



## A GUIDE TO WETLAND AND DEEPWATER HABITATS CLASSIFICATION USED IN THE NATIONAL WETLAND INVENTORY (NWI) MAPPING

### Purpose:

---

The Montana Natural Heritage wetland and riparian mapping is completed through photointerpretation of 1-m resolution color infrared aerial imagery acquired from 2005 through 2015. Ancillary data layers such as topographic maps, digital elevation models, soils data, and other aerial imagery sources are also used to improve mapping accuracy. Wetland mapping follows the federal Wetland Mapping Standard and classifies wetlands according to the Cowardin classification system of the National Wetlands Inventory (NWI). Riparian mapping follows the U.S. Fish and Wildlife Service's System for Mapping Riparian Areas. Federal, State, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands differently than the NWI. These data are intended for use in publications at a scale of 1:12,000 or smaller. As projects are completed, they are submitted to the U.S. Fish and Wildlife Service for inclusion in the NWI dataset. Mapped wetlands do not represent precise wetland boundaries, and digital wetland data cannot substitute for an on-site determination of jurisdictional wetlands.

The Montana Natural Heritage Program's Wetland and Riparian Mapping Center uses the Cowardin classification system (Cowardin et al. 2013) adopted by the National Wetland Inventory (NWI) for wetlands mapping (FGDC Wetlands Subcommittee 2009). The Cowardin wetland classification system separates wetlands first into systems, and then further separates systems into subsystems and classes.

A coding convention using letters and numbers is assigned to each mapped wetland. These letters and numbers describe the broad landscape context of the wetland, its vegetation type, its water regime, and the kind of alterations that may have occurred. Similar coding, based on U.S. Fish and Wildlife Service (USFWS) conventions, is applied to riparian areas (U.S. Fish and Wildlife Service 2009). These are mapped areas where vegetation composition and growth is influenced by nearby water bodies but where soils, plant communities, and hydrology do not display true wetland characteristics.

Both of these classification systems are described in more detail below. Classification types listed are followed by the coding convention used for mapping purposes.

#### ❖ Wetlands

In Montana, there are three wetland systems: [Palustrine](#), [Lacustrine](#), and [Riverine](#).

#### ❖ Riparian

In Montana, there is one classification system for [Riparian](#) areas.

## PALUSTRINE SYSTEM (P):

- ❖ In Montana, this system includes all wetlands dominated by trees, shrubs, and emergent, herbaceous vegetation.
- ❖ Wetlands lacking vegetation are also included in this system if they are less than 8 hectares (20 acres) in size and are less than 2 meters (6.6 feet) deep in the deepest portion of the wetland.

### *Palustrine Classes:*

Within the Palustrine System, seven classes of wetlands occur in Montana. Classes distinguish between substrate types or vegetation, or both. The wetland classes typically mapped in Montana include the following:

#### Rock Bottom (RB):

- Wetlands with a substrate made up of 75% or greater stones, boulders, and bedrock with less than 30% vegetation cover.

#### Unconsolidated Bottom (UB):

- Wetlands where mud, silt or similar fine particles cover at least 25% of the bottom, and where vegetation cover is less than 30%.

#### Aquatic Bed (AB):

- Wetlands with vegetation growing on or below the water surface for most of the growing season.

#### Unconsolidated Shore (US):

- Wetlands with less than 75% areal cover of stones, boulders, or bedrock.
- AND with less than 30% vegetative cover
- AND the wetland is irregularly exposed due to seasonal or irregular flooding and subsequent drying.

#### Emergent (EM):

- Wetlands with erect, rooted herbaceous vegetation present during most of the growing season.

#### Scrub-Shrub (SS):

- Wetlands dominated by woody vegetation less than 6 meters (20 feet) tall. Woody vegetation includes tree saplings and trees that are stunted due to environmental conditions.

#### Forested (FO):

- Wetlands dominated by woody vegetation greater than 6 meters (20 feet) tall.

## *Palustrine Water Regimes:*

Water regimes provide information on the duration and frequency of flooding in a wetland. The following water regimes are found in Palustrine wetlands in Montana:

### Temporarily Flooded (A):

- Surface water is present for only a brief time during the growing season.
- Most plants found in temporarily flooded wetlands are capable of survival in both uplands and wetlands, although they are likely to grow more robustly in wet conditions.

### Seasonally Saturated (B):

- The substrate is saturated at or near the surface for extended periods during the growing season, but unsaturated conditions prevail by the end of the season in most years.
- Surface water is typically absent, but may occur for a few days after heavy rain and upland runoff.

