



Northern Delaware Wetland Rehabilitation Program

REVIVING NEW CASTLE COUNTY'S HISTORIC WETLANDS

NDWRP History: The Northern Delaware Wetland Rehabilitation Program (NDWRP) was established by the Department of Natural Resources and Environmental Control in the early 1990's. Thirty-seven degraded marshes have been identified which encompass 6,700 acres of wetlands along the Christina and Delaware rivers in New Castle County for restoration through partnerships with civic and business leaders, scientists, resource managers, and private landowners. These marshes once contained some of the richest biodiversity in the State and served as important nursery and breeding habitat for a wide variety of fish and wildlife species. These marshes also serve as important biological filters, removing pollutants and sediments from local streams and further protecting shorelines and inland properties from storm generated waves and flooding. Funding for the program's restoration activities has come from a variety of sources including State and Federal agencies, environmental fines and Superfund settlements, local municipalities, industries, private citizens, and non-government environmental organizations.

Wetland Loss: The decline of wetland habitats in Delaware began with widespread diking and draining of these lands for agriculture in the 1600's and accelerated in the 1700's and 1800's as a result of significant filling to accommodate the rapid industrialization of our rivers. Further draining was implemented in the early 1900's in an effort to combat nuisance populations of mosquitoes. Additional infrastructure pressures from highway, commercial, industrial, and residential development has also taken its toll in recent years. Widespread pollution, the legacy of industrialization of our watersheds, has further complicated the process of restoring these wetlands back to a more natural condition.

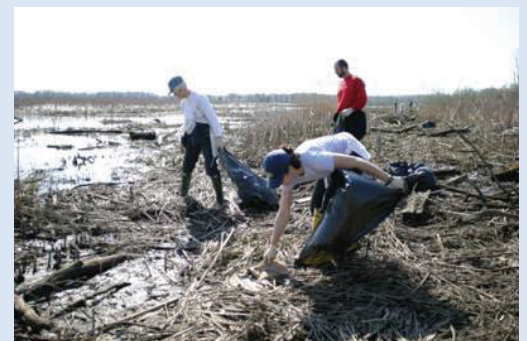
NDWRP Strategy: By ecologically improving numerous individual wetland sites, a corridor within an urban landscape will be reestablished providing much needed fish and wildlife habitat, as well as other wetland values and functions.

How can you aid the Northern Delaware Wetland Rehabilitation effort?

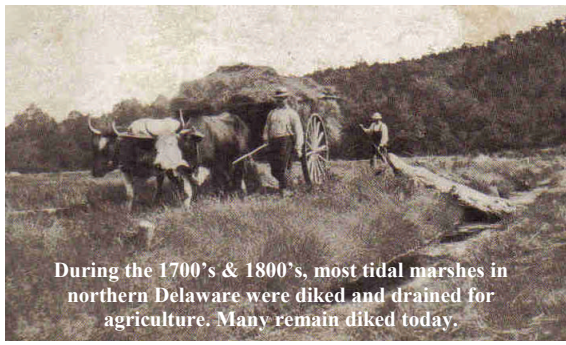
Private citizens can help protect and save Delaware's precious wetland resources by participating in public stewardship activities such as the Adopt-a-Wetland Program, International Coastal Cleanup, Christina River Watershed Cleanup, and other such programs in which DNREC participates. Watershed initiatives in stream corridors, like the Appoquinimink River, among others throughout the state, have been established to provide local citizens an organization where private landowners and other residents can participate to safeguard the long term health of the water quality and extensive wetland resources found in their watersheds. Landowners can also take advantage of numerous State and Federal wildlife enhancement initiatives that provide funding for habitat improvement on private lands like the *Phragmites* Cost Share Program (State), Wildlife Habitat Improvement Program (Federal), and New Castle County Conservation District Incentive Program.



*International Coastal Cleanup
at Augustine Creek Marsh*



Annual Christina River Watershed Cleanup



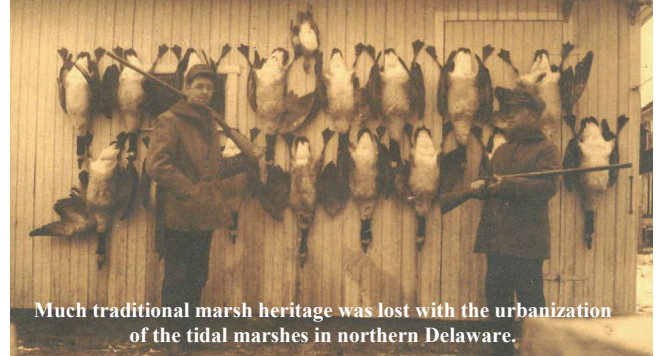
During the 1700's & 1800's, most tidal marshes in northern Delaware were diked and drained for agriculture. Many remain diked today.

