

Wetlands

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Wetland Types

"Wetlands are areas 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. Water saturation largely determines how the soil develops and the types of plant and animal communities living in and on the soil. Wetlands may support both aquatic and terrestrial species. The prolonged presence of water creates conditions that favor the growth of specially adapted plants and promote the development of characteristic wetlands soils."

-- EPA, *America's Wetlands: Our Vital Link Between Land and Water*

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Marshes



Tom Blagden, Jr.
Tidal marsh along the Edisto River, South Carolina

Marshes are defined as wetlands frequently or continually inundated with water, characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions. There are many different kinds of marshes, ranging from the prairie potholes to the Everglades, coastal to inland, freshwater to saltwater. All types receive most of their

water from surface water, and many marshes are also fed by groundwater. Nutrients are plentiful and the pH is usually neutral leading to an abundance of plant and animal life. For the purposes of this publication, we have divided marshes into two primary categories: [tidal](#) and [non-tidal](#).

Functions & Values

Marshes recharge groundwater supplies and moderate streamflow by providing water to streams. This is an especially important function during periods of drought. The presence of marshes in a watershed helps to reduce damage caused by floods by slowing and storing flood water. As water moves slowly through a marsh, sediment and other pollutants settle to the substrate, or floor of the marsh. Marsh vegetation and microorganisms also use excess nutrients for growth that can otherwise pollute surface water such as nitrogen and phosphorus from fertilizer. This wetland type is very important to preserving the quality of surface waters. In fact, marshes are so good at cleaning polluted waters that people are now building replicas of this wetland type to treat wastewater from



this wetland type to treat wastewater from farms, parking lots, and small sewage plants. **estuarine marsh species**

Non-tidal Marshes

Description

Non-tidal marshes are the most prevalent and widely distributed wetlands in North America. They are mostly freshwater marshes, although some are brackish or alkaline. They frequently occur along streams in poorly drained depressions, and in the

shallow water along the boundaries of lakes, ponds, and rivers. Water levels in these wetlands generally vary from a few inches to two or three feet, and some marshes, like prairie potholes, may periodically dry out completely.

It is easy to recognize a non-tidal marsh by its characteristic soils, vegetation, and wildlife. Highly organic, mineral rich soils of sand, silt, and clay underlie these wetlands, while lily pads, cattails (see photo), reeds, and bulrushes provide excellent habitat for waterfowl and other small mammals, such as red-winged blackbirds, great blue herons, otters, and muskrats. [prairie potholes](#), [playa lakes](#), [vernal pools](#), and [wet meadows](#) are all examples of non-tidal marshes.



Muskrat (*Ondatra zibethicus*) next to its house in a cattail-dominated marsh.

Functions & Values

Due to their high levels of nutrients, freshwater marshes are one of the most productive ecosystems on earth. They can sustain a vast array of plant communities that in turn support a wide variety of wildlife within this vital wetland ecosystem. As a result, marshes sustain a diversity of life that is way out of proportion with its size. In addition to their considerable habitat value, non-tidal marshes serve to mitigate flood damage and filter



Mink
(*Mustela vison*), a predator of the muskrat.



Pickerelweed (*Pontederia cordata*)

Status

Unfortunately, like many other wetland ecosystems, freshwater marshes have suffered major acreage losses to human development. Some have been degraded by excessive deposits of nutrients and sediment from construction and farming. Severe flooding and nutrient deposition to downstream waters have often followed marsh destruction and degradation. Such environmental problems prove the vital roles these wetlands play. This realization has spurred enhanced protection and restoration of marsh ecosystems, such as the [prairie potholes](#) and the Everglades.

