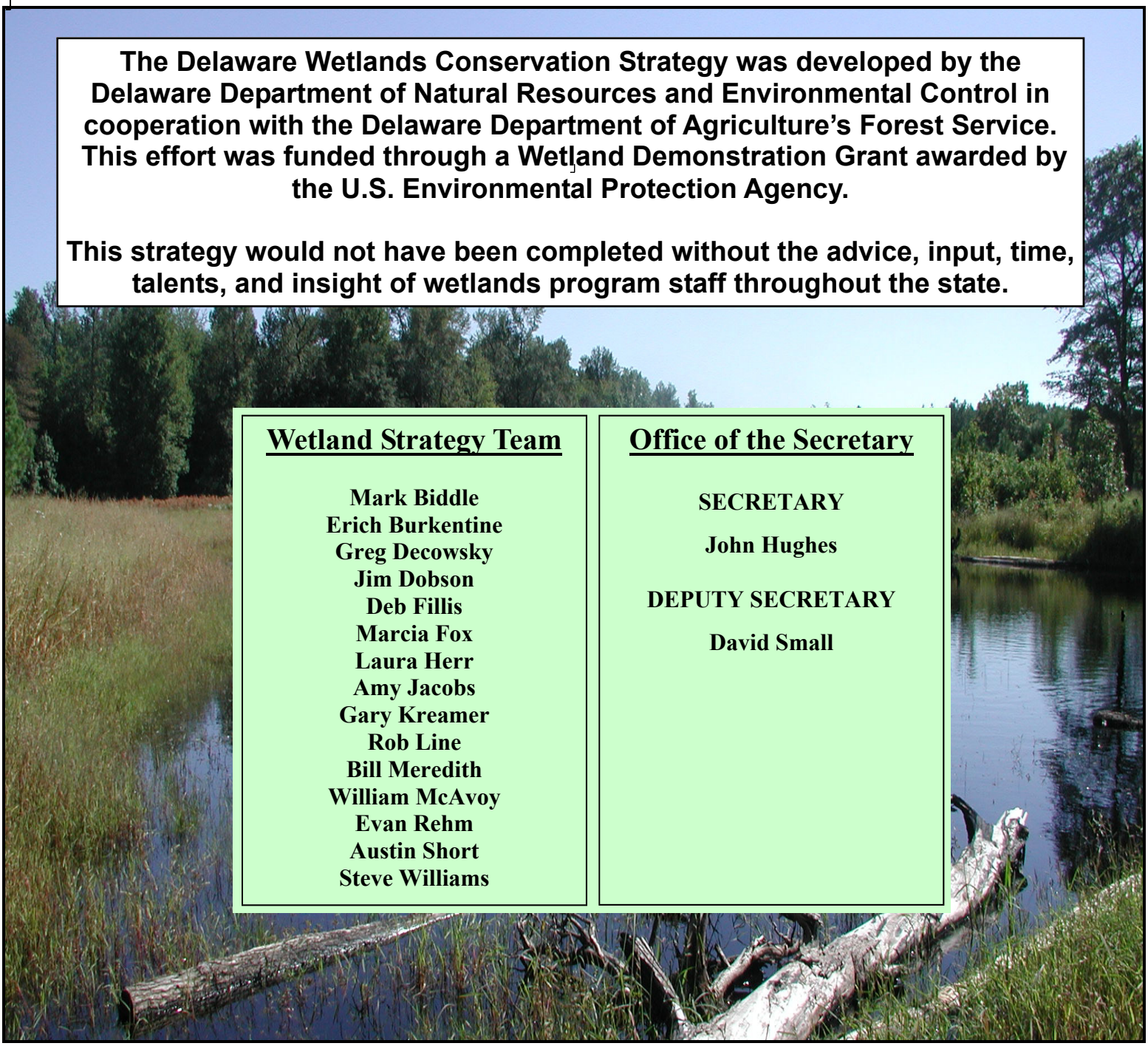
Delaware

Wetlands Conservation Strategy

2008

The Delaware Wetlands Conservation Strategy was developed by the Delaware Department of Natural Resources and Environmental Control in cooperation with the Delaware Department of Agriculture's Forest Service. This effort was funded through a Wetland Demonstration Grant awarded by the U.S. Environmental Protection Agency.

This strategy would not have been completed without the advice, input, time, talents, and insight of wetlands program staff throughout the state.



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August 14, 2008

Dear Fellow Delawareans:

Delaware's one-hundred miles of shoreline define its character and heritage. Due to our proximity to the coast, and our generally low elevation, we are endowed with hundreds of thousands of acres of wetlands representing approximately 36% of the land surface of Delaware. However, since Delaware was settled, we have lost roughly 54% of our original wetlands and many of the wetlands that remain have been negatively impacted through the centuries. Stressors that wetlands have suffered include filling, excavation, channelization, ditching, introduction of invasive species, contamination, dumping, fragmentation, and increased runoff or disturbance caused by adjacent land uses. Therefore, it is critical that we work together to improve these vital resources.

Delaware's natural landscape includes headwater forested wetlands where small tributaries originate. These large wetlands are nature's kidneys, filtering precipitation and runoff while providing habitat for wildlife. These headwater areas also support one of our signature wetland types - Delmarva Bays - also known as coastal plain ponds. These transient ("ephemeral") wooded wetlands are havens for biodiversity, providing essential nursery sites for amphibians and habitat for many of our rarest animals and plants. They also serve as water recharge areas that clean and sustain our vital ground-water resources that supply twenty-five percent of New Castle County's drinking water. In Kent and Sussex Counties, we rely solely on ground-water for our drinking water supply.

