Basic Steps Toward Restoring Your Wetland

This handbook will help guide you through a process that has many steps and sometimes tangents. The basic process more or less follows the seven steps listed here, but those steps sometimes require looking ahead in the handbook, or referring back to sections you may have already read, scanned, or skipped.

Get Familiar With Your Site

- ❑ Understand what wetlands are, and which types of wetlands exist in Wisconsin [Chapter 1].
- ❑ Begin a wetland journal and track seasonal information about plants, animals, water levels, and signs of disturbance in your wetland for at least a year to help you determine which type of wetland exists on the site now [Chapter 2].
- ❑ Determine whether your wetland needs simple conservation and/or management activities rather than restoration which can be more complicated [Chapter 3].
- ❑ Gain a sense of what wetland restoration is all about [Chapter 13].

Gather Information for a Restoration Plan

- ❑ Make a simple, hand-drawn map of the site to be restored that includes landscape features, plants, and boundaries [Chapter 3].
- ❑ Contact local, state, and federal agencies and resources to collect information about the site and its history including: a legal description and plat map, soils and wetland maps, topographic maps, aerial photos, prior drainage, and cultivation/grazing information [Chapter 3].
- ❑ Contact former landowner(s), neighbors, and other knowledgeable parties about the history of your chosen site [Chapter 3].
- ❑ Become familiar with potential permits necessary to conduct work in your wetland and the schedule for obtaining them [Chapter 7].

Pull it All Together

- ❑ Once you've collected photos of your wetland [Chapter 2], determined the level of disturbance on the site [Chapter 3], and gathered historic information, you can update your map [Chapter 4].
- ❑ You may wish to have a surveyor do a thorough survey of the site to determine its restorability [Chapters 3 & 4].
- ❑ Gather information on federal, state, and private wetland restoration programs to determine if you are eligible for technical or financial assistance [Chapter 8].

Plan Your Restoration

Take adequate time to plan your restoration project properly! This is a very important phase of your project.

- ❑ Establish realistic restoration goals for your wetland [Chapter 4].
- ❑ Recruit help from private or government agencies in planning and designing your restoration project [Chapter 8].
- ❑ Develop a site plan and "vision" map or illustration, complete with goals, designs, any engineering needs, etc. [Chapter 4].

PLEASE NOTE:
Technical terms are defined in the glossary.

- ❑ Determine which "restoration tools," such as filling or plugging ditches, are most appropriate for restoring the hydrology of your wetland [Chapter 4].
- ❑ Plan and apply for appropriate permits [Chapter 7].
- ❑ Determine if there is a viable "seed bank," or if you will need to reintroduce native wetland (and upland) plant species [Chapter 5].

Implement Your Restoration

- ❑ Establish a timetable for your project and follow it closely to prevent seasonal delays [Chapter 9].
- ❑ Be certain to have all permits in place before starting any work [Chapter 7].
- ❑ Evaluate and choose a contractor(s) for any "earth-moving" activities, engineering, or native vegetation restoration. Check their references [Chapter 9]!
- ❑ Locate sources of native seed or rootstock and acquire necessary plant materials prior to construction, for planting into the wetland soil once the site has been prepared [Chapter 5].
- ❑ Review your goals, objectives, and site plan with the contractor(s) before the contractor begins work and before the contractor leaves the site, to be certain your plan is understood, carefully followed, and that the desired result has been achieved [Chapter 9].
- ❑ Work closely with the contractor to plan specific details of the restoration project and be on-site daily to coordinate construction details with the work crew [Chapter 9].
- ❑ Break tile lines and fill any ditches in a sequence that doesn't place the project or the equipment in jeopardy [Chapter 9].