Tidal Marshes



The rail of the saltmarshes, the clapper, which is more commonly heard than seen

Description

Tidal marshes can be found along protected coastlines in middle and high latitudes worldwide. They are most prevalent in the United States on the eastern coast from Maine to Florida and continuing on to Louisiana and Texas along the Gulf of Mexico. Some are freshwater marshes, others are brackish (somewhat salty), and still others are saline (salty), but they are all influenced by the motion of ocean tides. Tidal marshes are normally categorized into two distinct

Status

Pressure to fill in these wetlands for coastal development has lead to significant and continuing losses of tidal marshes,

especially along the Atlantic coast. Pollution, especially near urban areas, also remains a serious threat to these ecosystems. Fortunately, most states have enacted special laws to protect tidal marshes, but much diligence is needed to assure that these protective measures are actively



The Great egret (*Casmerodius albus*) winters in the tidal marshes along the Gulf Coast.

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David Seawell, USGS

The Great egret (*Casmerodius albus*) winters in the tidal marshes along the Gulf Coast.

Wet Meadows

Description

Wet meadows are a type of [marsh](#) that commonly occurs in poorly drained areas such as shallow lake basins, low-lying farmland, and the land between shallow marshes and upland areas. Some wet meadows are found high in the mountains on poorly drained soil. These wetlands, which often resemble

grasslands, are typically drier than other marshes except during periods of seasonal high water. For most of the year wet meadows are without standing water, though the high water table allows the soil to remain saturated. A variety of water-loving grasses, sedges, rushes, and wetland wildflowers proliferate in the highly fertile soil of wet meadows.



This wet meadow is in Rocky Mountain National Park in Colorado.



The Marsh fern (*Thelypteris palustris*) is one of the most common wetland ferns.

Functions & Values

During periods of high rainfall, wet meadows collect runoff, reducing the likelihood of seasonal flooding to downstream low-lying areas. In the process of collecting and storing runoff, the vegetation of wet meadows removes the excess nutrients accumulated by the water, acting as a natural filter. This nutrient rich environment provides vital food and habitat for many insects, amphibians, reptiles, birds, and mammals.

Status

Wet meadows often occur in areas where farming is prevalent, leading historically to draining and filling of these wetlands for agricultural uses. Today, some recognize the importance of preserving these valuable wetlands, and efforts are underway to prevent further losses in some areas.

Prairie Potholes



The prairie potholes of Canada, Minnesota and North and South Dakota were formed by glaciers scraping over the landscape during the Pleistocene.

marshes are temporary, while others may be essentially permanent. Here a pattern of rough concentric circles develops. Submerged and floating aquatic plants take over the deeper water in the middle of the pothole while bulrushes and cattails grow closer to shore. Wet, sedgy marshes lie next to the upland.

Description

Prairie potholes are depressional wetlands (primarily [freshwater marshes](#)) found most often in the Upper Midwest, especially North Dakota, South Dakota, Wisconsin, and Minnesota. This formerly glaciated landscape is pockmarked with an immense number of potholes, which fill with snowmelt and rain in the spring. Some prairie pothole



Western grebe (*Aechmophorus occidentalis*)

Functions & Values

The Upper Midwest, because of its numerous shallow lakes and marshes, rich soils, and warm summers, is described as being one of the most important wetland regions in the world. The area is home to more than 50 percent of North American migratory waterfowl, with many species dependent on the potholes for breeding and feeding. In addition to supporting waterfowl hunting and birding, prairie potholes also absorb surges of rain, snow melt, and floodwaters thereby reducing the risk and severity of downstream flooding.



Giant burreed; Map of prairie pothole region



More than half of all prairie potholes have been drained or altered for agricultural use.

Status

Many of these important and highly productive communities have been altered or destroyed due to increased agricultural and commercial development. As a result, only an estimated 40 to 50 percent of the region's original prairie pothole wetlands remain undrained today.

Vernal Pools



Description

Vernal pools are seasonal depressional wetlands that occur under the

In the spring, wildflowers often bloom in brilliant circles of color that follow the receding shoreline of the pools. By early summer, the water has evaporated, and



smaller than the bulldozer that threatens to destroy them. More than 90% of California's vernal pools have already been lost. Great efforts are being made to protect the remaining vernal pools, as their disappearance marks the loss of rare and important habitat and some of the associated plant and animal species as well.



