

# What is Wetland Delineation?

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## Introduction to Wetland Delineation

Wetlands are known by a variety of colloquial names—swamp, bog, marsh, estuary. The general scientific consensus regarding wetlands is that a wetland is an area of land saturated by water to the extent that soil formation, plants and animal life in that area are influenced by the presence of water. Wetlands are found on every continent except Antarctica and may be found in every type of terrain. A wetland can occur at any elevation or latitude where liquid water exists and may or may not be associated with a body of moving or standing water.

Wetland delineation is a process used to determine whether an area meets the scientific definition of a wetland and, if the area does meet the definition, to discover the extent of the wetland. Wetlands are protected from intentional damage and destruction by a network of federal and state laws. Property owners, home builders, farmers, environmental engineers, conservationists, construction contractors and land developers all need to understand the biological, ecological and legal ramifications of wetlands and wetland disturbance.

## Definition of a Wetland

The EPA defines a wetland as an area “where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing

season.” One place where wetlands frequently occur is at the boundary between a water body and land, such as along sea coasts, rivers and lakes. Wetlands may also exist independently of a body of standing or moving water and may be fed by groundwater or surface water runoff. Contrary to what the name suggests, not all wetlands are saturated 100 percent of the time. Many wetlands, especially inland wetlands not associated with a lake or river, are dry during one or more seasons of the year.

## Responsible Regulatory Authorities

Several governmental agencies take the lead in wetland delineation and preservation. The EPA is the primary federal regulatory authority responsible for determining the existence and extent of wetlands and preserving these areas. The U.S. Army Corps of Engineers, the National Resources Conservation Service (previously known as the Soil Conservation Service,) the U.S. National Marine Fisheries Service, the National Oceanic and Atmospheric Administration and the U.S. Fish and Wild Service are involved to varying degrees in wetland delineation. Many states have governing authorities that administer all or a portion of the federal regulatory programs, as well as independently enacted state laws. These state authorities may also administer federal funding or federal/state matching funds designated for the delineation and preservation of wetlands. Local governments may also enact important laws and ordinances regarding wetlands.

## Regulations Pertaining to Wetland Delineation and Protection

No single law or regulatory program exists that encompasses the delineation and protection of wetlands. Instead, wetlands regulations are enfolded to varying degrees within a number of federal legislative acts, executive orders, state laws and local ordinances. Below are several key federal acts pertaining to wetlands management. In addition to these federal acts, many states have enacted more stringent wetland protection laws.

- Rivers and Harbors Appropriation Act—1899—This act was a very early piece of federal legislation designed to preserve and protect navigable waterways in the United States from obstruction by filling, debris deposition or construction without Congressional approval.
- Federal Water Pollution Control Act—1948—This was the precursor to the Clean Water Act and established federal programs to reduce water pollution, protect public water supplies and preserve habitats for fish and other aquatic animals.
- National Environmental Policy Act—1969—The National Environmental Policy Act requires all government agencies to examine possible environmental impacts prior to performing construction or development and mandates the preparation of Environmental Assessments (EA) and Environmental Impact Statements (EIS) by government entities.
- Clean Water Act—1972—The act was a sweeping series of amendments and revisions to the Federal Water Pollution Control Act. The Clean Water Act has been amended several additional times since the 1972 revision. The Clean Water Act includes standards for the amount of pollutants permitted to be discharged into surface waters and prevents the deposition of dredge and fill material into waterways, including wetlands. Point sources of pollution, such as industries, and non-point sources of pollution, such as agricultural run-off, are also addressed under the Clean Water Act.
- Endangered Species Act—1973—This act provides for protection of plant and animal species threatened with extinction due to overhunting or habitat destruction. Many aquatic and semi-aquatic species native to wetlands were considered endangered or have become endangered due to habitat destruction since this act was passed, and wetlands delineation and protection for the purpose of habitat preservation was one benefit to wetlands derived from this law.
- Water Resources Development Act—1974—This act, first passed in 1974, is a series of recurring legislative packages that are passed by Congress. The Water Resources Development Act authorizes a range of activities by the U.S. Army Corps of Engineers regarding the use and protection of waterways and other water resources.

- Executive Orders 11988 and 11990—1977—These orders, signed by President Jimmy Carter, prevented development in floodplains and in wetlands by government agencies or on federal lands. Development of floodplains and wetlands on privately owned lands were still allowed under applicable permits and supervision by government authorities.
- Emergency Wetlands Resources Act—1986—This act provided funding for wetlands conservation and legalized the purchase of wetland areas by the federal government. It also called for the preparation of a National Wetlands Priority Conservation Plan and led to the establishment of the National Wetlands Inventory.
- Farm Bills—1985, 1990, 1996 and 2002—These bills eliminated federal agricultural fund payments to farmers who planted crops in wetlands and encouraged the preservation and remediation of wetland areas by farmers.
- Tax Reform—1986—Changes made to the tax code in 1986 discouraged the private development of wetland areas.
- North American Wetlands Conservation Act—1989—This act is primarily concerned with the effects of habitat destruction on migratory birds and provides programs and funding for habitat preservation, including wetlands.
- Coastal Wetlands Planning, Protection and Restoration Act—1990—Primarily concerned with coastal wetland protection in Louisiana, this act also provides federal matching funds to other states for wetland preservation along the ocean coastlines.

