in areas of the state that are downstream from the Highlands. Regulations contained in the Highlands Water Protection and Planning Act provide enhanced protection of the region's wetlands, primarily through enhanced buffer areas where disturbance and development are prohibited. Ecosystem services that are provided by wetlands in the region and that are directly related to the goals of the Highlands Act include stormwater management and retention, groundwater recharge, biofiltration, habitat for threatened and endangered species and climate mitigation.

The Highlands Regional Master Plan Goal 1D (Protection, Restoration, and Enhancement of Highlands Open Waters and Riparian Areas) charges the Highlands Council to establish and maintain inventories of all Highlands Open Waters and Riparian Areas and their integrity. Wetlands are included in the definition of Highlands Open Waters. Regional Master Plan Goal (2F: Assessment and Restoration of Surface and Ground Water Quality of the Highlands Region and Regional Master Plan Goal (2G: Protection, Restoration and Enhancement of the Water Quality of the Highlands Region) both charge the Highlands Council to not only monitor and assess surface water quality but also to provide ways to improve and restore quality and quantity. This includes determinations on where development is best suited to reduce stressors on aquatic resources. Water quantity protection is a core standard of the Regional Master Plan. Stormwater planning is a major Regional Master Plan component written to be protective of Regional water quality and quantity.

In addition to the enhanced protective buffers, protections for the region's wetlands include strong impervious surface restrictions, soil disturbance limits, land use restrictions on large-scale sub-divisions and prohibitions on clearing forested areas. The Highlands Council is charged with monitoring land use changes in the region. This includes the loss (if any) of wetlands.The status of wetlands within the region and any subsequent impacts on water quality and quantity need to be part of an ongoing assessment of the effectivess of the Highlands Act. If necessary, additional regulatory protections and other planning measures may need to be considered along with wetland restoration and enhancement projects.

Meadowlands District

To reach NJSEA's goal of protecting the delicate balance of nature within the Meadowlands District, NJSEA regularly monitors and assesses the conditions of the wetlands and adjacent areas located throughout the District. The data is used to document site conditions, assist with wetland restoration prioritization and implementation, track trends within the Meadowlands, and compare baseline and trend data with statewide data.

The objectives of NJSEA's monitoring and assessment work include documenting conditions at each of the NJSEA-owned wetland sites within the District, including 17 preserved sites and 10 restored sites. In addition, NJSEA monitors and assesses three wetland mitigation banks and 10 restored wetland sites owned by others. The following conditions are monitored: physical conditions – soil and water quality; habitat communities – flora and fauna; structural diversity – vegetation strata, trophic levels, and spatial mosaic; site stressors – invasives, contamination, and over-utilization or misuse; and ecosystem function – productivity, habitat interactions and resilience/recruitment.

NJSEA continues to expand its monitoring and assessment efforts and add to its information base which currently includes: a Geographic Information System database; drone imaging and LIDAR mapping; ongoing assessments of fish, benthic invertebrate, diamondback terrapin, and avian populations; Surface Elevation Tables; and habitat community mapping. The data collected and analyzed will assist the NJSEA and its partners in assisting with the recovery of wetlands and other habitats, managing invasive species, protecting species of concern, detailing site stressors and restoration opportunities, and re-establishing resilient habitat conditions and functions.

In 2019, NJSEA began employing the Society for Ecological Restoration International Standards for the Practice of Ecological Restoration in collecting this data for each site, so that our results are developed within a framework that is comparable with data collected from around the world. The NJSEA also shares the SET monitoring data with the NJ Tidal Wetland Tracking Network, ensuring that all data collected is accessible, updated on a timely basis, and integrated with other state water quality data. The NJSEA will continue to participate in local, regional, national, and international wetland monitoring and assessment forums to share data, seek collaborative projects and research efforts, and expand our knowledge of established methodologies and cutting-edge technologies.

Specific actions and activities that will be undertaken by NJSEA to meet its long-term goals of increasing wetland habitat quantity and quality, and to meet our objectives, include:

- Monitoring and assessing flora and habitat communities using drones and LIDAR, creating GIS maps, noting site stressors and opportunities, and developing recommendations;
- Surveying avian fauna through point counts, use of the Motus Tower, bird banding, and the continued development of the Meadowlands Breeding Bird Atlas and fauna;
- Surveying fish and benthic invertebrate fauna, commencing the fourth periodic survey in 2023, and expanding the effort to include eDNA and ichthyoplankton studies;
- Surveying diamondback terrapin populations and developing recommendations about potential nesting habitat;
- Restoring the 800-acre brackish marsh located at Sawmill creek Wildlife Management Area;
- Restoring habitat for species of concern including breeding habitats for saltmarsh sparrow, diamondback terrapin, and black skimmer populations;
- Continuing to collaborate with other research organizations to produce credible and salient science, including recent work conducted with Rutgers University, Hofstra University, Montclair State University, New Jersey City University, Pratt Institute, New Jersey Institute of Technology, and Ramapo College;
- Coordinating with non-governmental organizations, such as Bergen County Audubon, NJ Audubon, NY/NJ Baykeeper, Hackensack Riverkeeper, NJ Conservation Foundation, Harbor Herons/NYC Audubon, and NJ Bike and Walk Coalition, to collect the data needed to protect the natural resources of the Meadowlands; and,
- Sharing our monitoring and assessment data with other federal, state, and local agencies to identify lessons learned, cutting-edge techniques, and compare results.

Core Element 2: Regulation

Under Section 404 of the Federal Water Pollution Control Act (also known as the Clean Water Act), 33 U.S.C. §§ 1251 et seq., the Federal wetlands permitting program, also known as the "Federal 404 Program," implemented by the United States Army Corps of Engineers (USACE), was established. Since March 2, 1994, in accordance with Section 404(g) of the Clean Water Act, 33 U.S.C. §§ 1344(g), New Jersey's freshwater wetlands program has operated in place of the Federal wetlands permitting program in most of New Jersey. While New Jersey's freshwater wetlands program operates in place of the Federal

404 program throughout most of the State, the USACE has retained responsibility for the Federal 404 Program in certain waters in New Jersey. These are all interstate and navigable waters (including adjacent wetlands), the entire length of the Delaware River within the State of New Jersey, Greenwood Lake and areas under the jurisdiction of the New Jersey Sports and Exposition Authority. Projects in these "non-delegable" waters remain subject to USACE jurisdiction, as well as to the State wetlands program. The USEPA oversees the NJDEP's wetlands program in accordance with the Federal Clean Water Act and a Memorandum of Agreement between NJDEP and the USEPA. To protect waters of the United States, including wetlands, the Clean Water Act requires a state assuming the Federal permitting authority to implement regulatory standards equally stringent as those currently in place for the Federal 404 Program.

