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WETLANDS OF WISCONSIN

Wetlands are distinct areas of land that are periodically or permanently saturated with water, commonly referred to as swamps, bogs, and marshes. At one point in time, wetlands were perceived to be useless, unsightly, and a barrier to development. That perspective led to many wetlands being filled in for agricultural and developmental purposes. Today, wetlands are valued for their contributions to wildlife habitats, water quality, flood abatement, and recreation.

Recent legislation in Wisconsin brought wetlands into the larger discussion of conservation efforts to preserve the remaining natural wetlands in the state. This brief provides a description of wetlands, their ecological functions and productivity, Wisconsin's wetlands, and the current debates about when it is appropriate to conserve them.

WETLAND DESCRIPTIONS

In 1978, the Wisconsin Legislature defined a wetland as "an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic (water-loving) vegetation and which has soils indicative of wet conditions." Wetlands are found between water sources, such as rivers or lakes, and upland areas. The common wetland categories include marshes, swamps, bogs, and fens; these categories are distinguished from one another based on factors such as vegetation and water sources.

Wetlands that are characterized by periodic saturation and nonwoody vegetation are known as marshes. Marshes can occur in coastal or inland areas. Swamps are found along floodplains of freshwater or saltwater bodies. The primary vegetation for swamps includes trees and shrubs. Wetlands that rely only on rain as a water source are known as bogs. Bogs are typically dominated by evergreen trees, shrubs, and sphagnum moss. Fens rely on groundwater and tend to be covered in grasses, reeds, and wildflowers.

WISCONSIN WETLANDS

The first government land survey in Wisconsin was completed in 1866 by federal land surveyors and mapped approximately 5 million acres of wetlands in Wisconsin. However, this number was likely underestimated due to the primitive nature of mapping and survey methods at the time. Modern soil analyses have estimated that approximately 10 million acres of wetlands existed before Wisconsin was settled. According to the Department of Natural Resources (DNR), approximately 75% of Wisconsin wetlands are privately owned, and just fewer than 23% are considered to be coastal wetlands.

In 1978, the Wisconsin Legislature authorized the DNR to perform an inventory of Wisconsin's wetlands every 10 years. In 1985, the first inventory was completed and approximately 5.3 million acres were remaining in the state, meaning at that point, Wisconsin had lost about 47% of its original acreage. Due to budget constraints and staff shortages, wetland acreage has not been completely reevaluated. As a consequence, the evaluation of wetlands in Wisconsin is still ongoing.

Wisconsin has a variety of wetlands due to its geologic history and multifaceted landscape, which includes forests, prairies, rivers, and two of the Great Lakes. At the end of the last ice age in Wisconsin, glacial retreat left many poorly drained basins, which led to the creation of wetlands. According to the Wisconsin Wetlands Association, Wisconsin also has some rarer types of wetlands such as fens, which some consider to be the rarest type due to its groundwater composition and plant life. In some locations, Wisconsin's coast

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along the Great Lakes contains unique, interdunal wetlands. Such wetlands are located in depressions within sand dunes.

The landscape along the Great Lakes supports many coastal wetlands. Wisconsin's coastal wetlands are distinguished by many characteristics that involve their interactions with the Great Lakes. Coastal wetlands serve as unique spawning grounds for fish and birds. Several studies suggest that such wetlands are the primary nursery grounds for fish. According to the DNR, long-term monitoring has found that high concentrations of migratory birds depend on coastal wetlands for food and shelter during the warmer months before migrating southward.

WETLAND FUNCTIONAL ATTRIBUTES

Wetlands have ecological functions that would be complicated to replicate by artificial means. Flood abatement, shoreline protection, and water filtration are among the most commonly cited services provided by wetlands. In many circumstances, they provide habitats for species that have specific biological requirements that other landscapes cannot provide.

During periods of heavy rainfall, wetlands mitigate the negative effects of flooding by acting as a natural sponge, which in turn slowly releases water into the surrounding area. The slow release reduces the water's momentum, flood height, and the potential for ground erosion. In areas that are prone to hurricanes or tropical storms, coastal wetlands act as storm surge protectors and can significantly reduce the effects of a surge. As a wetland absorbs water, the nearby groundwater supply is recharged and can later contribute to surface water systems during periods without precipitation.

