

2026 - 2030 Delaware Wetland Program Plan

A guidance for developing and refining a state of Delaware wetland program.



DELAWARE DEPARTMENT OF
NATURAL RESOURCES AND
ENVIRONMENTAL CONTROL

Overview

The Delaware Wetland Program Plan was developed by the Delaware Department of Natural Resources and Environmental Control's (DNREC) Wetland Monitoring and Assessment Program (WMAP). This effort is intended to identify and outline gaps and needs to develop and refine a wetland program in Delaware. The plan organization aligns with Environmental Protection Agency's (EPA) Core Element Framework and will be referenced over the five-year span to direct projects and prioritization.

In preparation for this program plan the following related documents were reviewed and considered: Delaware Wildlife Action Plan 2015-2025, 2025 Draft Delaware Climate Action Plan, 2020 Delaware Statewide Forest Strategy, Delaware Estuary Comprehensive Conservation and Management Plans (CCMP) 2019 Revision, Center for the Inland Bays 2021 CCMP, Delaware Wild Lands Strategic Plan 2024-2029, and The Nature Conservancy Delaware Bayshore Coastal Resilience Roadmap. The contents of this document categorize and identify existing or recently developed areas of need as they relate to wetland science, conservation, and management.

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All photos contained within this document were provided by WMAP, unless otherwise noted.

Cover Photo (top): Freshwater forested stream in Gumboro, Delaware.

Cover Photo (bottom): Ditched salt marsh at low tide in the Indian River Bay.

Back Cover: Baldcypress trees and swamp at Trap Pond State Park in Laurel, Delaware.

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Table of Contents

Overview	2
Table of Contents	3
Acronyms	4
Introduction	5
Wetland Monitoring and Assessment Program	7
Objective 1: Monitoring and Assessment	11
Goal A: Geospatial Analysis	12
Goal B: Monitoring	14
Objective 2: Regulatory Activities	16
Goal C: Regulatory	17
Objective 3: Voluntary Restoration and Protection	18
Goal D: Restoration	19
Goal E: Protection	21
Objective 4: Education and Outreach	23
Goal F: Education	24
Goal G: Outreach	27
Literature Cited	30
Appendix A: Accomplishments from 2021 to 2025	31
Appendix B: 2026-2030 Action Item to CEF Crosswalk	45

Acronyms

Acronym	Definition
BMP	Best Management Practice
CCMP	Comprehensive Conservation and Management Plans
CEF	Core Element Framework
DNREC	Department of Natural Resources and Environmental Control
EPA	Environmental Protection Agency
GIS	Geographic Information Systems
HOA	Homeowners Association
QAPrP	Quality Assurance Project Plan
RASCL	Resilient and Sustainable Communities League
SOP	Standard Operating Procedure
SWMP	Statewide Wetland Mapping Project
USFWS	United States Fish and Wildlife Service
WMAP	Wetland Monitoring and Assessment Program
WPP	Wetland Program Plan

Introduction

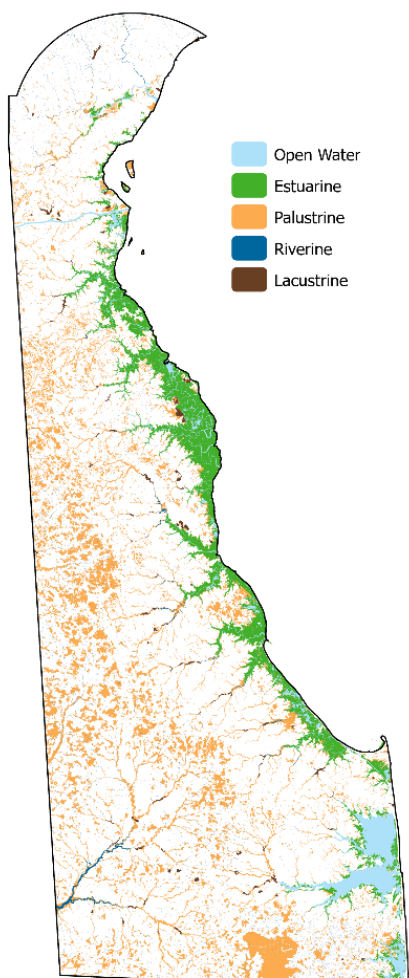


Figure 1. Wetland types in Delaware based on 2017 wetland maps.

Delaware is host to approximately 296,350 acres of wetlands that vary in salinity, soil type, and vegetation based on geographic location and water source (Figure 1). With roughly one quarter of the state's land area being wetlands, residents and visitors to Delaware are surrounded by these hard-working natural features, which provide many important services that support the state's economy (Figure 2). These services together total more than \$1 billion annually for the state of Delaware (Kauffman 2018). For example, wetlands can remove and retain disturbed sediments, pollutants, and nutrient runoff from non-point sources (e.g., agriculture, land clearing, and construction) from the water column before they enter our waterways, thereby improving the quality of drinking and swimming water. Such services provide Delaware an estimated \$474 million annually in water quality benefits (Kauffman 2018). Further, by retaining and binding sediment, these ecosystems help to stabilize the shoreline and reduce erosion. Wetlands also provide flood protection by collecting stormwater that spills over channel banks and slowly releases it, protecting downstream infrastructure and property. Flood control benefits provided by Delaware wetlands are valued at \$66 million annually (Kauffman 2018). Coastal wetlands also dampen destructive

storm energy along Delaware's shorelines. Finally, wetlands are biologically rich habitats home to many unique plant and animal species, some of which are rare and endemic to Delaware. These habitats are critical resources for migrating shorebirds and wintering waterfowl and serve as nurseries for most commercial fish and shellfish species in Delaware. As such, Delaware wetlands are a valuable source of wildlife and recreation (e.g., hunting, fishing, kayaking, and birding), generating approximately \$510 million annually (Kauffman 2018). Our bountiful wetland resources play an understated but vital role for our communities, economy, and well-being.

However, Delaware’s beautiful and valuable wetland resources are still vulnerable to the same threats they have faced for the past 45 years, such as conversion to agriculture or development, prioritization differences among decision makers, and a lack of awareness or appreciation of their intrinsic value. Other challenges are becoming more prominent, such as conversion to open water and saltwater intrusion due to increasingly elevated coastal waters. The intention of this Wetland Program Plan is to outline how to address some of those threats in the next five years (2026-2030) in cooperation with partners through the goals and action items listed.

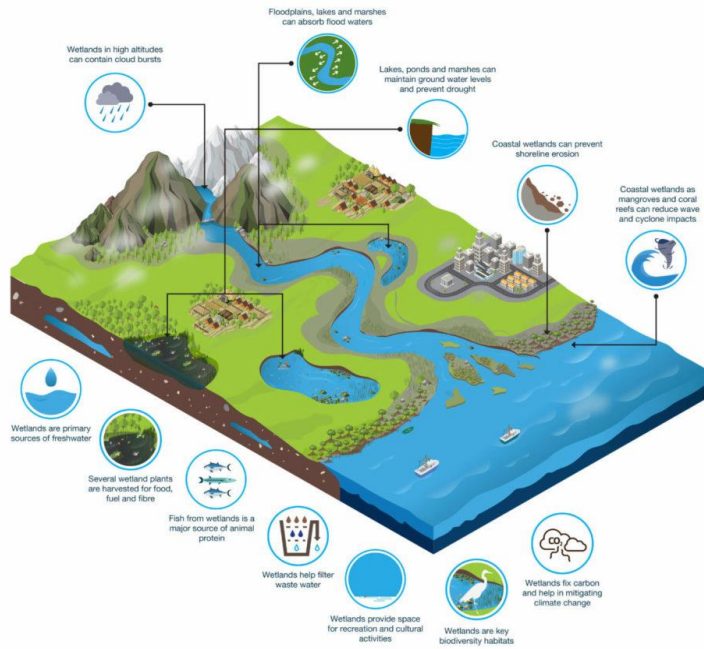


Figure 2. Ecosystem services provided by wetlands. Graphic obtained from Wetlands International.

A thriving network of organizations around the state are dedicated to studying, protecting, and improving wetlands for today and future generations. This network ranges from state, county, federal, private, non-profit, and academic groups, and often their work overlaps. In 2015, DNREC and many partners collaborated to update a guiding document comprised of 45 action items that identified and prioritized areas where information or action was needed. These action items were revised and updated by DNREC in 2020 as part of the 2021-2025 Delaware Wetland Program Plan (WPP) to account for completed items and address new gaps. Over the past 5 years, DNREC completed or made significant progress on 23 of 45 (51%) of previous action items. In addition, 33% of action items are in progress or ongoing. The remaining 16% have had no significant progress to report. While substantial progress has been made to advance Delaware’s wetland objectives, the work continues. Today, updated action items in the 2026-2030 Delaware Wetland Program Plan address evolving goals and remaining needs to expand and refine Delaware’s capacity to monitor and assess, restore and protect, educate, and regulate its wetland resources. Possible funding sources that could support action item work include Wetland Program Development Grants, cooperative agreements with NEP’s and other federal programs such as USFWS, as well as internal DNREC program support.

Wetland Monitoring and Assessment Program

Vision: To achieve an increase in wetland acreage and improve wetland condition to support the wealth of services and functions wetlands provide.

The objectives of the WMAP which will achieve our vision are:

- **Objective 1: Monitoring and Assessment** – Gather data on the status and trends (quantity, quality, functions, and services) of wetlands to track wetland condition and function over time.
- **Objective 2: Regulatory Activities** – Avoid, minimize, and replace impacts to wetland extent and function through effective regulation, efficient permitting and appropriate mitigation.
- **Objective 3: Voluntary Restoration and Protection** – Protect and restore wetlands through voluntary and long-term actions that uphold and elevate wetland extent and value.
- **Objective 4: Education and Outreach** – Inform the citizens and visitors of Delaware about the function, services, and critical importance of wetlands. Collaborate with a variety of partners to improve efficiency and effectiveness of educational materials, platforms for outreach, and public events.