Eastern Vernal Pools

These systems are very different from the numerous small, intermittent, frequently unvegetated depressions that occur in the mid-western and eastern United States, which are also referred to as vernal pools. The mid-western and eastern vernal pools are particularly important for amphibians.

Eastern vernal pools are critical spawning areas for the marbled salamander (*Ambystoma opacum*, inset) and other amphibians.

Playa Lakes



Description

Playa lakes are round hollows in the ground in the Southern High Plains

are many theories as to the origin of playas, but the most widely accepted are that playas are either carved by wind or formed by land subsidence (they are sinkholes). Whatever their origin, playas are important to humans, animals and plants of the High Plains.



Playas are important habitat for migratory birds and waterfowl. The Redwinged blackbird (*Agelaius phoeniceus*), Blue-winged teal (*Anas discors*), and the Mallard (*Anas platyrhynchos*) can all be found in playa lakes at some time of the year.

Functions & Values

Playas are important because they store water in a part of the country that receives as little as twenty inches of rain a year and where there are no permanent rivers or streams. Consequently, playas support an astounding array of wildlife. Two million waterfowl commonly winter in the playa lakes of the Southern High Plains. Mayflies, dragonflies, salamanders, bald eagles, endangered whooping cranes, jackrabbits and raccoons also can be found at playa lakes. Amphibians would not be present in this arid region if it were not for playas. Because playa lakes support such a wide variety of animals, they contribute significantly to the biodiversity of the High Plains. The surrounding land is mostly dedicated to a few agricultural species, and some species native to the High Plains survive only because of the existence of playa lakes. Playas also

help support the surrounding agriculture by providing irrigation water and seasonally recharging the Ogallala Aquifer. This famous aquifer underlies the Southern High Plains and is being used for irrigation and drinking water faster than it is being replenished.



Sandhill cranes (*Grus canadensis*) winter in playa lakes. Their wingspan is more than six



An estimated 25,000 playa lakes can be found on the high plains, but no one has ever tried to count them all. Almost all playa lakes are affected by agricultural activities in one way or another in this heavily farmed region

Status

Today, some playas are appreciated and protected because of their value to wildlife. Playas' importance as water storage sites is also recognized - they provide between 10 and 25 percent of the annual irrigation water in some counties. To protect this water source from pollution, many farmers are adopting playa-friendly farming

techniques like planting native vegetation around playas to filter sediment, fertilizer, and pesticides from the runoff that provides playas' water supplies. Sediment in runoff can fill playas, reducing their capacity to hold water and depleting biodiversity. An emerging threat to playas is that some farmers in the Southern High Plains are returning to dry farming techniques, which means less rainwater reaches playas. Some new irrigation methods can lead to decreases in the amount of water reaching playas as well, by altering runoff patterns. In some places, playas are still used as lagoons to hold animal waste, which seriously decreases their ability to support wildlife and can threaten groundwater purity.

Swamps

Description

A swamp is any wetland dominated by woody plants. There are many different kinds of swamps, ranging from the forested red maple, (*Acer rubrum*), swamps of the Northeast, to the extensive



such as the endangered American crocodile depend on these ecosystems as well. Swamps may be divided into two major classes, depending on the type of vegetation present: [shrub swamps](#), and [forested swamps](#).

attracted by its odor, which resembles decaying flesh.



Prothonotary warblers (*Protonotaria citrea*) are found in southern swamplands.

Functions & Values

Swamps serve vital roles in flood protection and nutrient removal. Floodplain forests are especially high in productivity and species diversity because of the rich deposits of alluvial soil from floods. Many upland creatures depend on the abundance of food found in the lowland swamps, and valuable timber can be sustainably harvested to provide building materials for people.

Status

Due to the nutrient-rich soils present in swamps, many of these fertile woodlands have been drained and cleared for agriculture and other development. Over 70 percent of the Nation's floodplain forested swamps have been lost. Historically, swamps have been portrayed as frightening no-man's-lands. This perception led to the vast devastation of immense tracts of swampland over the past 200 years, such as the destruction of more than half of the legendary Great Dismal Swamp of southeastern Virginia.