New Jersey has passed laws and regulations specifically designed to protect both coastal wetlands (Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq., Waterfront Development Act N.J.S.A. 12:5-3, Coastal Area Facility Review Act, N.J.S.A. 13:19, Coastal Zone Management Rules, N.J.A.C. 7:7) and freshwater wetlands (Freshwater Wetlands Protection Act N.J.S.A. 13:9B-1 et seq.). While New Jersey continues to share permitting authority with the USACE for coastal wetlands, our freshwater wetland protection program has been identified as one of the most stringent in the country and deemed of sufficient quality that the USEPA continues to approve New Jersey as an "assumed program." As one of only two "assumed programs" in the United States, USEPA has made the finding that New Jersey's regulation of activities in and around freshwater wetlands is consistent with the Federal 404b(1) Rule and acknowledges that New Jersey has implemented a regulatory process of wetland delineating and permitting that is comparable to or more stringent than that found at the Federal level.

The State's In Lieu Fee Program has been amended to ensure continued compliance with the Federal Mitigation regulations. A final In Lieu Fee Program Instrument was approved by the USEPA on August 6, 2015. One of the fundamental ideas in the In Lieu Fee Program Instrument is the continuation of the concept of creating, enhancing, and restoring wetlands for mitigation using intra-agency cooperative agreements among the NJDEP's Green Acres Office of Ecological Restoration, State Parks, State Forest Services, and Division of Fish and Wildlife programs.

In addition to regulating wetlands, New Jersey places buffers around certain wetlands, which far exceed the federal protection levels, to further protect them from degradation. Wetlands that are classified as intermediate or exceptional resource value are associated with a 50- and 150-foot buffer, respectively. In addition, all on-stream and off-stream wetlands in the Pinelands Area are protected with a 300-foot buffer. In the Highlands Region, all wetlands within both the Preservation and conforming Planning Areas are afforded 300-foot buffers and development activities are limited to previously disturbed areas. Under the State's Freshwater Wetlands Protection Act and implementing regulations, wetlands that discharge to trout-production waters or which are present or documented habitats for threatened or endangered species are considered exceptional resource value wetlands and are, therefore, associated with a 150-foot buffer. Most trout production waters are also designated as Category One waters pursuant to the State's Surface Water Quality Standards rules (N.J.A.C. 7:9B). Such waters are also protected through the implementation of the State's Flood Hazard Area Control Act Rules, which require a 300-foot riparian zone immediately adjacent to Category One waters and upstream waters within the same HUC14 sub-watershed. In addition, when unavoidable disturbances to coastal and freshwater wetlands occur as a result of permitting, these losses are generally mitigated at a ratio of 2:1 for creation/restoration and at various ratios for enhancement and preservation of wetlands.

In addition to the laws listed above, wetlands and waters receive coincident and supplemental protection from NJDEP regulations that apply to flood protection (Flood Hazard Area Control Act, N.J.S.A. 58:16A et seq., Flood Hazard Area Control Act Rules, N.J.A.C. 7:13 et seq.), Regional Planning and Management (Pinelands Protection Act, N.J.S.A. 13:18A-1 et seq., Highlands Water Protection and Planning Act, N.J.S.A. 13:20-1 et seq., Coastal Zone Management Rules, N.J.A.C. 7:7 -1 et. seq.) and Water Quality

(Stormwater Management Rules, N.J.A.C. 7:8; Surface Water Quality Standards, N.J.A.C. 7:9B). The NJDEP Division of Land Use Regulation in cooperation with the Office of Compliance and Enforcement ensures that activities permitted in and around wetlands are conducted in accordance with their approved plans, while actions that have impacted wetland resources without a permit are held to permitting standards for minimized impacts and appropriate mitigation. As a result, New Jersey finds itself in the unique position of satisfying USEPA core elements for regulatory protection when compared to other programs in the country. NJDEP laws and regulations can be found at http://www.nj.gov/dep/landuse/lawsregs.html.

New Jersey wetlands are further protected pursuant to the Technical Requirements for Site Remediation, N.J.A.C. 7:26E. Under this regulation, the NJDEP's Contaminated Site Remediation and Redevelopment Program (CSRRP) has been proactive in the investigation and remediation of wetlands within or impacted by contamination from known contaminated sites. An ecological evaluation is required to be conducted for all listed contaminated sites pursuant to N.J.A.C. 7:26E-1.16, during which wetlands are identified and evaluated for the presence of contaminants of potential ecological concern. To ensure that site remediations are protective for environmentally sensitive natural resources, including wetlands habitat and wetlands ecological receptors, CSRRP has prepared the Ecological Evaluation Technical Guidance. Direction is provided on how to conduct an Ecological Evaluation and an Ecological Risk Assessment and, if remediation is required, for the derivation of site-specific ecological risk-based remediation goals and Risk Management Decisions. The guidance devotes an entire section to investigation and remediation in wetlands, including the NJDEP Division of Land Resource Protection's restoration and mitigation requirements for impacts to wetlands from site discharges and remedial construction. The primary reference for this document is USEPA's Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments, USEPA 540-R-97-006, Office of Solid Waste and Emergency Response, Washington, DC (ERAGS - USEPA, 1997). Cross-program coordination occurs within the NJDEP between the Contaminated Site Remediation and Redevelopment Program and programs involved with monitoring, assessment, and restoration.

New Jersey Wetland-related Laws (N.J.S.A.) https://www.nj.gov/dep/landuse/lawsregs.html
Coastal Area Facility Review Act (CAFRA), N.J.S.A. 13:19
Waterfront Development Act, N.J.S.A 12:5-3 et seq.
Flood Hazard Area Control Act, N.J.S.A. 58:16A et seq.
Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq.
Highlands Water Protection and Planning Act, N.J.S.A. N.J.S.A 13:20-1 et seq.
Pinelands Protection Act, N.J.S.A. 13:18A-1 et. seq.
Tidelands Act, N.J.S.A. 12:3
Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq.

New Jersey Wetland-related Rules (N.J.A.C.) https://www.nj.gov/dep/rules/nj_env_law.html
Coastal Zone Management Rules, N.J.A.C. 7:7 -1 et. seq.
Flood Hazard Area Control Act Rules, N.J.A.C. 7:13
Freshwater Wetlands Protection Act Rules, N.J.A.C 7:7A
Stormwater Management Rules, N.J.A.C. 7:8
Surface Water Quality Standards Rules, N.J.A.C. 7:9B
Technical Requirements for Site Remediation, N.J.A.C. 7:26E
Highlands Water Protection and Planning Rules, N.J.A.C. 7:38
Pineland Comprehensive Management Plan (CMP)

Core Element 3: Voluntary Wetland Restoration, Creation, Enhancement, and Protection and Improved Coastal Shoreline Resilience

The State of New Jersey has active programs in place for ecological restoration and the protection of wetlands through land acquisition and watershed planning. Restoration is accomplished both by the NJDEP and in partnership with federal and local governments, non-profit organizations, and watershed organizations. NJDEP considers wetlands restoration, creation, and enhancement to be voluntary unless it is required to satisfy a regulatory requirement. The legal definitions for wetland creation, enhancement, and restoration can be found in the Freshwater Wetlands Protection Act Rules, N.J.A.C. 7:7A.