Evaluate and Monitor Your Restoration Project

- ❑ Monitor the site immediately after construction to look for potential problems [Chapter 10].
- ❑ Document changes in your wetland by continuing to keep your wetland journal [Chapters 2, 10, & 11].
- ❑ Take reference photographs regularly, noting changes in plant and animal life, water levels, etc., over the seasons and years [Chapter 11].
- ❑ Monitor and control invasive plant species that tend to become established in newly disturbed sites [Chapters 6 & 11].
- ❑ Inspect any plantings of native plants to watch for germination and establishment [Chapter 5].
- ❑ Regularly revisit your project goals to determine if the restoration is achieving what you intended at the outset [Chapters 4, 10, & 11].
- ❑ Practice "adaptive management" by continually evaluating the condition of your wetland and addressing needs as they arise [Chapters 6 & 11].

Plan for the Future

- ❑ Be alert to potential problems within your watershed, such as land use activities, that could harm your wetland. Work toward resolving threats [Chapter 11].
- ❑ Seek long-term protection or perpetual management options for your wetland and surrounding upland habitats [Chapter 11].

"The next morning we proceeded up the Fox River, which was very serpentine. We came to a shallow lake where we could not see water except in the canoe track. The wild rice was so thick that the Indians could hardly get one of their small canoes into the rice to gather it. Vast numbers of wild ducks fatten there on the Wild Rice every fall. When they rise, they make a noise like thunder."

—Peter Pond, fur trader, 1773-1775

DNR Archive Photo

CHAPTER 1. WISCONSIN'S WETLANDS

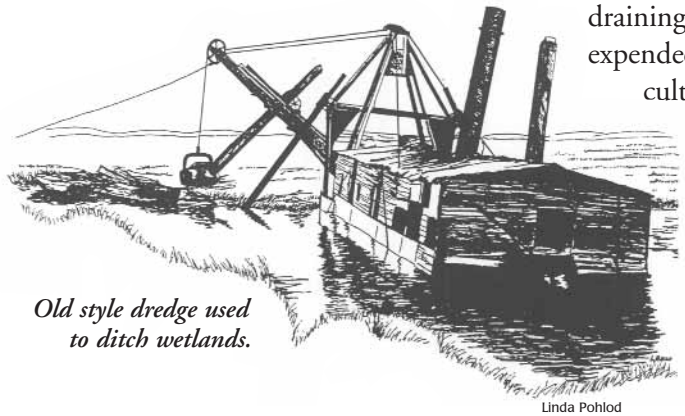
Wetland Losses...and Hope for the Future

"If there is any fact which may be supposed to be known by everybody and therefore by the courts, it is that swamps and stagnant waters are the cause of malaria and malignant fevers, and that public power is never more legitimately exercised than in removing such nuisances."

—The Swamp Land Act of 1850, United States Supreme Court

The influence of Aldo Leopold and other early conservationists made Wisconsin a pioneer in the preservation and restoration of wetlands. In the 1930s and 1940s, the prevailing practices of over-hunting waterfowl, clearing swamp forests of timber, and draining marshes for conversion into cropland were reversed at Horicon Marsh in the southeast, and Crex Meadows in the northwest, when a few far-sighted conservationists saw that we were losing something precious. These important wetland resources were revitalized as drained farmland was restored.

For most of Wisconsin's history, our predecessors looked at wetlands as areas of little importance, as "wastelands" that became valuable after they were drained or filled. Their intrinsic value to wildlife and society went unrecognized. Until the early 1970s, federal policy promoted draining wetlands, and many federal and state programs expended large sums to bring vast areas of wetland under cultivation. Ditching drained the water from these soggy areas, while rivers and streams were deepened and straightened to speed drainage after a rainfall. Later, farmers used extensive drain tile systems under wetlands to remove water more efficiently from cropland. Loggers cleared forested swamps of trees for timber. Those in urban areas filled wetlands to create land for houses, roads, or commercial buildings. As a



Old style dredge used to ditch wetlands.

Linda Pohlod

result, half of Wisconsin's original 10 million acres of wetlands were lost and many of our remaining wetlands are degraded.