A well-inundated southeastern swamp.

Forested Swamps



Swamps frequently support highly diverse vegetation because of the many layers of vegetation present: shrubs, saplings, and herbaceous plants.

Forested swamps are found throughout the United States. They are often inundated with floodwater from nearby rivers and streams. Sometimes, they are covered by many feet of very slowly moving or standing water. In very dry years they may represent the only shallow water for miles and their presence is critical to the survival of wetland-dependent species like wood ducks (*Aix sponsa*), river otters (*Lutra canadensis*), and cottonmouth snakes (*Agkistrodon piscivorus*). Some of the common species of trees found in these wetlands are red maple and pin oak (*Quercus palustris*) in the Northern United States, overcup oak (*Quercus lyrata*) and cypress in the South, and willows (*Salix* spp.) and western hemlock (*Tsuga* sp.) in the Northwest. [Bottomland hardwood swamp](#) is a name commonly given to forested swamps in the south central United States.

Shrub Swamps

Shrub swamps, are similar to forested swamps, except that shrubby vegetation such as buttonbush, willow, dogwood (*Cornus* sp.) , and swamp rose (*Rosa palustris*) predominates. In fact, forested and shrub swamps are often found adjacent to one another. The soil is often water logged for much of the year, and covered at times by as much as a few feet of water because this type of swamp is found along slow moving streams and in floodplains. [Mangrove swamps](#) are a type of shrub swamp dominated by mangroves that covers vast expanses of southern Florida.



Dave Davis

Button bush (*Cephalanthus occidentalis*) is found only in shrub swamps.

Bottomland Hardwoods



Bald cypress trees often have buttresses, like the ones in this picture, and knees.

Description

Bottomland hardwood forests are river swamps. They are found along rivers and streams of the southeast and south central United States, generally in broad floodplains. These ecosystems are commonly found wherever streams or rivers at least occasionally cause flooding beyond their channel confines. They are deciduous forested wetlands, made up of different species of gum (*Nyssa* sp.) and oak (*Quercus* sp.) and bald cypress (*Taxodium distichum*), which have the ability to survive in areas that are either seasonally flooded or covered with water much of the year. Identifying features of these wetland systems are the fluted or flaring trunks that develop in several species, and the presence of knees, or aerial roots.



The rings on the bases of these trees show that the water level is often higher in this forest.

Functions & Values

Bottomland Hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. In addition, these wetlands improve water quality by filtering and flushing



nutrients, processing organic wastes, and reducing sediment before it reaches open water.



Texas Parks and Wildlife

The Pileated woodpecker (*Dryocopus pileatus*) can be found in swamps and other forested habitats.

Status

Two hundred years ago, magnificent bottomland forests covered almost thirty million acres across the Southeastern United States. Today, only about forty percent of that area still supports these productive and unique ecosystems. It is estimated that losses of these swamps reached rates as high as 431,000 acres per year from 1965 to 1975, largely due to conversion to croplands, particularly for soybeans. In some regions of the lower Mississippi floodplain, only a very small percentage of original bottomland hardwood forests remain.

Mangrove Swamps



Bill Willen, USFWS

SAFETY CO.®

Four species of tropical mangroves can be found around the Gulf of Mexico. Their extensive root systems protect the coast from erosion and storm damage. The mangrove here (inset) is a red mangrove.

Description

Mangrove swamps are coastal wetlands found in tropical and subtropical regions. They are characterized by halophytic (salt loving) trees, shrubs and other plants growing in brackish to saline tidal waters. These wetlands are often found in estuaries, where fresh water meets salt water and are infamous for their impenetrable maze of woody vegetation. In

North America, they are found from the southern tip of Florida along the Gulf Coast to Texas. Florida's southwest coast supports one of the largest mangrove swamps in the world.