Natural Resource Restoration is administered by the NJDEP's Office of Natural Resource Restoration, which was established in the 1990s to restore natural resources for environmental injury caused by multiple oil spills and discharges. The authority for addressing injuries to the public's natural resources is derived from the Public Trust Doctrine[33]. This common law provides that public lands, waters, and living resources are held in trust by the government for the benefit of its citizens. Examples of recent and ongoing ecological restoration, creation, and enhancement projects by the NJDEP Office of Natural Resource Restoration include the removal of landfill material and restoration of a tidal freshwater wetland, open water, upland habitat, and park amenities in Camden City; wetland restoration designs in Cape May and Salem Counties; funded dam removals that have the effect of increasing water quality and wetlands quality along the Raritan River, Millstone, Paulins Kill and Musconetcong River[34], and provided funded to NJ Forest Service for Atlantic White Cedar Restoration projects. The Office of Natural Resource Restoration also administers grant programs funded through Natural Resource Damage settlements to provide funding for the design and construction of restoration projects in the same area as damaged resources.

The NJDEP's Fish and Wildlife has been involved in the restoration of tidal wetlands for over 50 years. Programs to restore tidal flow to salt hay impoundments along the Delaware Bay and to convert *Phragmites*-dominated marshland along the entire coast to native *Spartina* species have been actively and successfully pursued since the 1960s. In 2014, NJDEP's Fish and Wildlife partnered with the US Army Core of Engineers, the New Jersey Department of Transportation, and several environmental nonprofit organizations to implement three beneficial use of dredged material pilot projects to enhance salt marsh and other coastal habitats. The Division of Science and Research assisted with and continues to monitor these pilot projects as part of a current Wetland Program Development Grant. This monitoring includes the use of drone imagery collected by NJDEP's new drone program to track changes in vegetative cover.[35] NJDEP Fish and Wildlife's dam removal programs, which restore anadromous fish runs and native aquatic habitats, have also been active for many decades. In recent years, the NJDEP Fish and Wildlife has actively cooperated with the NJDEP Division of Parks and Forestry Bureau of Forest Management to restore Atlantic White Cedar wetlands in the Pinelands and has cooperated with the NJDEP Office of Natural Resource Restoration to create and restore a variety of tidal and freshwater wetland ecosystems throughout the State.

Throughout the past several decades the NJDEP Forest Service has restored Atlantic white-cedar in freshwater wetland habitats in the Pinelands and assisted in the development of an Atlantic white-cedar best management practices manual. Typical Atlantic white-cedar restoration efforts include wetland site preparation, competition management and fencing to prevent deer browse on young trees. Atlantic white-cedar stands have important ecological value in New Jersey and the associated wetland restoration work

[33] https://www.nj.gov/dep/landuse/download/13_20.pdf
[34] https://www.nj.gov/dep/nrr/restoration/completed.html
[35] https://www.nj.gov/dep/dsr/wetlands/beneficial-use-dredged-material-monitoring-plan.pdf

is critical to maintaining those functions. A new landscape-scale effort is being used to focus restoration and regeneration management projects and meet a Forest Service goal to increase the acreage of Atlantic White Cedar wetland forest by 10,000 acres.

Additionally, New Jersey has an active land acquisition program that is overseen by the NJDEP Green Acres Program, which seeks to acquire both uplands and wetlands and provides funding to local governments and nonprofit organizations that acquire lands for a variety of recreational and conservation purposes. New Jerseyans have long supported open space preservation, as demonstrated through the approval of thirteen statewide Green Acres ballot initiatives since 1961, when the Green Acres Program was created to meet New Jersey's growing recreation and conservation needs. Green Acres funding is also used to leverage federal funding made available to preserve wetlands. For example, the Green Acres Program has preserved wetlands with federal funding such as the Cooperative Endangered Species Conservation Fund Land Recovery Acquisition Grants Program (authorized under Section 6 of the Endangered Species Act), Wetlands Reserve Program, Wetlands Reserve Enhancement Program, North American Wetlands Conservation Act, Land and Water Conservation Fund and the Forest Legacy Program. Together with public and private partners, the Green Acres Program has protected more than 650,000 acres of open space throughout the State. The Green Acres, Blue Acres, and Farmland and Historic Preservation Bond Act of 2007 authorized $12 million for acquisition of lands in the floodways of the Delaware River, Passaic River, or Raritan River, and their respective tributaries, for recreation and conservation purposes. An additional $24 million was approved by the voters in the Green Acres, Water Supply and Floodplain Protection, and Farmland and Historic Preservation Bond Act of 2009. Green Acres continues to partner with Blue Acres to obtain grants and co-manage resiliene and restoration projects on land acquired by Blue Acres funding, such as completing buyouts of properties where the land is required to be restoration for flood resilience. The Pinelands Conservation Fund, which was established in 2004 as part of an agreement between the Pinelands Commission and the Board of Public Utilities, has provided matching grants to private partners and the Green Acres Program for the acquisition of uplands and wetlands located in the Pinelands. Green Acres additionally partners with the Pinelands Commission to preserve lands within the Highlands due to its important natural features. Currently, Green Acres is working on a planning effort called “Outside, Together!”, which will capture the State’s open space and recreation needs and priorities to act as guidance for the next five years. This effort will result in the creation of New Jersey’s 2023-2027 Statewide Comprehensive Outdoor Recreation Plan.

NJDEP Fish and Wildlife has created several GIS planning tools that facilitate conservation actions addressing Core Element 3. One is a tool for strategic wildlife habitat protection called “New Jersey’s Landscape Project,” commonly referred to as the “Landscape Project maps.”[36] The Landscape Project maps provide wildlife habitat mapping for community land-use planning and species conservation. These maps serve a variety of purposes, ranging from the identification of priority habitats for restoration, enhancement, or protection, to assist with compliance requirements for applicable conservation projects. NJDEP Fish and Wildlife has also developed a statewide habitat connectivity plan entitled Connecting Habitat Across New Jersey or “CHANJ.” CHANJ was developed by a multi-partner, multi-disciplinary working group consisting of over 40 different agencies or organizations across the state. It provides a strategic plan for wildlife conservation by identifying key areas of habitat connectivity and prescribes actions needed for preserving and restoring critical habitat linkages for terrestrial wildlife in New Jersey. The plan pairs an interactive GIS mapping tool that identifies areas crucial for habitat connectivity and provides a menu of implementation actions specific to each identified wildlife corridor with a best management practices manual – or “toolbox” – that provides detailed guidance on how to secure, enhance, restore, or mitigate connectivity conflicts associated with each corridor. This effort by experts in science, policy, and communication has incorporated riparian habitat and other hydrologically connected wetland corridors in New Jersey’s fragmented landscape.