United States Fish and Wildlife Service

The federal Clean Water Act of 1972 has subsequently provided some, albeit still inadequate, protection to the nation's wetlands. Over the past three decades the vital role wetlands play in maintaining the overall health of our environment has become clearer. Yet, even as we begin to recognize the complexity and importance of wetland ecosystems and establish state and national measures to protect them, small wetlands statewide continue to be filled for development or drained for agricultural activities. Indirect impacts due to urban runoff, rural development, and invasion by exotic species further degrade wetlands. The cumulative statewide loss is considerable, not only in quantity, but also in wetland quality. Many of our remaining original wetlands, about five million acres, are seriously impacted. Because the majority of Wisconsin's wetlands are privately owned, individual landowners -you! - are crucial to protecting what wetland resources remain and restoring them to their original condition. Even if you don't own property with wetlands, your advocacy role is equally important.

The picture isn't entirely bleak. Increasingly, we are recognizing the need for stronger protective measures for remaining wetlands. Federal and state initiatives and private efforts to restore wetlands have accelerated. Private landowners like you are extremely important in this effort since most of the state's wetlands or potentially restorable sites are on private land.

This handbook is a ***starting point*** for landowners interested in restoring wetlands on their property. It is not a "recipe book" with a specific "formula" because wetland restoration is not a simple task and each wetland is different and will require its own unique process that should be chosen based on the particular characteristics of the site. This handbook demonstrates how you can assess your wetland site, introduces the basic tools needed for you to consider a restoration project, and provides recommendations for planning.

You need not undertake wetland restoration alone! Chapter 8 outlines a variety of government agencies and non-profit organizations that have considerable experience in wetland restoration. They can provide technical assistance, help evaluate the site, plan restoration, and sometimes offer financial assistance for the implementation of your project.

Read this handbook first for suggestions, perhaps to spark your interest in a restoration project, and to see why you should consider the many aspects of your individual wetland project ***prior*** to starting restoration work. Planning is a huge part of the project; 50 percent to 70 percent of a restoration project involves gathering necessary background information, conferring with experts, and designing the restoration. The more effort you put into planning, the more likely your project will achieve its goals. It took nature thousands of years to create a wetland ecosystem, and the degradation in many cases may have

"Swamps and wetlands are a necessary part of the ecological creation. ...An owner of land has no absolute and unlimited right to change the essential natural character of his land so as to use it for a purpose for which it was unsuited in its natural state and which injures the rights of others."

—Justice Hallows,
Wisconsin Supreme Court,
Just vs. Marinette County, 1972

"For millennia, water lay over the land. Untold generations of water plants, birds, animals, insects, lived, shed bits of themselves, and died. I used to like to imagine how it all drifted down, lazily, in the warm, soupy water-leaves, seeds, feathers, scales, flesh, bones, petals, pollen-then mixed with the saturated soil below and became, itself, soil. I used to like to imagine the millions of birds darkening the sunset, settling the sloughs for a night, or a breeding season, the riot of their cries and chirps, the rushing *hough-shhh* of twice millions of wings, the swish of their twiglike legs of paddling feet in the water, sounds barely audible until amplified by millions."

– Jane Smiley, *A Thousand Acres,* 1991

taken 100 years, thus your project requires a long-term view. Patience and perseverance through the hours of planning and years until diversity and health are restored to the wetland bear gratifying rewards.

With rehabilitation and restoration we will begin to add more acres to our treasury of wetland resources. These restored wetlands will contribute to the health and well being of our cultural and ecological future.

What is a Wetland?

Wetlands are wonderful wet, muddy, soggy, boggy places. They are places that suck your boots off, trip you on logs or hummocks, and tip you on your back. They are habitat for waterfowl and frogs, home to lady slipper orchids and the elusive Virginia rail. They are places of beauty and diversity, where odd-shaped pitcher plants capture insects for nutrients, tiny sundews trap gnats on sticky hairs, and the call of the sandhill crane echoes in the spring.

Wetlands are ecosystems typically found where land meets water on the landscape, a transitional place between dry upland and aquatic environments. Wetlands may form at the edges of lakes, rivers, and streams, in low isolated spots on the landscape, where groundwater comes to the surface via springs and seeps, or where rainwater collects and the underlying impermeable soils or bedrock trap the water.