Mangrove trees dominate this wetland ecosystem due to their ability to survive in both salt and fresh water. In the continental United States, only three species of mangrove grow: red, black, and white mangroves. Red mangrove (*Rhizophora mangle*) is easily recognized by its distinctive arching roots. Black mangrove (*Avicennia* sp.), which often grows more inland, has root projections called pneumatophores, which help to supply the plant with air in submerged soils. White mangroves (*Laguncularia racemosa*) often grow even farther inland with no outstanding root structures.



Dan Moulton

Black mangrove (*Avicennia germinans*) is the most common mangrove in the United States outside of the everglades. The straw-like spikes surrounding this plant are pneumatophores.

A wide diversity of animals is found in mangrove swamps. Since these estuarine swamps are constantly replenished with nutrients transported by fresh water runoff from the land and flushed by the ebb and flow of the tides, they support a bursting population of bacteria and other decomposers and filter feeders. These ecosystems sustain billions of worms, protozoa, barnacles (*Balanus* spp.), oysters (*Crassostrea* spp.), and other invertebrates. These organisms in turn feed fish and shrimp, which support wading birds, pelicans, and the much endangered crocodile.



Functions & Values

The importance of mangrove swamps has been well established. They function as nurseries for shrimp and recreational fisheries, exporters of organic matter to adjacent coastal

now common, was hunted almost to extinction in the early 20th century for its fine feathers which were used to adorn hats.

and productivity has been observed. Mangrove swamps have experienced loss of 3.2 percent since the 1950s. However, efforts are underway to enhance the protection of these valuable ecosystems.



The snowy egret (*Egretta thula*), now common, was hunted almost to extinction in the early 20th century for its fine feathers which were used to adorn hats.

Functions & Values

The importance of mangrove swamps has been well established. They function as nurseries for shrimp and recreational fisheries, exporters of organic matter to adjacent coastal food chains, and enormous sources of valuable nutrients. Their physical stability helps to prevent shoreline erosion, shielding inland areas from severe damage during hurricanes and tidal waves.

Status

As these wetlands are increasingly threatened by the damming of upstream sources, significant decline in their integrity and productivity has been observed. Mangrove swamps have experienced loss of 3.2 percent since the 1950s. However, efforts are underway to enhance the protection of these valuable ecosystems.

Fens



Description

Fens, are peat-forming wetlands that receive nutrients from sources other than precipitation: usually from upslope sources through drainage from surrounding mineral soils and from groundwater movement. Fens differ from bogs because they are less acidic and have higher nutrient levels. They are therefore able to support a much more diverse plant and animal community. These systems are often covered by grasses, sedges, rushes, and wildflowers. Some fens are characterized by parallel ridges of vegetation separated by less productive hollows. The ridges of these patterned fens form perpendicular to the downslope direction of water movement. Over time, peat may build up and separate the fen from its groundwater supply. When this happens, the fen receives

Fens, like bogs, are peatlands, but because they are fed by groundwater they are not so

Like bogs, fens are mostly a northern hemisphere phenomenon -- occurring in the northeastern United States, the Great Lakes region, the Rocky Mountains, and much of Canada -- and are generally associated with low temperatures and short growing seasons, where ample precipitation and high humidity cause excessive moisture to accumulate.

Functions & Values Fens, like bogs, provide important benefits in a watershed, including preventing or reducing the risk of floods, improving water quality, and providing habitat for unique plant and animal communities.



Showy lady's slipper, *Cypripedium reginae*, is an example of a unique plant that thrives in fens

Status

Like most peatlands, fens experienced a decline in acreage at a rate of about



are that much more rare, and it is crucial to protect them.

Status

Like most peatlands, fens experienced a decline in acreage at a rate of about eight percent from 1950 to 1970, mostly from mining and draining for cropland, fuel, and fertilizer. Because of the large historical loss of this ecosystem type, remaining fens



Fens may be dominated by woody or herbaceous vegetation. In this photograph, trees are invading an herbaceous fen.

are that much more rare, and it is crucial to protect them. It is important to recognize that while mining and draining these ecosystems provide resources for people, up to 10,000 years are required to form a fen naturally.