These objectives align with the EPA's [Core Element Framework](#) (CEF) and outline the four major components within which the Delaware WPP is rooted. Objective 1 is a direct product of the ongoing efforts to monitor and assess the condition, function, and services of wetlands in the state. Focus areas within this objective include watershed assessments of wetland condition, long-term monitoring of tidal saltmarsh within the Inland Bays, and monitoring of wetland recovery prior to and post restoration. Objective 2 incorporates assessment results from Objective 1 and uses that information to inform regulatory decisions and address regulatory gaps. Where regulatory gaps remain, Objective 3 provides an alternative opportunity to positively affect the decisions being made about the management, restoration, and protection of wetlands. Focus areas within this objective include the beneficial use of dredge material and installation of living shorelines. Finally, Objective 4 transfers the knowledge and perspectives gained from Objectives 1, 2, and 3 to bring awareness and appreciation for wetlands to other organizations and the public. The product of all four objectives will lead to an increase in wetland acreage and improvement of wetland condition, in turn supporting the wealth of services and functions wetlands provide.

Wetland Program Plan

The WMAP is guided by the Delaware Wetland Program Plan, which is an update of the Delaware Wetlands Conservation Strategy. The 2008 Delaware Wetlands Conservation Strategy was replaced in 2011 by the Delaware Wetland Monitoring Strategy, which then evolved into the Delaware Wetland Program Plan. The first WPP was produced in 2015 using the input of a core team of 15 professionals representing six DNREC divisions and the Delaware Forest Service. Based on accomplishments since 2008 and the existing gaps and needs of multiple wetland programs in the state, seven major goals were identified and accompanied by related action items. These action items were revised and updated by WMAP in 2020 as part of the 2021-2025 Delaware WPP to account for completed items and address new gaps. This five-year plan is intended to be a guiding document for DNREC and its partners to identify and prioritize wetland program needs, and to encourage collaboration and efficiency to expand and refine Delaware's capacity to conserve and improve its wetland resources.

Assessment Methods

The WMAP uses standardized assessment protocols to determine the quality of Delaware's wetlands and measure the functions and ecological services that they are providing. The State of Delaware has developed multiple levels of assessment methods to evaluate wetland condition. These levels include landscape level remote sensing, ground truthing through rapid field assessment, intensive field assessment, and fixed monitoring stations (Figure 3). The amount of information and level of effort increases as the spatial scale moves from regional to site specific. Each level overlaps with the next, allowing feedback, refinement, and validation.

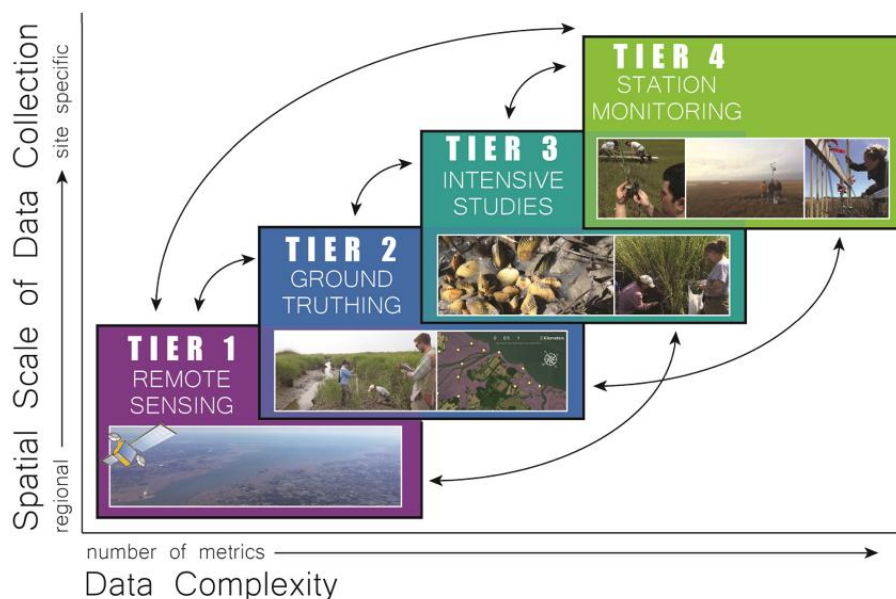


Figure 3. Four-tiered approach to wetland assessment. Graphic obtained from Partnership for the Delaware Estuary (PDE).

Quality Assurance Program and Project Plans

DNREC has an umbrella Quality Management Plan (version 7 dated 11/28/2023) which was approved by EPA Region 3. The WMAP complies with DNREC's QMP and collects and manages all data under an EPA-approved Quality Assurance Project Plan (QAPrP). The QAPrP covers project and task organization, training, equipment testing, sampling design, sampling methods, assessment and oversight, data generation and acquisition, data management, data verification and validation, and quality control. Training will be provided to all persons involved in the data collection process to ensure assessment protocols and data collection techniques are followed and high-quality data is produced. All data will be entered or transferred into an Excel computer database that has been developed to consistently store wetland assessment data. All data entry is checked during a quality control process for accuracy. Digital scans of datasheets will be stored on the computer with paper copies of datasheets stored in the Watershed Assessment and Management Section. A copy of the QAPrP can be obtained from Delaware DNREC's Watershed Assessment and Management Section. The QAPrP will be reviewed annually and updated as needed to reflect changes to staffing etc.

Project Reporting and Outreach

For each project and/or assessment a technical report will be produced in a timely fashion that summarizes the goals of the project, the assessments conducted, condition and function results, and next steps or project takeaways. Other documents for sharing project results will be produced as needed including information on becoming involved in protecting and restoring wetlands based on suggested management recommendations. These documents will be shared on the WMAP website, as well as promoted during various outreach events. Additional outreach efforts focus on presenting findings during webinars to other natural resource stakeholders (e.g., other government agencies, non-profits, universities, etc.) and providing high-level presentations on wetland-related topics to the public (e.g., libraries, HOAs, etc.).

Program Evaluation

A team of wetland professionals will review the WMAP's progress every five years. This team will consist of individuals with knowledge of sampling methods, techniques, and survey design, as well as users of this information including planners and managers. The evaluation will include summarizing past accomplishments, identifying remaining gaps and needs, and producing new objectives and action items.

A list of the 2021-2025 Delaware Wetland Program Plan accomplishments can be found in Appendix A. A review of the progress and status of action items spanning 2021-2025 identified areas of strength and room for improvement. Overall, a tremendous amount of work was accomplished and resulted in shareable products available to the public. Only six out of forty-five action items were found to have 'no progress to report'. Some actions were not successfully addressed due to COVID-19 limitations, such as in-person trainings and meetings, and the 2022 Wetlands Conference.

The five-year period in review was active for mapping and related analyses and reporting, also conducting watershed condition assessments and generating reports, collaborating with other professionals, and executing wetland education and outreach. Areas with less task progress included protocol development or specific refinement, formal adoption of standardized methods for wetland restoration, improving county and municipal codes for wetland management, and researching impacts of climate change on tidal wetlands.

The focus for 2026-2030 will be on updating statewide wetland mapping, analysis, reporting, and result sharing, also assisting with state regulatory changes which may include protocol, map, training, and outreach development, as well as further researching and demonstrating wetland restoration tactics such as living shorelines and beneficial use. There will be a continued focus on expanding education and increasing voluntary stewardship by landowners, HOAs, and communities. Having released the final watershed-based wetland condition report in 2025, the program plans to utilize statewide results before repeating watershed condition assessments. Future watershed assessment surveys would likely follow a similar order, starting in southern watersheds where impacts of growth and climate change are most intense.

In total, the 2026-2030 plan outlines 41 action items organized in seven Goals. Each action item is tied to objectives in EPA's CEF. A crosswalk of every action item to a CEF objective can be found in each section of the program plan and in Appendix B.

Objective 1: Monitoring and Assessment

As the backbone of the Wetland Monitoring and Assessment Program, Objective 1 is centered around the creation, refinement, and use of the best available scientific data to track wetland quantity, quality, and

Objective 1: Gather data on the status and trends (quantity, quality, functions, and services) of wetlands to track wetland condition and function over time.

function across Delaware and document changes in these resources over time. Work conducted under Objective 1 will continue to follow the EPA's three-tiered framework to monitor and assess the condition of wetlands. At the landscape level, this includes developing and using geographic information systems (GIS) to locate, quantify acreage, and determine spatial and temporal patterns of wetlands. On a more local level or project scale, this involves evaluating and monitoring wetland condition and function over time in response to an activity or stressor. Finally, at the site level, this entails more intensive monitoring of wetlands over long periods of time, focusing on small changes to understand the big picture trends of wetlands and how they are responding to changing environmental conditions.



Figure 4. The WMAP staff conducting a vegetation survey of a long-term monitoring site within the Inland Bays.

The information and resources produced in Objective 1 through mapping, assessing, and monitoring wetlands will help us contribute to the greater science of wetland ecology and track progress towards achieving the State's vision of an increase in wetland acreage and improvement in wetland condition. Further, these efforts will feed into making better management decisions, help shape regulatory actions and requirements, and guide more effective restoration and protection activities. Together, this will foster an enhanced awareness and appreciation for wetlands through education, outreach, and the transfer of knowledge.

Effective monitoring and assessment of wetlands enables Delaware to meet federal Clean Water Act requirements 12 under Section 305(b) including “[a] description of the water quality of all waters of the United States and the extent to which the quality of waters provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water” (40 CFR § 130.8). In addition, the 2008 Compensatory Mitigation Rule calls for the use of scientifically valid functional and condition assessments for determining the type, quantity, and location for compensatory mitigation (33 CFR § 332.3), which Delaware hopes to develop in coming years.



Goal A: Geospatial Analysis

Use geospatial analysis tools to gather information and develop resources about the extent of wetlands in Delaware.

