

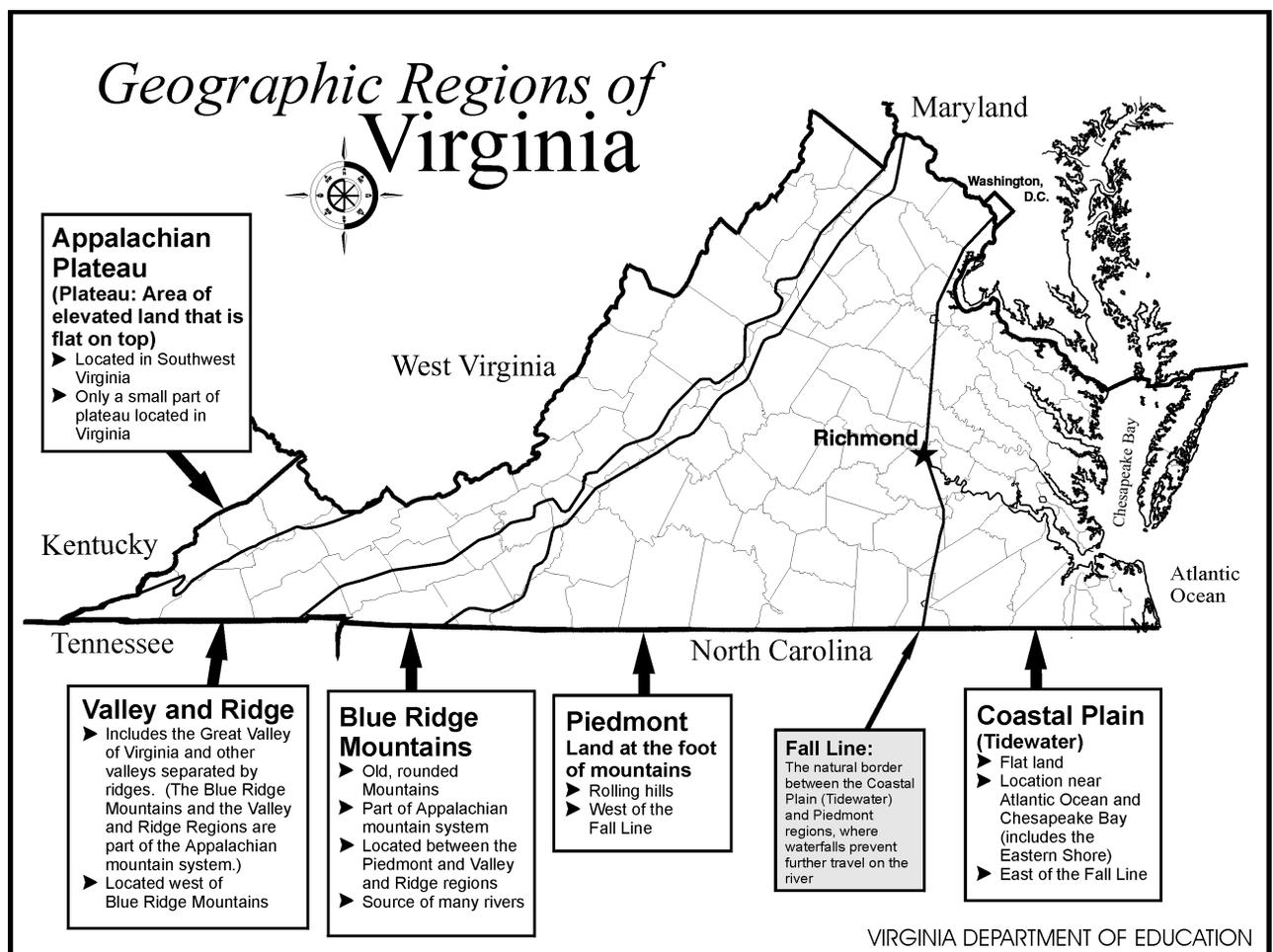
Getting to Know Virginia's Wetlands

"When one tugs at a single thing in nature, he finds it attached to the rest of the world." ~John Muir

Our Commonwealth's Wetlands: a "Wealth" of variety, including some that are not that "Common"

Why All The Variety?