Wetland plants are uniquely adapted to seasonal or year-round saturated soils, with specialized root and stem structures designed to capture and transport oxygen that is limited in a wet environment. How much water is present for how long and the specific soil conditions determine which plants are suited to the site. Saturated conditions also slow the decomposition of organic material such as dead leaves and plants, thereby tying up nutrients and creating organic soils such as peat.

Although a cattail marsh is among the most recognizable wetlands, many different kinds of wetlands exist in Wisconsin, including wet prairies, sedge meadows, sphagnum bogs, tamarack swamps, floodplain forests, and alder thickets. Despite the wide variety of wetland types, three features are common to all:

- The presence of water at or just below the surface of the land for at least a portion of the year (wetland hydrology),
- Specific types of soils that develop under saturated (wet) conditions (hydric soils), and
- Distinctive plants adapted to wet conditions (hydrophytes).

For regulatory purposes, the State of Wisconsin defines 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 vegetation and which has soils indicative of wet conditions.*** **—Wisconsin Statutes *23.32(1)***

In very general terms, the term *marsh* or meadow applies to a wetland dominated by grass-like plants—sedges, reeds, grasses, and cattails—and wildflowers, and *swamps* are wetlands with considerable shrub or tree cover.

WISCONSIN'S 14 WETLAND COMMUNITIES

- SHALLOW, OPEN WATER
- DEEP MARSH
- SHALLOW MARSH
- SEDGE MEADOW
- WET MEADOW
- WET PRAIRIE
- CALCAREOUS FEN
- SHRUB CARR
- ALDER THICKET
- HARDWOOD SWAMP
- CONIFEROUS SWAMP
- FLOODPLAIN FOREST
- OPEN BOG
- CONIFEROUS BOG

WISCONSIN WETLAND COMMUNITIES

SHALLOW, OPEN WATER WETLANDS occur where there is 6 feet or less of standing water. They differ from marshes in that the water is seldom, if ever, drawn down. The aquatic plants in these communities occur at or below the surface and are known as submergent vegetation. Submergent plants are rooted, or attached to the bottom, and may have leaves that float at the surface such as water lilies. Because these communities almost always have deep water, they will not support most emergent vegetation—those plants that rise out of the water such as reeds and cattails—except for wild rice, an emergent that may grow in deeper waters. Typical open water plants include pondweed, water lily, coontail, and the floating duckweeds.

Yellow Pondlily

MARSHES contain deep to shallow standing water.

- **Deep marshes**, with more than 6 inches of standing water, may contain both submergent and emergent plants.
- **Shallow marshes**, with 6 inches or less of standing water, generally contain only emergent plants.

Deep and shallow marshes often occur adjacent one another on a gradient. They may exist along pond edges, quiet lakeshores and bays or on gently sloping stream banks that are not prone to strong winds or fast-flowing water. Common marsh plants include cattail, bulrush, bur reed, and pickerel weed. The water level of marshes, especially shallow marshes, may vary considerably from year to year. Shallow marshes may become dry during drought periods.

Pickerel Weed

INLAND FRESH MEADOWS characterize saturated soils with little to no standing water. They contain a mixture of grasses, sedges, and wildflowers, known as forbs. In Wisconsin, four types of inland fresh meadows occur: **sedge meadows**, **wet meadows**, **wet (low) prairies**, and **calcareous fens**.

Tussock Sedge

- Sedges, grass-like plants generally in the genus *Carex*, dominate the **sedge meadow**. "Sedges have edges" is a mnemonic device you can use to help identify these sharp-leaved, triangular-stemmed plants. Several characteristic wetland sedges grow in hummocks. Grasses and forbs may be present, but are not as abundant as sedges. Sedge meadows often occur on peat or muck soils.
- Grasses dominate the **wet meadows,** and generally a large variety of forbs, such as goldenrod and aster, are present. The invasive and very aggressive reed canary grass often thrives in wet meadows that have been disturbed by drainage or plowing (see Chapter 3).
- While **wet (or low) prairies** are similar to wet meadows, they are somewhat drier. Usually found in the southern part of the state, grasses such as prairie cord grass and particular species of wildflowers characterize this wetland community, which has grown scarce due to extensive conversion for agriculture.