### Seasonally Flooded (C):

- Surface water is typically present for extended periods of time during the growing season but is usually gone by the end of the growing season.
- When surface water is absent, the depth to substrate saturation may vary considerably among sites and years.

### Continuously Saturated (D):

- The substrate is saturated at or near the surface for extended periods during the growing season, but unsaturated conditions prevail by the end of the season in most years.
- Surface water is typically absent, but may occur for a few days after heavy rain and upland runoff.

### Seasonally Flooded-Saturated (E):

- Surface water is present for extended periods (generally for more than a month) during the growing season, but is absent by the end of the season in most years.
- When surface water is absent, the substrate typically remains saturated at or near the surface.

### Semipermanently Flooded (F):

- Surface water is present throughout the growing season.
- When surface water is absent, the water table is usually at or very near the land surface.

### Intermittently Exposed (G):

- Surface water is present throughout the year except in drought years.

### Permanently Flooded (H):

- Substrate is covered by water throughout the year in all years.

### Intermittently Flooded (J):

- Substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity.
- The dominant plant communities under this regime may change as soil moisture conditions change.

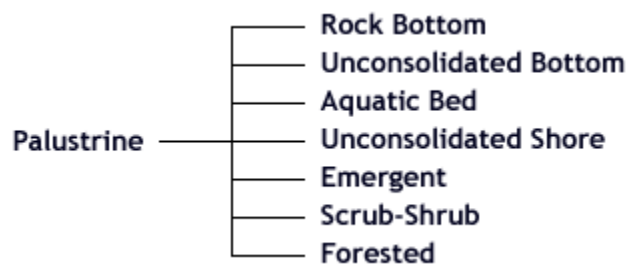
### Artificially Flooded (K):

- The amount and duration of flooding are controlled by means of pumps or siphons in combination with dikes, berms, or dams.
- The vegetation growing on these areas cannot be considered a reliable indicator of Water Regime.

### *Examples of Palustrine wetlands:*

To classify Palustrine wetlands, we combine the codes for the system, class, and water regime. The following are examples of types of wetlands and how they would be coded for wetland mapping purposes.

1. A cattail marsh with standing water most of the year: **PEMF**
2. A grass- and sedge-dominated prairie pothole that is only wet at the beginning of the growing season: **PEMC**
3. A saturated sedge-dominated fen: **PEMB**
4. A small shallow pond with abundant lily pads and other floating vegetation, where standing water occurs throughout the growing season: **PABF**
5. A small shallow pond with a muddy substrate and vegetation growing in less than 30% of its area, where standing water is present most of the year: **PUBF**
6. A willow-dominated wetland that also consists of some upland plant species: **PSSA**



### LACUSTRINE SYSTEM (L):

- ❖ This system includes any large body of water that is greater than 8 hectares (20 acres) in size OR is more than 2 meters (6.6 feet) deep.

- ❖ This system is usually found in a topographic depression. It may also be formed by damming of a river channel.

## Lacustrine Subsystems:

### *Limnetic Subsystem (L1):*

- This subsystem includes all deep-water habitats within the Lacustrine system.

### *Limnetic Classes:*

#### Rock Bottom (RB):

- Deep waterbodies with a substrate made up of 75% or greater stones, boulders, and bedrock with less than 30% vegetation cover.

#### Unconsolidated Bottom (UB):

- Deep waterbodies with mud or silt covering at least 25% of the bottom.

#### Aquatic Bed (AB):

- Deep waterbodies with vegetation growing on or below the water surface for most of the growing season.

### *Limnetic Water Regimes:*

#### Semipermanently Flooded (F):

- Surface water is present throughout the growing season.
- When surface water is absent, the water table is usually at or very near the land surface.

#### Intermittently Flooded (G):

- Surface water is present throughout the year except in drought years.

#### Permanently Flooded (H):

- Substrate is covered by water throughout the year in all years.

#### Artificially Flooded (K):

- Waterbody where the amount and duration of flooding is controlled artificially by either dikes or dams.
- The vegetation growing on these areas cannot be considered a reliable indicator of water regime.

### *Littoral Subsystem (L2):*

- Shallow fringe of wetland around the deeper Limnetic zone.
- Extends from the shore to areas where the depth is 2 meters (6.6 feet) or to the maximum extent of nonpersistent vegetation.

## *Littoral Classes*

### Rock Bottom (RB):

- Lakeshore areas where 75% or more of the substrate is stones, boulders or bedrock and where there is less than 30% vegetation cover.

### Rocky Shore (RS):

- A shoreline that experiences some wave action, where 75% or more of the substrate is stones, boulders or bedrock and where there is more than 30% vegetation cover.