[36] https://www.state.nj.us/dep/fgw/ensp/landscape/index.htm

The NJDEP's Office of Natural Lands Management's Natural Heritage Program Database is a continuously updated inventory of rare plants and representative ecological communities. Natural Heritage Priority Sites coverage identifies critically important areas to conserve New Jersey's biological diversity, with emphasis on rare plant species and ecological communities in both upland and wetland ecosystems.

As part of the Statewide Nonpoint Source Management program,[37] The NJDEP Bureau of Environmental Analysis, Restoration, and Standards administers the Water Quality Restoration Grant Program. The NJDEP, in partnership with local and regional stakeholders, has invested significant resources in characterizing the causes and sources of water quality impairment in several priority watersheds and has found that reducing non-point source pollution is key to meeting water quality objectives in those watersheds. Most recently, the NJDEP has focused the grant program on non-point source pollution control projects that can address water quality impairment in priority regions of the State through the rotating basin approach to comprehensive regional assessment of water quality. Projects such as ecological restoration that implement approved watershed plans to improve water quality through the prevention and mitigation of non-point source. Recent projects have included the creation of riparian buffers and living shorelines and installation of stormwater measures to improve the quality of waters and wetlands. Tools such as the Living Shoreline Feasibility Model and Wetland Assessment Tool for Condition and Health (WATCH) v2.0 were created to assist in the determination of project type and viability. Education and outreach are also important elements of this program.

The Highlands Regional Master Plan includes several programs designed to identify categorize, assess, and, thereby, effectively manage the natural resources of the region. One such program, entitled Restoration of Streams and Riparian Areas, addresses Highlands Open waters which include all springs, streams(including intermittent streams), wetlands, and bodies of freshwater (including reservoirs). Each Highlands Open Water as designated in the Regional Master Plan is protected by a 300-foot buffer. Subprograms include evaluation, monitoring, planning, and restoration of Highlands Open Waters as goals, policies, and objectives of the Regional Master Plan. While the NJDEP regulates freshwater wetlands, the Regional Master Plan seeks to improve resources including wetlands across the Highlands Region, in a cooperative effort with municipalities and counties. Specific goals, policies, and objectives of the Regional Master Plan apply in each of the core elements of the Wetland Program Plan.

The Highlands Open Space Partnership Funding Program is a matching grant program designed to support the acquisition of property for the protection of resources within the Highlands Region. Applications are considered for the acquisition of property in fee simple or through conservation easements for any passive recreation or conservation purposes. Additionally, the Highlands Council has developed a Transfer of Development Rights (TDR) program for the region. This program serves as one mechanism to address some of the equity concerns of property owners in the Preservation Area that have been affected by the implementation of the Highlands Act as well as permanently preserve land through the purchase of Highlands Development Credits (HDCs). The Highlands TDR Program allocates HDCs to sending zone property owners which may be sold to developers for use in appropriate voluntary receiving zones. Once the property owner sells their HDCs, a conservation easement is placed on the property while ownership is maintained. Both programs are administered under the provisions of N.J.A.C. 7:70. To date, nearly 600 acres of wetlands in the Highlands Region have been permanently preserved through these programs.

The NJDEP has assisted the United States Department of Agriculture's Natural Resources Conservation Service by providing information on freshwater and tidal wetland ecological communities, including plant

[37] https://www.nj.gov/dep/grantandloanprograms/eps_nspc.htm

species, soils, hydrology, and ecological dynamics, for their provisional concepts related to Ecological Site Description projects[38] in Major Land Resource Areas of New Jersey. Ecological Site Designs provide land managers the information needed for evaluating the land as to suitability for various land-uses, capability to respond to different management activities or disturbance processes, and ability to sustain productivity over the long term.

The NJDEP Office of Climate Resilience reviews and administers New Jersey's Federally approved Coastal Management Program and is responsible for development and implementation of a number of planning activities including Resilient NJ community planning program[39], ocean resource planning, and NJ Fostering Regional Adaptation through Municipal Economic Scenarios (NJ FRAMES). The NJDEP Office of Policy Implementation coordinates the Department's Living Shoreline program[40] that addresses the loss of vegetated shorelines, beaches, and habitat in the littoral zone by providing for the protection, restoration, or enhancement of these habitats[41], and the Municipal Public Access Planning program.

NJDEP and an extensive network of partners have formed the New Jersey Coastal Resilience Collaborative to support comprehensive coastal resilience planning and implementation based upon the best available science and technical tools. Where possible, the Collaborative will identify and leverage funding opportunities to implement mitigation and adaptation projects and activities at the community and regional level. This includes, but is not limited to, the development of coastal resilience protocols and best practices; support for needed vulnerability and risk assessments; development of tools and identification of available resources; and technical assistance to identify and implement land use planning techniques, living shorelines, and other ecology-based coastal hazard mitigation and adaptation strategies.

Additional new mapping tools and reports on ecosystem resilience are now available to assist in identifying potential restoration sites and research supporting methods used to get to the goal of greater resilience. Examples include The Nature Conservancy's 2017 report on "Resilient Coastal Sites for Conservation in the Northeast and Mid-Atlantic US." The University of Massachusetts Conservation Assessment and Prioritization System (CAPS) is a method to assess aquatic connectivity (critical linkages) for 13 states in the North Atlantic Region. NatureServe, utilizing a National Fish and Wildlife Foundation grant, has created tools for assessing coastal resilience and identifying restoration projects in estuarine watersheds including the Delaware Bay.[42]

To foster communications regarding tidal wetland restoration, NJDEP has participated in a number of regional restoration work groups. Workgroups include Beneficial Use of Dredged Material Learning Network, Restoration Potential Analysis, DE/NJ Salt Marsh Workgroup, Low-tech Salt Marsh Restoration Workgroup, Mid-Atlantic Wetland Workgroup, Bay Island Initiative, and NJ Coastal Resilience Collaborative. Through this participation, NJDEP hopes to create a larger network of information and data-sharing to allow for enhanced restoration strategies. This participation additionally ensures that NJDEP remains in the discussion and planning steps for new restoration projects.