"Beginning at sea level at the eastern edge of the state, the surface of Virginia rises gradually in elevation and increases in irregularity, until it reaches maximum elevation and ruggedness in the western part of the state" ([Virginia Department of Conservation and Recreation \[DCR\], Natural Communities of Virginia \[NCV\], n.d.](#)). Virginia possesses a greater variety of natural landscapes, more than any other state in the east, having five major **physiographic providences**, or geographic regions (Woodward & Hoffman, 1991). These five geographic regions are from east to west: the Coastal Plain, the Piedmont Plateau, the Blue Ridge, the Ridge and Valley, and the Appalachian Plateaus ([DCR, NCV, n.d.](#)). Each region has its own unique geology and soil composition, as well as unique climatic patterns, influenced by the Commonwealth's diverse topographic relief (Woodward & Hoffman, 1991). It is no surprise then, that Virginia's wetlands are so diverse!



To better understand Virginia's wetlands we have developed a simplified classification system to discuss the various wetland types. The first major classification divides Virginia's wetlands as being either tidal or nontidal.

Tidal Wetlands

“Virginia is well endowed with tidal wetlands... The massive prairie-like appearance of the saltmarshes of the Eastern Shore and the lush, tropical-like vegetation of the freshwater marshes of the Mattaponi and Pamunkey Rivers have a particular gestalt beauty that is indescribable” (Silberhorn, 1976).

Tidal wetlands, also referred to as **estuaries**, are located within Virginia's Coastal Plain. Estuaries are semi-enclosed coastal waterbodies that are affected by both tides as well as freshwater (White, 1989). Estuaries have **salinity gradients** ranging from saltwater at the mouth to freshwater at some upstream limit that is still subject to tidal action.

“Salinity is defined as the measure of dissolved salts in water, usually expressed in parts per thousand (ppt)” (White, 1989, p.14). The salinity at the mouth of the Chesapeake Bay and tidal rivers close to its mouth are considered **saltwater**, approximate to that of seawater (averages 35 ppt) whereas **freshwater** contains few salts (usually less than 0.5ppt). **Brackish** water is broadly defined as a middle range in the salinity gradient between tidal freshwater and seawater. The salinity of estuarine systems varies seasonally and yearly depending on the volume of freshwater flowing into the system from upstream. Generally, salinity levels are lowest during the early spring due to higher amounts of rain and melting snow. The degree of brackishness is therefore “inverse to the seasonal freshwater flow — fresher in spring and saltier in the autumn” (White, 1989, p.18). Along this salinity gradient, every habitat “supports a unique community of plants and animals, each particularly suited to the water chemistry and bottom **substrate** of a given salinity zone” (White, 1989, p.18).

Virginia has four main estuarine systems, all of which ultimately drain into the Atlantic Ocean. The largest of these is the Chesapeake Bay watershed, which drains a large portion of Virginia as well as parts of New York, Pennsylvania, Maryland, Delaware, West Virginia and Washington, D.C. Four Virginia Rivers flow into the Chesapeake Bay including the Potomac, Rappahannock, York and James Rivers, all of which have tidal gradients ranging from saltwater, brackish and tidal freshwater. The next largest is the Chowan watershed. Rivers that drain into the Chowan River system include the Meherrin, Nottoway, and the Blackwater Rivers. These rivers have tidal freshwater portions within Virginia before becoming brackish and joining the Chowan River in North Carolina (Woodward & Hoffman, 1991). North Carolina's Currituck Sound is drained by three waterbodies that originate in Virginia: the Northwest and North Landing Rivers and Back Bay. Although all three waterbodies have tidal portions in Virginia, only Back Bay has brackish

portions. Virginia's Coastal Bay, which includes the area between Virginia's Eastern Shore mainland and the Barrier Islands.

In Virginia, tidal wetlands are diverse, consisting of marshes, tidal swamps and **subaqueous lands**. Tidal wetlands are one of the most productive type of ecosystem, providing food, critical habitat, nursery grounds, and shelter to a myriad of animals at various stages in their life cycle. These wetlands perform important filtering functions prior to their drainage into the Atlantic Ocean. They also help stabilize coastlines, preventing erosion during storms ([Hutchings, 2003](#)). Tidal wetlands are particularly important habitats for brackish and marine fishes and shellfish, small mammals, migratory shorebirds, various waterfowl, and a variety of wading birds such as herons and egrets. Most commercial and game fishes use tidal marshes and estuaries as nursery and spawning grounds. Striped bass, bluefish, sea trout, croaker, menhaden, and flounder are among the most familiar fishes that rely on tidal wetlands. Shellfish including oysters, clams and shrimp as well as the Blue crab, the prized shellfish of the Chesapeake Bay, also depend on coastal marshes ([CBP, 2002](#)).