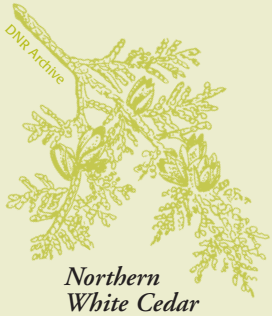
White Ladyslipper Orchid

Calcareous fens generally occur south of the tension zone in places where springs or seeps bring calcium-rich groundwater to the surface, turning both soil and water somewhat alkaline. Often, white deposits appear on the surface where minerals have precipitated out of the water. Characteristic plants in this community tolerate the harsh growing conditions. Among the rarest of the state's wetland communities, calcareous fens contain some of the most threatened or rare plant species, such as white ladyslipper orchid, false asphodel, Ohio goldenrod, and lesser fringed gentian.

SHRUB SWAMPS are dominated by shrubs and woody plants less than 20 feet tall. Wisconsin supports two basic types of shrub swamp: alder thickets and shrub-carrs.

- **Alder thickets** frequently grow along stream banks in northern and central Wisconsin. The tall multi-stemmed speckled alder dominates this community, and its dense overhanging branches help keep streams cool.
- **Shrub-carrs** grow on saturated soils throughout the state and are home to red osier dogwood and a number of willow species. The shrub-carr community may encroach on sedge meadows that become drier as a result of drainage or disturbance. The absence of fire also allows shrubs to invade sedge meadows.

WOODED SWAMP refers to forested wetlands often associated with ancient lake basins and old river channels.



Northern White Cedar

- **Coniferous swamps** occur on saturated peat soils generally within or north of the tension zone. Mixed stands of tamarack and black spruce characterize the northern coniferous swamp. Northern white cedar and tamarack are found in cedar swamps, which occur on soils that are pH neutral or even slightly alkaline.
- Lowland **hardwood swamps** occur predominantly south of the tension zone and contain hardwood tree species such as black ash, red maple, and yellow birch. Water often inundates these swamps regularly, such as in spring, and they occur on saturated soils.

FLOODPLAIN FORESTS are forested wetlands associated with seasonally flooded river floodplains and old river channels (oxbows). This community may experience extremes in depth and duration of flooding, occasionally having standing water in deeper zones well into the growing season. The floodplain forest typically becomes very dry late in the growing season and may resemble an upland community to an untrained observer. Characteristic tree species include silver maple, river birch, eastern cottonwood, black willow, American elm, and swamp white oak.

OPEN BOGS contain distinctive plants associated with saturated, nutrient-poor, acidic soils in northern, central, and southeast Wisconsin. Most bogs occur in depressions where sphagnum moss forms a thick mat. Over time the sphagnum slowly builds thick organic peat soils. Since groundwater or streams that would normally "flush" a wetland rarely flow into or through bogs, the soil becomes very acidic. Plants that live in bogs must be adapted to the extremes in acidity. Remarkably, sphagnum moss not only survives in acid conditions but also contributes further to a bog's acidity. Typical bog plants include members of the blueberry (heath) family, such as the native cranberry, leatherleaf, bog rosemary, and Labrador tea. Other characteristic species include pitcher plants, sedges, sundews, and various orchids.

- **Coniferous bogs** are sphagnum bogs that contain tamarack and/ or black spruce trees.