Wetlands significantly impact water quality due to their abundance of plants and soil microbiological activity. Water quality is determined by a number of factors such as physical, chemical, and biological characteristics. As water reaches a wetland, suspended sediments in the water fall to the ground as they move around plants. A reduction in sediment load reduces water turbidity, which is a measurement of water clarity. As turbidity decreases, more sunlight reaches plant life on the bottom of a water body and increases the likelihood of photosynthesis, which is necessary for maintaining adequate oxygen levels for aquatic organisms.

Due to their location between upland streams and larger water bodies, wetlands can reduce the negative effects of nutrient run-off from agricultural fields. Nutrient pollution occurs when there are excesses of chemicals such as nitrogen or phosphorus, which can come from sources that include agricultural fields, factories, and wastewater. Excess nutrients in water can create algal blooms, which in turn consume the oxygen needed by other organisms such as fish. Some algal blooms can result in fish kills, which negatively impact the fishing industry.

Streams that are adjacent to fields can carry nitrogen and phosphorus used in fertilizers. Studies have demonstrated that a wetland may absorb as much as 90% of nutrient run-off from neighboring streams. A chemical reaction between nitrogen, plants, and microbes reduces excess nitrogen in water. Excess phosphorus can be absorbed by plants and microbes or undergo chemical reactions with other elements and compounds in the water that results in some phosphorus removal.

Many species of plants and animals depend on wetlands for food, shelter or spawning grounds. According to the U.S. Environmental Protection Agency (EPA), wetlands affect the life cycle of 75% of the fish and shellfish commercially harvested, and about 90% of fish caught by sport anglers. Wetlands are one of the most biologically productive ecosystems in the world, and are often compared to the productivity rates of coral reefs and tropical rain forests. Biological productivity refers to the processes by which photosynthetic organisms such as plants and some bacteria produce food for other organisms through photosynthesis. In Wisconsin, about one-third of endangered or threatened species depend on wetlands.

The abundance of habitats directly influences the diversity and number of animals

found in a wetland, which can potentially increase a wetland's recreational value. Hunters, fishermen, birders, and hiking enthusiasts enjoy wetlands nearly year-round. Although a large portion of Wisconsin's wetlands are privately owned, some may be accessed through hunting club memberships. The DNR estimates that bird and wildlife watchers spend nearly $271 million per year on their hobby.

RESTORATION AND MITIGATION

Recent efforts have been made to restore previously filled in wetlands. Some restoration has occurred through private endeavors, where landowners volunteer to restore a wetland on their property. Other wetland restoration activities are performed by mitigation. Wetland mitigation is defined as enhancement, restoration, creation, or preservation of wetlands to compensate for adverse impacts to other wetlands.

In Wisconsin, mitigation may be accomplished in three ways, each subject to approval from the DNR. First, a person or developer can implement a restoration project of their own.

Mitigation can also occur by purchasing credits from a mitigation bank. A mitigation bank is defined by the Wisconsin Statutes as a system of accounting for wetland loss and compensation that includes one or more sites where wetlands are restored, enhanced, created, or preserved to provide credits to be subsequently applied or purchased in order to compensate for adverse impacts to other wetlands. A bank is managed and conserved by a sponsor.

Lastly, wetland mitigation can be done through established in lieu fee subprograms. Such programs allow payments to the DNR or other entity for the purposes of restoration, enhancement, creation, or preservation of wetlands. In Wisconsin, wetlands restored using in lieu fees must be open to the public for recreation.

Many studies have examined the effectiveness of wetland mitigation. In general, the effectiveness of a restored wetland on water quality largely depends on two factors: geographical position and size. In order to maximize effectiveness, a restored wetland should be positioned in a way that it intercepts a watershed that contains excessive nutrients. Second, a restored wetland must have a large enough area to accommodate for the amount of time it takes to reduce nutrient loads.

Studies have examined vegetation development within restored wetlands. In many cases, restored wetlands do not contain similar seed banks found in natural wetlands. Without proper vegetation management, some restored wetlands will not have the same vegetative diversity found in natural wetlands.

CURRENT DEBATES: CONSERVE OR DEVELOP?