Tidal marshes are generally dominated by **emergent**, or herbaceous vegetation. Tidal marshes can be freshwater, brackish or salt water due the fluctuation of tides and freshwater input.



Alice Jane Lippson

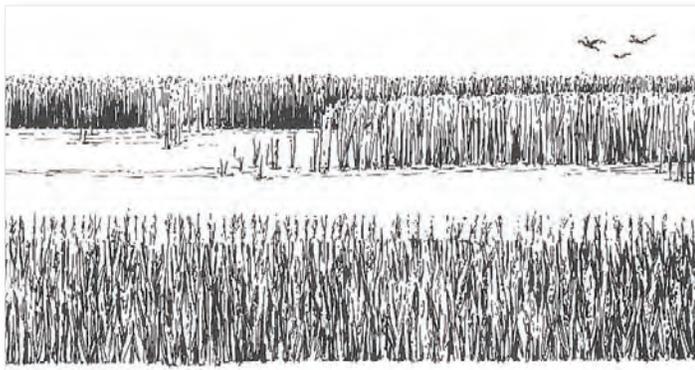
Freshwater Marsh

Tidal Freshwater Marshes – Tidal freshwater marshes border tidal freshwater streams and rivers located in the upper reaches of tides. Tidal freshwaters are regions of narrow salinity gradients (0-0.5 ppt) yet contain daily tidal fluctuations. Salinity zones can fluctuate and can become slightly brackish during summer droughts. The plant community of freshwater marshes is quite diverse and is dominated by emergent aquatic plants such as broad-leaved cattail (*Typha latifolia*), soft rush (*Juncus effusus*), arrow arum (*Peltandra virginica*), pickerelweed (*Pontederia cordata*), reeds, ferns, and sedges or floating-leafed plants such as duckweed and waterlilies (White, 1989).

Tidal Brackish Marshes – Brackish marshes have the most fluctuating salinity levels of tidal marshes and are usually found between salt marshes and freshwater marshes along river systems. Salinity levels in brackish marshes are influenced by tidal action as well as water movement from fresh water marshes ([Louisiana Challenge Grant, 1997](#)). Plants and animals living within brackish marshes must tolerate wide swings in salinity levels (White, 1989). It makes sense, then that in terms of plant diversity, brackish marshes are less diverse than freshwater marshes but more diverse than salt marshes (White, 1989). Brackish marshes provide vital habitat and nutrients for many aquatic animals and waterfowl.

Tidal Salt Marshes – Salt marshes have the highest salinity levels of tidal marshes and are generally most affected by the wind and tidal movement ([Louisiana Challenge Grant, 1997](#)). Salt marshes generally have two zones: the low marsh, or one that is regularly flooded usually during high tide, and the high marsh, one that is not flooded on a regular basis, only during the highest tides of the year (White, 1989).

As the below diagram by Lippson demonstrates, the low marsh zone is almost completely dominated by saltmarsh cordgrass (*Spartina alterniflora*). The high marsh zone contains slightly greater plant diversity, commonly containing salt meadow hay (*Spartina patens*), salt grass (*Distichilis spicata*) and black needle rush (*Juncus roemerianus*). (White, 1989). Other plants associated with the high marsh zone include sea lavender (*Limonium carolinianum*) and glasswort (*Salicornia sp.*) (Lippson and Lippson, 1984).



Low Salt Marsh Zone comprised almost entirely of saltmarsh cordgrass stands

Alice Jane Lippson



High Marsh Zone showing “tussled” saltmeadow in foreground

Tidal Swamps

Tidal swamps are dominated by woody plants (trees or shrubs) and are tidally flooded. In Virginia, tidal swamps occur in between emergent tidal wetlands and swamp forests or uplands. They can also occur on depositional islands in large meanders of tidal rivers. The herbaceous flora associated with tidal swamps can be very diverse and typically contains species characteristic of both tidal marshes and freshwater swamps.