Our tributaries then flow into streams bordered by wetlands. When heavy storms occur, rainwater filters through these wetlands, helping to clean and cool water before it reaches larger waterways. As streams rise and overflow into these adjacent wetlands, they further cleanse the water and substantially reduce flood impacts. Moving toward the coast, Delaware's wetlands become broad expanses of emergent vegetation providing shelter and food resources to some of our most cherished wildlife. These coastal wetlands and their estuaries serve as nursery grounds for many commercially and recreationally important fish and shellfish, protect us from storm damage, and serve as one last purification stop before water reaches the Inland Bays, Delaware Bay, Chesapeake Bay and the Atlantic Ocean. Coastal salt marshes are among the most productive ecosystems in the world, surpassing modern agriculture in biological productivity.

Every part of our State is within thirty miles of the Delaware Estuary or the Atlantic Ocean, and most areas are within one mile of wetland habitat. The value of our wetlands is undeniable and their holistic functions on the landscape are irreplaceable. The major forces threatening the services provided to us by wetlands include climate change, sea level rise, runoff, and development. Protection of our resources will best be accomplished by utilizing good science to quantify the impacts befalling wetlands and then determining the best means to reverse damage that has already occurred including ways to prevent harm from happening in the future. The facts obtained through the research currently underway will be shared with wetland practitioners, decision makers, and the public. Collaboration amongst Delaware's wetland practitioners will only enhance their achievements in the care of wetlands and in the interest of protecting Delaware's native beauty and natural services for the citizens of the First State.

The development of this document was a collaborative effort between State agencies. Implementation will include working with private landowners and local governments, providing professional training for resource managers, mapping, monitoring and assessment based on national standards, prioritizing and performing effective restoration, protecting vulnerable wetlands, educating the public, promoting volunteer stewardship of wetland areas, and engaging in public policy-making. Renowned preservationist and writer John Muir once said, "When one tugs at a single thing in nature, he finds it attached to the rest of the world." All of us have a role to play in the stewardship of wetlands.

Please join us in our initiative to protect and improve Delaware's wild and wonderful wetland resources!

Sincerely,

John A. Hughes
Secretary

Delaware's Good Nature depends on you!

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EXECUTIVE SUMMARY

The Delaware Wetlands Conservation Strategy is a collaborative effort among the Delaware Department of Natural Resources and Environmental Control (DNREC) and other State partners. This strategy will guide the efforts of State agencies to improve Delaware's wetland resources through increased agency coordination, data availability, education, monitoring, and restoration efforts. Goals will be implemented over the next five years and will be reevaluated in 2013. We encourage other government and private wetland stakeholders in Delaware to adopt this strategy and collaborate with the State to enhance our capacity to conserve wetlands.

In 2006, DNREC completed an interview and survey based assessment of current wetland programs administered by government agencies and private organizations including, five Federal, fifteen State, three local, and eight nonprofit conservation programs. During this assessment we cataloged current programs, identified gaps in protection, and listened to concerns expressed by wetland program managers. This document grew out of recognition of those needs, and represents an effort to develop a comprehensive strategy to assess the current status of wetland protection, highlight successes, identify gaps and areas of program overlap, and recommend approaches with measurable outcomes for enhancing and improving wetland protection on various fronts.

To slow wetland loss and improve existing wetland conditions, new and innovative ideas are being used. For example, the formation of DNREC's Ecological Restoration and Protection Team created a core group of scientists, program managers, and citizens who implement restoration projects (including wetlands). This team's accomplishments highlight the potential benefits that can be garnered through the coordination of programs and sharing of resources. Similarly, monitoring and assessment of natural, restored, and enhanced wetlands are occurring through the collaborative efforts of DNREC, federal agencies, non-governmental organizations, and citizen monitoring groups with the intent of assessing wetlands of all watersheds. There is a wide range of education programs that effectively provide information to school and youth groups, develop and disperse instructional materials, and promote hands-on citizen involvement. While federal, state and local wetland programs are making progress towards protecting, preserving, enhancing, and restoring wetlands, they still need additional support to tackle these daunting tasks.

Therefore, The Delaware Wetlands Conservation Strategy outlines six goals to focus efforts with the aim of maximizing the use of resources to best protect wetland resources in the state and the services that they provide:

- ✧ Update wetland inventory maps and improve access to wetland related data.
- ✧ Increase monitoring efficiency and effort to provide insight into wetland function and health.
- ✧ Integrate wetland restoration, creation, enhancement, and protection efforts to ensure efficient use of resources.
- ✧ Coordinate information and resources sharing among wetland protection programs, professionals, and agencies.
- ✧ Enhance education and outreach efforts to broaden wetland stewardship among all wetland stakeholders.
- ✧ Work with partners to provide support and enhancement for existing regulatory programs and to provide protection of wetlands that are not covered by state and federal regulations.

The above goals when completed will produce comprehensive data and coordinated efforts to better protect wetlands in Delaware. However, wetlands should not be considered in isolation of other habitats when considering conservation actions, but rather as one component of a functioning landscape. Improved wetland information and programs should be integrated with other conservation efforts to best protect and enhance Delaware's natural systems. Funding and resources above what are currently available will be needed to make these goals attainable. Funding from federal grants, state sources, and cost-share opportunities will be vital and will serve as the catalyst for this strategy's success. This document is intended to serve as an identification tool for objectives and needs. The Wetland Workgroup will be convened every two years to evaluate progress towards meeting the objectives and to develop implementation plans.