### Methods of Wetland Delineation

The most common identifying feature associated with a wetland is the presence of standing water. Wetlands are also recognized because of the presence of alluvial or hydric soil types, the hydrology and drainage conditions of the site, and the plants and animals that inhabit or frequent the location. The simplest method of delineating a wetland is to consult the National Wetlands Inventory (NWI.) This inventory consists of maps showing the location of wetlands in the United States. If a particular location has not been mapped as part of this inventory or if the NWI maps are not clear as to the exact boundaries of a wetland area, an environmental consultant can determine if a wetland exists based upon the review of aerial and satellite photos and examining the interaction of soil, plants, animals and water at the site.

After the field investigation of the site is performed, a wetland delineation report is prepared for review by the applicable regulatory authority. Requirements of a wetland delineation report depend upon the particular regulatory agency and may vary from state to state. A wetland delineation report generally contains maps of the property showing the location of the

wetland, date of the field work, details of the delineation procedure used and other pertinent information.

Training courses on wetland delineation for environmental professionals are offered through many state government conservation departments, universities and private training organizations. These courses generally include units on wetland soils, identifying wetland vegetation, the hydrology and hydrodynamics of wetlands, wetland boundary delineation and wetland mapping.

### **Wetland Classification Systems**

Two widely used systems of identifying and classifying wetlands have been developed under the direction of governmental entities; “A Hydrogeomorphic Classification for Wetlands” and “Classification of Wetlands and Deepwater Habitats of the United States.” Both technical documents outline systems of classification that use a combination of the factors listed above to categorize wetlands according to a number of criteria. The EPA refers to both of these methods in its published regulations and guidance.

### **Hydrogeomorphic Wetland Classification System**

“A Hydrogeomorphic Classification for Wetlands” was finalized in 1993 by Dr. Mark M. Brinson, a biologist with East Carolina University, for use by the U.S. Army Corps of Engineers. This system of

classifying wetlands, known as the HGM method, examines the following factors:

- the geomorphic setting—the type and condition of the terrain where the wetland is located,
- the source of the water that saturates the wetland—precipitation, overland flow or groundwater, and
- the hydrodynamics of the wetland--the ways that water moves into and out of the wetland, including tides, channel flow, groundwater seepage, precipitation, evaporation and evapotranspiration.

The HGM classification originally outlined four different categories of wetlands but later editions expanded the list to include seven categories:

- Riverine—These wetlands occur along rivers and in floodplains and are fed primarily by waterway overflow and surface flow. Headwaters, waterway confluences and oxbow lakes are all examples of riverine wetlands.
- Lacustrine—Lacustrine fringe wetlands are found along lakes. Their existence is partly due to the elevated water table that occurs around inland water bodies.
- Slope—Slope wetlands are fed by groundwater and are located where the water table meets the ground surface. Although the name implies that these wetlands are always found on sloped grades,

slope wetlands may occur in areas that are nearly flat with a high water table.

- Estuarine or Tidal—These wetlands occur along the coastline and may intersect with riverine wetlands where rivers meet the ocean. Tidal wetlands are likely to remain saturated for most of the year.
- Mineral Flats—These occur in areas of old lake and sea beds, and most of the water that they contain is derived from precipitation and surface water flows instead of groundwater.
- Organic Flats—These primarily flat wetlands are similar to depressional and mineral wetlands but contain accumulations of organic material. Peat bogs are an example of an organic wetland.
- Depressional—These wetlands occur in areas of low terrain where surface runoff accumulates. Depressional wetlands may contain inlets and outlets or be self-contained, with underlying soil layers of low permeability.

The HGM classification method has been built upon and expanded by other agencies including the NRCS in later technical guidance regarding the use of soils to delineate wetlands. “Hydrogeomorphic Wetland Classification System: An Overview and Modification to Better Meet the Needs of the Natural Resources Conservation Service” is a 2008 technical document by the NRCS that outlines how

the HGM method may best be used by the NRCS. “Soil Hydrodynamic Interpretations for Wetlands” is a 2011 technical guidance prepared by the NRCS to examine the soils specific to each of the different classifications of wetlands.

The HGM system does not take into account the native plant and animal life in classifying wetlands. With the exception of the consideration of organic material in some wetlands, this system looks solely at the non-biological attributes that make up a wetland.

### **Classification of Wetlands and Deepwater Habitats of the United States**

“Classification of Wetlands and Deepwater Habitats of the United States” was first published in 1979. The book and the wetlands delineation and classification system it contains was a collaborative effort by Lewis M. Cowardin of the U.S. Fish and Wildlife Service, Virginia Carter of the U.S. Geologic Survey, Francis C. Golet of the University of Rhode Island and Edward T. LaRoe of the National Oceanographic and Atmospheric Administration. This classification system is primarily used by the U.S. Fish and Wildlife Service division of the Department of the Interior.