Types of tidal swamps in Virginia include shrub swamps, tidal bald cypress – tupelo swamps, tidal hardwood swamps and estuarine fringe swamp forests (found only in southeastern Virginia in the North Land and Norwest Rivers) ([DCR, NCV, n.d.](#)).

Nontidal Wetlands

Nontidal wetlands are a diverse category of wetlands that are unaffected by tides and are generally characterized by their vegetation type. Their vegetation can be extremely diverse and can be categorized in three main types:

- **Emergent wetlands**, commonly called marshes and wet meadows, dominated by grasses, sedges and other herbaceous or non-woody plants
- **Shrub wetlands**, characterized by low to medium-height woody plants
- **Forested wetlands**, largely wooded swamps and bottomland hardwood forests

([CBP, 2002](#))

Emergent Wetlands

Nontidal Freshwater Marshes – Nontidal freshwater marshes are similar to tidal marshes yet are not dependant on tidal flow but instead rely on seasonal flooding, rainfall, and runoff for their water supply. Like their tidal counterpart, emergent aquatic plants dominate freshwater marshes. These ecosystems are characterized by shallow water that is frequently or continually above the soil surface and is derived from streams, overland flow and groundwater. They have little or no peat deposition and soils with a high mineral content (Firehock et al., 1998).

Wet Meadows – Wet meadows are a particular type of marsh, found in areas that are only periodically inundated or saturated. Many people have a wet meadow area on their property and would probably not consider it a “wetland.” Wet meadows resemble grasslands and are typically drier than other marshes except during periods of seasonal high water. They contain a variety of meadow-like wetland plants including grasses, sedges, rushes, and wildflowers ([EPA, 2005](#)).



Mouldas

Arrow Arum in freshwater marsh

Headwater wetlands – Headwater wetlands are found at the upper ends of wetlands and intercept and modify runoff and shallow groundwater before entering streams that flow into larger rivers and estuaries. Headwater wetlands are extremely valuable for their role with water quality protection and stormwater management. Headwater wetlands also serve as important habitat (Hershner, Havens, Rudnický & Schatt, 2000).

Isolated wetlands – Isolated wetlands are unique non-tidal wetlands that, as their name implies are, not directly “connected” hydrologically through surface water sources, but rather obtain their hydrologic inputs primarily through precipitation and ground water. Nonetheless, they perform many of the same beneficial functions and values as traditional wetlands such as filtering nutrients and sediments, recharging streams and ground water supplies, and providing critical habitat for a variety of wildlife. Due to their “isolated nature”, they support unique and rare animal and plant communities that are adapted to and flourish in this environment. Isolated wetlands are found in a variety of regions in the state and vary widely in their appearance as well as in the plants and wildlife that they support ([DEQ, July 2005](#)). Various types of isolated wetlands are discussed below.

Shrub and Forested Wetlands



Mouldas

Dragon Run Swamp

Swamps – Swamps are dominated by woody plants (trees or shrubs) and are either normally saturated to the surface or flooded by up to a foot of water. Tree and shrub dominated swamps are usually located at the headwaters as well as along the borders of tidal creeks and streams along the landward margins of freshwater and brackish marshes (White, 1989). Swamps are characterized by saturated soils during the growing season, and standing water during certain times of the year. The highly organic soils of swamps form a thick, black, nutrient-

rich environment for the growth of water-tolerant trees such as cypress, Atlantic white cedar, and tupelo. Some swamps are dominated by shrubs, such as buttonbush or smooth alder. Plants, birds, fish, and invertebrates such as freshwater shrimp, crayfish, and clams require the habitats provided by swamps ([EPA, 2005](#)).

Bottomland forests and wet woods – Two other types of forested wetlands, **bottomland forests** and **wet woods** conceal their water below the surface for most of the year, unlike traditional swamps.

Hydrologically Unique Wetlands – Isolated Wetlands and Headwater Wetlands

Some nontidal wetlands may also be classified based on their hydrologic inputs, discussed in the following paragraphs.



Jerrell

Lee County Extension Agent Harold Jerrell showing how large cinnamon ferns (Osmunda cinnamomea) can get.

