

# Water Words Dictionary—Appendix D–2

## WETLANDS AND DEEPWATER HABITATS

### Classification Hierarchy—Systems, Subsystems, and Classes

(U.S. Department of the Interior—U.S. Fish and Wildlife Service—USFWS)

[Reprinted from *Classification of Wetlands and Deepwater Habitats of the United States*, December 1979 (Reprinted 1992), U.S. Department of the Interior, Fish and Wildlife Service, Office of Biological Services, Washington, D.C., 20240.]

#### **Classification Notations Used:**

! = **System**

▲ = **Subsystem**

# = Class

## WETLANDS AND DEEPWATER HABITATS—CLASSIFICATIONS

### ! **Marine**

#### ▲ **Subtidal**

- # Rock Bottom
- # Unconsolidated Bottom
- # Aquatic Bed
- # Reef

#### ▲ **Intertidal**

- # Aquatic Bed
- # Reef
- # Rocky Shore
- # Unconsolidated Shore

### ! **Estuarine**

#### ▲ **Subtidal**

- # Rock Bottom
- # Unconsolidated Bottom
- # Aquatic Bed
- # Reef

#### ▲ **Intertidal**

- # Aquatic Bed
- # Reef
- # Streambed
- # Rocky Shore
- # Unconsolidated Shore
- # Emergent Wetland
- # Scrub–Shrub Wetland
- # Forested Wetland

### ! **Riverine**

#### ▲ **Tidal**

- # Rock Bottom
- # Unconsolidated Bottom
- # Aquatic Bed
- # Streambed
- # Rocky Shore

- # Unconsolidated Shore
  - # Emergent Wetland
  - ▲ **Lower Perennial**
    - # Rock Bottom
    - # Unconsolidated Bottom
    - # Aquatic Bed
    - # Rocky Shore
    - # Unconsolidated Shore
    - # Emergent Wetland
  - ▲ **Upper Perennial**
    - # Rock Bottom
    - # Unconsolidated Bottom
    - # Aquatic Bed
    - # Rocky Shore
    - # Unconsolidated Shore
  - ▲ **Intermittent**
    - # Streambed
- ! Lacustrine**
- ▲ **Limnetic**
    - # Rock Bottom
    - # Unconsolidated Bottom
    - # Aquatic Bed
  - ▲ **Littoral**
    - # Rock Bottom
    - # Unconsolidated Bottom
    - # Aquatic Bed
    - # Rocky Shore
    - # Unconsolidated Shore
    - # Emergent Wetland
- ! Palustrine**
- ▲ (none)
    - # Rock Bottom
    - # Unconsolidated Bottom
    - # Aquatic Bed
    - # Unconsolidated Shore
    - # Moss-Lichen Wetland
    - # Emergent Wetland
    - # Scrub-Shrub Wetland
    - # Forested Wetland

## WETLANDS AND DEEPWATER HABITATS

### HIERARCHICAL STRUCTURE—SYSTEMS AND SUBSYSTEMS

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#### ! **Marine System**

- " **DEFINITION:** The Marine System consists of the open ocean overlying the continental shelf and its associated high-energy coastline. Marine habitats are exposed to the waves and currents of the open ocean and the water regimes are determined primarily by the ebb and flow of oceanic tides. Salinities exceed 30‰, with little or no dilution except outside the mouths of estuaries. Shallow coastal indentations or bays without appreciable freshwater inflow, and coasts with exposed rocky islands that provide the mainland with little or no shelter from wind and waves, are also considered part of the Marine System because they generally support typical marine biota.
- " **LIMITS:** The Marine System extends from the outer edge of the continental shelf shoreward to one of three lines: (1) the landward limit of tidal inundation (extreme high water of spring tides), including the splash zone from breaking waves; (2) the seaward limit of wetland emergents, trees, or shrubs, or (3) the seaward limit of the Estuarine System, where this limit is determined by factors other than vegetation. Deepwater habitats lying beyond the seaward limit of the Marine System are outside the scope of this classification system.
- " **DESCRIPTION:** The distribution of plants and animals in the Marine System primarily reflects differences in four factors: (1) degree of exposure of the site to waves; (2) texture and physicochemical nature of the substrate; (3) amplitude of the tides; and (4) latitude, which governs water temperature, the intensity and duration of solar radiation, and the presence or absence of ice.
- " **SUBSYSTEMS:** (1) **Subtidal**—The substrate is continuously submerged. (2) **Intertidal**—The substrate is exposed and flooded by tides; includes the associated splash zone.