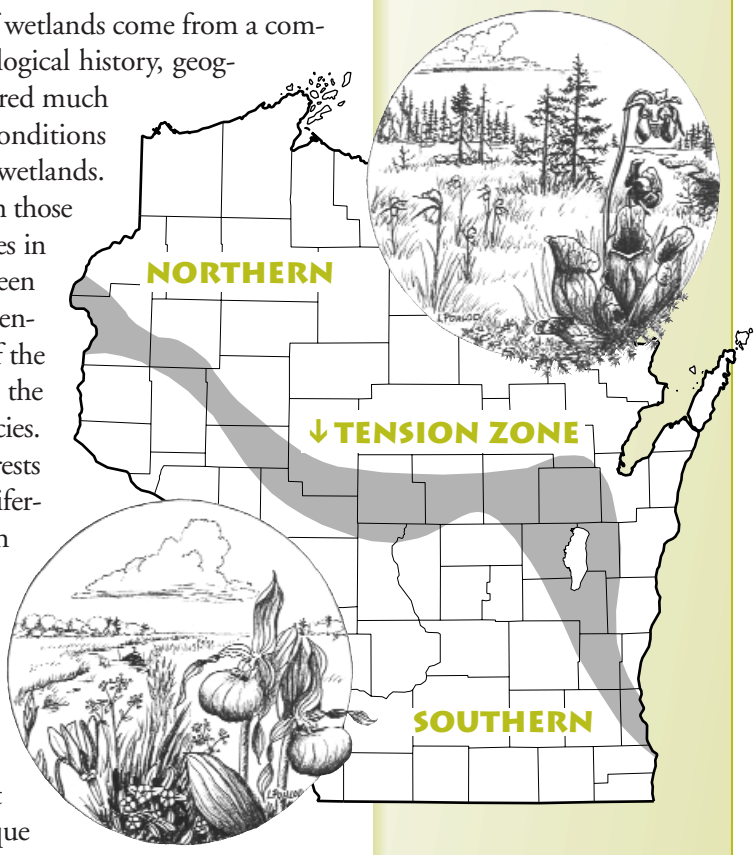
Northern Bog

Our Wetland Heritage

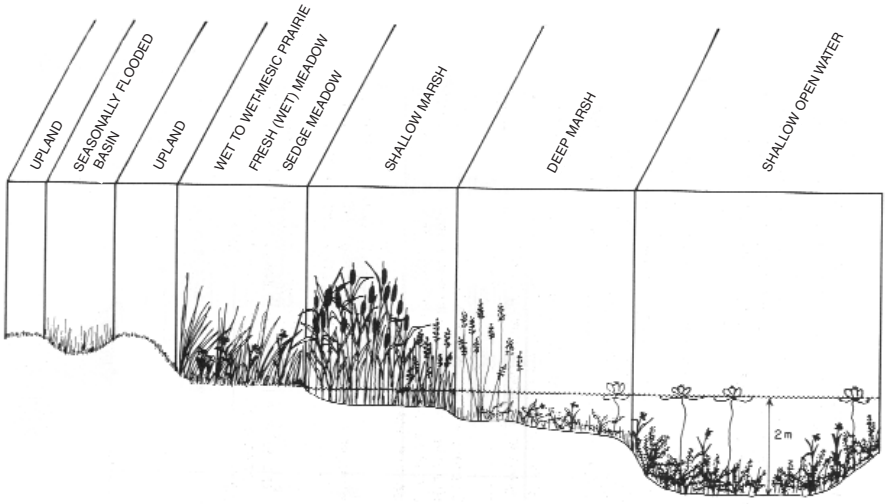
Wisconsin's large variety and abundance of wetlands come from a combination of factors that include our geological history, geography, and climate. When the glaciers that covered much of the state receded about 12,000 years ago, conditions existed that favored the formation of extensive wetlands.

Northern wetlands may differ markedly from those in the southern half of the state due to differences in climate and soils. The transitional area between northern and southern plant communities, the tension zone, runs diagonally through the middle of the state from northwest to southeast and represents the range limits of a large number of plant species. Communities such as prairies and hardwood forests exist south of the tension zone and mixed conifer-hardwood forests dominate the ecosystems north of the zone. Within the tension zone, northern and southern vegetation mix, harboring diverse habitats. Wetlands in the hilly western "driftless area" of the state, an area missed by the last glacial advance, are generally confined to the floodplains of rivers and streams.