The Meadowlands District

The NJSEA 2020 Master Plan states that the NJSEA should acquire and preserve wetlands and other adjacent habitats for water quality, wildlife habitat, and flood storage purposes, and that the NJSEA should assist with the recovery of these valuable habitats with a goal of reestablishing ecological

[38] https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/ecoscience/desc/
[39] https://www.nj.gov/dep/bcrp/resilientnj/
[40] https://www.nj.gov/dep/oclup/ls/index.html
[41] https://www.nj.gov/dep/oclup/case-studies-projects/living-shorelines-projects.html.
[42] http://www.natureserve.org/conservation-tools/projects/nfwf-coastal-resilience-assessments

functions and services. The objectives undertaken to reach this goal include looking for opportunities to increase biodiversity, improve habitat for species of concern, promote habitat connectivity, create a more resilient shoreline throughout the District, and remove and attenuate contamination within aquatic habitats.

To date, the NJSEA has acquired and preserved approximately 2,700 acres of wetlands and facilitated the protection of approximately 1,600 additional acres. The 2020 Master Plan calls for the continued acquisition of wetlands, which the NJSEA continues to do as they become available.

The NJSEA collaborates with other research institutions and non-governmental organizations to help reach its stated goals, perform baseline studies, understand site stressors, determine priorities, and develop restoration plans. The NJSEA is also an active member of the Meadowlands Interagency Review Team, which reviews all potential District wetland impacts and associated mitigation, and an active member of the NY/NJ Harbor Estuary Program Restoration Working Group. To further protect the wetland within the District, the NJSEA has established relationships with federal and state agencies, as well as non-governmental organizations and academic institutions, to study the natural resources of the Meadowlands and their changing conditions over time and under climate change and sea-level rise, to understand how best to assist and prioritize their recovery.

Specific actions and activities that NJSEA will undertake to meet its goals of protecting and restoring wetland habitats include:

- Continuing to review past restoration efforts to inform future projects, and share these lessons with others through developing research papers, presenting at local, regional and international meetings, and holding workshops;
- Continuing to update the NJSEA Wildlife Action Plan, including the development of species recovery plans for those species of concern noted in the Plan, and sharing the results with NJDEP;
- Continuing to develop a GIS map of the coastal shoreline and habitats of the Meadowlands; and
- Restoring wetland and other habitats within the District, including the priority sites – Sawmill Creek, Losen Slote Creek, Riverbend Marsh, Harrier Meadow, Belle Meade/Lyndhurst Riverside Marsh, Kearny Freshwater Marsh, Meadowlark Marsh, and the Keegan Landfill.

Further information about ongoing projects can be found on the Meadowlands Research and Restoration Institute website.

Core Element 4: Wetland Water Quality Standards

The USEPA guidance for states and tribes developing Wetland Water Quality Standards indicates that water quality standards for wetlands may differ from other traditional surface water standards. Wetland water quality standards may be derived and supported using quantification of indicators related to wetland functions or condition and rely less on conventional water chemistry parameters' thresholds. The derivation process for the wetland water quality standards may also involve a suite of measures such as ecological services and vegetation or macroinvertebrate diversity to identify and protect the full range of wetland functions and/or ecological condition, resulting in a narrative criterion for wetlands instead of numeric criteria.

The effort to develop meaningful and defensible Wetland Water Quality Standards is occurring nationwide and is well reported in publications and other resources by EPA and the Association for State

Wetland Managers[43]. For example, guidelines[44,45] and templates[46] are available to assist states in the process of developing narrative or numeric wetland water quality standards. To date, 14 states[47] have developed narrative or numeric Wetland Water Quality Standards and information from these states would be used to inform New Jersey's approach in considering the feasibility of developing Wetland Water Quality Standards. The Association for Clean Water Administrators' focal area of Monitoring, Standards, and Assessment[48] will also be an important information resource during this process.

As New Jersey is evaluating the possibility of developing Wetland Water Quality Standards, wetland monitoring and assessment data collected by wetland scientists in the state would provide critical information on wetland condition, their uses and function using a reference-based approach along a gradient from high to low ecological integrity. Ecological integrity assessment data on landscape and buffer condition, vegetation, soil, and hydrology metrics and environmental stressors has been collected during statewide and USEPA National Wetland Condition Assessments. This rich data set includes sediment chemistry and water quality data that could be used to build a foundation for development of wetland water quality standards in the future. Additional work is needed to better understand the effects of biogeochemical exchanges between surface water, ground water and wetlands and the effects of wetlands on downstream water quality. New Jersey could also build on its aquatic biological assessment research and expertise from benthic macroinvertebrates, amphibians, fish, and diatoms for developing wetland condition metrics. Quantitative reconstructions of historic water quality and sediment nutrients can be used to determine reference conditions based on sediment core diatoms. The utility of wetland diatom/algae and nutrient data is being tested to see if a Tiered Aquatic Life Use or Index of Biological Integrity models can be used in defining wetland water quality standards. The New Jersey Floristic Quality Assessment Index based on floristic diversity has proved to be a good predictor of wetland condition, and further tests are being conducted on a variety of freshwater and coastal wetland types along the condition gradient to confirm the utility of this tool in developing wetland water quality standards.

Wetland functional assessments evaluate how well a wetland may perform ecological services such as water purification, nutrient transformation, carbon sequestration, flood protection, groundwater recharge, and stream flow maintenance, shoreline stabilization, sediment deposition, fish and wildlife habitat, and conservation of biodiversity, and may inform the designated uses of a specific wetland. Many tools have been developed and tested for assessing wetland function. The NJDEP and Rutgers University conducted an evaluation of functional assessment methods in a 2004 report Development of Wetland Quality and Function Assessment Tools and Demonstration.

Existing wetland condition and functional assessment tools as well as continued efforts in wetland monitoring and assessment in New Jersey will provide an important nexus as the state considers water quality standards for wetlands. Options for wetland specific quality standards (narrative and/or numeric) will be evaluated through collective exploration involving NJDEP Natural and Historic Resources program, Division of Science and Research, Division of Land Use Management, and Water Resource Management program, as well as the Pinelands Commission and Highlands Council.

Core Element 5: Adaptation, Resilience and Mitigation in a Changing Climate

[43] https://www.aswm.org
[44] https://www.epa.gov/cwa-404/national-guidance-water-quality-standards-wetlands
[45] https://www.aswm.org/pdf_lib/wwq_standards_for_states.pdf
[46] https://www.epa.gov/wqs-tech/templates-developing-wetland-water-quality-standards
[47] https://www.aswm.org/wetland-programs/water-quality-standards-for-wetlands/2780-states-with-wetlands-and-water-quality-standards
[48] https://www.acwa-us.org/focus-areas/monitoring-standards-and-assessment

NJDEP Commissioner Shawn LaTourette has identified the reduction of and response to climate change as one key goal for the Department. It is recognized that the State of New Jersey has an urgent need to lead the way in addressing climate change from threats to its coastline to rising temperatures. To address and mitigate climate change, the NJDEP works to foster a robust public dialog about the impacts of climate change, enable a clean and renewable energy economy (100% by 2050), and achieve resilient coastlines and flood-prone areas.