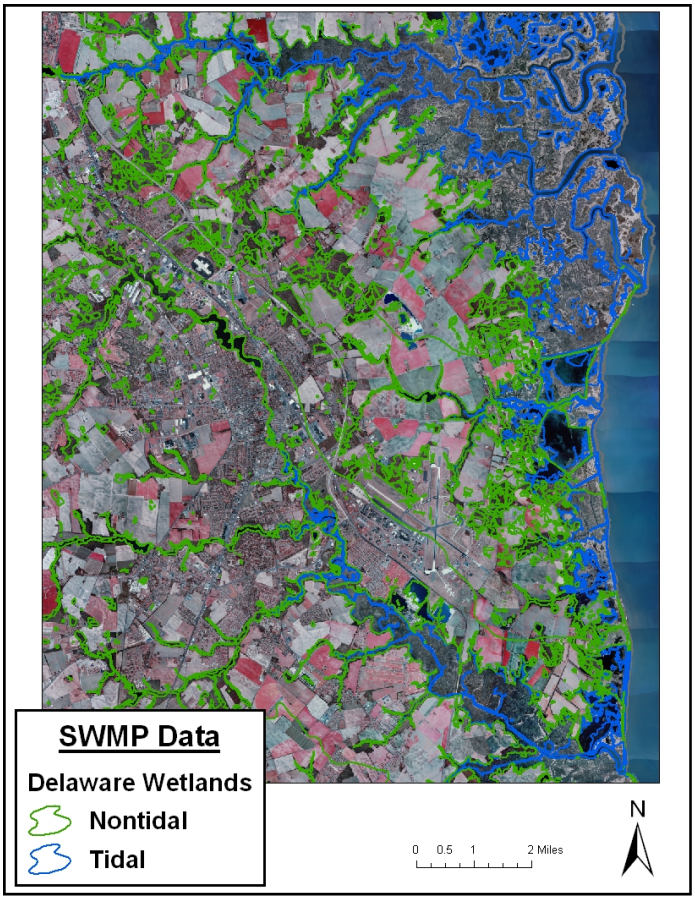
Delaware features a wealth of wetland resources both in abundance and variety, but wetland loss remains a major environmental and social concern. Historically 36% of the land area in Delaware was wetlands. However, between 1780 and 1992 well over 100,000 acres were lost, leaving only 46% of the original acreage[a]. Of the remaining approximate 350,000 acres[b], the majority is in private holdings and much of it has already been degraded or converted to other land uses. Therefore, the success of almost any wetlands program is based on public support and awareness.

These lush and essential ecosystems are often situated between the upland areas where people live and work and our rivers, bays, and other deep water habitats. As such, they play a vital role in reducing the impacts of storms and floods. They also act as water filters removing nutrients, contaminants, and potential carcinogens keeping our waters safe for drinking, swimming, and fishing. This means the rain that falls in our backyard and trickles across the road picking up pollutants, such as gasoline, pesticides, and fertilizers, is filtered by wetlands before flowing to our rivers or streams eventually ending up in the places we fish and swim. By some estimates, wetlands provide ~ 4.9 trillion dollars[c] worth of economic goods (e.g., food) and services (e.g., floodwater control) annually worldwide. Wetlands also provide habitat for endangered species like the bog turtle, game species like the American black duck, and 57% of Delaware's native plant species.

While the major contributor to past wetland loss was direct conversion to agriculture and drainage for other land use purposes, more recent threats include residential, commercial, industrial and urban development, and sea level rise. In addition to outright wetland loss, remaining wetlands are being degraded or altered through fragmentation, establishment of invasive species, hydrologic alteration, sediment budget and transport alterations, unsustainable forest harvesting, and increased input of nutrients, stormwater, and other pollutants. With the constant threat of development and human-induced changes, it is increasingly important to efficiently use the resources available to ensure wetland services continue to support our needs through future generations. In addition, wetlands must be considered in a larger landscape context by considering and including connected habitats such as upland forests, grasslands, and open space.

[a] Dahl, Thomas E. 1990. Wetlands losses in the United States 1780's to 1980's. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 13 pp.
[b] Statewide Wetland Mapping Project (SWMP) maps which were derived from photo interpretation of 1992 aerial photography.
[c] Constanza et al. 1997. Nature vol. 387.

GOAL A: UPDATE WETLAND INVENTORY MAPS AND IMPROVE ACCESS TO WETLAND RELATED DATA

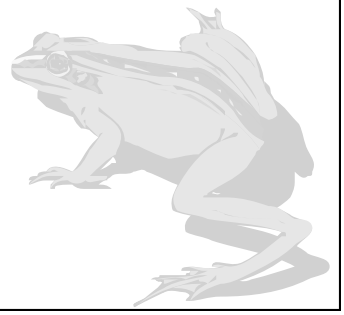


Updating and combining wetland GIS layers allows project managers to track wetland acreage and status including restoration acreage.

CURRENT STATUS AND INITIATIVES

The most recent statewide inventory of wetlands in Delaware is the 1994 Statewide Wetland Mapping Project (SWMP), which identifies the location and type of wetlands based on photo interpretation of 1992 aerial photography. The last wetlands "status and trends" report documents changes from 1981/1982-1992. Data layers containing past wetland restoration and enhancement sites have been created and are currently being updated to include additional sites. Similarly, data layers containing State owned and protected lands are constantly updated as properties are acquired.

Wetland projects and programs have generated a wealth of data including monitoring reports, watershed level wetland condition reports, management plans, natural heritage data, and GIS mapping of wetlands, restoration and protection sites. Consequently, there is valuable information that could be applied by various users, such as landowners, biologists, students, volunteers, land use planners, decision makers, and those seeking permits. But, because the majority of these data are scattered in various locations within and outside of DNREC, they are not currently easily accessible or utilized. Currently, most wetland data is only disseminated to the public through outreach programs and events. It should be more accessible to the public through electronic avenues (e.g., Delaware wetlands website and data portal).



