

## A Clarification of the U.S. Fish and Wildlife Service's Wetland Definition

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In 1979, the U.S. Fish and Wildlife Service published its *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin, *et al.* 1979). This document describes the Service's official wetland definition and classification system. It was developed primarily to serve as the foundation for a national wetlands mapping project called the National Wetlands Inventory. Other objectives of the classification system were: (1) to describe ecological units having certain homogeneous natural attributes, (2) to arrange these units in a system that would facilitate resource management decision-making, and (3) to provide consistent concepts and terminology that could be used for the entire United States (Cowardin, *et al.* 1979). The Service has used this classification system successfully to map the nation's wetlands. The purpose of this article is to examine the Service's wetland definition, identify a common misinterpretation of this definition, and discuss the differences between soil and nonsoil.

### The Service's Wetland Definition

The Service defines wetlands as follows: "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year" (Cowardin, *et al.* 1979).

In defining wetlands from an ecological standpoint, the Service emphasizes three key attributes: (1) hydrology—the degree of flooding or soil saturation, (2) wetland vegetation (hydrophytes), and (3) hydric soils. All areas considered wetland must periodically have enough water to stress plants and animals not adapted to life in water or saturated soils. Ninety-four percent of wetlands in the conterminous United States have hydrophytes and hydric soils. Another five percent are inland ponds, and about one percent are nonvegetated exposed areas such as tidal mud flats. The Service, in cooperation with other federal agencies, has prepared national and regional lists of plant species that occur in wetlands (Reed 1988). The USDA Soil Conservation Service has developed a national list of hydric soils (USDA Soil Conservation Service 1987) to help identify wetlands in the field.

According to the classification system, "[t]he term wetland includes a variety of areas that fall into one of five categories:

- (1) areas with hydrophytes and hydric soils, such as those commonly known as marshes, swamps, and bogs;
- (2) areas without hydrophytes but with hydric soils—for example, flats where drastic fluctuation in water level,

wave action, turbidity, or high concentration of salts may prevent the growth of hydrophytes;

(3) areas with hydrophytes but nonhydric soils, such as margins of impoundments or excavations where hydrophytes have become established but hydric soils have not yet developed;

(4) areas without soils but with hydrophytes, such as the seaweed-covered portion of rocky shores; and

(5) wetlands without soil and without hydrophytes, such as gravel beaches or rocky shores without vegetation."

So, wetlands can be either vegetated or nonvegetated. Completely drained hydric soils that are no longer capable of supporting hydrophytes due to a change in water regime are not considered wetland. In these cases, wetland hydrologic conditions no longer exist. Areas with completely drained hydric soils are, however, good indicators of historic wetlands, which may be suitable for restoration.

Soil scientists were still developing the concept of hydric soils when the Service published the classification system in 1979. The Service first coined the term "hydric soil" in early drafts of the system. Since that time, the concept of hydric soils has evolved. As a result, category 3 and the example of category 2 above are no longer valid. Soils recently inundated (formerly nonhydric soils), such as the margins of impoundments or excavated ponds with growths of hydrophytes, are now by definition classified as hydric soils. According to hydric soil criteria 3 and 4, soils that are ponded for long duration (7–30 days) or very long duration (more than 30 days) during the growing season, and soils that are frequently flooded for long duration or very long duration during the growing season are hydric soils (USDA Soil Conservation Service 1987). The tidal flat example is no longer valid for category 2 since nonvegetated tidal flats, once considered "soil," have been reclassified to "nonsoil" (see soil vs. nonsoil discussion below). A wetland where vegetation has recently been removed is an example of an area without hydrophytes, but with hydric soils (provided the area is not completely drained).