Bringing the Past to Life in Delaware's Marshes

Not long after the Dutch, Swedes, and English arrived in Delaware in the 1600's, began the diking of the once extensive freshwater tidal marshes in northern Delaware for farmland. Today, 400 years after settlement, most of the marshes south of Wilmington along the lower Delaware River to Port Penn, and west along the Christina River to Churchman's Marsh, remain diked and cutoff from the benefits of tidal exchange.

Despite begin drained, many of these tidal marshes remained productive habitats; thick with stands of wild rice, cattail, sweetflag, rushes, smartweed, and other plants favored by birds, waterfowl, muskrats, and many other

species of wildlife. Aerial waterfowl censuses of northern Delaware in the early 1950's documented upwards of 1,500 waterfowl per square mile, dramatically eclipsing the statewide average of 155 at the time. An aerial count on November 1, 1950, recorded 15,000 pintail ducks on the Newport marshes. Muskrat trapping was also very productive in marshes from the Christina River to the C&D Canal with over 20,000 hides harvested annually, well above the state average. Unfortunately, increasing urbanization and continued diking ultimately took their toll on these remnant marshes, rendering many habitats unsuitable for wildlife by the 1970's.



Much traditional marsh heritage was lost with the urbanization of the tidal marshes in northern Delaware.

How to Restore a Marsh?

The Northern Delaware Wetland Rehabilitation Program seeks to achieve the following goals.

Improve Water Quality

The key to restoring any wetland is reestablishment of proper hydrology and in the case of the degraded marshes in northern Delaware that entails re-connecting these marshes to daily tidal exchange with the estuary. We have installed new water control structures on several marshes to permit the tidal flushing of nutrients and aquatic organisms into and out of these marshes. This increased volume of exchange also filters out many pollutants conveyed into these rivers and marshes from non-point sources in the drainage, another priority in the state's efforts to improving water quality statewide.



Increase Wildlife Populations

Reestablish preferred native plants species for food and cover, deploy nesting boxes to supplement the available habitat, manage water levels to advantage the needs of aquatic mammals, water birds, and endangered species seasonally, and increasing the diversity of habitats with the creation of pools, channels, and island fringes, which all contribute to attracting wildlife back to many once degraded marshes.

Invasive Species Control

Phragmites, a tall grass introduced to the region in the 1800's, has overrun many of Delaware's tidal marshes replacing a once diverse and beneficial cover of native vegetation with a dense alien monoculture with little value to fish or wildlife. All project sites restored to date have required extensive work to control this invasive plant to permit reestablishment of the former biodiversity that is conducive to native wildlife species. *Phragmites* is controlled by spraying the plants with herbicides in late summer, followed by a controlled burn of the dead canes in winter, requiring three or more years



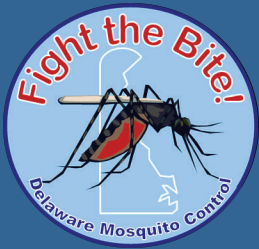
A tidal freshwater marsh is one of the most productive environments on Earth.

- Like giant kidneys, marshes filter out nutrients, suspended sediments, toxic substances, and other pollutants from local waters thereby improving water quality.
- Coastal freshwater marshes support the largest and most diverse populations of birds creating vital habitat for ducks, geese, herons, egrets, and shorebirds.
- The wetlands of the Delaware and Christina rivers provide spawning, nursery, and feeding habitats for eel, shad, herring, catfish, crab, and perch.
- Many endangered species depend on wetlands for survival. In Delaware, 38% of the state's endangered species rely on wetlands for breeding, nesting, foraging, or resting. These species range from barking tree frogs to bald eagles and bog turtles.
- A marsh is like a big sponge during heavy rains, soaking up floodwater and then slowly releasing it to local streams after peak storm flows have subsided, helping to reduce flooding.
- Wetlands act as buffer strips between sea and mainland, absorbing wave action from storms, thereby reducing shoreline erosion.
- Marshes provide a wealth of recreational activities including bird watching, boating, fishing, wildlife photography, hunting, hiking, and crabbing.



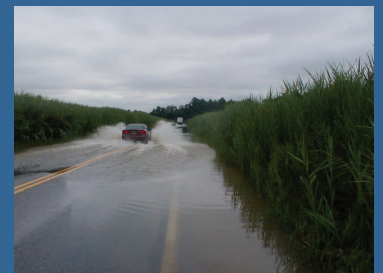
Control Mosquitoes

Historically, many of Delaware's coastal marshes provided prime breeding habitat for mosquitoes which in the early 1900's resulted in widespread ditching of these marshes in an attempt to control nuisance mosquito breeding areas. Unfortunately, the removal of surface water from wetlands by ditching can actually create prime mosquito breeding habitat for floodwater egg-laying species. Several restoration practices have helped control mosquito populations in wetlands and decreased the use of insecticides and include: reintroduction of tidal exchange to increase the abundance of mosquito-eating fish that are natural predators to mosquito larva, and improving fish access to mosquito breeding areas via appropriate channel cleaning or creation.