Wisconsin's wetlands fall into 14 different community classifications defined by a unique combination of plants, soil types and water levels. In many places, several kinds of wetlands occur together to form a mosaic on the landscape. Wetlands also may change as they transition from very wet to drier habitats, such as from marsh to sedge meadow to shrub swamp. *Wetland Plants and Plant Communities of Minnesota and Wisconsin* (1997, United States Army Corps of Engineers, St. Paul) by Steve Eggers and Don Reed has many photos of different wetland plants and communities.



Wetland vegetation often differs from northern to southern Wisconsin, with a mixing of the two in the tension zone.



Generalized cross section of a meadow-marsh-open water complex.

Wetlands, Watersheds, and the Water Cycle . . .

Water moves from the atmosphere to the land and back again in a complex hydrologic cycle. This cycle has flux; annual and seasonal variations in hydrologic patterns are natural phenomena in wetlands. Many factors affect the water available to your site, including rainfall, groundwater levels, temperature, evaporation rates, how much water is taken up by plants, climactic changes, and especially land and water use in your watershed.

What is a Watershed?

A watershed (also called a drainage basin) is the topographic area that drains to a single water body. Water always flows downhill following the topography of the land, from high to low elevations. Landforms such as hills will determine the direction and speed of water movement. If a hill separates two watersheds, a raindrop may end up in a different watershed, depending on which side of the divide it falls on. The slope of the hill collects and funnels water towards a channel at its base, which in turn will follow land elevations down slope, eventually creating a natural feature such as a stream, river, lake or wetland. You can locate the watershed of your site on a detailed topographic map. The highest elevation point on all sides of your site is the divide that defines the watershed of your site.

Your wetland plays the role of a "stabilizer" of local hydrology within its watershed. During rainfall or snowmelt, the wetland slows water movement, storing it in its absorbent, sponge-like wetland soils. This ability to retain (or retard) storm and meltwater runoff can reduce the frequency and severity of downstream flooding. Reduced water velocity in turn allows sediment particles to settle out. Wetlands can, therefore, effectively reduce the amount of sediments carried downstream into streams and lakes.

"A watershed is a gatherer—a living place that draws the sun and rain together. Its surface of soils, rocks, and plant life forms a "commons" for this intermingling of sun, water, and nutrient."