### Unconsolidated Bottom (UB):

- Shorelines where mud, silt or other fine particles comprise at least 25% of the substrate.

### Aquatic Bed (AB):

- Shorelines with vegetation growing on or below the water surface for most of the growing season.

### Unconsolidated Shore (US):

- Shorelines where there is less than 75% areal cover of stones, boulders, or bedrock, and less than 30% vegetation cover.
- The area is also irregularly exposed due to seasonal or irregular flooding and subsequent drying.

### Emergent (EM):

- Shorelines that have nonpersistent, erect, rooted herbaceous vegetation during most of the growing season.

## *Littoral Water Regimes:*

### Temporarily Flooded (A):

- Surface water is present for only a brief time during the growing season.
- Most plants found in temporarily flooded wetlands are capable of survival in both uplands and wetlands, although they are likely to grow more robustly in wet conditions.

### Seasonally Flooded (C):

- Surface water is typically present for extended periods of time during the growing season but is usually gone by the end of the growing season.
- When surface water is absent, the depth to substrate saturation may vary considerably among sites and years.

### Semipermanently Flooded (F):

- Surface water is present throughout the growing season.
- When surface water is absent, the water table is usually at or very near the land surface.

### Intermittently Exposed (G):

- Surface water is present throughout the year except in drought years.

**Permanently Flooded (H):**

- Surface water is present throughout the year in all years.

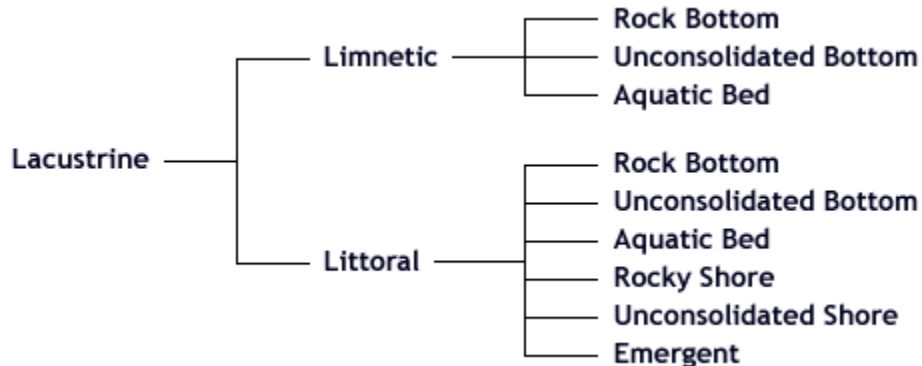
**Intermittently Flooded (J):**

- Substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity.
- The dominant plant communities under this regime may change as soil moisture conditions change.

*Examples of Lacustrine Systems:*

To classify Lacustrine habitats, we combine the codes for the system, subsystem, class, and water regime. The following are examples of Lacustrine wetlands and how they would be coded for wetland mapping purposes.

1. The portions of Flathead lake that are deeper than 2 meters (6.6 feet): **L1UBH**
2. A shoreline area along Flathead Lake consisting of floating vegetation where surface water is present for most of the year: **L2ABG**
3. A rocky shoreline adjacent to a glacial lake where water is only present in the spring: **L2RSC**



**RIVERINE SYSTEM (R):**

- ❖ This system includes all wetlands and deepwater habitats that are within natural and artificial channels.
- ❖ These systems contain either continuous (perennial) or intermittently flowing water.

**Riverine Subsystems:**

*Lower Perennial Subsystem (R2):*

- This subsystem typically has a low gradient and slow water velocity.

- Substrates in this subsystem are mainly made up of sand and mud.
- Floodplains are usually well developed.

### *Upper Perennial Subsystem (R3):*

- This subsystem typically has steep gradients and fast water velocity.
- Substrates typically consist of rocks, cobbles, or gravel with some patches of sand.
- Floodplains are typically absent or poorly developed.

### *Lower and Upper Perennial Classes*

#### Unconsolidated Bottom (UB):

- Stream channels where the substrate is at least 25% mud, silt or other fine particles.

#### Aquatic Bed (AB):

- Stream channels with vegetation growing on or below the water surface for most of the growing season.

#### Unconsolidated Shore (US):

- Shorelines with less than 75% areal cover of stones, boulders, or bedrock and less than 30% vegetation cover.
- The area is also irregularly exposed due to seasonal or irregular flooding and subsequent drying.

#### Rock Bottom (RB):

- Stream channels with stones, boulders, and bedrock comprising at least 75% of the substrate, with less than 30% vegetation cover.