#### ! **Estuarine System**

- " **DEFINITION:** The Estuarine System consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semienclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water. Offshore areas with typical estuarine plants and animals, such as red mangroves (*Rhizophora mangle*) and eastern oysters (*Crassostrea virginica*), are also included in the Estuarine System.
- " **LIMITS:** The Estuarine System extends (1) upstream and landward to where ocean-derived salts measure less than 0.5‰ during the period of average annual low flow; (2) to an imaginary line closing the mouth of a river, bay, or sound; and (3) to the seaward limit of wetland emergents, shrubs, or trees where they are not included in (2), above. The Estuarine System also includes offshore areas of continuously diluted sea water.
- " **DESCRIPTION:** The Estuarine System includes both estuaries and lagoons. It is more strongly influenced by its association with land than is the Marine System. In terms of wave action, estuaries are generally considered to be low-energy systems. Estuarine water regimes and water chemistry are affected by one or more of the following forces: oceanic tides, precipitation, freshwater runoff from land areas, evaporation, and wind. Estuarine salinities

range from hyperhaline to oligohaline. The salinity may be variable, as in hyperhaline lagoons (e.g., Laguna Madre, Texas) and most brackish estuaries (e.g., Chesapeake Bay, Virginia–Maryland); or it may be relatively stable, as in sheltered euhaline embayments (e.g., Chincoteague Bay, Maryland) or brackish embayments with partly obstructed access or small tidal range (e.g., Pamlico Sound, North Carolina).

- " **SUBSYSTEMS:** (1) **Subtidal**—The substrate is continuously submerged. (2) **Intertidal**—The substrate is exposed and flooded by tides; includes the associated splash zone.

## **! Riverine System**

- " **DEFINITION:** The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5‰. A channel is “an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.”
- " **LIMITS:** The Riverine System is bounded on the landward side by upland, by the channel bank (including natural and man-made levees), or by wetland dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. In braided streams, the system is bounded by the banks forming the outer limits of the depression within which the braiding occurs. The Riverine System terminates at the downstream end where the concentration of ocean-derived salts in the water exceeds 0.5‰ during the period of annual average low flow, or where the channel enters a lake. It terminates at the upstream end where tributary streams originate, or where the channel leaves a lake. Springs discharging into a channel are considered part of the Riverine System.
- " **DESCRIPTION:** Water is usually, but not always, flowing in the Riverine System. Upland islands or Palustrine wetlands may occur in the channel, but they are not included in the Riverine System. Palustrine Moss–Lichen Wetlands, Emergent Wetlands, Scrub–Shrub Wetlands, and Forested Wetlands may occur adjacent to the Riverine System, often on a floodplain.
- " **SUBSYSTEMS:** The Riverine System is divided into four Subsystems: the Tidal, the Lower Perennial, the Upper Perennial, and the Intermittent. Each is defined in terms of water permanence, gradient, water velocity, substrate, and the extent of floodplain development. The Subsystems have characteristic flora and fauna. All four Subsystems are not necessarily present in all rivers, and the order of occurrence may be other than that given here. (1) **Tidal**—The gradient is low and water velocity fluctuates under tidal influence. The streambed is mainly mud with occasional patches of sand. Oxygen deficits may sometimes occur and the fauna is similar to that in the Lower Perennial Subsystem. The floodplain is typically well developed. (2) **Lower Perennial**—The gradient is low and water velocity is slow. There is no tidal influence, and some water flows throughout the year. The substrate consist mainly of sand and mud. Oxygen deficits may sometimes occur, the fauna is composed mostly of species that reach their maximum abundance in still water, and true planktonic organisms are common. The gradient is lower than that of the Upper Perennial Subsystem and the floodplain is well developed. (3) **Upper Perennial**—The gradient is high and velocity of the water fast. There is not tidal influences and some water flows throughout the year. The substrate consists of rock, cobbles, or gravel with occasional patches of sand. The natural dissolved oxygen concentration is normally near saturation. The fauna is characteristic of running water, and there are few or no planktonic forms. The gradient is high compared with that of the Lower Perennial Subsystem, and there is very little floodplain