Vision and Direction

In Delaware, locating wetlands, quantifying acreage, and analyzing spatiotemporal trends of these important natural resources is not only vital for tracking wetland condition and function, but is feasible for a small state. For decades, DNREC has tracked wetland resources changing in the face of natural and anthropogenic forces, making mapping and landscape-level geospatial analysis a critical component of understanding and managing Delaware's resources. It is imperative that the information produced from this form of monitoring and assessment be routinely and regularly updated, as well as expanded upon, to ensure progress is made towards achieving Objective 1.

Given the documented rate of changing conditions, updating state wetland maps roughly every decade is necessary to keep information and resources current. Within the next five years, DNREC will produce updated Statewide Wetland Mapping Project (SWMP) maps, which will incorporate any advances in mapping technology and refinement that has occurred since previous maps were produced in 2017. The SWMP data layer will be made publicly available and incorporated into the National Wetland Inventory. Data will be used to produce a report on the status and trends of Delaware's wetlands since 2017, as well as to update existing related data layers (e.g., rare and unique wetlands) and create additional materials deemed necessary to track wetland condition and function over time (e.g., conversion of vegetated to flooded wetlands).

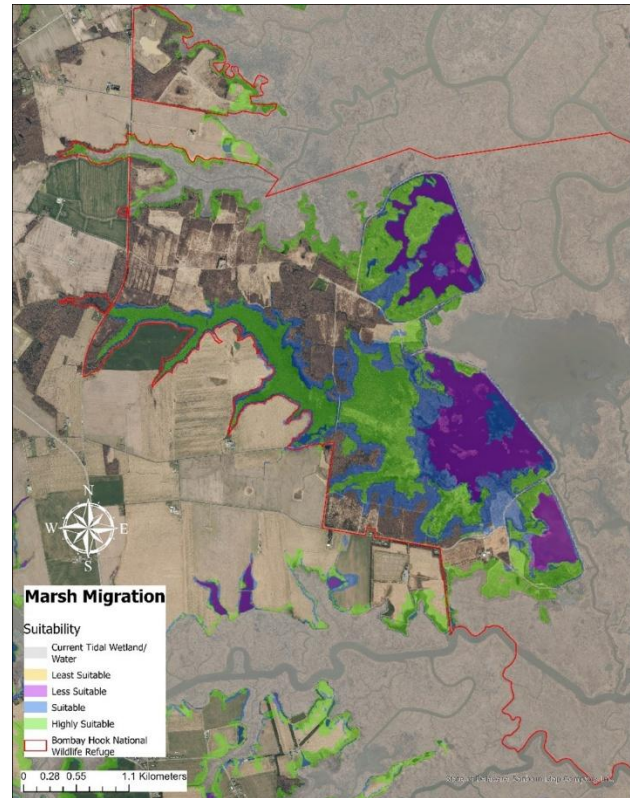


Figure 5. Example mapping resource produced by the Marsh Migration Model. Map shows migration suitability within Bombay Hook National Wildlife Refuge.

WMAP will continue to develop new and expand upon existing geospatial resources. As wetlands continue to be lost to anthropogenic (e.g., development) and natural (e.g., open water conversion) causes, WMAP should focus efforts on analyses that will highlight wetland areas for protection or restoration. Information gleaned should be considered in planning for future environmental conditions and hazards. Additionally, the products of these efforts—and wetland mapping at large—should be integrated into other state programs such as transportation, planning and zoning, fish and wildlife conservation, and flood protection. Decision making that is informed by geospatial data by the state, or other environmental organizations, can help increase wetland acreage and improve wetland condition.

Goal A: Spatial Analysis Action Items, Descriptions, and CEF Crosswalk

Action Item	Description	CE, Phase, Action	Schedule
A-1	Produce updated Statewide Wetland Mapping Project maps and report on the status and trends of Delaware’s wetlands. Incorporate maps into the National Wetland Inventory.	MA 1.c MA 2.e	2027-2028
A-2	Assist with the creation of spatial tools that assist in wetland project screening, tracking, and monitoring.	MA 2.d	2026-2028
A-3	Increase use of mapping resources and geospatial analysis in related projects such as coastal resilience research and planning, transportation projects, and mitigation planning.	MA 3.b MA 3.d	2028-2030
A-4	Incorporate wetland mapping into state agency decision-making.	MA 1.b Reg 2.g	2026-2027
A-5	Make mapping resources and supporting data publicly available.	MA 2.d MA 3.b	2026-2030



Goal B: Monitoring

Increase monitoring efficiency and effort to provide insight into current wetland condition and function and changes occurring over time.

Vision and Direction

On the ground monitoring of natural, restored, and created wetlands provides valuable insight into wetland health and function while creating opportunities to make in-person observations that cannot be derived from landscape-level assessments. These datasets can be interpreted to track short-term variability and long-term changes in wetland resources at the project, site, watershed, and/or state levels. Further, monitoring efforts provide a scientific basis for more effective regulation, planning, and management.

To increase monitoring efficiency, the WMAP will hold training workshops to educate wetland professionals on existing standardized protocols and encourage the adoption of these methods in related wetland work, whether it be general monitoring, restoration, mitigation, creation, or the like. Additionally, to maximize the utility of assessment findings, data and supporting documents will continue to be made available online through the WMAP website. The WMAP, as well as other practitioners and stakeholders, should use the materials and build upon the findings to inform future research.

Monitoring efforts in the next five years will focus on tracking changes in the extent, health, and function of wetlands over time on a project, watershed, and statewide basis. This includes collecting and analyzing data on physical, chemical, and biological indicators to evaluate the performance and success of wetland management techniques such as living shorelines, beneficial use, and migration encouragement. While much of this work is already being done by the WMAP, continuing efforts will help expand the timeframe of ongoing datasets and allow for long-term analysis of trends. The WMAP will also expand on studies that monitor wetland sediment accretion rates and elevation and investigate the ecological dynamic of habitat shifts due to increasingly elevated coastal waters and saltwater intrusion in coastal wetlands. With rapidly changing environmental conditions, it is imperative that field monitoring is incorporated into the assessment of wetland condition and function to ensure—whether an increase in wetland acreage is achieved or not—that the ecosystem services that are currently provided are sustained and supported into the future.

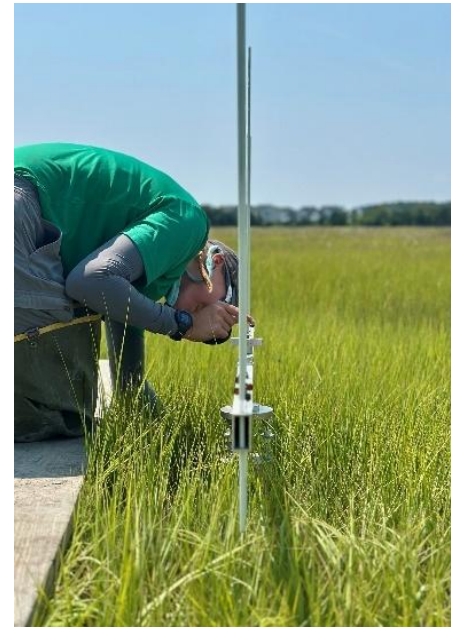


Figure 6. A WMAP scientist reading a surface elevation table (SET) in a tidal salt marsh. This survey is conducted annually to examine long-term trends in elevation.

Goal B: Monitoring Action Items, Descriptions, and CEF Crosswalk

Action Item	Description	CE, Phase, Action	Schedule
B-1	Encourage adoption of standardized protocols and use of reference data for wetland restoration, mitigation, or creation.	MA 2.c	2026-2030
B-2	Host training workshops for environmental professionals to learn and promote the use of DNREC’s wetland monitoring and assessment protocols and collection methods.	MA 2.a	2027 & 2029
B-3	Track changes in the extent, health, and function of wetlands over time on a project, watershed, and statewide basis. Participate in the 2026 National Wetland Condition Assessment.	MA 2.b MA 2.e	2026 (NWCA) 2028 Status & Trends 2030 Inland Bays or Nanticoke
B-4	Support and expand on studies that monitor wetland sediment accretion rates, wetland elevation, and the longevity of coastal wetlands.	MA 2.d MA 2.e	2026-2030
B-5	Collect and analyze physical, chemical, and biological indicators to evaluate the performance and success of wetland management techniques such as living shorelines, beneficial use, and migration encouragement. Use reference site data as a benchmark for reference condition.	MA 2.e MA 3.c VRP 1.c	2026-2030
B-6	Investigate the ecological dynamic of habitat shifts due to increasingly elevated coastal waters and saltwater intrusion in coastal wetlands such as ghost forests, marsh migration, and high marsh-low marsh shifts.	MA 2.e VRP 1.c	2028-2030
B-7	Make monitoring and assessment data, results, and supporting documents and findings publicly available.	MA 2.d, MA 3.b	2026-2030

Objective 2: Regulatory Activities

In recent years, federal jurisdiction over wetlands has been reduced, shifting more responsibility to each state to protect these important natural resources. Despite the added responsibility, Delaware remains the

only state in the mid-Atlantic without a state freshwater wetland program. As a result, the conversion and degradation of freshwater wetlands due to human impacts has been documented for decades. For example, a lack of federal jurisdiction over isolated wetlands has led to the loss of biologically rich forested pond wetlands throughout the state. Further, the pressure of development from land and rising waters from the shoreline has encroached upon protective floodplain wetlands from both sides. Meanwhile, demands for land for agriculture, forestry, and development has left headwater forested flats vulnerable to conversion.

Objective 2: Avoid, minimize, and replace impacts to wetland extent and function through effective regulation, efficient permitting, and appropriate mitigation.

Objective 2 builds upon the scientific data of the previous objective to inform regulatory decisions and address regulatory gaps. Specifically, the WMAP aims to assist in the expansion of DNREC's regulatory authority to encompass all wetlands including freshwater wetlands. Presently, at the time of compiling this Wetland Program Plan, steps are being taken to introduce and pass freshwater wetland legislation for the State. The WMAP, as wetland experts, has been providing technical assistance throughout the process to ensure proposed legislation is rooted in the most up-to-date science and creates a program that will effectively protect and restore wetland extent and function. If passed, the WMAP would not administer the program, but would be involved in the process of establishing, developing, and launching a new regulatory program.



