Chapter I

Why Protect Wetlands and How Are They Identified?

Wetlands provide important public benefits that require protection. The first step in protection is to identify where the wetlands are. Soil and vegetation characteristics as well as hydrologic evidence determine the presence or absence, and the extent of wetlands. The NJ Freshwater Wetlands Protection Act provides for classification of wetlands by such resource values as water quality and plant and wildlife habitat. This chapter describes wetlands' physical parameters, why wetlands are valuable, how wetlands are identified and wetland classification.

WHAT ARE FRESHWATER WETLANDS?

Freshwater wetlands occur throughout New Jersey. They usually lie between dry upland areas and water bodies and occur most frequently along rivers and streams and on the margins of lakes and ponds. They can be groundwater-fed depressions. They also occur on slopes where springs erupt at the surface.

The different types of freshwater wetlands vary in character and appearance. They include marshes, wet meadows, swamps bogs and vernal habitats.

- marshes are most often covered with shallow water;
- swamps and wet meadows are often covered with water for only a portion of the year, occasionally drying up during the summer;
- bogs have very restricted inflow and outflow of water and often provide habitat for plant species that will not survive elsewhere;
- vernal habitats are confined wetland depressions that hold water for at least two consecutive months out of the year. They provide habitat to many species of amphibians, insects, reptiles, and plants, but do not support fish.

The NJ Freshwater Wetlands Protection Act defines a wetland as:

"an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation..."

To be considered a wetland, an area must have enough water maintained in the region of the root system at some time during the growing season to support vegetation that tolerates wet conditions and to inhibit the growth of vegetation that cannot survive under wet conditions.

The changing nature and interrelationship of the three wetlands attributes – water, soil, and vegetation – determines the extent and type of the wetland. For example, the extent and type of wetlands and wetlands vegetation near rivers depends on the magnitude and frequency of floods, as well as on the fluctuations in ground water levels.

WHY PROTECT FRESHWATER WETLANDS?

Wetlands work 24 hours a day, seven days a week, providing value to the public. Freshwater wetlands provide many important functions simultaneously.

- protect and preserve drinking water supplies;
- protect water quality by vegetative uptake of pollution in stormwater;
- provide a natural means of flood and storm damage protection that prevents loss of life and property;
- provide essential habitat for a major portion of the state's fish and wildlife;
- maintain critical base flows to surface waters during droughts.

Wetlands Provide a Range of Public Benefits.

A 1978 study by the Biology and Economics Departments of Tufts University, Massachusetts, showed that one acre of wetland provides between $153,000 and $190,000 (1978 dollars) of public value. The $37,000 difference is accounted for by varying values assigned to recreation and aesthetic functions. Please see Table 1 for additional details.

TABLE 1

Summary of the Benefits of One Acre of Charles River Wetland

Function	Status	Low Estimate of Value	High Estimate of Value
Increases in Land Value			
Flood Prevention	proven	$33,370	$33,370
Local Amenity	proven	150	480
Pollution Reduction			
Nutrients and BOD	proven	$16,960	$16,960
Toxic Substances	proven	+	+
Water Supply	proven	$100,730	$100,730
Recreation and Aesthetics			
Recreation	proven	$2,145	$38,469
SUB TOTAL		**$153,355**	**$190,009**
Preservation and Research	probable	+	+
Vicarious Consumption and Option Demand	possible	+	+
Undiscovered Benefits	possible	+	+
TOTAL Including Visual-Cultural Benefits		**$153,535+**	**$190,009+**

SOURCE: AN ECONOMIC ANALYSIS OF WETLAND PROTECTION, FRANCIS R. THIBODEAU. DEPARTMENT OF BIOLOGY, TUFTS UNIVERSITY AND BART D. OSTRO, DEPARTMENT OF ECONOMICS, TUFTS UNIVERSITY, MASSACHUSETTS. 1978

Flood Control... *Wetlands control flooding by storing excess floodwater*

In the 1970's the U.S. Army Corps of Engineers estimated that protecting 8,545 acres of wetlands in the Charles River basin outside Boston would save $17 million per year in flood damage costs.

Approximately a decade later, the Corps estimated that purchase of 13,000 acres of wetlands in New Jersey's Passaic River basin would save $13.25 million per year in flood damage costs.

Water Purification... *Wetlands purify water by absorbing pollutants and filtering out sediment.*

At a cost of $30 million in the 1960's, the Corps channelized the Kissimmee River in Florida, straightening miles of meandering river and building dikes and levees to prevent flooding. Subsequent to the channelization and before wetlands had federal protection, wetlands separated from the river by dikes were filled for agricultural use. By the mid-1970's, downstream Lake Okeechobee was suffering from severe eutrophication caused by nutrient-rich agricultural runoff from the filled wetlands. Florida authorities were very concerned because the lake provides water supply for southern Florida during dry periods. They have decided to dismantle the channelization project and restore the wetlands. The estimated cost is $280 million.