### Misinterpretation of the Service's Definitions

Unfortunately, defining "wetland" in two sentences rather than one has created some confusion. In interpreting the definition, most readers have naturally focused on the second sentence, which begins with "[f]or purposes of this classification wetlands must have one or more of the following three attributes . . ." Often, they have mistakenly concluded that the Service's definition requires that only one of the three attributes—wetland vegetation, undrained hydric soils, or hydrology—must be present in order to classify an area as wetland. Hence, they consider the Service's wetland definition to be extremely broad, that is, a one parameter definition. Some individuals may interpret this definition so loosely that a low-lying area dominated by red maple (*Acer rubrum*), a plant that occurs as frequently in wetlands as in upland areas, is considered wetland without examining the soils or looking for signs of wetland hydrology. This was clearly not the Service's intention.

If you look closely at part (3) of the second sentence of

the definition, however, you will notice that the hydrology attribute pertains *only* to areas where "the substrate is non-soil." This phrase was included to address areas lacking vegetation and soil, such as rocky shores and mud, sand, and gravel flats. It should be emphasized that in order for any area to be classified as wetland by the Service, the area must be periodically saturated or covered by shallow water, whether wetland vegetation and/or hydric soils are present or not; this hydrologic requirement is addressed in the first sentence of the definition. After all, hydrophytes and hydric soils develop as a direct result of a wetland hydrologic regime, that is, wetland hydrology.

#### "Soil" vs. "Nonsoil"

Unfortunately, the term "nonsoil" was not defined in the glossary of the Service's classification system. Before defining this term, let us consider the meaning of "soil." According to *Soil Taxonomy* (Soil Survey Staff 1975), soil is "the collection of natural bodies on the earth's surface, in places modified or even made by man of earthy materials, containing living matter and supporting or capable of supporting plants out-of-doors." This definition supports the traditional view that soil is "the natural medium for the growth of land plants." Vegetation may be only seasonally present as in deserts or in wetlands dominated by nonpersistent emergent (nonwoody) plants. In other instances, soil may lack vegetation, but be able to support plant life if it is irrigated. The upper limit of soil is air or shallow water. *Soil Taxonomy* adds that "[a]reas are not considered to have soil if the surface is permanently covered by water deep enough that only floating plants are present or if survival conditions are so unfavorable that only lichens can exist on bare rocks" (Soil Survey Staff 1975).

Thus, "nonsoil" consists of areas that do not support erect emergent or woody vegetation, such as cattails (*Typha* spp.) growing erect in shallow water areas or trees on uplands. The Soil Conservation Service has not classified the tidal mud and sand flats found along U.S. coasts as a particular soil series, but has classified them as open coastal waters. Since they generally do not support macroscopic aquatic plants, these tidal flats have "nonsoil" as opposed to "soil" substrates. This is also true of rocky, sandy, or gravelly shores, beaches, and bars. Other "non-soil" areas include areas of stones, boulders, bare bedrock, and glaciers, as well as permanently flooded substrates lacking erect vegetation (USDA 1980). (Note: There are, however, seasonally vegetated tidal flats, especially along tidal freshwater rivers. These areas are often colonized by nonpersistent emergent plants such as spatterdock (*Numphar luteum*) and wild rice (*Zizania aquatica*). Since these flats support erect herbaceous vegetation, their substrates are considered soil.)

#### The Vital Attribute

The Service's definition of "wetland" requires that in order to be considered wetland, an area must be subjected to periodic inundation and/or soil saturation or be covered by shallow water. The predominance of hydrophytes (wetland plants) and the presence of undrained hydric soils are manifestations of wetland hydrology. While wetland plants and hydric soils are associated with most wetlands, there are wetlands lacking vegetation and/or soil. These nonvegetated wetlands are common along U.S. coasts and

in arid and semiarid regions. All wetlands have a hydrologic commonality, that is, periodic inundation and/or soil saturation for prolonged periods or permanent cover by shallow water. This condition is responsible for creating and maintaining all wetlands—it is their most vital attribute. If the Service's wetland definition is a one parameter definition as some people have claimed, that one parameter must be wetland hydrology, and not simply the presence of plant species that are known to occur in wetlands.

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