#### Rocky Shore (RS):

- A shoreline experiencing at least some wave action, characterized by 75% or greater bedrock, stones or boulders, with less than 30% vegetation cover.

#### Emergent (EM)\*:

- Stream channels with erect, rooted herbaceous vegetation present during most of the growing season. ***\* Lower Perennial Subsystem only***

### *Lower and Upper Perennial Water Regimes:*

#### Temporarily Flooded (A):

- Surface water is present for only a brief time during the growing season.
- Most plants found in temporarily flooded wetlands are capable of survival in both uplands and wetlands, although they are likely to grow more robustly in wet conditions.

#### Seasonally Flooded (C):

- Surface water is typically present for extended periods of time during the growing season but is usually gone by the end of the growing season.



- When surface water is absent, the depth to substrate saturation may vary considerably among sites and years.

#### Semipermanently Flooded (F):

- Surface water is present throughout the growing season.
- When surface water is absent, the water table is usually at or very near the land surface.

#### Intermittently Exposed (G):

- Surface water is present throughout the year except in drought years.

#### Permanently Flooded (H):

- Channel holds water throughout the year in all years.

#### *Intermittent Subsystem (R4):*

- This subsystem includes channels that only have surface flow during a portion of the year.
- Isolated pools may form in the channel when there is no water flow.

#### *Intermittent Classes*

##### Streambed (SB):

- Active channel that contains periodic water flow.

#### *Intermittent Water Regimes:*

##### Temporarily Flooded (A):

- Surface water is present for only a brief time during the growing season.
- Most plants found in temporarily flooded wetlands are capable of survival in both uplands and wetlands, although they are likely to grow more robustly in wet conditions.

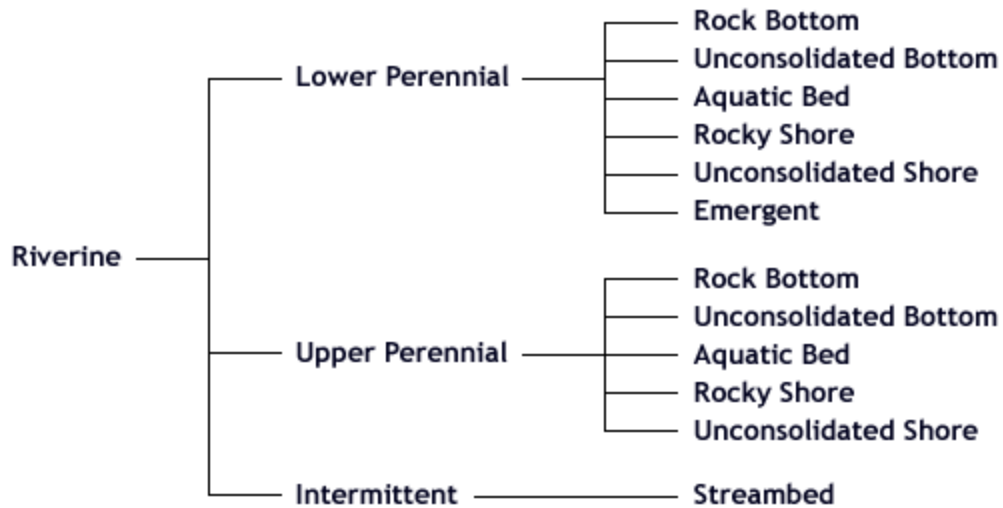
##### Seasonally Flooded (C):

- Surface water is typically present for extended periods of time during the growing season but is usually gone by the end of the growing season.
- When surface water is absent, the depth to substrate saturation may vary considerably among sites and years.

#### *Examples of Riverine Systems:*

To classify Riverine habitats, we combine the codes for the system, subsystem, class, and water regime. The following are examples of types of Riverine systems and how they would be coded for wetland mapping purposes.

1. Headwater stream with a rocky substrate and continuous flow: **R3RBH**
2. Small intermittent channel that connects two wetlands: **R4SBA**
3. Missouri River: **R2UBH**



### *Special Modifiers:*

---

Special modifiers are codes that describe any manmade or natural alterations to wetland systems. These codes are added to the end of the system, subsystem, class, and water regime.

#### Beaver (b):

- This modifier describes wetlands that are formed within and adjacent to streams by beaver activity.

#### Partially Drained/Ditched (d):

- This modifier describes manmade alterations to wetlands, including inflow or outflow ditches or drains.

#### Farmed (f):

- This modifier describes wetlands that have been altered by farming practices such as plowing or cropping.