Figure 7. A valuable Coastal Plain Pond wetland in Delaware. These unique, isolated wetlands are not currently protected at the state or federal level.

The long history of statewide wetland condition assessments and robust mapping resources will be valuable assets that can be used to build an effective, streamlined, and efficient regulatory process. These data can identify wetlands to be avoided, determine where human activities will cause minimal degradation to wetlands, and evaluate ecosystem services that need to be mitigated. The use of this information in regulatory actions, combined with legal tidal and nontidal wetland protections, will help conserve remaining wetlands and improve wetland condition and services at the state-level.



Goal C: Regulatory

Use wetland data and findings to support establishing and developing an effective state wetland protection program.

Vision and Direction

To achieve an increase in wetland acreage and improve wetland services, it is imperative that the scientific data that is acquired through monitoring and assessment be used to develop an effective state wetland protection program. The WMAP will continue efforts to create a freshwater wetland program and increase efforts to develop a wetland mitigation program rooted in the most up-to-date wetland research. These two programs, along with existing regulations, will allow Delaware to make progress towards achieving Objective 2. As a result, Delaware will have state-level protection of wetlands, particularly those left out of federal jurisdiction such as isolated and unique wetlands. In addition, Delaware will have incorporated historic data into evaluating proposed impacts and will properly mitigate for unavoidable losses. The WMAP will assist with the creation of online tools to disseminate new information and streamline the permitting process. Regulatory compliance will be increased through effective training, documentation, and understanding of the regulatory process.

Goal C: Regulatory Action Items, Descriptions and CEF Crosswalk

Action Item	Description	CE, Phase, Action	Schedule
C-1	Help establish a state wetland permitting program that includes freshwater, isolated, rare, and unique wetland communities.	Reg 1.a	2026-2027
C-2	Assist in clarifying the scope and operation of the regulatory program.	Reg 1.b	2026-2027
C-3	Facilitate adoption of an assessment tool by the professional community through documentation and education (e.g., classification SOP and trainings).	Reg 1.c Reg 3.c VRP 1.b	2027-2030
C-4	Encourage and increase compliance by the regulated community through public education and outreach.	Reg 1.c Reg 3.e	2028-2030
C-5	Help develop an assessment tool to assist with the review of permit applications.	Reg 3.c	2026-2028
C-6	Contribute to the development of a mitigation program using available wetland data. Use these data to establish mitigation performance standards and success criteria.	Reg 2.f Reg 2.g Reg 3.c	2026-2028

Objective 3: Voluntary Restoration and Protection

In addition to conserving Delaware’s wetland resources through regulations that prevent or minimize impacts and losses, it is necessary to also manage and protect valuable wetlands through voluntary means. Restoration and protection efforts can secure and protect wetlands from conversion and help achieve an increase in wetland acreage and improve wetland function through a variety of actions. In areas where state and federal regulations leave gaps, voluntary protection and restoration efforts can be effective to provide long-term management and self-sustaining improvements to wetland extent and value.

Objective 3: Protect and restore wetlands through voluntary and long-term actions that uphold and elevate wetland extent and value.

In Delaware, the WMAP has historically relied on voluntary actions to conserve and improve wetlands. In coastal areas where state regulations are in place, emphasis has been on restoring tidal wetlands to improve habitat value, storm protection, and coastal resilience and preparedness. In nontidal wetlands, where weakened federal protection leaves gaps at the state level, voluntary protection through easements, restoration, and creation has been prioritized. A growing emphasis has also been placed on targeting landowners and promoting the benefits of stewardship actions at a small-scale, individual property level. However, these efforts can happen at a landowner, community, municipal, professional, and/or partner level.



Figure 8. A coastal wetland and shoreline restoration project in Millsboro, Delaware.

Objective 3 builds upon the results and findings generated from monitoring and assessment efforts to inform and enhance voluntary wetland restoration, management, and conservation programs in the state. Specifically, the WMAP will use this information to target locations for active restoration, develop technical resources for practitioners, and guide stewardship efforts. Further, the WMAP will focus on advancing the field through knowledge sharing, collaboration with other resource managers and restoration practitioners, and providing professional trainings and targeted outreach. Through

these efforts, Delaware will experience an increase in wetland acreage and function, greater participation in long-term and sustainable protection programs, improved professional ability to implement successful wetland restoration projects, a more collaborative community of practice, and a strengthened capacity for independent citizen stewardship on many levels.



Goal D: Restoration

Advance wetland restoration practices through research and demonstration to stem loss and create gain in acreage and function.

Vision and Direction

Voluntary wetland restoration includes wetland creation, reestablishment, and enhancement that returns lost resources and natural function or produces an increase in acreage and improves provided ecosystem services. These activities enhance wildlife habitat value, water quality benefits, storm and flood protection, recreational opportunity, and support economically valuable industries. As wetlands loss continues on a downward trajectory, ecological restoration (e.g., living shorelines and beneficial use of dredge material) has become a key component of wetland and natural resource management in the state of Delaware. DNREC has been actively involved in testing and developing restoration techniques in non-tidal and tidal wetlands to improve project performance and increase utilization of techniques that benefit these habitats. Over the next five years, the WMAP will continue to contribute towards project implementation and tracking throughout the state, collaborate with partners to unify state and regional restoration goals, and improve the body of knowledge guiding restoration priorities.



Figure 9. Professionals taking a training workshop hosted by DNREC and the Delaware Living Shorelines Committee.

Restoration activities will be rooted in existing science and build upon the results and findings of previous assessments and monitoring efforts in order to increase project success. The WMAP, and other wetland practitioners, should use wetland status and trends and watershed condition assessment data to inform restoration prioritization across the state. Watershed-level restoration plans will provide a roadmap for state agencies and restoration professionals to ensure efforts are collective and targeted. To address knowledge gaps, research should focus on investigating the interconnectedness of shoreline, shellfish, and submerged aquatic vegetation (SAV) habitats, as well as studying the success of piloting novel restoration techniques.

In addition to project implementation, it is critical that research results and restoration project findings are shared throughout the community of practitioners. Through technical workshops, streamlined project tracking, and coordination with partners, the WMAP will assist in the collection and dissemination of restoration materials, which will be used to advance and standardize restoration practices throughout the state.

Goal D: Restoration Action Items, Descriptions and CEF Crosswalk

Action Item	Description	CE, Phase, Action	Schedule
D-1	Host technical workshops for professionals on restoration practices such as living shorelines.	VRP 1.c	Annually 2026-2030
D-2	Support restoration and tracking efforts put forth by the Chesapeake Bay Program.	VRP 2.a VRP 3.a	2026-2030
D-3	Develop watershed-level restoration plans using condition assessment data, spatial resources, and stakeholder input.	VRP 1.c MA 1.a	2029-2030
D-4	Investigate the relationship between shoreline, shellfish, and SAV restoration and how they can be incorporated together.	VRP 1.b Reg 3.c	2027-2029
D-5	Continue to develop a multi-agency stakeholder group to coordinate and encourage restoration project sharing, tracking, and effectiveness.	VRP 1.a	2026-2030
D-6	Use status and trends results and findings on wetland loss and changes to inform wetland protection and restoration prioritization.	MA 3.c MA 3.d VRP 1.b	2027-2030



Goal E: Protection

Protect and improve wetlands through voluntarily stewardship and actions that increase function and value.

Vision and Direction

Non-regulatory wetland protection is commonly achieved by developing a strategy or plan that secures properties and shields them from future impacts and conversion, makes improvements to wetland condition, and develops or builds a community of caretakers that oversee protection of wetlands into the future. These actions can be achieved at the property, neighborhood, municipal, or county levels for publicly and privately owned lands. Protective actions provide security for a wetland or wetland complex over time, improve wetland condition and function, and help build a stronger watershed system overall. As these actions are voluntary, public outreach, technical guidance, and landowner participation are essential. Over the next five years, the WMAP will improve voluntary wetland protection by promoting enrollment in existing protection programs, providing education to build awareness and drive interest, developing guidance materials to facilitate action, and using professional connections to increase program leveraging and collaboration.



Figure 10. Tiger salamanders captured from a wetland pond for mark and release monitoring.

Goal E: Protection Action Items, Descriptions and CEF Crosswalk

Action Item	Description	CE, Phase, Action	Schedule
E-1	Connect private landowners with guidance and resources about wetland improvements and promote participation in conservation efforts.	VRC 1.c	2027-2030
E-2	Conduct targeted outreach to community groups and local governments to encourage wetland protection and develop long-term stewardship plans.	VRP 2.c	2026
E-3	Encourage enrollment into conservation easements through program promotion, networking, and information sharing.	VRP 2.c	2030
E-4	Promote native planting and increase invasive plant removal through messaging, education, and written materials.	VRP 1.c	2028
E-5	Improve buffer management through targeted messaging, education, and coordination with buffer incentive programs.	VRP 2.c VRP 1.c	2029

Objective 4: Education and Outreach

Objective 4 is focused on communicating the science and research on wetlands to stakeholders, decision makers, and the public. Sharing information on the status, health, and importance of these habitats in Delaware can improve the condition of wetlands

on the ground, whether they be on private or public lands. Education and outreach efforts will focus on relaying findings from monitoring, assessment, and research projects, as well as the overall value and services of wetlands. By raising awareness of Delaware's rich wetland resources and the valuable services they provide, professionals and the public will appreciate wetlands and work towards sustaining them for future generations.

Objective 4: Inform the citizens and visitors of Delaware about the function, services, and critical importance of wetlands. Collaborate with a variety of partners to improve efficiency and effectiveness of educational materials, platforms for outreach, and public events.

The WMAP will also incorporate and support work being done by state, federal, and non-profit partners to share projects and improve efficiency of state-wide wetland efforts. Through participation in work groups and collaborative programs, lines of communication will be established to disseminate data, methods, and findings, enhancing information sharing across many audiences. Additionally, there will be an emphasis on making better connections with landowners and stakeholders (e.g., HOAs, environmental groups, local government leaders, etc.) to increase reach while also promoting the importance of wetlands. Collaboration between stakeholders and accessibility for all audiences is key. The WMAP will take a lead role in facilitating information sharing and the transfer of knowledge about wetlands among professionals, citizens, and visitors alike.