development. (4) **Intermittent**—In this Subsystem, the channel contains flowing water for only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent.

### ! **Lacustrine System**

- " **DEFINITION:** The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; and (3) total area exceeds 8 ha (20 acres). Similar wetland and deepwater habitats totaling less than 8 ha are also included in the Lacustrine System if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 2 m (6.6 feet) at low water. Lacustrine waters may be tidal or nontidal, but ocean-derived salinity is always less than 0.5‰.
- " **LIMITS:** The Lacustrine System is bounded by upland or by wetland dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. Lacustrine Systems formed by damming a river channel are bounded by a contour approximating the normal spillway elevation or normal pool elevation, except where Palustrine wetlands extend lakeward of that boundary. Where a river enters a lake, the extension of the Lacustrine shoreline forms the Riverine–Lacustrine boundary.
- " **DESCRIPTION:** The Lacustrine System includes permanently flooded lakes and reservoirs, intermittent lakes (e.g., playa lakes), and tidal lakes with ocean-derived salinities below 0.5‰. Typically, there are extensive areas of deep water and there is considerable wave action. Islands of Palustrine wetland may lie within the boundaries of the Lacustrine System.
- " **SUBSYSTEMS:** (1) **Limnetic**—All deepwater habitats within the Lacustrine Systems; many small Lacustrine Systems have no Limnetic Subsystems. (2) **Littoral**—All wetland habitats in the Lacustrine System. Extends from the shoreward boundary of the system to a depth of 2 m (6.6 feet) below low water or to the maximum extent of nonpersistent emergents, if these grow at depths greater than 2 m.

### ! **Palustrine System**

- " **DEFINITION:** The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5‰. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres); (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 2 m at low water; and (4) salinity due to ocean-derived salts less than 0.5‰.
- " **LIMITS:** The Palustrine System is bounded by upland or by any of the other four Systems.
- " **DESCRIPTION:** The Palustrine System was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and prairie, which are found throughout the United States. It also includes the small, shallow, permanent or intermittent water bodies often called ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; or river floodplains; in isolated catchments; or on slopes. They may also occur as islands in lakes or rivers. The erosive forces of wind and water are of minor importance except during severe floods. There is often great similarities between wetlands lying adjacent to lakes or rivers and isolated wetlands of the same class in basins without open water.
- " **SUBSYSTEMS:** None.

**SALINITY MODIFIERS**

**Used in Wetland and Deepwater Habitat Classification System**

<b>Coastal Modifiers<sup>1</sup></b>	<b>Inland Modifiers<sup>2</sup></b>	<b>Salinity (parts per thousand)</b>	<b>Approximate Specific Conductance ( Mhos @25 C)</b>
Hyperhaline	Hypersaline	> 40	> 60,000
Euhaline	Eusaline	30.0–40.0	45,000–60,000
Mixohaline (Brackish)	Mixosaline <sup>3</sup>	0.5–30.0	800–45,000
Polyhaline	Polysaline	18.0–30.0	30,000–45,000
Mesohaline	Mesosaline	5.0–18.0	8,000–30,000
Oligohaline	Oligosaline	0.5–5.0	800–8,000
Fresh	Fresh	< 0.5	< 800

<sup>1</sup> Coastal Modifiers are used in the Marine and Estuarine Systems.

<sup>2</sup> Inland Modifiers are used in the Riverine, Lacustrine, and Palustrine Systems.

<sup>3</sup> The term Brackish should not be used for inland wetlands or deepwater habitats.

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