Control Flooding

The installation of new water control structures has lessened the duration of flood events on local properties. Restoration of native marsh vegetation and hydrology has also reestablished the marsh's natural ability to slow, absorb, and store excess runoff through improved marsh structure, ultimately reducing the severity of many flood events.



Reduce Shoreline Erosion

As natural buffer strips between land and sea, wetlands absorb wave action and protect shoreline soils through development of robust stands of vegetation with their important dense mat of soil holding roots. Exposed shorelines can be enhanced by re-vegetation or use of other erosion control techniques, such as bio-logs or riprap.



Improve Recreational & Educational Opportunities

Where feasible, rehabilitation planning incorporates provisions for nature trails and greenways, observation towers, and launches for canoes and kayaks in or near the targeted wetland. The educational opportunities this access affords to school groups or the general public is invaluable in relating the vital role and unseen function wetlands provide to the local community and region. Programs are regularly presented at local schools, civic association meeting, and corporation training sessions to inform the public of the value of wetlands to the state's residents and how the NDWR Program is helping to accomplish these important goals.



Despite nearly three centuries of environmental abuse, Delaware's northern marshes are being brought back to life. Below are the stories of five northern marshes we've successfully restored so far.

Augustine Creek Marsh: 1130 acre Diked Marsh

Located south of Port Penn • Surrounded by agricultural land • Reintroduced tidal exchange with new computer controlled tide gate, controlled *Phragmites*, installed wildlife nesting structures • This marsh basin is now one of the premiere wetlands complexes on the Atlantic Coast that is nearby a major heronry at Pea Patch Island.

Broad Dyke Marsh: 210 acre Diked Marsh

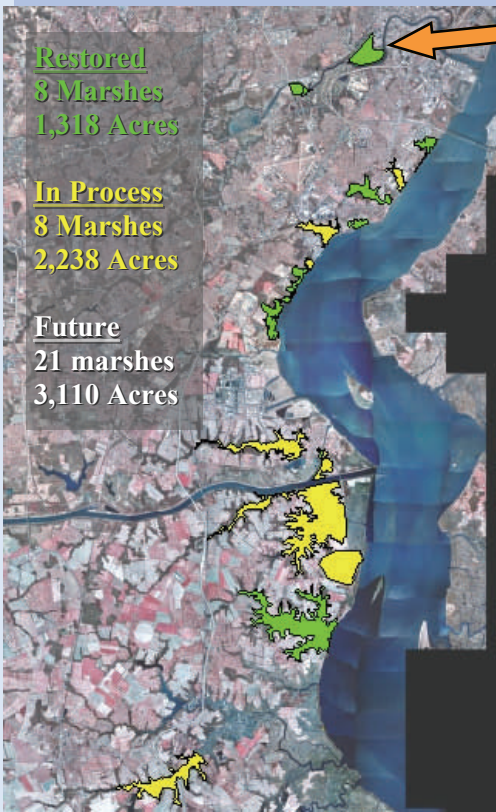
Located in City of New Castle • Surrounded by residential and commercial developments • Reintroduced tidal exchange with new computer controlled tide gate, controlled *Phragmites*, installed wildlife nesting structures.

Gambacorta Marsh: 41 acre Diked Marsh

Located in the City of New Castle • Former landfill for industrial waste • Waste removed and landfill capped pre-restoration • Tidal exchange improved, controlled *Phragmites*, installed wildlife nesting structures.

Newport Marsh: 44 acre Diked Marsh

Located south of Newport • Former dredge spoil cell during I-95 construction • Restored tidal exchange by creating channels in marsh interior and connected with Christina River, controlled *Phragmites*, installed wildlife nesting structures, and planted trees to manage other invasive plants onsite.



Old Wilmington Marsh (Russell W. Peterson Urban Wildlife Refuge)

This 225-acre formerly diked freshwater tidal marsh is located just south of the City of Wilmington on the Christina River. The marsh borders the city's recently revitalized Riverfront District and is surrounded by highways, former industrial sites, in a highly urbanized landscape. This remnant marsh parcel was targeted in the "Visions of the River" initiative in 1992 for rehabilitation. In 2002, the marsh was designated the **Russell W. Peterson Urban Wildlife Refuge** in honor of the former Governor's contribution to environmental issues both locally and nationally. • *Phragmites* control was begun in 1995 and extensive resculpting of the marshscape followed in 2005. Plans for an education center and marsh trails are ongoing and groundbreaking for these elements is planned later in 2006. The center will serve as a gateway to the Refuge. The City's River Walk, along the revitalized City Riverfront District, will be linked to a Refuge trail system.



Contact Information
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 and Wetland Rehabilitation
 (302) 836-2555
www.fw.delaware.gov/Services/MosquitoSection.htm