Figure 11. Families visiting the WMAP exhibit table at an education and outreach event.

A general understanding of wetland condition and their critical importance, including major stressors that are impacting wetlands as determined through the program, will be valuable for education and outreach efforts. Shining a spotlight on the plethora of wetland projects WMAP is involved in, as well as highlighting collaborative efforts with partners, broadens the understanding of these habitats and the species that inhabit them. The goal in sharing this information to varying audiences is to gain their support in better wetland management, restoration, conservation, and long-term protection. Educational materials, literature, and in-

person events are an integral part of outreach and the future of wetland protection. The creation of engaging, digestible social media content and online writings will help this effort substantially. The [WMAP website](#) serves as a homebase for all audiences to better understand wetlands, minimize their impact on them, and further connect with the resources around them.



Goal F: Education

Enhance education efforts to broaden wetland understanding and strengthen environmental stewardship among the public and a variety of wetland stakeholders.

Vision and Direction

Enhancing and diversifying the ways we communicate about wetlands to varying audiences is crucial to turn science into better management and action. To accomplish this goal, the WMAP will create more reachable messaging about wetlands and their benefits, while also providing clear directives about what is needed and how audiences can help with wetland conservation in Delaware. This information should be easily accessible and organized clearly. Focus should also be on targeting specific audiences such as realtors, homebuyers, and HOA's to increase environmental stewardship on privately owned lands. Priorities for wetland professionals should include attending public events to attract new wetland enthusiasts, as well as conducting outreach to all ages on Delaware wetland issues. The WMAP will continue to provide free public programming where possible and track the number of individuals interacted with at events and programs to aid in the long-term goal of increasing the quality and quantity of such contacts.



Figure 12. The WMAP staff running a learning activity for school-aged children.

As development increases and the population continues to grow in Delaware, it is clear more effort should be made to communicate with audiences on the importance of wetland regulation and policy. In addition to that, local, county, and municipal officials should be provided guidance or suggestions on how to improve planning decisions and mitigate impacts on wetlands. These efforts should include education on the state of Delaware's tidal regulation and the need for non-tidal state jurisdiction and a permitting program. Through customized educational materials the public and stakeholders alike can be more informed about the regulatory process and support better management decisions.

Communication of the WMAP efforts is crucial. There should be distinct, recognizable messaging inclusive to all audiences and targeted when necessary. Focus should be on reaching landowners and stakeholders in their own backyards with messages that are tailored to certain priorities or outreach needs (e.g., general public, K-12, business owners, recreational enthusiasts, etc.) with a goal to move people to take action and make a difference in areas that are privately owned or not regulated. Communicating the results of science and research, such as wetland assessments or monitoring projects, is important and should be centered around how management can be improved and how citizens can utilize tools available to address threats posed to our state resources. Increasing public

participation in wetland programs through online and social media venues can expand the number of followers reached, leading to stronger connections with modern audiences. Creating a wide variety of online materials from e-newsletters to print-friendly brochures can further wetland understanding and strengthen environmental stewardship. In addition, cross-posting other wetland content or updates (e.g., Partnership for the Delaware Estuary, Delaware Center for the Inland Bays, Delaware Sea Grant, USFWS, etc.) on social media will boost exposure and awareness. Updating materials and content on the [WMAP website](#) is key to disseminate wetland science, promote program efforts, and to foster wetland stewards.



Figure 13. An example social media post from the WMAP's Instagram.

Goal F: Education Action Items, Descriptions and CEF Crosswalk

Action Items	Description	CE, Phase, Action	Schedule
F-1	Expand upon efforts to reach audiences such as realtors, homebuyers, and HOAs on wetland regulations, conservation, and stewardship.	MA 1.b VRP 1.b	2026-2028
F-2	Increase engagement with K-12 students and youth-aged groups through the development and promotion of wetland education programs and events.	Reg 3.e	2027-2030
F-3	Communicate and provide educational information to diverse audiences on the benefits of protecting wetlands to economic development, tourism, recreation, human health, and quality of life.	Reg 3.e VRP 1.c	Ongoing 2026-2030
F-4	Educate on the benefits of wetland regulation and policy, including tidal regulation and the need for non-tidal state jurisdiction and permitting.	Reg 1.c Reg 3.e	2026-2028
F-5	Develop and implement educational lectures and events to teach citizens, local leaders, and environmental stewards the importance of wetlands, how wetland services support the economy, the threats posed to our state resources, and the tools available to address those threats.	VRP 1.b Reg 3.e	2028-2030
F-6	Create and disseminate printed and electronic materials such as social media, brochures, e-newsletters, and displays to address specific education and outreach needs to target audiences.	MA 1.a Reg 3.e VRP 1.b	Annually 2026-2030



Goal G: Outreach

Improve reach to varying audiences, increase project sharing with practitioners, and facilitate collaboration with partners.

Vision and Direction

Outreach efforts by the WMAP have grown, but a goal is to continue to broaden reach and improve information sharing among all audiences. Now more than ever, professionals and the public alike want to stay informed of developments and new projects in the wetland field. There is a need to open more lines of communication between government representatives and partners and the general public. These efforts should include prioritizing collaboration between partners to create social media and online content, host successful events, and educate target audiences. In addition, working together with partners more succinctly should help maximize limited funding and strengthen relationships between groups with similar goals to protect and conserve wetlands. This work should also include cooperation from universities and colleges, non-profits, and local environmental organizations to maximize impact, reduce redundancy, and create identity.



Figure 14. Citizens shopping for native plants at an event co-hosted by WMAP.

The WMAP should continue to participate in and lead professional work groups in order to facilitate information sharing and transfer of knowledge regarding wetland related efforts or issues. DNREC has been successful in leading several professional work groups that involve a variety of partners such as the Delaware Living Shorelines Committee, RASCL, and the Delaware Restoration Work Group. These groups are critical for hosting professional trainings and informing other states and organizations about Delaware's projects and advances in the wetland field. Planning and executing the Delaware Wetlands Conference will engage and inform a wide audience in a short time, while also encouraging networking and relaying important wetland information. Organizers will try to have relevant topics represented, facilitate interactive discussions and activities, and assist attendees in making connections within the Mid-Atlantic and beyond. This effort will also expand opportunities for private sector entities to support wetlands through sponsorship perks and benefits.

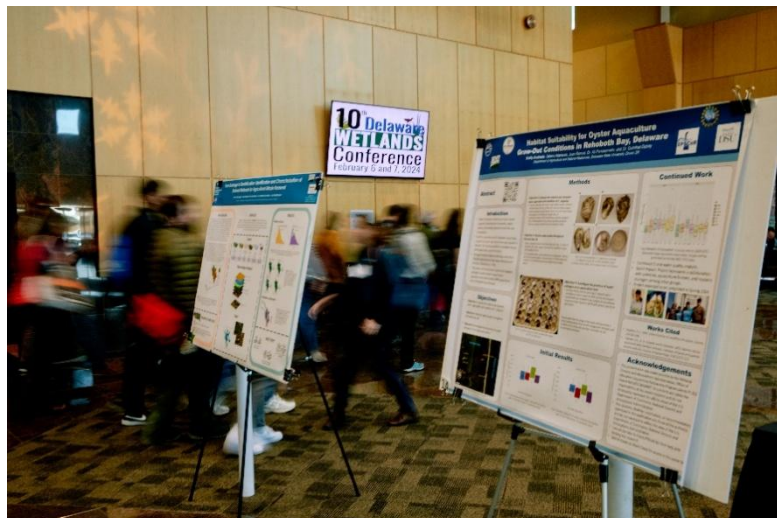


Figure 15. Scientific posters displayed at the 2024 Delaware Wetlands Conference.

To expand outreach with groups on a community or local level, the WMAP will create and execute lectures, workshops, and events that focus on wetland information but incorporate a variety of other natural resource topics. These topics should include specific areas such as native plants, planning for changing environmental conditions, partner tools, best management practices (BMPs), and/or riparian buffers and even provide resources on said topics from partners. Focus should also be on acting as an environmental

liaison for wetland projects, technical advising, financial support (when possible), and DNREC as a whole. By cross sharing this information to target audiences, wetland professionals can gain group support for better wetland management, restoration, conservation, and long-term protection.

Goal G: Outreach Action Items, Description and CEF Crosswalk

Action Items	Description	CE, Phase, Action	Schedule
G-1	Collaborate with partners to maximize program exposure, audience reach, and event success through social media, professional gatherings, and targeted events.	MA 1.b MA 2.b VRP 1.a	Annually 2026- 2030
G-2	Encourage project sharing within DNREC, among partners, and with academia through a plethora of outreach methods to maximize impact, reduce redundancy, and create identity.	MA 2.b MA 3.c	2028- 2030
G-3	Participate in and lead professional work groups to encourage data sharing and transfer of knowledge regarding wetland related issues in the state and the region.	MA 3.c Reg 3.c	Ongoing 2026- 2030
G-4	Host a biennial wetlands conference to share information relating to current wetland activities (e.g., monitoring, restoration, planning, education) among wetland professionals and interested public.	Reg 3.e	2028 2030
G-5	Expand upon efforts to collaborate with groups on a community and local level and assist with general dissemination of wetland and natural resource information.	Reg 3.e VRP 1.a VRP 1.b	2026- 2027
G-6	Sustain and encourage collaboration to advance science, tools, education, and tactics.	MA 2.e Reg 3.e	Ongoing 2026- 2030

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Appendix A: Accomplishments from 2021 to 2025

Accomplishments in this section were supported, in part, by EPA Region 3 Wetland Program Development Grants CD 96383101, CD 96390601 and CD 96362201.