This system relies upon the presence of a variety of aquatic and semi-aquatic plants, the occurrence of hydric soil types and the flooding frequency to categorize wetlands into five systems.

Descriptions of the five systems and their subsystems are as follows:

- **Marine**—Marine wetlands comprise the entire continental shelf and shoreline and include areas that are subjected to wave action. River estuaries where seawater is diluted by fresh water are not included. This category is subdivided into Subtidal and Intertidal subcategories depending upon the frequency that the underlying soil mass is submerged.
- **Estuarine**—These wetlands occur where rivers meet the ocean and may exhibit varying degrees of salinity. Estuarine wetlands are generally enclosed by land on several sides and may experience tidal action. Like marine wetlands, estuarine wetlands are divided into Subtidal and Intertidal categories.
- **Riverine**—Riverine wetlands occur in channels associated with permanent or intermittently moving water. These include the waterway channel itself and surrounding land that is constantly or seasonally saturated by the presence of the river, canal or creek. As a waterway approaches the ocean and the salinity and tidal action increase, a riverine wetland becomes designated as estuarine. Riverine wetlands are further divided into Tidal, Lower Perennial, Upper Perennial and Intermittent, depending upon the flow patterns. Some waterways feature all four types of riverine wetlands at varying points along the channel, while other waterways feature only one of these types.

- **Lacustrine**—These are wetlands associated with lakes, reservoirs and ponds. These water bodies generally possess an inlet and outlet, and may be continuously or seasonally saturated. Lacustrine wetland areas are subdivided into Limnetic and Littoral—limnetic wetlands are continuously underwater and littoral are only partially or intermittently submerged.

- **Palustrine**—Palustrine wetlands occur in inland areas and may or not be directly associated with a body of water. These experience no tidal action and the water is not saline. This category contains no subdivisions and includes peat bogs, fens and marshes.

The subdivisions of each type are able to be further broken down into more distinct categories based on specific location, underlying material, salinity, tidal action, soil type and specific vegetation.

### **National Wetlands Inventory**

The U.S. Fish and Wildlife Service developed the National Wetlands Inventory (NWI) using the classification system outlined in “Classification of Wetlands and Deepwater Habitats of the United States.” The preparation of this inventory was authorized by the Emergency Wetlands Resources Act of 1986. This information is available to the public for use by engineers, conservationists, land developers and other interested parties. Federal government agencies, state agencies, private corporations and conservation groups have

all contributed to the preparation and presentation of this information.

Information for this inventory was first gathered using aerial photography and was printed onto clear overlay sheets for use with topographic maps or as a stand-alone paper map. These maps were able to show the general location of wetlands, but were not always up-to-date because wetlands may be intermittent and boundaries may change seasonally. Improved computer technology streamlined the mapping process and allowed for easier updating. Wetlands data is now available on-line and can be added to other maps, such as USDA soil maps, using a digital mapping product at the NWI website. Written reports regarding wetlands are also regularly issued as part of the NWI.

The information contained in the NWI is a valuable resource that can be used in a number of ways. The NWI aids in the protection of wetlands, preservation of habitats, climate change tracking and emergency response planning. The Federal Emergency Management Agency (FEMA) used data from the NWI to predict and assess damage from the Deepwater Horizon oil spill in 2010. Many people use the NWI to research property prior to purchase, and environmental consultants use the data in the NWI to advise clients on property use constraints due to the presence of wetlands. Conservationists, naturalists and land developers also benefit from the NWI. For more information about this program, visit <http://www.fws.gov/wetlands/NWI/Overview.html>.

Many states also maintain wetland databases or map inventories on-line. These maps may be based on the federal NWI maps or may be derived from independent research performed within the state.

### **Importance of Wetland Delineation**

Wetlands are important because, as the boundary between earth and a body of water, they filter contaminants and sediment from run-off before it enters water body. Wetlands are also important habitats for many species of animals and for flood mitigation and prevention. Delineating the location and extent of wetlands is necessary for protection of waterways and habitat preservation.

Wetlands delineation is also important to property owners. If a wetland area is found to exist on a property that parcel of land may still be used for building a home or other development in most jurisdictions if proper set-backs from the wetland area are observed. Other mitigation efforts might also be necessary depending upon the location, size of the property and specific wetland features. In many cases, if a wetland is found to exist on a piece of property the owner is required to seek a permit to build on or develop the property. If the permit is denied, the landowner generally finds that the value of the property decreases. Lawsuits with the federal government often result in which the homeowner seeks damages from the government for loss of use or diminished property values.

Determining if a wetland exists before a piece of property is purchased is one important way that a landowner can protect himself or herself from buying a parcel of land that cannot be developed or used because of the presence of a wetland.

## **Conclusion**

Wetland conservation is a vital part of today's environmental policy, and wetland delineation is one of the most basic aspects of wetlands conservation. Wetlands are important for the prevention of pollution and the preservation of the natural food chain. Knowing the location of wetlands is also important for landowners to be able to comply with environmental regulations. Due to all of these factors, wetland delineation is not only important to environmental professionals, but to all Americans.

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