VISION STATEMENT

Improved wetlands data and user access should provide the best available information to program managers, policymakers, regulatory agencies, researchers, and public entities. Updating the SWMP maps would give managers an up-to-date spatial context on which to base program action. The updated SWMP maps would also provide the basis for a new wetland "status and trends" report, to identify more recent changes in wetland type and acreage. The creation of a wetlands restoration database in conjunction with updated wetland maps would provide a comprehensive catalog of previously restored wetlands and give managers insight into the success of programs.

A consolidated database where the majority of wetland related information is copied and stored would provide a comprehensive reference source that could be utilized by all wetland stakeholders. The completed database should be updated regularly and made available through electronic means to provide easy access by DNREC, partners, and the general public. The database would be best accessible through a Delaware Wetlands Website. The website would serve as a window for the public into the types and biology of Delaware's wetlands, and the functions, services and values provided to our state by wetlands, while sharing the work performed by DNREC and our partners to better understand and protect such valuable habitats.

ACTION ITEMS

A-1 **COMPLETE UPDATE OF DELAWARE SWMP MAPS AND PRODUCE AN UPDATED WETLANDS "STATUS AND TRENDS" REPORT** based on 2007 aerial photography and LIDAR. Include mapping of wetlands most susceptible to sea level rise (SLR), restored, created, and mitigated sites The report will determine issues affecting wetlands (e.g., development, SLR).

A-2 **DEVELOP GIS DATA LAYERS** that combine and compare SWMP layers with mapping resources from other State plans (e.g., Wildlife Action Plan) to highlight overlapping areas prioritized for protection or restoration.

A-3 **CREATE A COMPREHENSIVE RESTORATION TRACKING DATABASE** to integrate information from existing and newly completed restoration projects.

A-4 **CREATE A CENTRAL LOCATION FOR RESEARCH PROJECTS** to facilitate access by multiple Divisions or agencies when funding is available.

A-5 **CREATE A COMPREHENSIVE WETLAND WEBPAGE** that provides basic wetland information, descriptions and contact information for restoration programs, and guidance on how to obtain wetland related information.

A-6 **CREATE AN INFORMATION PORTAL** to store all data, metadata, and materials related to wetlands. The portal should include data from a variety of sources and contain diverse types of information (e.g., educational materials, technical documents, management plans).

A-7 **WIDELY DISTRIBUTE INFORMATION ON THE CENTRAL PORTAL** to educators, local governments, policymakers, resource planners and other groups.

A-8 **DESIGNATE OR CREATE A POSITION OR STAFF MEMBER** to regularly update, monitor, and track the information portal.

GOAL B: INCREASE MONITORING EFFICIENCY AND EFFORT TO PROVIDE INSIGHT INTO WETLAND FUNCTION AND HEALTH

Monitoring data can be used to track the function and health of wetlands throughout the state.

CURRENT STATUS AND INITIATIVES

Monitoring of natural, restored[c], and created wetlands produces baseline ecological information, providing the scientific basis on which to assess damage or improvement, identify trends, and make sound management decisions. In Delaware, statewide monitoring assesses the condition of natural wetlands on a watershed basis, and evaluates their function and health. Mitigation[d] sites are monitored in compliance with permit conditions using various methods to document whether sites are meeting basic function requirements for hydrology and vegetative cover. However, additional monitoring above and beyond what is required for mitigation sites is needed. Also due to limited staffing resources and a general lack of monitoring requirements, relatively few voluntarily restored or created sites are monitored. Post-restoration and post-creation monitoring of voluntary and to understand the functions and services that these wetlands are establishing on the landscape and to provide a sound basis for mid-course corrections when needed.

A comprehensive wetland report for the Nanticoke Watershed has been completed and prioritizes areas for restoration and protection based on wetland condition. Over several years, similar efforts will be duplicated in watersheds across Delaware. Parallel projects such as the Wildlife Action Plan, Pollution Control Strategies, and the creation of State Resource Area and Land Use/Land Cover maps highlight the importance of wetlands and will also be used in producing watershed specific reports. To ensure sound management decisions, the prioritization process should be a collaborative effort among scientists, managers, and citizens incorporating concerns from a variety of stakeholders.

Currently citizen monitoring groups also collect data on wetland condition and function as a learning opportunity for their members. Citizen groups, with tailored training, could collect relevant data with the potential to assist in program affiliated monitoring efforts which would instill a greater sense of accomplishment while improving assessment efficiency. Some groups in Delaware have made great strides in their collection of defensible data.

[c] The term "restoration" is used to encompass wetland restoration, enhancement, and rehabilitation practices.
[d] Mitigation can include wetland restoration or creation as a means of requisite compensation for permitted wetland loss or degradation.

VISION STATEMENT

Increased baseline data collection on natural, restored, created, and mitigated wetlands will provide a scientific basis for decisions made by managers and planners. These data can be incorporated into watershed based planning, help prioritize areas for restoration, and support ongoing statewide initiatives such as Pollution Control Strategies or Watershed Management Plans. The Divisions within DNREC and stakeholders interested in performing monitoring should develop and utilize a standard protocol to determine the condition, functions, and services of natural wetlands. In addition, specialized protocols for monitoring restoration sites should be developed to track restoration projects and programs. Discussions should be initiated with involved parties to develop monitoring requirements on mitigation and creation sites based on the standardized protocols.