Objective 1: Monitoring and Assessment

2021-2025 Action Items	Progress and Status	Shareable Outputs
<p>A-1 Utilize 2017 Statewide Wetland Mapping Project (SWMP) maps and report to further produce and analyze wetland status and trends results.</p>	<p>Have used 2017 maps and related information to analyze unique wetland acreage and distribution, evaluate how the Sackett decision impacted regulated wetlands in Delaware and as an input for our updated marsh migration model.</p>	<p>https://documents.dnrec.delaware.gov/Watershed/Wetlands/delawares-unique-wetland-communities.pdf</p>
<p>A-2 Develop up-to-date spatial data resources (e.g., land use, flooding, LIDAR, sea level rise predictions, ownership, protection status) to highlight overlapping areas prioritized for protection or restoration.</p>	<p>Delaware acquired updated statewide imagery and land use land cover layers in 2022 and made the 4ft marsh migration model available publicly on Delaware FirstMap.</p>	<p>https://de-firstmap-delaware.hub.arcgis.com/maps/9aef8e852c14445dbeb1f786259d3457/explore?location=39.123681%2C-75.553033%2C7</p>
<p>A-3 Contribute to and promote use of a restoration tracking web mapper such as the Watershed Resource Registry to report, map and track wetland projects and opportunities.</p>	<p>Continue to expand the map of living shoreline projects in the Delaware Bay as part of our A Tour of Living Shorelines Story Map. This spatial inventory tracks and promotes living shorelines.</p>	<p>https://storymaps.arcgis.com/stories/7165a947d72441a18a0d9e9e4fd00b8c</p>
<p>A-4 Increase use of mapping resources in related projects such as sea level rise research and planning, transportation projects and mitigation planning.</p>	<p>Updated the marsh migration model to identify areas most suitable to become future tidal wetlands.</p>	<p>https://dnrec.delaware.gov/watershed-stewardship/wetlands/marsh-migration/</p>

<p>A-5 Develop more GIS capabilities to maintain wetland related data sets and layers and assist with spatial analysis needs.</p>	<p>Added a mapping component to our Wetland Health Assessments by Watersheds web page. This map is color-coded by grade and provides pop-up information about the assessment results and links to technical documents.</p>	<p>https://dnrec.delaware.gov/watershed-stewardship/wetlands/assessments/</p>
<p>A-6 Maintain and promote a map-based database of volunteer monitoring projects and information.</p>	<p>No progress to report.</p>	
<p>B-1 Develop standardized sampling protocols for assessment and monitoring of natural, restored and created wetlands and streams.</p>	<p>Developed a modified DERAP rapid assessment method for evaluating restored, created or enhanced wetland projects in 2022. The method is designed to assess nontidal wetlands and used reference data to set scoring for hydrology, habitat and biotic criteria. The method was pilot tested for refinement. Although it has not been published online, it has been presented professionally (e.g. to the Delaware Restoration Work Group).</p>	<p>No online materials to share.</p>
<p>B-2 Encourage adoption of standardized protocols and use of reference data for wetland restoration, mitigation, or creation.</p>	<p>No significant progress to report.</p>	
<p>B-3 Hold training workshops to teach and promote use of monitoring and assessment protocols, data collection methods and quality assurance techniques for environmental professionals, educators, and volunteer participants.</p>	<p>No progress to report. COVID paused in-person trainings, and our focus shifted to living shorelines.</p>	

<p>B-4 Use reference and assessment data to update and adapt DERAP, DECAP and MidTRAM to evaluate beaver impoundments.</p>	<p>No progress to report.</p>	
<p>B-5 Share assessment results online for access in data form, as technical reports, as wetland report cards, in geospatial data form, and in public-friendly materials.</p>	<p>Released the Brandywine Watershed Wetland Condition Report in 2022 and published the report, report card, and dedicated webpage for sharing results. Assessment work was completed in 2019.</p> <p>Wetland condition data is uploaded by watershed and shared publicly through the Delaware Open Data portal in tidal and nontidal groupings for reference and use.</p> <p>Upgraded our Watershed Assessments page in 2023 with an interactive map that highlights watershed information and leads the reader to assessment results.</p>	<p>https://dnrec.delaware.gov/watershed-stewardship/wetlands/assessments/brandywine/</p> <p>https://data.delaware.gov/</p> <p>https://dnrec.delaware.gov/watershed-stewardship/wetlands/assessments/</p>
<p>B-6 Assess the condition of wetlands based on the specified watershed schedule and the National Wetland Condition Assessment in 2021.</p>	<p>Assessed the condition of wetlands in the Pocomoke River Watershed in 2022. Wetland points throughout the watershed in both Maryland and Delaware were assessed and included in reporting. A technical report, report card, and dedicated webpage were produced to share results.</p> <p>Participated in the NWCA 2021. Our wetland crews performed the assessments for 8 sites with 2 resamples.</p>	<p>https://dnrec.delaware.gov/watershed-stewardship/wetlands/assessments/pocomoke/</p>
<p>B-7 Establish clear baselines for wetland condition and track changes over time on a watershed and statewide basis.</p>	<p>With the completion of the Pocomoke Watershed, we have determined ambient wetland condition for the entire state. Next steps are to thoughtfully evaluate wetland condition changes in watersheds.</p>	<p>https://dnrec.delaware.gov/watershed-stewardship/wetlands/assessments/</p>

<p>C-1 Identify coastal areas to be secured for potential wetland migration that will improve coastal protection and provide critical beach, marsh, and forest habitat.</p>	<p>Worked with Delaware Coastal Programs to update the Marsh Migration Model for Delaware in 2024 and 2025. Identified areas most suitable for tidal wetland migration in response to sea level rise. This project produced three SLR scenario model output layers (the 4ft scenario is available publicly on Delaware FirstMap), a dedicated webpage, an informational flyer for the public, and a technical report. Outreach for this project included many presentations and webinars for targeted audiences.</p>	<p>https://dnrec.delaware.gov/watershed-stewardship/wetlands/marsh-migration/</p>
<p>C-2 Study and integrate traditional practices to increase coastal wetland health and resiliency such as natural buffers, <i>Phragmites</i> control, and coastal impoundment restoration.</p>	<p>Contributed to a workshop dedicated to <i>Phragmites</i> management in 2024 hosted by Delaware NERR. Gave a presentation on monitoring <i>Phragmites</i> management.</p> <p>Conducting a 7-acre tidal wetland project to eradicate <i>Phragmites</i> and restore a native high marsh community. Began in 2019 and is ongoing. Study includes monitoring <i>Phragmites</i> response to chemical treatment over several years and natural re-establishment of native species, use by wildlife, and wetland platform stability. Conducted as part of an adjacent beneficial use low marsh restoration project.</p>	<p>https://dnrec.delaware.gov/events/phragmites-management-workshop/</p>
<p>C-3 Investigate the risk of flooding and saltwater intrusion to state wildlife impoundments and ponds and consider how to support important wetland communities and related species.</p>	<p>As part of the Marsh Migration Model described in C-1, output maps focused on Delaware Fish and Wildlife properties containing impoundments and ponds were created and shared directly with agency staff to inform habitat management and planning decisions.</p>	<p>No public materials to share.</p>

<p>C-4 Improve understanding of and promote possible use of blue carbon value system for coastal wetlands as it relates to climate change.</p>	<p>No progress to report. Other programs such as Delaware NERR have been researching blue carbon.</p>	
<p>C-5 Investigate the ecological dynamic of habitat shifts due to sea level rise and saltwater intrusion in coastal wetlands such as ghost forests, marsh migration, and high marsh-low marsh shifts.</p>	<p>Some indirect activity related to building and interpreting the Marsh Migration Model.</p>	<p>No shareable outputs.</p>
<p>C-6 Support and expand on studies that monitor sediment rates, wetland elevation, and sustainability of coastal wetlands.</p>	<p>Supporting long-term study with NEP to monitor tidal wetland sediment accretion and wetland elevation through annual data collection, management, and sharing. Responsible for reading one SET and surveying seven wetland stations annually.</p> <p>Participation with the Delaware Bay SET Work Group up through 2023. Activities included collaborating with NEPs and NERR to coordinate and standardize monitoring efforts, synthesize a large network of SET monitoring datasets, and report out on tidal wetland elevation in the Delaware Bay.</p>	<p>No shareable outputs.</p>

<p>C-7 Refine spatial identification and prioritization of sites suitable for dredge material to enhance shorelines and tidal wetlands.</p>	<p>Serving on a Beneficial Use and Dredge Work Group hosted by DNREC to improve coordination and efficiency with projects in Delaware since its formation in late 2023. Group meets monthly to discuss ongoing and proposed projects. Actively contributed to evaluating wetland sites proposed for beneficial use in the Inland Bays.</p> <p>Have a proposal in with NEP to develop a spatial and field-based screening tool of proposed BU sites to cross with waterway dredging schedules and priorities.</p>	<p>No shareable outputs.</p>
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Objective 2: Voluntary Restoration and Protection

2021-2025 Action Items	Progress and Status	Shareable Outputs
<p>D-1 Host workshops to share wetland restoration techniques and practices with consultants, engineers, planners, wetland professionals and interested stakeholders.</p>	<p>Annual Living Shoreline Intro Training Workshops. 2025 marked our 9th training workshop. The two-day agenda includes presentations on biology, permitting, design, maintenance, etc. Includes classroom and field components. Instructors are members of the Delaware Living Shorelines Committee.</p>	<p>https://www.delawarelivingshorelines.org/trainings-workshops/2025/3/25/introduction-to-living-shorelines-training</p>
<p>D-2 Educate eligible landowners about restoration and conservation options and promote enrollment or participation through workshops, online materials, and targeted communications.</p>	<p>Hosted 14 living shoreline webinars for a broad audience. Webinar recordings are available online.</p> <p>Developed and presented a Wetlands 101 lecture for numerous communities, HOAs, and local groups focused on wetland ecology, benefits, conservation, and stewardship.</p>	<p>https://www.delawarelivingshorelines.org/recorded-webinars</p>
<p>D-3 Support collaboration and information sharing between private and public sectors to more effectively advance and improve wetland restoration practices and rates of success.</p>	<p>Established the Delaware Restoration Work Group in 2021. Host bi-annual meetings, online and in-person, for roughly 45 active members. Members include state and federal agency staff, non-profits, and some practitioners. Activity includes presentations, project sharing, networking, encouraging collaboration, and leveraging of funds.</p>	<p>Work Group materials are shared through a Google Drive.</p>
<p>D-4 Develop watershed level restoration plans in watersheds with completed wetland assessments using GIS analysis and stakeholder input.</p>	<p>Developed a restoration plan for the Inland Bays watershed in 2022. The spatial component used wetland assessment and available resources to identify properties for restoration implementation. The narrative component explored major challenges and presented tactics and tasks to address and improve restoration success for wetlands and SAV.</p>	<p>https://dnrec.delaware.gov/watershed-stewardship/wetlands/restoration-strategies/</p>