- **Vernal Pools or Seasonal Ponds** – A vernal pool, or seasonal pond, is a temporary, freshwater wetland that contains water for a portion of the year and supports a fantastic array of plants and animals often not found anywhere else. “Vernal pools are often found in the flood plain of a stream, in seasonally-flooded woodlands, as sinkhole ponds, or where rainwater and snow collect in forest depressions. Vernal pools typically dry up in the summer time and fill up with rainwater during the fall and winter” ([Virginia's Vernal Pools, n.d.](#)). Seasonal ponds range anywhere in size from 50 feet to several hundred feet or more in diameter ([DCR, Natural Resources Fact Sheet \[NRFS\], n.d.](#)).

- **Pocosins** – Often tucked between coastal freshwater marshes and deepwater swamp forests of the southeastern Coastal Plain, pocosins are one of Virginia’s rarest wetlands. Pocosins generally occur in flat poorly drained areas with a sandy or peaty acidic soil composition ([DCR, NRFS, n.d.](#)). The word pocosin comes from the Algonquin Native American word for “swamp on a hill. These wetlands are dominated by small trees and shrubs and have a high water table leaving the soil saturated for much of the year. Pocosins receive most of their water from rainfall and in the drier months of spring and summer, natural fires occur because pocosins periodically become very dry. These fires increase the diversity of shrub and tree species and aid in the germination of seeds ([EPA, 2005](#)).
- **Carolina Bays** – The Carolina Bays are elliptical geologic depressions in the sand of the southeastern Coastal Plain of Virginia. They have long been the subjects of scientific curiosity, controversy, and debate since they were first discovered in the Eighteenth Century. Called “bays”, they are not ocean inlets, but rather these depressions are usually surrounded by a variety of bay trees such as red bays and sweet bays. The depressions are almost perfectly oval and are unique. They support an abundant community of plant and animal life. The largest concentrations of bays are in North and South Carolina ranging in size from quite small to large ([Wheatley Memorial Institute of Information Sciences, 2005](#)).

- **Bogs** – Bogs are one of Virginia’s most distinctive kinds of wetlands. They are found in areas with poor drainage in the higher elevations of the Blue Ridge and Ridge and Valley regions of Virginia. Spongy peat deposits, acidic waters, and a dense ground cover of sphagnum moss characterize bogs. Bogs receive all or most of their water from precipitation and as a result, bogs are low in the nutrients needed for plant growth, a condition that is enhanced by acid forming peat mosses. Bogs support unique plant life, such as carnivorous plants such as pitcher plants. They also serve an important ecological function in preventing downstream flooding by absorbing precipitation ([EPA, 2005](#)).
- **Sea-level Fens** – Sea-level fens are a type of extremely rare coastal wetland located at the upland edges of wide, ocean-side tidal marshes. Not discovered in Virginia until 1991, they receive water and nutrients from underground seeps and like bogs, their soils are acidic and low in nutrients. Sea-level fens support an interesting variety of carnivorous plants such as sundew and bladderwort ([DCR, NCV, n.d.](#)).



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Carnivorous pitcher plant often found in bogs and fens

- **Groundwater seepage wetlands of Coastal Plain and Piedmont** – These unique wetlands, sometimes also called seepage swamps or bogs, are most frequent in the Coastal Plain but sometimes occur in the Piedmont. Seepage wetlands support unusual vegetation and many plants that occur in no other habitats. The most characteristic tree of these wetlands is the sweet bay magnolia, but red maple, loblolly pine, tupelo and sweet gum are often present as well in addition to shrubs. The herbaceous layer is the most unusual containing carnivorous pitcher plants and sundews within thick beds of sphagnum moss ([DCR, 1997](#)).
- **Karst Depressional or Sinkhole Wetlands** – **Karst** depressional, or **sinkhole** wetlands are found in only in the central Shenandoah Valley, in Augusta, Page and Rockingham Counties. They are formed by the decomposition of underlying minerals, which then levels off and intersects with the ground water table ([DCR, NCV, n.d.](#)). Springs and seeps permanently feed some, while others are only seasonally saturated from precipitation. (Woodward & Hoffman, 1991) Like many isolated wetlands, these sinkhole wetlands support a unique and rare variety of plants and animals ([DCR, NCV, n.d.](#)).