Much of the current debate about wetlands focuses on whether to conserve the remaining wetlands in the state, or to develop the land for commercial or agricultural interests. While science suggests that there are numerous benefits of keeping wetlands intact, some argue that in some circumstances, there is more benefit to developing the land to create jobs or farmland. Proponents for strong wetland conservation typically include scientists and environmental advocates. Opponents, who are in favor of some development, include parties such as commercial developers and private landowners.

Those in favor of strong protections say that wetland conservation is important for future flood mitigation. In recent years, flooding events from heavy rainfall or hurricanes have resulted in massive costs associated with property damage and clean-up efforts. According to the U.S. EPA, wetlands can reduce flooding peaks up to 60%, which in turn could reduce costly damages from flooding. Proponents say that further removal of wetlands will exacerbate future spending on flood control and clean-up.

The recreational values associated with wetlands are commonly cited by wetland conservation advocates. The unique wildlife that resides in wetlands could potentially be negatively impacted or eliminated if wetlands are unavailable. Some worry about areas that rely heavily on the recreation and tourism industry

would be adversely affected by wetland loss. Such losses could impact the economy in areas that receive revenues from recreational fish and game licenses, consumer spending, and job growth that result from the tourism industry.

Proponents for conservation maintain that wetlands are needed to reduce the nutrient load into other waterways that affect wildlife, recreation, and drinking water quality. Although water treatment facilities can clean polluted water, such facilities can be costly to build and maintain. According to the DNR, some wetlands have the ability to filter out water pollutants as effectively as a $5 million treatment facility. Advocates believe that maintaining wetlands is a more economical way to prevent water contamination than building more treatment facilities.

In general, individuals and industries that oppose strict wetland conservation recognize that wetlands provide ecological contributions. However, they believe that some wetland loss is necessary for other areas of economic growth. Opponents state that job creation from industries that include mining and energy extraction would produce enough economic gains that would offset negative impacts from filling in a wetland. For example, in some rural areas where unemployment can be particularly high, industrial development can provide jobs and encourage economic growth.

Private landowners believe that the fate of wetlands on their property should be their decision. Although some choose to keep wetlands in place, others wish to fill them in to potentially increase the value of their property. In certain cases, it may be more profitable for a landowner to fill in a wetland in order to use it as farmland. Other landowners may feel like having a wetland on their property is a burden with respect to the potential high property taxes that are associated with them. As a result, private landowners and wetland conservationists have found common ground in advocating for tax incentives for landowners to maintain wetlands on their property.

WETLAND LEGISLATION

Wetlands in Wisconsin are protected under state law. The Wisconsin Statutes contain provisions that govern wetland mapping, identification and confirmation, zoning, and the permitting process to proceed with a project that will impact a wetland. In many circumstances, wetlands are also protected under the federal Clean Water Act.

Chapter 374, Laws of 1977, created Section 23.32 of the Wisconsin Statutes. It defines wetlands and requires the DNR to prepare maps that identify wetlands that have an area of five acres or more. 1995 Wisconsin Act 27 authorized the DNR to collect fees for the sale of wetland maps.

2009 Wisconsin Act 373 created provisions regarding wetland identification and confirmation under Section 23.321. The section allows any person who owns or leases land to request that the DNR provide wetland identification and confirmation services for a fee. 2013 Wisconsin Act 1 amended the section to also allow any holder of an easement for ferrous mining purposes to request identification and confirmation services.

Chapter 330, Laws of 1981, created separate sections that provide zoning rules for shoreland wetlands located in cities and villages.

A large portion Wisconsin's wetland laws address the permitting process that allows for certain discharges into wetlands. 2001 Wisconsin Act 6 created provisions that govern the permitting process for discharges, public notice requirements, and mitigation measures that must be taken to offset the effects of any project that negatively impacts wetlands. The act also created water quality certifications for certain types of discharge that would adversely affect nonfederal wetlands. The permitting process was later amended by 2011 Wisconsin Act 118, which removed the water quality certification and replaced it with general and individual permits. The general permit authorizes any activity covered by the permit. However, the individual permit only authorizes an individual activity at a specific place. 2013 Wisconsin Act 1 created a separate

section that addresses the permitting process for ferrous mining activity.

2013 Wisconsin Act 20 created an escrow subprogram as part of the mitigation program. The subprogram allows applicants who are eligible for a wetland individual permit that will affect a nonfederal wetland to establish an escrow account to be used to purchase credits from a mitigation bank.

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