<p>D-5 Support the wetland restoration goals outlined in the Chesapeake Bay agreement.</p>	<p>Longstanding participation in CBP Wetland Work Groups (tidal and nontidal), attending regular meetings, contributing to documents and discussions, and supporting state requests and reporting.</p>	<p>https://www.chesapeakebay.net/who/group/wetland-evaluation-taskgroup#about</p>
<p>D-6 Develop, apply and standardize science-based tools and approaches that help advance shoreline restoration and stem erosion in a variety of settings.</p>	<p>Developed the Techniques and Applications of Living Shorelines in Delaware with the Delaware Living Shorelines Committee in 2023 to help select the appropriate elements and supplies for a successful shoreline project.</p> <p>Also featured seven living shoreline case studies as examples of the above-mentioned guidance.</p> <p>Promoted the guidance through professional presentations and during the annual Living Shoreline Intro Training Workshop.</p>	<p>https://static1.squarespace.com/static/59b69f4f2994caee6bf52abe/t/656e37c905afc05d70acded3/1701722074723/Techniques+and+Application+of+Living+Shorelines+in+Delaware.pdf</p> <p>https://www.delawarelivingshorelines.org/techs-and-apps-case-studies</p>
<p>D-7 Collaborate with stakeholders to establish wetland banks that provide ecological uplift and meet performance standards.</p>	<p>Participated with the Delaware Interagency Review Team (DIRT) led by the ACOE Philadelphia District in 2020 and 2021. Purpose of the team was to review the Peterson Refuge Umbrella Mitigation Bank Draft Prospectus from DelDOT. Contributed to the review of the Prospectus and weighed in on components such as legitimacy of the proposed service area, credit schedule, and assessment methodology.</p>	<p>No published related materials.</p>

Objective 3: Education and Collaboration

2021-2025 Action Items	Progress and Status	Shareable Outputs
<p>E-1 Host a biennial wetlands conference to share information relating to current wetland activities (e.g., monitoring, restoration, planning, education) among wetland professionals and interested public.</p>	<p>Hosted 2-day events in 2022 and 2024 for over 400 attendees which included concurrent sessions, posters, networking, student competitions, and field trips.</p>	<p>https://documents.dnrec.delaware.gov/Watershed/Wetlands/Conference/2024-Program.pdf</p>
<p>E-2 Participate in and lead professional work groups to encourage data sharing and transfer of knowledge regarding wetland related issues in the state and the region.</p>	<p>Serve as leads for Delaware Living Shorelines Committee and Delaware Restoration Workgroup. State representative for Delaware Estuary and Inland Bays STAC. Participate with Chesapeake Bay Program Wetland Workgroup, Delmarva Restoration and Conservation Network, and CHaRRM.</p>	<p>https://www.delawarelivingshorelines.org/</p>
<p>E-3 Encourage project sharing within DNREC and among conservation partners and academia through online and written communications or an organized cooperative to maximize impact and reduce redundancy.</p>	<p>Established the Delaware Restoration Work Group in 2021. Host bi-annual meetings, online and in-person, for roughly 45 active members. Activity includes presentations, project sharing, networking, encouraging collaboration, and leveraging of funds.</p>	<p>Work Group materials are shared through a Google Drive.</p>
<p>E-4 Collaborate with conservation partners to maximize program exposure, audience reach and event success through social media, professional gatherings and targeted events.</p>	<p>Constantly cross-sharing partner events, programs, and announcements through multiple social media platforms, quarterly e-newsletters, and promotion during biannual work group meetings. Partners include NEPs, NERR, non-profits, and agency programs.</p>	<p>https://www.instagram.com/p/DJIMEIKqx1/?img_index=1</p>

<p>E-5 Sustain and encourage collaboration to advance science, tools, and tactics.</p>	<p>Created an educational flyer to justify and encourage secure funding for regular (10 year) updates to statewide wetland maps.</p>	<p>https://documents.dnrec.delaware.gov/Watershed/Wetlands/2024-Importance-of-Wetland-Mapping.pdf</p>
<p>F-1 Expand upon efforts to reach audiences such as realtors and homebuyers on wetland regulations, conservation, and stewardship.</p>	<p>Leading continuing education courses for real estate professionals through county and statewide Associations of Realtors. Course content includes wetlands, tax ditches, beaches, and floodplains.</p>	<p>https://dnrec.delaware.gov/watershed-stewardship/wetlands/realtors/</p>
<p>F-2 Educate on the benefits of regulating freshwater wetlands, including isolated wetlands, under state jurisdiction and permitting.</p>	<p>Developed a fact sheet highlighting Delaware’s unique wetland communities and their value and their vulnerability under current regulatory definitions.</p>	<p>https://documents.dnrec.delaware.gov/Watershed/Wetlands/delawares-unique-wetland-communities.pdf</p>
<p>F-3 Develop and implement a series of workshops and communications to educate county and municipal leaders regarding the importance of wetland benefits, how wetland services support the economy, the threats posed to our state resources, and the tools available to address those threats.</p>	<p>Developed and presented a Wetlands 101 lecture for numerous communities, HOAs, and municipal groups focused on wetland ecology, benefits, conservation, and stewardship.</p> <p>Hosted a series of living shoreline webinars and in-person workshops to understand and encourage the utilization of nature-based tactics to stem erosion and improve shoreline habitat. Both county and municipal representatives attend and engage.</p> <p>Offer living shoreline resources targeted for homeowners, HOAs, and local governments.</p>	<p>https://www.eventbrite.com/e/wetlands-101-a-prized-natural-resource-in-delaware-tickets-1676004166579</p> <p>https://www.delawarelivingshorelines.org/trainings-workshops</p> <p>https://www.delawarelivingshorelines.org/additional-resources</p>
<p>F-4 Create and disseminate printed and electronic materials such as social media, video, brochures, postcards, and signage to address specific education/outreach needs to target audiences.</p>	<p>Created and distributed quarterly e-newsletter to over 900 subscribers which highlights posts from our program blog. Weekly posts on three social media platforms highlighting projects, outputs, and activities.</p>	<p>https://wmap.blogs.delaware.gov/</p>

F-5 Communicate and provide educational information to diverse audiences on the benefits of protecting wetlands to economic development, tourism, recreation, human health, and quality of life.

Refreshed and heavily promoted the Delaware Wetland Toolbox as a great source of wetland information for landowners and beginners. Includes a wetland mapper, a review of wetland benefits and services, conservation tips, and intro level resources.

Created a Wetland Fact Sheet (in English and Spanish) and Discovering Wetlands brochure for widespread dissemination on identifying wetlands and their functions and status.

Created a self-guided pamphlet encouraging landowners to identify wetlands on their property by using online maps, looking for natural indicators, and understanding how to work around and live with wetlands.

<https://storymaps.arcgis.com/stories/179a4b6298d94a7097d292791ea3aaf2>

In English:

<https://documents.dnrc.delaware.gov/Admin/DelawareWetlands/Documents/Delaware-Wetlands-Fact-Sheet.pdf>

In Spanish:

<https://documents.dnrc.delaware.gov/Watershed/Wetlands/Hoja-informativa-de-los-humedales-de-Delaware.pdf>

<https://documents.dnrc.delaware.gov/Admin/DelawareWetlands/Documents/Discovering-Wetlands.pdf>

F-6 Compile, develop, and promote wetland education curriculum and materials that align with science standards in public schools.

No progress to report with developing official curriculum but have participated in many K-12 environmental education events such as Make-a-Splash and Wilmington Earth and Arbor Day and given many requested classroom demonstrations.

No online materials to share.

Objective 4: Regulation

2021-2025 Action Items	Progress and Status	Shareable Outputs
<p>G-1 Establish a state wetland conservation program that includes protecting freshwater, rare, and unique wetland communities and species, compliance monitoring, and tracking impacts cumulatively.</p>	<p>Have not established a freshwater wetland program. Responded to 2022 Senate Joint Resolution 2 by producing a requested report on Options for a Nontidal Wetland Permitting Program. Also amended this report in response to 2023 Senate Continuing Resolution 86 to adjust recommendations based on ramifications of the 2023 Sackett ruling.</p> <p>Contributed to drafting and revising a freshwater wetland bill including giving presentations on rare and unique wetlands, wetland status and trends, and attending regular stakeholder meetings 2024-2025.</p>	<p>https://legis.delaware.gov/docs/default-source/jloscdocuments/2024-2025_jloscreviews/g-dnrec/relateddocument_optionsforanontidalwetlandpermittingprogram_sjr209302021andscr8606292023.pdf?sfvrsn=a10b8b38_1</p>
<p>G-2 Update state tidal regulations to reference most recent wetland mapping resources in place of a static year.</p>	<p>No formal update. The issue of outdated tidal wetland regulatory maps is widely understood and is a priority to adjust if/when state wetland statutes are opened and amended.</p>	
<p>G-3 Develop an MOU between state agencies to protect and conserve rare and unique wetlands on state-owned property.</p>	<p>Established a Cooperative Agreement between DNREC and Delaware Department of Agriculture in 2023 to collaboratively manage and protect unique wetlands occurring on state-owned forest, park, and fish and wildlife lands.</p>	<p>Copy of agreement available upon EPA request.</p> <p>https://news.delaware.gov/2023/02/02/dnrec-dda-celebrate-world-wetlands-day-with-agreement-to-manage-protect-delawares-unique-wetland-communities/</p>