Jerrell

Captain cottongrass, a rare bog plant. Photo taken in 1980s in a bog along White Branch, located in the Cumberland Mountains on the Virginia-Tennessee border (north of the town of Rose Hill, Lee County, Virginia).

Subaqueous Lands – Wetlands or Deep Water Habitats?

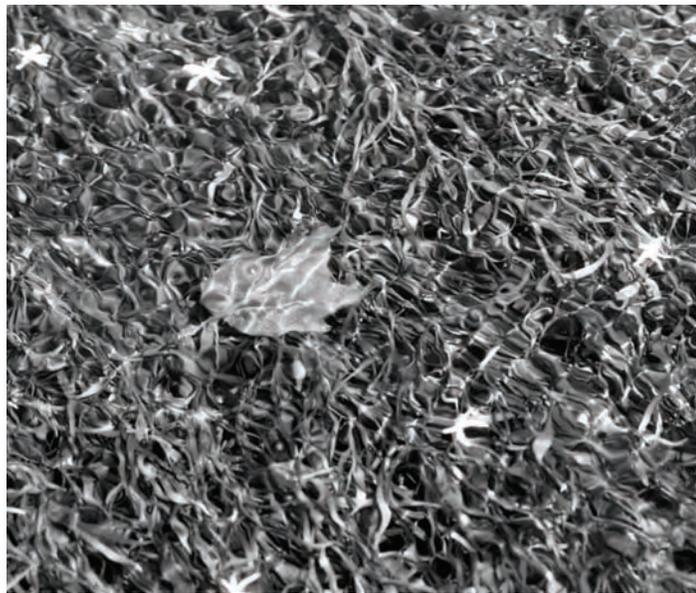
Subaqueous lands are located entirely below the water level surface and include vegetated and unvegetated areas. Vegetated areas are referred to as subaquatic vegetation. Depending on the water depth and the permanency of the water, these habitats may be considered wetlands or instead as deepwater habitats.

Submerged aquatic vegetation (SAV), also sometimes referred to as underwater grass, is found in tidal as well as nontidal waters. These plant communities serve as essential food and habitat for many aquatic species, including waterfowl, shellfish, finfish and invertebrates. SAV beds also oxygenate the water, remove suspended sediments within the water and protect shorelines from erosion (CBP Website). “These aquatic plants are fully submersed, living with their leaves at or below the surface of the water. Like marsh plants, different species are segregated according to salinity and depth and provide habitats for freshwater, slightly to moderately brackish and highly brackish communities” (White, 1989, p.23).



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Cypress swamp



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Water stargrass, a freshwater SAV species, makes the section of the Upper James River where this photo was taken appear as a “river of grass”

Unvegetated subaqueous lands include mudflats and oyster beds. Mudflats are located adjacent to marshes in tidal areas that are exposed during low tides. These areas are devoid of rooted plants. Blue crabs, wading birds, and waterfowl all forage on mudflats. Oyster beds provide nooks and crannies that offer shelter and food sources for many aquatic animals. Small finfish find shelter among the many shells and large fish, waterfowl and blue crabs forage on the reef. The oyster beds provide a ridged structure resistant to erosion and help dissipate wave energy.

Wetland Types in Virginia – A Review

Tidal Vegetated

- Tidal Marshes- Freshwater, Brackish or Salt
- Tidal Swamps (shrubs or forests)
- Submerged Aquatic Vegetation (SAV)

Tidal Unvegetated

- Oyster beds and Mudflats

Nontidal Vegetated

Emergent

- Freshwater Marshes
- Wet Meadows

Shrub and Forested Wetlands

- Swamps
- Bottomland Forests and Wet Woods

Submerged Aquatic Vegetation (SAV)

Headwater Wetlands

Isolated wetlands- groundwater or rainfall fed

- Vernal Pools or seasonal ponds
- Pocosins
- Carolina Bays
- Bogs
- Fens
- Groundwater Seepage Wetlands
- Sinkhole or Karst Depressional Wetlands

“A Wetland By Any Other Name” – Understanding the NWI Wetland Classification System

There are many ways to go about describing and classifying wetlands. Over the years, scientists realized the need to more precisely categorize wetlands and develop a uniform “language” so that wetlands could more easily be discussed. After all, it is much easier to discuss something when you are using the same language!