To supplement current Department monitoring initiatives, volunteer monitoring programs should be coordinated to collect data that can be directly utilized by exiting programs. The data collection should be conducted in ways that optimize the output's utility to wetland scientists and managers. Groups such as DNREC's Adopt-a-Wetland, Delaware Nature Society's Stream Watch, the University of Delaware's Inland Bays Citizen Monitoring, and the Nanticoke Watershed Alliance's Creek Watchers programs should coordinate with the Department and each other to develop a network of volunteers collecting operative data.

Volunteers collect valuable data, which can be used to make sound scientific decisions to restore and protect wetlands.

ACTION ITEMS

B-1 **DEVELOP STANDARD SAMPLING PROTOCOLS** for all wetland assessment and monitoring activities including those in natural, restored, and created wetlands. Protocols should use a tiered approach to account for varying staff expertise, schedules, and financial resources.

B-2 **ADOPT AND USE STANDARDIZED MONITORING PROTOCOLS** within DNREC Divisions and organizations conducting wetland restoration, mitigation, or creation. Create a Memorandum of Understanding (MOU) with organizations and groups outside of DNREC to adopt and use the protocols.

B-3 **HOLD TRAINING WORKSHOPS** for wetland scientists, educators, and volunteer participants to disseminate updates on monitoring protocols, data collection methods, and quality assurance techniques.

B-4 **PLACE MONITORING AND ASSESSMENT DATA RESULTS ON THE DELAWARE WETLANDS WEBSITE** in order to better inform the public, policy makers, and their decisions.

B-5 **PROMOTE OPPORTUNITIES FOR VOLUNTEER PARTICIPATION** through the Adopt-a-Wetland and other programs via monitoring projects by students, educators, service organizations, and other members of the community.

B-6 **CREATE A DATABASE OF MONITORING ACTIVITIES** completed by volunteer groups that will be maintained and re-evaluated as a means of assessing program enterprises.

B-7 **DEVELOP A WEB-BASED MAP** that allows volunteers involved in monitoring to access and input data and compare project information statewide.

GOAL C: INTEGRATE WETLAND RESTORATION, CREATION, ENHANCEMENT, AND PROTECTION EFFORTS TO ENSURE EFFICIENT USE OF RESOURCES

Restoration of formerly degraded or farmed wetlands attempts to reinstate wildlife habitat and other ecosystem functions.

CURRENT STATUS AND INITIATIVES

DNREC's creation of the Ecological Restoration Team, Northern Delaware Wetland Rehabilitation Program, and Open Spaces Program, as well as the adoption of the federal Landowner Incentive Program were significant in expanding restoration[e] efforts while completing ecologically significant projects. Collaborative efforts already occur among the U.S. Fish and Wildlife Service, Natural Resources Conservation Service, National Oceanic and Atmospheric Administration, DNREC Divisions, County Conservation Districts, DOA's Forest Service, DelDOT, and private organizations. Through these initiatives, project planning has become more organized while financial and staffing resources have been combined to accomplish on-the-ground results. However, currently there is no strategic plan outlining locations for restoration, creation, and protection and what types are needed across Delaware. Increased coordination and dialogue among stakeholders could improve results while utilizing current resources as efficiently as possible.

Strategic restoration, creation, and protection plans are compulsory for providing program guidance and prioritization of the types and locations of wetlands in need, allowing resources to be dedicated to projects with the maximum positive ecological impact. Additionally, with the diversity of programs working to restore and create wetlands, it is important to develop consistent construction standards to ensure quality projects. The technical expertise relating to wetland restoration and creation is shared among wetland experts in numerous agencies and organizations, but could be channeled into the production of helpful manuals and instructional workshops. The manuals could provide guidance for contractors and consultants who are completing on-site construction. The completion of projects by qualified contractors using established techniques should minimize problems after a project has been completed. Currently, the limited funding and staff available to revisit sites and correct complications may result in less than optimal performance of restored and created sites. A standard reporting method for parties involved in restoration and creation would help track projects over time and identify sites where maintenance activities are needed.

[e] The term "restoration" is used to encompass wetland restoration, enhancement, and rehabilitation practices.

VISION STATEMENT

Through increased stakeholder coordination and development of watershed priorities, restoration, creation, and protection efforts would be focused maximizing ecological results. Watershed-level science-based plans would guide restoration, creation, protection and management decisions and facilitate a holistic approach toward improving watersheds. A network of communication should be established among practitioners within DNREC, governmental agencies, non-governmental programs, and private organizations to share information relating to wetland restoration, creation and protection and to jointly prioritize sites and projects. Standardized methods for construction of and reporting on wetland projects would ensure high quality results throughout the state while creating a means to identify projects in need of revisiting. These best available techniques should be applied to all State lands to set high standards of wetland protection and restoration.

Sharing information about successful wetland construction techniques, such as the addition of organic matter, would help programs and wetland restorers complete more effective projects.

ACTION ITEMS

C-1 **DEVELOP AND USE WATERSHED LEVEL RESTORATION PLANS** in watersheds with completed wetland assessments to provide direction for restoration, creation, and protection project planning. Wetlands will be prioritized using a holistic approach including ecological condition data, economic, social and political concerns, input from governmental agencies, private organizations, and citizen groups.

C-2 **DEVELOP WETLAND PROJECT STANDARD OPERATING PROCEDURES (SOPs)** for construction techniques and reporting comprising a variety of wetland types and projects. The SOPs should provide detailed direction for wetland construction techniques, but be flexible enough to be adapted to varying conditions and projects. Investigate the need for Memoranda of Understanding (MOUs) with government agencies, non-governmental agencies, and private groups.

C-3 **CREATE A REFERENCE MANUAL COMPOSED OF THE WETLAND PROJECT SOPs** focusing on successful procedures and reporting methods.