<p>G-4 Encourage County and municipal-level support to establish forested buffers around isolated and headwater forested wetlands and ecologically rare and unique wetland communities.</p>	<p>Although not a product of the WMAP, the passage of the 2022 Sussex County Buffer Ordinance is notable progress on this task. Staff played a small role in providing information during development.</p> <p>In August 2024 Sussex County also adopted new rules to preserve adult trees as buffers, increase replacement ratios for clear cutting, and improve tree buffers in new developments starting in February 2025.</p>	<p>https://sussexcountye.gov/sites/default/files/packets/Sussex%20County%20-%20Drainage%20and%20Resource%20Buffer%20-%20Recommended%20Ob%20the%20PC%2012.15.2021.pdf</p> <p>https://sussexcountye.gov/news/sussex-county-adopts-new-rules-protect-enhance-residential-buffer-zones</p>
<p>G-5 Find ways to encourage or incentivize ag interests to use federal and states programs created to protect or restore wetlands, streams, and forests on ag lands, as well as to creatively find funding mechanisms for these programs.</p>	<p>Have been using the Delaware Restoration Work Group to increase awareness for wetland incentive programs such as CREP through discussions, to help practitioners find information about available programs through the Restoration Funding Sources shared table, and to encourage leveraging available funds through networking.</p>	<p>Work Group materials are shared through a Google drive.</p>
<p>G-6 Review existing county municipal codes and ordinances to consider their full intent, whether they are being used to their full extent, and to identify gaps in wetland protection including constructed wetland best management practices.</p>	<p>No progress to report.</p>	

G-7 Report on the condition of wetlands in compliance with the Clean Water Act (305b report) and explore opportunities to develop Water Quality Standards for Wetlands.

Inclusion of the Wetland Monitoring and Assessment Program and links to wetland reports in the 2022 and 2024 305(b) and 303(d) Integrated Reports to EPA.

<https://dnrec.delaware.gov/watershed-stewardship/assessments/reports/>

Appendix B: 2026-2030 Action Item to CEF Crosswalk

Delaware WPP 2026	WPP Goal Language	CEF Objective Reference
Objective 1: Monitoring and Assessment	Gather data on the status and trends (quantity, quality, functions, and services) of wetlands to track wetland condition and function over time.	
Goal A	Geospatial Analysis: Use geospatial analysis tools to gather information and develop resources about the extent of wetlands in Delaware.	
A-1	Produce updated Statewide Wetland Mapping Project maps and report on the status and trends of Delaware’s wetlands. Incorporate maps into the National Wetland Inventory.	MA 1.c MA 2.e
A-2	Assist with the creation of spatial tools that assist in wetland project screening, tracking, and monitoring.	MA 2.d
A-3	Increase use of mapping resources and geospatial analysis in related projects such as coastal resilience research and planning, transportation projects, and mitigation planning.	MA 3.b MA 3.d
A-4	Incorporate wetland mapping into state agency decision-making.	MA 1.b Reg 2.g
A-5	Make mapping resources and supporting data publicly available.	MA 2.d MA 3.b
Goal B	Monitoring: Increase monitoring efficiency and effort to provide insight into current wetland condition and function and changes occurring over time.	
B-1	Encourage adoption of standardized protocols and use of reference data for wetland restoration, mitigation, or creation.	MA 2.c
B-2	Host training workshops for environmental professionals to learn and promote the use of DNREC’s wetland monitoring and assessment protocols and collection methods.	MA 2.a
B-3	Track changes in the extent, health, and function of wetlands over time on a project, watershed, and statewide basis. Participate in the 2026 National Wetland Condition Assessment.	MA 2.b MA 2.e

B-4	Support and expand on studies that monitor wetland sediment accretion rates, wetland elevation, and the longevity of coastal wetlands.	MA 2.d MA 2.e
B-5	Collect and analyze physical, chemical, and biological indicators to evaluate the performance and success of wetland management techniques such as living shorelines, beneficial use, and migration encouragement. Use reference site data as a benchmark for reference condition.	MA 2.e MA 3.c VRP 1.c
B-6	Investigate the ecological dynamic of habitat shifts due to increasingly elevated coastal waters and saltwater intrusion in coastal wetlands such as ghost forests, marsh migration, and high marsh-low marsh shifts.	MA 2.e VRP 1.c
B-7	Make monitoring and assessment data, results, and supporting documents and findings publicly available.	MA 2.d MA 3.b

Objective 2: Regulatory Activities	Avoid, minimize, and replace impacts to wetland extent and function through effective regulation, efficient permitting and appropriate mitigation.	
Goal C	Regulatory: Use wetland data and findings to support establishing and developing an effective state wetland protection program.	
C-1	Help establish a state wetland permitting program that includes freshwater, isolated, rare, and unique wetland communities.	Reg 1.a
C-2	Assist in clarifying the scope and operation of the regulatory program.	Reg 1.b
C-3	Facilitate adoption of an assessment tool by the professional community through documentation and education (e.g., classification SOP and trainings).	Reg 1.c Reg 3.c VRP 1.b
C-4	Encourage and increase compliance by the regulated community through public education and outreach.	Reg 1.c Reg 3.e
C-5	Help develop an assessment tool to assist with the review of permit applications.	Reg 3.c
C-6	Contribute to the development of a mitigation program using available wetland data. Use these data to establish mitigation performance standards and success criteria.	Reg 2.f Reg 2.g Reg 3.c

Objective 3: Voluntary Restoration and Protection	Protect and restore wetlands through voluntary and long-term actions that uphold and elevate wetland extent and value.	
Goal D	Restoration: Advance wetland restoration practices through research and demonstration to stem loss and create gain in acreage and function.	
D-1	Host technical workshops for professionals on restoration practices such as living shorelines.	VRP 1.c
D-2	Support restoration and tracking efforts put forth by the Chesapeake Bay Program.	VRP 2.a VRP 3.a
D-3	Develop watershed-level restoration plans using condition assessment data, spatial resources, and stakeholder input.	VRP 1.c MA 1.a
D-4	Investigate the relationship between shoreline, shellfish, and SAV restoration and how they can be incorporated together.	VRP 1.b Reg 3.c
D-5	Continue to develop a multi-agency stakeholder group to coordinate and encourage restoration project sharing, tracking, and effectiveness.	VRP 1.a
D-6	Use status and trends results and findings on wetland loss and changes to inform wetland protection and restoration prioritization.	MA 3.c MA 3.d VRP 1.b
Goal E	Protection: Protect and improve wetlands through voluntarily stewardship and actions that increase function and value.	
E-1	Connect private landowners with guidance and resources about wetland improvements and promote participation in conservation efforts.	VRP 1.c
E-2	Conduct targeted outreach to community groups and local governments to encourage wetland protection and develop long-term stewardship plans.	VRP 2.c
E-3	Encourage enrollment into conservation easements through program promotion, networking, and information sharing.	VRP 2.c
E-4	Promote native planting and increase invasive plant removal through messaging, education, and written materials.	VRP 1.c
E-5	Improve buffer management through targeted messaging, education, and coordination with buffer incentive programs.	VRP 2.c VRP 1.c

Objective 4: Education and Outreach	Inform the citizens and visitors of Delaware about the function, services, and critical importance of wetlands. Collaborate with a variety of partners to improve efficiency and effectiveness of educational materials, platforms for outreach, and public events.	
Goal F	Education: Enhance education efforts to broaden wetland understanding and strengthen environmental stewardship among the public and a variety of wetland stakeholders.	
F-1	Expand upon efforts to reach audiences such as realtors, homebuyers, and HOA's on wetland regulations, conservation, and stewardship.	MA 1.b VRP 1.b
F-2	Increase engagement with K-12 students and youth-aged groups through the development and promotion of wetland education programs and events.	Reg 3.e
F-3	Communicate and provide educational information to diverse audiences on the benefits of protecting wetlands to economic development, tourism, recreation, human health, and quality of life.	Reg 3.e VRP 1.c
F-4	Educate on the benefits of wetland regulation and policy, including tidal regulation and the need for non-tidal state jurisdiction and permitting.	Reg 1.c Reg 3.e
F-5	Develop and implement educational lectures and events to teach citizens, local leaders, and environmental stewards the importance of wetlands, how wetland services support the economy, the threats posed to our state resources, and the tools available to address those threats.	VRP 1.b Reg 3.e
F-6	Create and disseminate printed and electronic materials such as social media, brochures, e-newsletters, and displays to address specific education and outreach needs to target audiences.	MA 1.a Reg 3.e VRP 1.b
Goal G	Outreach: Improve reach to varying audiences, increase project sharing with practitioners, and facilitate collaboration with partners.	
G-1	Collaborate with partners to maximize program exposure, audience reach, and event success through social media, professional gatherings, and targeted events.	MA 1.b MA 2.b VRP 1.a
G-2	Encourage project sharing within DNREC, among partners, and with academia through a plethora of outreach methods to maximize impact, reduce redundancy, and create identity.	MA 2.b MA 3.c

G-3	Participate in and lead professional work groups to encourage data sharing and transfer of knowledge regarding wetland related issues in the state and the region.	
G-4	Host a biennial wetlands conference to share information relating to current wetland activities (e.g., monitoring, restoration, planning, education) among wetland professionals and interested public.	Reg 3.e
G-5	Expand upon efforts to collaborate with groups on a community and local level and assist with general dissemination of wetland and natural resource information.	Reg 3.e VRP 1.a VRP 1.b
G-6	Sustain and encourage collaboration to advance science, tools, education, and tactics.	MA 2.e Reg 3.e



**“Fortunately, nature is amazingly resilient:
places we have destroyed, given time and
help, can once again support life.”**

- Jane Goodall, The Book of Hope (2021)