#### Diked/Impounded (h):

- This modifier describes manmade alterations to wetlands where impoundments or dikes have been added.

#### Managed (m):

- This modifier is used to identify wetlands where water inputs are controlled to achieve a specific water regime or habitat type. Water control structures in combination with dikes and impoundments are common. Examples – wetland restoration sites, duck ponds, wildlife refuges, waterfowl production areas.

#### Excavated (x):

- This modifier describes wetlands that were created through the excavation of soils.

### *Examples of Modified Wetlands:*

1. A stock pond that holds water throughout the year: **PUBHx**
2. A small wetland adjacent to a perennial stream created by a beaver dam that contains aquatic vegetation and is semipermanently flooded: **PABFb**
3. An impounded intermittent stream that creates a small emergent wetland that holds water early in the growing season: **PEMCh**

### RIPARIAN SYSTEMS (Rp):

The Wetland and Riparian Mapping Center uses the riparian classification system developed by the U.S. Fish and Wildlife Service to map riparian areas in Montana. The riparian classification types listed below are followed by the coding convention used for mapping purposes.

- ❖ Plant communities (trees, shrubs and/or herbaceous plants) contiguous to rivers, streams, lakes, or drainage ways.
- ❖ Riparian areas are influenced by both surface and below surface hydrology.
- ❖ The plant species present in riparian areas are distinctly different from plant species found in adjacent areas.
- ❖ Plants in riparian areas demonstrate more vigorous or robust growth forms than in adjacent areas.

### Riparian Subsystems:

#### *Lotic Subsystem (Rp1):*

- This subsystem includes any riparian area adjacent to a stream or river system with intermittent or perennial water flow.

#### *Lentic Subsystem (Rp2):*

- This subsystem includes any riparian area that borders a Palustrine or Lacustrine wetland.

### *Riparian Classes*

#### Emergent (EM):

- Riparian areas that have erect, rooted herbaceous vegetation during most of the growing season.

#### Scrub-Shrub (SS):

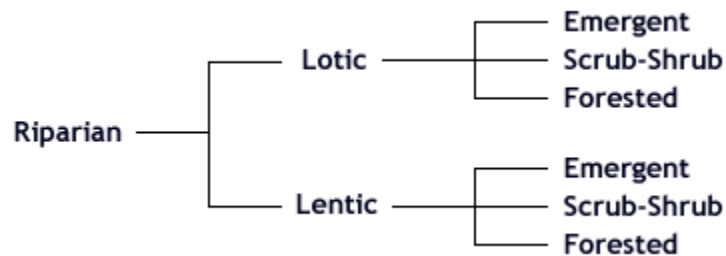
- This type of riparian area is dominated by woody vegetation that is less than 6 meters (20 feet) tall.
- Woody vegetation includes tree saplings and trees that are stunted due to environmental conditions.

### Forested (FO):

- This riparian class has woody vegetation that is greater than 6 meters (20 feet) tall.

### Examples of Riparian Systems:







1. A riparian area adjacent to a perennial stream that is vegetated with cottonwoods: **Rp1FO**
2. A riparian area adjacent to a large lake that is dominated by willows: **Rp2SS**
3. A narrow fringe of grasses and sedges adjacent to an intermittent stream: **Rp1EM**



## HISTORIC NWI Wetland Mapping

Historic NWI Wetland Mapping represents wetland mapping created from 1980s aerial imagery and may overlap areas with MTNHP Wetland and Riparian Mapping. Historic wetland mapping was produced as topical overlays using U.S. Geological Survey topographic maps as the base. The hard copy product is a composite map showing topographic and planimetric features from the USGS map base and wetlands and deepwater habitats from the U.S. Fish and Wildlife Service's topical overlay. Riparian mapping was not conducted in the historic wetland mapping project. The data are intended for use in publications at a scale of 1:24,000 or smaller. The map products were neither designed nor intended to represent legal or regulatory products.

References Legend:  [View WorldCat Record](#)  [View Online Publication](#)

- 
-   Cowardin, L.M., et al. 2013. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service, FWS/OBS-79/31. 103pp.
  -   FGDC Wetlands Subcommittee. 2009. Wetlands Mapping Standard. U.S. Geological Survey, Reston, Virginia.
  -   U.S. Fish and Wildlife Services. 2009. A system for mapping riparian areas in the western United States. Division of Habitat and Resource Conservation, Branch of Resource and Mapping Support, Arlington, Virginia.

For questions about the data displayed here or to report errors, please contact the Montana Natural Heritage Program at (406) 444-5354 or [mtnhp@mt.gov](mailto:mtnhp@mt.gov).