Recreation and Sport... *Wetlands provide opportunities for fishing, hunting, photography and other activities*

According to the Emergency Wetlands Protection Act enacted by Congress in 1986, wetlands are the basis for over $10 billion in annual expenditures on nature study, fishing, hunting, and other outdoor activities.

The U.S. Fish and Wildlife Service estimates that in 1980, observers and photographers of wetland-dependent bird species added close to $10 billion to the U.S. economy.

Dr. Paul Kerlinger, Director of New Jersey Audubon Society's Cape May Bird Observatory, estimates that in 1988 bird watchers spent well over $6 million on travel accommodations alone in Cape May County, New Jersey.

Public benefits where dollar figures not available.... *Some wetland values are very difficult to measure accurately.*

For example, wetland ecosystems have provided ingredients for invaluable medical advances. Researchers at Bristol-Myers Squibb Institute for Medical Research, Princeton, developed a valuable antibiotic using bacteria from soil in the wetlands of the New Jersey Pine Barrens. The antibiotic, Azectam, is effective against a wide range of bacterial infections, and is especially useful in hospitals. In 1989, sales amounted to approximately $200 million and provided invaluable health benefits. No one knows what other medical benefits future research on wetland biota will yield.

Wetlands are ideal places to teach children and adults about the web of life. But, how can educational value be translated into economic return? Similarly, it is almost impossible to come up with dollar values for the open space and climate modification benefits provided by wetlands.

WETLANDS' PHYSICAL ATTRIBUTES

Three characteristic wetlands attributes are essential to identify wetlands: vegetation, soils and hydrology.

Wetlands Vegetation

Plants that have adapted to living in wet conditions are called hydrophytes. Hydrophytes are unique because they grow in soils that lack oxygen as a result of excess water content. They are classified into four categories:

- Obligate plants nearly always occur in wetlands and are the best vegetative indicators of wetlands. Examples include cattails, royal ferns, skunk cabbage, swamp azalea, white cedar.
- Facultative wetland plants occur in wetlands over two-thirds of the time and are good indicators of wetlands. Examples include cinnamon fern, pin oak, high bush blueberry, elderberry.
- Facultative plants occur in wetlands between one-third and two-thirds of the time, but also occur in uplands. Examples include red maples, foxtail grass, witch hazel, rosebay rhododendron.
- Facultative upland plants are more typical of uplands, but will grow in wetlands less than one-third of the time. Examples include American holly, beech, bracken fern.

The *National List of Plant Species that Occur in Wetlands: 1988* is available from the U.S. Fish and Wildlife Service, Suite 101, Monroe Building, 9720 Executive Center, St. Petersburg, FL 33702. *New Jersey's Threatened Plant Species* is available from the Office of Natural Lands Management, CN 404, Trenton, NJ 08625-0404, 609-984-1339.

Web Sources:

www.charttiff.com/WetlandMaps/WetlandPlants/plantlists.html

http://plants.usda.gov/

Wetland Soils

Wetland soils contain excess water for long enough periods to inhibit the presence of free oxygen, necessary to support normal vegetation and to break down minerals.

Soils that occur in wetlands are called hydric and are separated into two categories, organic and mineral.

- **Organic** soils contain a high percentage — more than half of the volume of the upper 32 inches of the soil — of organic material because the lack of oxygen slows down the natural decomposition process. Hydric organic soils are dark in color.
- **Mineral** soils contain a very low percentage of organic material and are hydric when they are saturated long enough to change their properties substantially. Hydric mineral soils are usually gray, mottled immediately below the soil surface, or exhibit dark colors at the surface, and gray mottled areas below the surface.

Evidence of hydric conditions can consist of dark vertical streaking in the subsurface; brown or orange-brown channels left by oxidized roots; or, the odor of hydrogen sulfide (rotten eggs).

Soil scientists have grouped hydric soils according to their degree of association with wetlands. Hydric soils found specifically in the state's counties are available by county at: www.state.nj.us/dep/dwq/pdf/soilcondist.pdf. The following list is a general one.

TABLE 2

NEW JERSEY HYDRIC SOILS

Note: Alluvial Land as mapped by soil surveys does include wetland, however due to its variability (including wet and dry environments), it could not be categorized within one of the three groups. Also, wet phases of somewhat poorly drained soils not on this list may also on occasion be associated with wetland.