C-4 **HOST WORKSHOPS TO INFORM** construction managers, wetland ecologists, and interested stakeholders about advancements in wetland project techniques.

C-5 **DEVELOP A PROGRAM WITH STAFF AND ADDITIONAL RESOURCES** designed to maintain and improve existing wetland projects.

GOAL D: COORDINATE INFORMATION AND RESOURCE SHARING BETWEEN WETLAND PROTECTION PROGRAMS, PROFESSIONALS, AND AGENCIES

Regular training and workshops can keep wetland scientists up to date with monitoring protocols and restoration efforts.

2006 Delmarva Wetlands Conference

Coordinating planning, monitoring and education efforts ensures the most efficient use of program resources.

CURRENT STATUS AND INITIATIVES

Within DNREC, programs are working together to protect and restore wetland resources by integrating restoration, protection, education, and monitoring efforts to improve how we direct resources and provide information to the public. In several cases, wetland restoration projects have included an educational component by involving schools or citizens groups. A biennial wetlands conference is hosted by DNREC to enhance sharing and communication among scientists, researchers, managers, and the general public. The integration of program areas can provide additional resources, technical advice, restoration, and outreach opportunities that will ultimately strengthen individual programs.

While strides have been made to increase collaboration amongst projects, program coordination among disciplines (e.g., wetland constructors, educational staff, monitoring scientists) is still limited, which leads to programs not reaching their full potential of audiences. Moreover, wetland programs are not always connected with other projects striving towards similar ecological goals, resulting in similar minded programs becoming disconnected and the duplication of efforts. By increasing communication through a variety of new avenues and by expanding existing efforts, programs will operate more efficiently and effectively.

Another area where State agency coordination is critical is the Preliminary Land Use Service, or PLUS. In Delaware the Office of State Planning Coordination, along with several other State agencies, provides guidance and coordination and serves as a resource for local governments. Their guidance includes assisting local governments with comprehensive planning and land use decisions. Additionally, PLUS offers a forum for numerous State agencies to engage landowners, land planners, landscape architects, engineers, and other consultants as they work through the land development process. For the process to be most effective, agencies must have the opportunity to provide input as early as possible, preferably during the concept phase. From a wetlands protection perspective, PLUS allows several DNREC agencies to provide comments regarding the potential impacts a development project may have on the resource and offer redesign options that will avoid or minimize those impacts.

VISION STATEMENT

Increased communication among wetland professionals should lead to collaborative efforts between programs and agencies and create new opportunities to increase wetland protection efforts. Coordinating programs would reduce duplication of efforts and lead to more efficient use of resources. The PLUS process could be improved with more cohesive and inclusive wetland comments from within DNREC. The safeguards offered to wetlands through the PLUS process could also be enhanced by better informing Delaware residents about the role they can play as advocates for wetlands by voicing their concerns to local decision makers.

A wetlands newsletter should be created to highlight the success of programs and keep staff up to date on current wetland activities. Consideration should be given to non-wetland resources to ensure wetland projects are not completed at the expense of other important natural resources. A series of conferences, technical workshops, meetings and public forums should be held to update and increase dialogue among wetland scientists, managers, researchers, and the general public. The increased dialogue would support other strategy goals such as increased monitoring efficiency and the integration of wetland restoration efforts. While reaching out to the general public, efforts should also be made to establish positive relationships with the business community to garner their support.

Wetlands provide valuable habitat for wildlife such as birds and amphibians.

ACTION ITEMS

D-1 **CREATE A WETLANDS NEWSLETTER** to update professionals on ongoing wetland activities and encourage partnerships.

D-2 **HOST A BIENNIAL CONFERENCE** to share information relating to current wetland activities (e.g., monitoring, restoration, education) among wetland professionals and interested public.

D-3 **ASSIST NON-GOVERNMENTAL ORGANIZATIONS** with the completion of wetland related projects. Examples of assistance include grant writing advice and support, technical advice or planning of restoration projects, and support in the development of monitoring programs.

D-4 **ENCOURAGE CORPORATE SPONSORSHIP** by marketing specific projects and programs that will appeal to corporate interests.

D-5 **INTEGRATE WETLAND ASSESSMENT DATA INTO PLUS PROCESS** by documenting the consequences of land use changes on representative wetland habitat types for purposes of identifying and mitigating potential wetland impacts from a given project, while providing management and protection options for developers, planners, and wetland advocates.

D-6 **PRODUCE MORE COHERENT WETLANDS COMMENTS AS A PART OF PLUS REVIEWS** by improving coordination amongst DNREC staff.

GOAL E: ENHANCE EDUCATION AND OUTREACH EFFORTS TO BROADEN WETLAND STEWARDSHIP AMONG ALL WETLAND STAKEHOLDERS

Education and outreach programs enable hands-on experience while introducing and informing citizens to the many benefits of wetlands.

CURRENT STATUS AND INITIATIVES

In Delaware, State run wetland-focused environmental education programs are numerous and varied. Many of these target K-12 school groups, including field trips, outreach programs, teacher workshops, summer camps, special events, and a variety of audio-visual and other curriculum support materials. Materials and programs offered through and developed by DNREC's Aquatic Resource Education Center, are integrated into school curriculums at particular grade levels on a statewide basis, and as a result, are achieving a substantial and sustainable reach.