On January 29, 2018, Governor Phil Murphy signed Executive Order 7 (EO 7) directing the NJDEP and the Board of Public Utilities to take all necessary regulatory and administrative measures to ensure New Jersey's timely return to full participation in the Regional Greenhouse Gas Initiative (RGGI). The RGGI is a multi-state, market-based program that establishes a regional cap on carbon dioxide (CO_2) emissions and requires fossil fuel power plants providing 25 megawatts (MW) or more to the grid to obtain an allowance for each ton of CO_2 emitted annually. Power plants may comply by purchasing allowances from quarterly RGGI auctions, secondary markets, or through projects that offset CO_2 emissions[49]. States use the revenue generated from these auctions to increase investment in energy efficiency and other greenhouse gas reduction strategies, rate payer assistance and advance innovation in clean energy economy[50]. Currently, twelve Northeast and Mid-Atlantic states participate in RGGI to limit greenhouse gas emissions generated by fossil fuel-fired power plants[51]. Launched in 2005, RGGI was the first mandatory greenhouse gas "cap-and-trade" program in the United States. After working with the other RGGI states to determine how best to re-engage in the RGGI program, NJDEP proposed two rulemakings. First, the CO_2 Budget Trading Program rule proposal establishes New Jersey's portion of the overarching RGGI program, including the regional cap and applicability requirements for regulated entities. Second, the Global Warming Solutions Fund Act rule proposal establishes a framework, including the guidelines and the priority ranking system that NJDEP, NJ Economic Development Authority and NJ Board of Public Utilities will use to select eligible programs and projects to receive RGGI auction proceeds.

The New Jersey Global Warming Response Act, enacted in 2007, requires the State to reduce economy-wide greenhouse gas emissions to 1990 levels by 2020 and to 80% below 2006 levels by 2050. The Global Warming Solutions Fund Act authorizes the State to implement a market-based CO_2 emissions trading program, such as RGGI, and directs where New Jersey's proceeds from the auctions are deposited and how that money must be used. 10% of New Jersey's proceeds shall be allocated to the NJDEP to support programs that enhance the stewardship and restoration of the State's forests and tidal marshes that provide important opportunities to sequester or reduce greenhouse gases. To this end, the 2020-2022 Strategic Funding Plan was established and identifies two main initiatives for the investment of DEP's carbon sequestration funding: 1) promoting blue carbon in coastal areas and 2) enhancing forests and urban forests. Resulting from this allocation, the Natural Climate Solutions Grant Program provided $15 million in funding for tidal wetland forest restoration projects. With the request for proposals window having closed on September 16, 2022, this grant program will support New Jersey-based projects with the potential to increase carbon sequestration, as well as habitat creation, resilience, and water quality improvements. Funding will be provided to projects that are focused on either blue carbon (e.g., living shorelines, restoration of tidal flow, salt marsh vegetation restoration, and submerged aquatic vegetation restoration) and green carbon (e.g., forest restoration and urban forest canopy and water quality enhancement), in accordance with the Strategic Funding Plan. Project specific information can be found on New Jersey's RGGI Climate Investments Dashboard.

[49] https://www.rggi.org/allowance-tracking/offsets
[50] https://www.rggi.org/investments/proceeds-investments
[51] https://www.state.nj.us/dep/aqes/oce-ghges.html

NJDEP is working collaboratively with the NJ Department of Agriculture to draft an evolving Natural & Working Lands Strategy that identifies detailed strategies that will mitigate the impacts of climate change through carbon storage and sequestration in natural and agricultural lands.

In 2019, Governor Murphy signed Executive Order No. 89, which established an Interagency Council on Climate Resilience and directed the Department to coordinate development of a Statewide Climate Change Resilience Strategy to promote the long-term mitigation, adaptation, and resilience of New Jersey's economy, communities, infrastructure, and natural resources. The Climate Change Resilience Strategy acts as a blueprint for protection of property, lives, infrastructure and natural environments by guiding policies, regulations, resources, and funding. The Resilience Strategy includes six (6) priority area – priority area 2 is to strengthen the resilience of New Jersey's ecosystems and priority area 6 is focused on coastal resilience. New Jersey's coastal resilience planning is currently being implemented on a project, site specific, municipal, and regional basis. The Resilience Strategy includes state-level recommendations to tie together the resilience planning efforts occurring across state agencies for a comprehensive and effective approach to increase the resiilence of the state. The Department's resilience planning efforts occur in part under New Jersey's Coastal Management Program, part of the NOAA's National Coastal Zone Management Program, and addresses some of today's most pressing coastal issues, including sustainable and resilient community planning through the Resilient NJ program, climate change, ocean planning, and planning for energy facilities and development.

In 2020, the NJDEP released its first scientific report on climate change that summarizes the latest knowledge regarding climate change's impact on the State's environment.[52] The report is meant to inform both State and local organizations as they navigate the impacts of climate change. Chapter 5 (Impacts of Climate Change on Resources and Ecosystems) of this report review current literature on the impacts of climate change on freshwater and tidal wetlands and coastal wetland forests in New Jersey. Additional information regarding Sea-level Rise and Ocean Acidification can be found in Chapter 4 sections 3 and 4, respectively.

As explained under Core Element 4, the New Jersey Coastal Resilience Collaborative was formed by the NJDEP and an extensive network of state, federal, academic, and conservation partners to support comprehensive coastal resilience planning and implementation based upon the best available science and technical tools. Where possible, the NJ CRC identifies and leverages funding opportunities to implement mitigation and adaptation projects and activities at the community and regional level.
The Office of Climate Resilience has funded creative initiatives to help landowners and managers plan and build resilience in the face of a dramatically changing coastal landscape, many of these have been described in the narrative for Core Elements One and Three. The NJDEP Blue Acres Program works to better protect public safety and the environment by relocation New Jersey families whose homes are subject to repeated flooding and contributes to New Jersey's Climate Change Resilience Strategy through a proactive approach to guide state acquisition of lands that increase host community resilience through the strategic acquisition of lands that have been damanged, may be prone to future damage due to sea-level rise, storms, or storm-related flooding, or that may buffer or protect other lands from such damage.

NJDEP has additionally driven the creation of a number of tools to allow for more efficient targeting of sites conducive to restoration and significant enhancement of carbon sequestration. New Jersey's blue carbon and at-risk coastal zones were mapped in the U.S. Climate Alliance Coastal Vulnerability interactive mapping tool created by Duke University's Nicholas Institute for Environmental Policy Solutions. This interactive map allows for calculations of carbon sequestration and loss based on projected rates of sea-level rise and potential restoration/mitigation efforts. Additionally, as part of the Coastal Ecological Restoration and Adaptation Plan, a series of interactive mapping tools have been

[52] https://www.nj.gov/dep/climatechange/docs/nj-scientific-report-2020.pdf

created. This series includes a CERAP Issues of Concern Data Explorer, a Stakeholder-suggested map of potential project areas, and a carbon sequestration map. The Issues of Concern Data Explorer and the Stakeholder-created map will be combined with other regional attributes (e.g., overburdened communities) with set regions around generalized areas of concern to provide a comprehensive picture of effects resulting from restoration. This project will result in a single online mapping tool available to the public.