Group 1 - Soils that nearly always display consistent hydric conditions.

Adrian	Croton	Lyons, Stony	St. Johns
Bayboro	Doylestown	Manahawkin	Sulfaquents
Berryland	Elkton	Matlock	Sulfihemists
Bibb	Fluvaquents	Muck	Swamp
Biddeford	Fresh Water Marsh	Mullica	Tidal Marsh
Bowmansville	Halsey	Norwich	Wallkill
Carlisle	Humaquepts	Norwich, Stony	Wayland
Chippewa	Keansburg	Pocomoke	Weeksville
Cokesbury	Lamington	Portsmouth	Whitman
Cokesbury, Stony	Livingston	Preakness	Whitman, Stony
Colemantown	Lyons	Sloan	

Group 2 - Soils displaying consistent hydric conditions in most places, but additonal verification is needed.

Atherton	Leon	Plummer	Ridgebury, Stony
Atsion	Othello	Raynham	Shrewsbury
Fallsington	Parsippany	Reaville (wet variant)	Watchung
Fredon	Pasquotank	Ridgebury	Watchung, Stony
Haledon (wet variant)	Passaic (Parsippany variant)		

Group 3 - Soil displaying hydric conditions in few places and additional verification is needed.

Abbottstown	Hammonton	Rowland	Venango, Stony
Amwell	Klej	Turbotville	Whippany
Chalfont	Lenoir	Venango (Albia)	

Source.: Tiner, R. W., Jr. Wetlands of New Jersey.

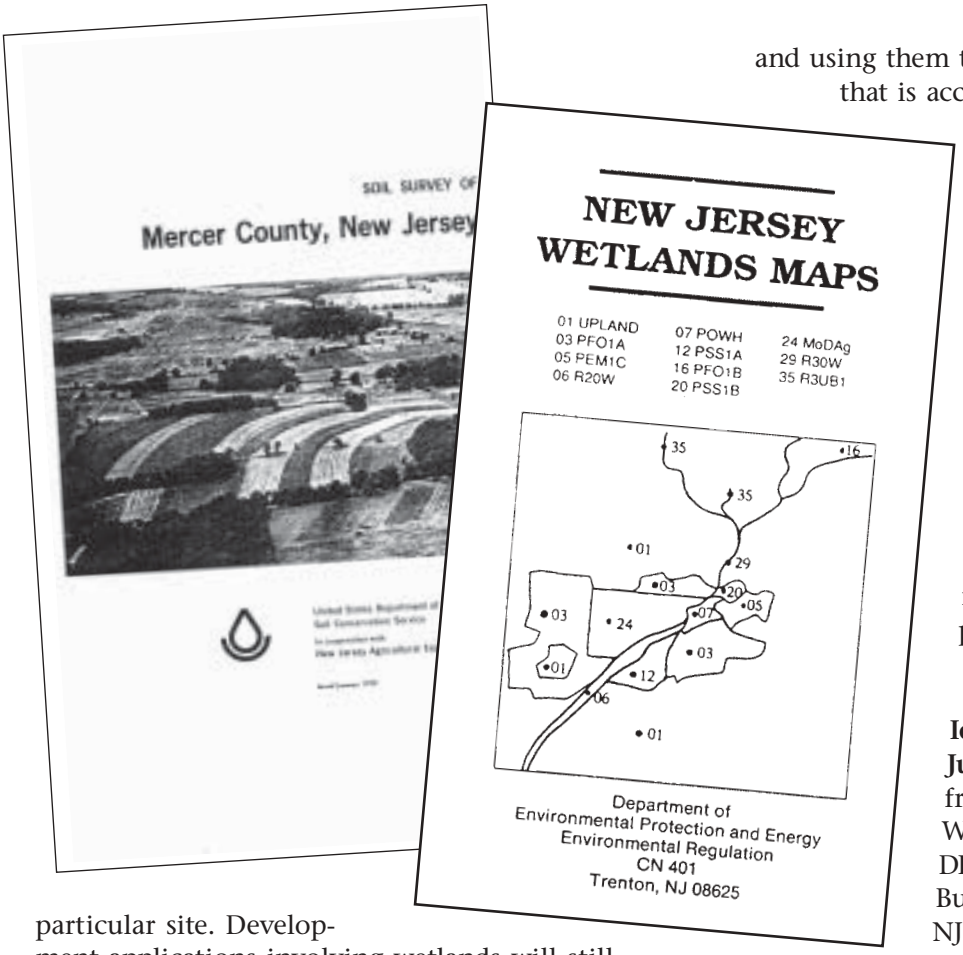
Wetlands Hydrology

Wetlands depend on the presence of surface or ground water supplied by rainfall, flooding, snow melt, and/or subsurface water for a long enough period to support wetland vegetation. The presence of water in wetlands is highly variable and is not always obvious. At times when water is not apparent in a particular area, **hydrologic indicators** are used to ascertain that water is a dominant factor. These indicators include sediment deposits, water marks on tree trunks, moss lines on trees, elevated (buttressed) roots.