Though adult and general public-targeted wetland education and outreach programs are less widespread, in recent years efforts in this area have expanded in recognition of the need to inform the public of ongoing conservation work, raise awareness of the benefits of wetlands, increase technical information sharing, and engage landowners in positive wetland experiences. A key component of this effort has been the state's Adopt-a-Wetland program, which matches wetland sites with citizen volunteers in order to increase wetland stewardship and monitoring, while amplifying personal connections to the wetland resource. As part of that approach, customized loan kits have been developed for volunteer use in monitoring key components of wetland habitats. A restoration guidebook is also being developed to inform private landowners of incentives, approaches and voluntary opportunities for preserving, enhancing, and restoring wetlands. Interactions with landowners during requested site visits to their property is a valuable outreach opportunity to better inform them about the importance of wetlands. For instance, the Forestry Service's development of management plans for timber lot owners often includes delineating wetlands and wetland buffers aiding in the protection of those habitats while apprising landowners of their function and value to the landscape.

Although wetland education and outreach programs are having positive impacts in Delaware, awareness of and access to such resources among teachers, youth leaders, and other potential user groups could be improved. For example, a recent survey of Delaware citizens regarding green infrastructure showed water quality concerns to be the highest priority issue in the state. Yet in the same survey, wetlands were considerably further down the list of priorities. This suggests a need and an opportunity to inform the public regarding the key role wetlands play in improving water quality.

VISION STATEMENT

Education and outreach are paramount to promoting the importance of wetland protection and helping mobilize people to translate awareness into action. Expansion of efforts should target key adult audiences that have previously been overlooked - particularly legislators, local land use decision makers, and landowners. Endeavors should focus on transforming negative impressions and misconceptions about wetlands into positive pathways for action and involvement in their protection, stewardship, and restoration by optimizing buy-in and addressing concerns from the viewpoints of the respective audiences. Better awareness of, and access to, wetland education materials and opportunities through website development and other means should encourage more educators, and the young people they teach, to become involved and make a difference.

Incorporating a field component into education programs helps to engage students in making real-world connections to wetlands.

Bolstered communication and collaboration is needed among volunteer organizers to ensure efforts are geared effectively to meet the needs of multiple programs while increasing and guiding volunteer participation. Improved volunteer coordination should increase involvement and sharing of resources while cultivating political, economic, and personal support for wetland protection attempts.

ACTION ITEMS

E-1 **IDENTIFY AND ADDRESS GAPS IN COVERAGE OF WETLAND** topics, issues, and audiences reached by utilizing program assessments (e.g., Green Infrastructure Assessment).

E-2 **COMPILE AND DEVELOP A WETLAND EDUCATION TOOLKIT** (e.g., powerpoint presentations, brochures, videos, activity kits and other resources) that can cover a broad range of audiences and integrate them into the wetland webpage for easier access by educators.

E-3 **CREATE A LIST OF CONTACTS OR LEAD AGENCIES** to refer citizens interested in becoming involved with wetland stewardship, monitoring, or restoration projects.

E-4 **HOST WORKSHOPS FOR ENVIRONMENTAL EDUCATION PROGRAM MANAGERS** to promote networking and collaboration on projects, programs, and events that promote wetland conservation.

E-5 **ESTABLISH AND EXPAND PARTNERSHIPS** between governmental, non-governmental, and non-profit groups to better coordinate existing education efforts and target groups identified as overlooked.

E-6 **INCREASE VOLUNTEER STEWARDSHIP AND MONITORING** of wetlands statewide through additional adoptions of Adopt-a-Wetland sites.

E-7 **DEVELOP AND IMPLEMENT A SERIES OF WORKSHOPS** to educate local decision makers about the benefits of wetlands and provide them with tools available for wetland protection.

E-8 **PUBLISH AND DISTRIBUTE A WETLAND RESTORATION GUIDEBOOK** to inform private landowners of programs, funding, and options available to restore wetland areas.

E-9 **DEVELOP FACTSHEETS AND OTHER MATERIALS** to dispel myths about wetland regulations, "takings", and other negative impressions the public may hold, while emphasizing the benefits of wetlands to water quality and other areas of citizen concern.

E-10 **DEVELOP NEW MARKETING APPROACHES AND TOOLS** to promote wetland protection to the general public and other government agencies such as an Ecosystem Services Model.

GOAL F: WORK WITH PARTNERS TO PROVIDE SUPPORT AND ENHANCEMENT FOR EXISTING REGULATORY PROGRAMS AND TO PROVIDE PROTECTION OF WETLANDS THAT ARE NOT COVERED BY STATE AND FEDERAL REGULATIONS

Reducing impacts to wetlands through appropriate regulations could help decrease future flooding and property damage.

CURRENT STATUS AND INITIATIVES

The Federal and State governments in Delaware have made significant advancements towards regulatory protection of wetlands since the adoption of legislations beginning in the 1970s. At the federal level, the Army Corps of Engineers is given regulatory power over "navigable waters" and their "adjacent" wetlands through Section 404 of the Clean Water Act, and through Section 10 of the Rivers and Harbors Act. Activities occurring in tidal wetlands and lands under tidal and nontidal waterways are also regulated by the State through two primary means, the Wetlands Act and the Subaqueous Lands Act. Proposed modifications to jurisdictional wetlands and waters are scrutinized through a detailed permitting and review process which works to minimize potential impacts. The 401 Water Quality Certification Program requires the State to approve any actions in wetlands and waters in which the federal government has authority to issue approvals for regulated activities. The 401 Program ensures that activities will not be incongruent with defined State Water Quality Standards.