The preceding pages classified wetlands using terminology such as marshes and swamps. Wetlands were classified first by being either tidal or nontidal, followed next by the dominant vegetation type. Lastly, for nontidal wetlands, other characteristics such as unique hydrology, geology or soils came into play in the classification process.

The FWS published the report, “Classification of Wetlands and Deepwater Habitats of the United States” (Cowardin et al.) in 1979, and then went on to use this system to identify and map all of the wetlands in the United States (National Wetlands Inventory [NWI]). This classification system has become the national standard for classifying wetlands and arranges wetlands and deepwater habitat types into ecological factors based on hydrology, dominant vegetation, soil types, flooding regime and other factors (Firehock et al., 1998). The Cowardin system is hierarchical and includes several layers of detail for wetland classification including: a *system* (described in following paragraph), a *subsystem* of water flow; *classes* of **substrate** types; *subclasses* of vegetation types and dominant species; as well as flooding regimes and salinity levels for each system.

Example of Wetland Types and their U.S. Fish and Wildlife Service Classification Equivalent

Types, Common Name	Cowardin Classification equivalent
Tidal saltwater marsh	Estuarine intertidal emergent, saline
Tidal freshwater marsh	Estuarine intertidal emergent, fresh
Nontidal freshwater marsh	Palustrine emergent, fresh
Cypress swamp, freshwater tidal	Palustrine forested, needleleaved deciduous, fresh

The FWS classification system uses five categories, or *systems*, to classify wetlands and deepwater habitats based on the location within the landscape. These systems are: marine, estuarine, riverine, **lacustrine** and **palustrine**. *Marine* wetlands are associated with the high-energy coastline. *Estuarine* wetlands occur in estuaries where freshwater and saltwater mix. *Riverine* wetlands are located within freshwater river channels that are dominated by emergents present only during the growing season. *Lacustrine* wetlands are located along the edges of lakes where the water depth is less than 2 meters (6.6 feet). *Palustrine* wetlands are nontidal freshwater wetlands that are neither riverine nor lacustrine (Firehock et al., 1998). Wetlands that fall within a river channel that are dominated by **persistent emergent vegetation** are also considered palustrine. The FWS classification system continues with *subsystems* based on frequency of flooding and *classes* and *subclasses* based on soil type and dominant vegetation. The table below shows some examples of wetland types, listed on the left by their common names and then on the right by Cowardin classification equivalent.

For more information about the FWS Classification system, see Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979), available online at: <http://www.chartiff.com/pub/WetlandMaps/Cowardin.pdf>

Wetlands to See, Wildlife to Meet – Visiting Virginia’s Public Wetlands

“*Conservation is a state of harmony between men and land.*”
- Aldo Leopold

Extensive educational resources regarding wetlands exist, but for the knowledge and appreciation of these priceless ecosystems to come alive, you must visit one! Virginia is rich with a diversity of public wetlands in which to visit. These locations vary in size and accessibility.

Many Virginia state parks and Natural Area Preserves, maintained by DCR, contain substantial wetland areas that are as natural areas for hiking, canoeing, and environmental education activities. State parks are an ideal place to visit independently or through a guided tour sponsored by the park. In addition to state parks, there are also wetlands such as Wildlife Management Areas, preserves owned by The Nature Conservancy, FWS National Wildlife Refuges, teaching areas owned by the Virginia Institute of Marine Science as well as local and regional parks. Following is a list presenting a few possible wetlands to visit, organized by region, as well as contact information.

Aerial view of Taskinas Creek



NOAA/DOC by Bahen

Kayaking the Upper Chippokes Creek



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FWS/McCrensky

Birdwatching at Occoquan Bay National Wildlife Refuge



NOAA/DOC by Bahen

Canoeing on Taskinas Creek at York River State Park, also the site of the Chesapeake Bay National Estuarine Research Reserve (CB NERR)



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"The Wetlands" at Lewis Ginter Botanical Gardens

Wetlands to Visit in Virginia

Central Virginia

- **Douthat State Park** – Seasonally inundated fringe wetlands and vernal pools with interpretive programming and hiking accessibility
- **Folly Mills Creek Fen Natural Area Preserve** –An excellent example of a Shenandoah fen community with several rare plant species
- **Holiday Lake State Park** – Vernal pools that are utilized for interpretive programming by nonprofit organization, Virginia's Vernal Pools
- **James River State Park** – Freshwater marsh area accessible by hiking or viewed on an overlook dock