AVAILABLE WETLANDS MAPS

Hydric soils, shown on county soil surveys, which are available through the County Soil Conservation Districts, give a good indication of the presence of wetlands. The best source of wetlands maps is the New Jersey Department of Environmental Protection (DEP). The mapping is available as GIS downloads from the DEP web page at www.nj.gov/dep/gis/ or on quarter quad maps available from DEP Maps & Publications, (609) 777-1038, P.O. BOX 438 Trenton, NJ 08625-0417.

It should be noted that while far more detailed than the county soil survey maps, the DEP maps can still not approach the accuracy of a site-specific survey and should only be used as a guideline in regard to the presence or absence of wetlands on a



particular site. Development applications involving wetlands will still require, in most instances, use of the federal identification and delineation techniques.

WETLANDS DELINEATIONS

Because protection of wetlands depends on accurate and consistent identification methods, the NJ wetlands legislation requires use of a single wetlands identification methodology. To facilitate the wetlands identification and boundary delineation process, the Act authorizes the DEP to provide verification for the presence or absence of wetlands, for delineations, and other provisions, by issuing Letters of Interpretation. (See Chapter IV for full details on Letters of Interpretation.)

In an effort to insure accurate, consistent and repeatable wetlands identifications and determinations, the NJ legislature directed the DEP to adopt and use the federal methodology that has been developed by the four federal agencies primarily involved in wetlands identification and delineation: the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the U.S. Department of Agriculture Soil Conservation Service. It provides direction on identifying various site-specific wetland indicators and using them to establish a wetlands boundary that is accurate, consistent, and repeatable.

The federal methodology uses a three-parameter approach to identify wetlands. Characteristics of the soils, the vegetation and evidence of hydrology are used to determine the presence, absence, or extent of wetlands. Individuals performing delineations should have a sound background in botany, soil science, and hydrology. However, the degree to which expertise is required in any or all of these areas depends on the type of wetlands determination required and the characteristics of a particular site.

The **Federal Manual for Identifying and Delineating Jurisdictional Wetlands** (available from Superintendent of Documents, Washington DC at 202-783-3238; or, DEP Maps and Publications Office, Bureau of Revenue, CN 402, Trenton, NJ 08625, 609-777-1039) suggests four approaches for wetland field investigations to determine the extent of wetlands on a particular piece of property. All involve both office and field efforts.

For most instances, a **routine on-site determination** is all that is necessary to determine the existence of wetlands. This approach may be conducted by assessing the soils or by evaluating the plant communities.

For more difficult sites, an **intermediate-level on-site determination** is required. This approach is necessary on sites where the determination of wetlands vegetation requires more detailed analysis, especially when the boundary between the upland and wetlands is not clearly defined.

The third approach, a **comprehensive on-site determination** is designed for those sites that are extremely large or complex or when detailed information is necessary to support legal challenges. In applying this approach, use of a team of specialists is recommended so that accurate and detailed information may be compiled on the soils, vegetation, and hydrology of the property.

The last approach presented is for **disturbed area and problem area determinations.** Disturbed areas are those where filling, damming, clearing, or other human activities have impacted the wetlands. Wetland determinations on these sites require

research into the past history of the site as well as investigation into existing conditions. Identification problems on these areas can occur because vegetation usually common to upland situations exist or the wetlands are unique to very limited geographical regions. An evaluation of other site characteristics or familiarity with the region is helpful in defining these wetlands.

All four approaches involve investigations into the types of vegetation present, the soil characteristics, and on-site hydrology. To establish that a particular area is a wetland, all three parameters must be satisfied. However, not all circumstances warrant a thorough investigation of each parameter. Where obligate wetland plants are dominant, the area can be considered a wetland without intensive review of the soils and hydrology. In instances where the soils show hydric characteristics and there is obvious sign of wetland hydrology, the vegetation is assumed to be hydrophytic and does not require further investigation. However, where facultative wet, facultative, or facultative upland plant species are predominant, soil characteristics need to be investigated and hydrologic indicators documented. In general, the Federal Manual recommends that each parameter be investigated to establish accurately the extent of wetlands.