Additionally, direct federal activities, federal funding to local governments, and federal permits and licenses within Delaware are reviewed and permitted by the Division of Soil and Water Conservation's Coastal Program pursuant to the Coastal Zone Management Act of 1972. This Act requires federal actions that affect the designated Coastal Zone of the State to adhere to State coastal management policies. Delaware's approved coastal management policies apply to state laws and regulations pertaining to coastal waters management, subaqueous lands, wetlands, beaches, flood hazard areas and others. The entire state is considered the Coastal Zone which provides an additional layer of protection to the state's wetland resources. The Food Security Act of 1985 and the subsequent Food, Agriculture, Conservation and Trade Act of 1990 also discourage landowners from converting wetlands to agricultural use by making lands ineligible for agricultural benefit programs if wetlands are farmed, with the exception of prior converted wetlands.

Even with numerous federal and state level protection efforts, many nontidal (e.g., headwater tributaries) and isolated (e.g., flooded forests, seasonal ponds) wetlands are threatened because of gaps in existing regulations or are being impacted illegally due to limited enforcement activity. Legally wetlands are permitted to be impacted on a small scale with blanket approvals with no reporting or mitigation requirements. The sum of the small scale impacts can be detrimental to ecosystems as a whole. In addition, some previously converted wetlands do not fall under regulatory control or disincentive programs. Recent court challenges (SWANCC and Rapanos/Carabell decisions) question the extent of waters covered by the Clean Water Act and have created quandaries in discerning which wetlands and waterways are currently under the U.S. Army Corps of Engineer's jurisdiction. This ambiguity has resulted in a period of vulnerability for some wetlands due to an uncertainty in enforcement responsibilities.

VISION STATEMENT

Increased enforcement of current regulations would lead to a decline in the amount of wetlands illegally destroyed. Funding and support for increased enforcement should be pursued through federal agencies by soliciting for greater assistance in enforcing both federal and State regulations. To build upon better oversight, new and unused avenues to protect wetlands should be explored and implemented, including research to document the effects of wetland impacts on wetland functions and services. Any unused existing mechanisms should be addressed and utilized to their full practicable extent.

If these avenues are fully exhausted and do not provide full protection of all wetlands, new or expanded regulatory oversight which could involve DNREC assuming wetland regulatory capacity from the federal government, should be considered. This assumption of such capacity should be a collaborative process involving DNREC, other state and federal agencies, the general public, and stakeholders in order to create viable mechanisms. There would be advantages to the people of Delaware in having wetlands and waters oversight within one agency including timely reviews, consistency, and resource-based protection.

Many nontidal and isolated wetlands are threatened because of gaps in existing regulations or are being impacted illegally due to limited enforcement activity.

ACTION ITEMS

F-1 **ORGANIZE A COLLABORATIVE REVIEW** of all existing state, county, and municipal wetland programs to investigate their full intent, whether they are being used to their full extent, and to identify gaps in wetland protection.

F-2 **CONDUCT A REVIEW OF REGULATORY PROGRAMS** that could affect construction in and around wetlands. Identify gaps in protection and seek changes to the regulations.

F-3 **SUPPORT THE STATE'S EXISTING REGULATORY DECISION MAKING PROCESS** by researching impacts resulting from commonly approved projects while exploring and assessing techniques for avoiding and minimizing wetland impacts.

F-4 **INCREASE REGULATION ENFORCEMENT** efforts by working with EPA, USACOE, and USFWS to designate personnel to Delaware.

F-5 **EVALUATE THE EFFECTS ON ISOLATED WETLANDS** due to the SWANCC ruling and the USACOE's implementation of new guidelines, including number of acres permanently or temporarily impacted.

F-6 **PURSUE STATE AND LOCAL REGULATORY CHANGES** necessary to maintain and improve Delaware's wetland resources based upon the statewide Wetland Monitoring and Assessment Program's findings and upon the results of the studies listed above.

EVALUATING PROGRESS

Achievement of the goals presented in the preceding pages will lead to better protection and restoration of wetland resources in Delaware. We will evaluate progress toward meeting these goals and improving wetland protection in Delaware in five years (2013). The answers to the following questions will be used to evaluate areas where we've met our goals, areas that require more work, and to determine if there is a need to develop new goals or action items.

GOAL A: Update wetland inventory maps and improve access to wetland related data.

- Which wetlands/wetlands-associated data layers and maps are currently up to date and which data layers are out-dated?
- Which data layers are available to the public and other program staff?

GOAL B: Increase monitoring efficiency and effort to provide insight into wetland function and health.

- How many wetlands in Delaware have been sampled using standardized assessment protocols?
- How much of this information is available to the public and other program staff?

GOAL C: Integrate wetland restoration, creation, enhancement, and protection efforts to ensure efficient use of resources.

- What strategic watershed restoration and protection plans have been developed for priority watersheds?

GOAL D: Coordinate information and resource sharing between wetland protection programs, professionals, and agencies.

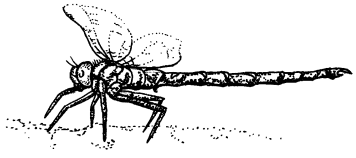
- How many workshops and public forums have been conducted to update and increase dialogue among wetland scientists, managers, researchers, and the general public?
- Have wetlands benefitted from the inclusion of wetland assessment data in the PLUS process?

GOAL E: Enhance education and outreach efforts to broaden wetland stewardship among all wetland stakeholders.

- Are the tools, resources and other wetlands education materials we have developed for decision makers, landowners, teachers and volunteers being utilized to protect wetlands and receiving positive feedback from their intended users?
- Who is using these materials to improve wetland awareness and protection in Delaware?

GOAL F: Work with partners to provide support and enhancement for existing regulatory programs and to provide protection of wetlands that are not covered by state and federal regulations.

- Have extensive reviews of and additional support to existing regulatory programs been completed to clarify where increased regulatory enforcement and regulatory changes/additions are needed for impacts on non-tidal wetlands, most importantly those considered isolated?



"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

Aldo Leopold