Core Element 6: Public Outreach and Education

While public outreach and education are addressed in several of the Core Elements in this Wetland Program Plan, it is highlighted here because of its integral importance to successful efforts in wetland assessment, regulation, restoration, and protection. Public outreach and stakeholder involvement has been critical to the success of the NJDEP's initiatives. The NJDEP is aware that the public values wetlands for the many ecological services they provide such as flood control, shoreline stabilization and storm protection, water purification, recreation, and tourism. The NJDEP has developed innovative education and learning tools such as the Bureau of Environmental Analysis, Restoration, and Standard's stewardship programs (e.g., AmeriCorps NJ Watershed Ambassador program and Community Water Monitoring program[53]), interactive mapping (e.g., NJ-GeoWeb[54] and the Landscape Project[55]), guidance documents (e.g., wetland mitigation and vernal pool certification), and reports (e.g., New Jersey Integrated Water Quality Assessment Reports[56]) that are posted on various NJDEP websites and thus readily available to the public. The NJDEP, in cooperation with the Rutgers University Office of Continuing Education, provides wetlands training and information for a wide range of audiences. Environmental education opportunities and water-dependent public recreation (e.g., birding and fishing) and access (e.g., trails, boardwalks, and boat launches) for the citizens of and visitors to our State are critical if our precious wetland resources are to be valued and protected.

A "Lessons Learned" paper based on the first four years of NJDEP's pilot beneficial use of dredged material for salt marsh and other habitat enhancement was written to inform the development of future projects and initial findings from the monitoring.[57] In addition to the release of scientific publications,[58,59] these projects have been presented at conferences, meetings, and workshops. Within Watershed and Land Management and associated Divisions of Land Resource Protection and Watershed Restoration and Protection, educational efforts include social media campaigns, in-person outreach to environmental professionals and educators, and the development of wetland associated map layers (mitigation sites, mitigation banks), which are accessible to the public through the NJDEP website GIS tools. In addition, through funding provided under a Wetland Programmatic Grant in 2019, Watershed and Land Management staff are in the final stages of completing a wetland technical manual which will provide detailed guidance on the wetland mitigation process. This document is expected to be publicly available in the Fall of 2022.

The Division of Science and Research has initiated several avenues to open and maintain both internal and external education and communication about wetland work within the State of New Jersey. Monthly NJDEP wetland seminars are hosted to feature wetland-related research, with typical audience

[53] https://www.state.nj.us/dep/wms/bears/americorps.htm
[54] https://www.nj.gov/dep/gis/geowebsplash.htm
[55] https://www.state.nj.us/dep/fgw/ensp/landscape/index.htm
[56] https://www.nj.gov/dep/wms/bears/generalinfo.htm
[57] https://www.nj.gov/dep/dsr/wetlands/beneficial-use-dredged-material-project-summary-lessons-learned.pdf
[58] http://www.westerndredging.org/phocadownload/WEDA_Journal_of_Dredging_(Vol_19_No_3).pdf
[59] https://doi.org/10.1139/anc-2020-0020

participation reaching more than 100 members each seminar. Additionally, a NJDEP Wetland Team, which now includes members from the Highlands, Pinelands, and Meadowlands, meet on a monthly-basis to review and share the latest developments in wetland-related work. This is also used as an opportunity to seek out collaborations, funding opportunities, and crowd-source ideas and advice regarding current projects. An Instagram account for outreach and education that is intended to reach the public through a modern medium was created in 2021 and now features more than 350 followers as of September 2022. Posts include science-based information about wetlands and climate change, among other important human health and ecological subjects. In addition, posts highlight NJDEP research and publicly available publications, reports, and web resources.

New Jersey's post-Sandy focus on coastal resilience resulted in excellent outreach products including:

- National Fish and Wildlife Federation Grant - Building Ecological Solutions to Coastal Community Hazards: A Guide for NJ Coastal Communities addressing coastal hazards in four NJ ecosystems: developed lands; beaches and dunes; coastal forests and shrublands; and tidal marshes, with an overview of the ecosystems, protective values, key vulnerabilities and ecological solutions to hazards ;
- Training for professionals/contractors in ecological goals, assessments, projects and monitoring;[60]
- Development of high school curriculum module for ecological assessment and solutions, with six National Fish and Wildlife Federation project case studies, for in class and field activities. Initial phase engaged 700 students. (Scholars, Educators, Excellence, Dedication, Success); and
- 2017 American Planning Association New Jersey Excellence Award for Outstanding Community Outreach and Education

The Meadowlands District

The NJSEA's public outreach and education efforts help the agency reach its goals of protecting the delicate balance of nature, increasing wetland habitat quantity and quality, monitoring and assessing wetlands and other adjacent habitats within the District, and preserving and assisting in the recovery of these habitats. The NJSEA's ecological restoration efforts have transformed the Meadowlands into a popular ecotourism and education destination.

The District features 21 parks with 8 miles of walking trails, seasonal free pontoon boat cruises led by NJSEA staff, and the state-of-the-art William D. McDowell Observatory in DeKorte Park. Through the Meadowlands Environment Center, the NJSEA provides environmental science programs to schoolchildren through a contract with Ramapo College, with approximately 15,000 students participating in field trips to DeKorte Park throughout the year. The NJSEA also works with the Reed Academy, providing educational and employment training programs for autistic teens and adults.

The NJSEA also collaborates with Bergen County Audubon Society, which leads twice-monthly guided nature walks in the Meadowlands. The NJSEA also maintains the Meadowlands Nature Blog (www.meadowblog.net), as well as an Instagram account, which includes great wildlife and landscape photos from area photographers, news about upcoming NJSEA events, and other Meadowlands-related nature and environment news.

The objectives of NJSEA's public outreach and education program include providing education and ecotourism opportunities; increasing awareness about the wetlands and other natural resources of the Meadowlands; and incorporating innovative practices and technology into our programs. Specific actions and activities include the following:

[60] http://www.sustainablejersey.com/nc/events-trainings/

- Highlighting innovative ecological restoration projects and practices such as regenerative stormwater conveyance techniques, floating island technologies, innovative monitoring practices, and living shoreline techniques;
- Continuing to work with Bergen County Audubon, NJ Audubon and the Hackensack Riverkeeper to develop citizen science data collection programs; and,
- Developing more story maps to inform others about the history, current research and restoration projects of the Meadowlands.