Eastern Virginia

- **Belle Isle State Park** – Eight distinct wetland types, including both tidal and nontidal marshes can be viewed from multiple hiking trails
- **Blackwater River Preserve** – Owned by the Nature Conservancy. Access limited to a canoe due to very swampy conditions
- **Chippokes Plantation State Park** – Both freshwater marshes and cypress swamps that can be viewed from the road and from hiking trails
- **Great Dismal Swamp National Wildlife Refuge** – The Great Dismal Swamp is the largest swamp in Virginia, with over 111,000 acres of forested wetlands
- **North Landing River Preserve** – owned by The Nature Conservancy. One of the largest expanses of undisturbed freshwater marsh habitat along the entire eastern seaboard. This unusual wetland system provides a habitat for southern species of plants that are rare in Virginia, including sawgrass, an integral part of the Florida Everglades
- **Ragged Island Wildlife Management Area** – Brackish marsh accessible by a boardwalk with an interpretive trail. Hunting is permitted in this area – use caution when visiting.
- **Virginia Coast Reserve** – Extensive salt marshes fringe the inner coast of the Barrier Islands that run more than 60 miles up the Virginia coast. The Nature Conservancy owns all or part of 14 out of 18 Barrier Islands. Visitors must first contact the VCR office.
- **York River State Park** – Salt marshes and tupelo swamps that viewed from boardwalks, hiking trails or guided canoe trips. While canoeing on Taskinas Creek, you can experience tidal salt marsh to tidal fresh water marshes

Northern Virginia

- **Caledon State Park** – Swamps and marshes that are seasonally restricted and require crossing fairly rugged terrain to visit
- **Leesylvania State Park** – Freshwater marshes and fringe wetlands that can be viewed from hiking trails or by canoe
- **Mason Neck State Park** – Swamps and freshwater tidal marshes that can be viewed from hiking trails, boardwalks or guided canoe trips
- **Occoquan Bay National Wildlife Refuge** – Wetlands make up over half of the area in the refuge and include wet meadows, bottomland hardwoods, open freshwater marshes and tidally influenced marshes

Southwest Virginia

- **Deep Run Ponds Natural Area Preserve** – Sinkhole pond system that supports a variety of rare plant and animal species
- **Grayson Highlands State Park** – Unique bog called Sullivan Swamp
- **Fairystone Farms Wildlife Management Area** – Has an 8-acre impounded marsh area. Hunting is permitted in this area – use caution when visiting.
- **Hungry Mother State Park** – Seasonally inundated wetland located along the lake

Resources for Wetland Visitation

Before heading out to visit a wetland, contact the location or research it online first. Some of these locations may be temporarily closed to public access due to maintenance, bird nesting or other reason.

- **National Wildlife Refuge Systems** – 800-344-WILD or <http://www.fws.gov/refuges> for an alphabetical or state listing of refuges – Contact the National Wildlife Refuge Systems for more information before visiting a refuge
- **Natural Area Preserves** – <http://www.state.va.us/dcr/dnh/preserve.htm> for an alphabetical listing with more detailed information. Most Natural Area Preserves are owned by the Department of Conservation and Recreation, but some are owned by local governments, universities, private citizens or The Nature Conservancy
- **The Nature Conservancy** – 800-628-6860 or <http://www.nature.org> – Contact the Nature Conservancy to visit their wetlands preserves
- **Virginia Department of Game and Inland Fisheries Wildlife Management Areas** – 804-367-1000 or <http://www.dgif.state.va.us/hunting/wma/index.html> – Many of their wildlife management areas with wetlands are popular spots for waterfowl hunting! Use caution when visiting!
- **Virginia Institute of Marine Science (VIMS)** – 804-684-7000 or <http://www.vims.edu> – Has a teaching marsh and some coastal wetlands that can viewed by scheduling a tour.
- **Virginia State Park System** – 1-800-933-PARK or visit their website <http://www.dcr.virginia.gov/parks>
- **Virginia's Vernal Pools** – 434-248-5444 or visit their website <http://www.lynchburgbiz.com/virginiavernalpools/index.html> – Sponsors educational programs about vernal pools during the spring at state parks.