Priorities over the next five years include enhancing access to hands-on experiences in wetlands, creating more story maps on all facets of the Meadowlands, and developing additional partnerships with other agencies, institutes, and non-governmental organizations.

Core Element 7: Environmental Justice

All New Jersey residents, regardless of income, race, ethnicity, color, or national origin, have a right to live, work, and recreate in a clean and healthy environment. Historically, New Jersey's low-income communities and communities of color face a disproportionately high number of environmental and public health stressors and, as a result, suffer from increased adverse health effects. New Jersey seeks to correct these outcomes by furthering the promise of environmental justice.

Formalized in 2003, the NJDEP Office of Environmental Justice assists in amending NJDEP's internal work to incorporate environmental justice, facilitates a council of NJ agencies to amend the ways the State achieves environmental justices, and engages with environmental justice communities to remove barriers to accessing resources so that communities are better informed and heard. To this end, the Office of Environmental Justice administers the EJ Advisory Council, which acts as a valuable forum for discussions about integrating environmental justice into NJDEP's programs, policies, and activities. Additionally, the Office of Environmental Justices seeks to increase public participation and education, serve as a community liaison, increase access to state government environmental information, and foster partnerships with municipalities, OBCs, and community-based organizations. Priorities for the next five years include the development of the Environmental Justice Assessment Report and Action Plan, which will evaluate the NJDEP and its current work and gaps in environmental justice and identify opportunities and solutions to futher justice, and utilize the federal Justice40 Initiative guidance to ensure that environmental justice communities receive the necessary focus for funding and projects related to wetlands and other ecological and economic uplift.

In 2018, Executive Order No. 23 (E.O. 23) was signed by Governor Philip D. Murphy. In E.O. 23, Governor Murphy recognized that, historically, New Jersey's low-income communities and communities of color have been exposed to disproportionately high and unacceptably dangerous levels of air, water, and soil pollution, with the on-going potential for increased impacts on public health. These communities continue to be disproportionately affected by environmental degradation, health risks, housing challenges, and inadequate access to resources that affect their quality of life. Recognizing this history and the continued need to provide environmental justice, E.O. 23 emphasizes that residents of all communities should receive fair and equitable treatment in decision-making that affects their environment, communities, homes, and health. E.O. 23 directs the NJDEP to develop guidance for all state departments to incorporate environmental justice considerations into their actions. Furthering the Promise: A Guidance Document for Advancing Environmental Justice Across State Government was prepared by the NJDEP in September 2020 and provides a framework for Executive Branch agencies and departments on how to consider the environmental and health impacts of their programs and policies in overburdened communities. It seeks to bring state agencies and departments together to tackle the many complex

environmental justice issues related to quality of life, including housing, health, transportation, and strategic enforcement actions.

Further action was taken on September 18, 2020, when Governor Phil Murphy signed New Jersey's Environmental Justice Law (N.J.S.A 13:1D-157). This groundbreaking new law gives NJDEP the authority to require certain types of facilities to undergo additional requirements for new and expanding structures in areas defined as overburdened communities (OBC) in the law. The additional requirements include accessible public meetings and developing an Environmental Justice Impact Statement which considers current and prospective environmental justice burdens within the overburdened community (OBC). Additionally, NJDEP has the authority to reject or require application modification in accordance with the Law. On June 6, 2022, NJDEP formally proposed these promulgating regulations (Proposed Environmental Justice Rules). Upon adoption, the Environmental Justice Rules will establish the implementation process for assessing relevant environmental and public health stressors affecting overburdened communities (OBCs) and to deny or condition permits where facilities cannot avoid the occurrence of disproportionate environmental or public health stressors in the OBC. In furtherance of this effort, NJDEP has developed the Environmental Justice Mapping, Assessment and Protection (EJMAP) tool. EJMAP establishes an objective, publicly available representation of the existing environmental and public health stressors in the State's OBCs and supports the analysis required under the Environmental Justice Rules. Although developed primarily for OBC and stressor visualization to facilitate implementation of the EJ Law, EJMAP is also being used by many NJDEP programs to ensure their work equitably benefits disadvantaged communities. It has been used to help identify wetland restoration and protection projects, including the Coastal Ecological Restoration and Adaptation Plan, Blue Acres, and The Natural Climate Solutions Grants program. Additionally, Green Acres is prioritizing its local and nonprofit grant funding to projects within Adversely Stressed Overburdened Communities.

Through a partnership between NJDEP and NJ Economic Development Authority (NJEDA), the Community Collaborative Initiative (CCI) was launched as a place-based, grassroots partnership in Camden through the community stakeholder process implemented by the NJDEP Office of Brownfield Reuse's Brownfield Development Area program. The Camden Collaborative Initiative was formally launched in 2013 to protect, maintain and restore human health and the environment. From this initiative, Cramer Hill Waterfront Park was created, which involved enhancing and expanding existing freshwater wetlands and creating an additional 7 acres of tidal freshwater wetlands open to the public for recreation and education. Following the successes in Camden, the place-based collaborative framework grew into the Community Collaborative Initiative in 2015 to include Trenton and Perth Amboy, and Bayonne in 2017. The Community Collaborative Initiative formally became a program in 2019 and is currently housed in the Community Investment and Economic Revitalization Program. CCI expanded into eight additional cities, Bridgeton, Jersey City, Millville, Newark, Paterson, Paulsboro, Salem, and Vineland, each with a designated CCI Liaison. CCI Liaisons are now embedded in 12 municipalities with overburdened communities to work with our public and private partners on our aligned interests, find and leverage resources, and facilitate innovative and multiple-use solutions to better support these communities. The Community Collaborative Initiative works closely across all NJDEP programs and with the Office of Environmental Justice to advance NJDEP's mission to protect human health and the environment and to improve social, economic, and health conditions in overburdened communities.

Additional successful wetlands and environmental justice community projects include several brownfield site reuse projects led by NJDEP's Site Remediation Program. D.R.E.A.M. Park in Logan Township, Gloucester County features a park in which a 1,600-acre dredge spoil dumpsite was converted into a combined horseback riding facility and wetland habitat preservation site along the Delaware River, with a 300-foot buffer around the wetlands. Carter Wallace Facility in Cranbury Township, Middlesex County was a site of significant remediation work and now features a safe and functional warehouse and distribution park that was built with protection and expansion of on-site wetlands in mind, creating a

permanent preservation of wetlands through deed restriction. This project additionally addressed groundwater and surface water quality by constructing a 300-foot buffer around the wetlands and a water treatment system for stormwater discharge. The Essex Street Riverfront Park in Rahway City, Union County is a park designed around wildlife and habitat conservation with walking trails, gardens, and open-to-the-public wetlands. Each of these projects have been successful in balancing wetland habitat and wildlife protection and local community needs for recreation and economic development.