— Peter Warshall, River Voices

Linda Pohlod

Fluctuations in a Wetland

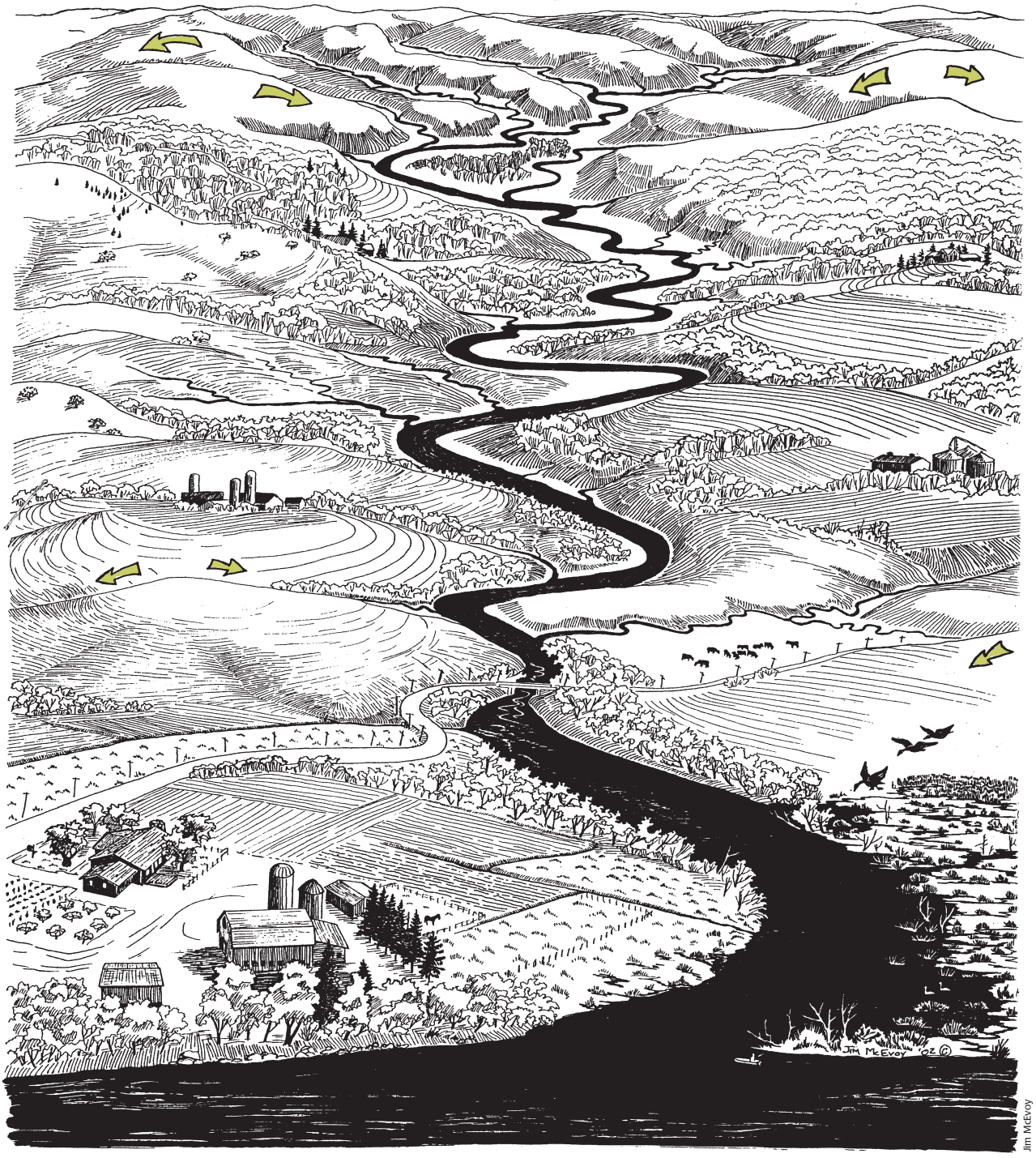
Rainfall varies seasonally and may be abundant during major climatic events. When snow melts before the ground thaws in spring, a maximum surge of water often occurs in a watershed. Another surge generally arrives with heavy spring rainfall. Both can raise wetland water levels. With the drier and hotter weather of summer, water levels drop as evaporation increases. Growing plants take in water through their roots and release it to the atmosphere through their leaves in a process called transpiration. By late summer water levels may be at their lowest, but the cool of autumn reduces evaporation and with plants dying back transpiration decreases. Fall rains can contribute new water to the wetland. Water levels rise again and the cycle starts over, varying in magnitude depending on the type of wetland, such as marsh or riverine forest, and its source of water.

You should anticipate this normal seasonal cycle of water levels. Furthermore, annual cycles may vary from year to year or even decade to decade based on larger climate changes. Physical changes in the watershed can also cause water level changes in your wetland. Beavers are a natural

change agent as they build dams across streams that block water. Beaver activity may increase the water level in a wetland.

Human changes may be more permanent and less benign. Constructed stormwater facilities upstream, or lack of them, affect the amount, quality, and temperature of water flowing downstream. Upstream agricultural or municipal use of water may alter your wetland as well. In urban or suburban areas, new roads, parking lots, and other impermeable surfaces can cause increased water runoff into wetlands and waterways.

A typical watershed includes all drainages within a basin (below).



Jim McEvoy

RESTORATION OF WATERSHEDS: A CASE STUDY

Whittlesey Creek Wildlife Refuge, Bayfield County

Whittlesey Creek near Ashland in Bayfield County owes its name to Asaph Whittlesey, the first member of the Wisconsin Legislature to represent the Lake Superior area. He was so determined to serve northern Wisconsin at the legislative session in Madison in January 1860, he donned buckskin and goggles to fend off snow blindness, and with his tin drinking cup strapped to his waist, snowshoed 240 miles to the nearest train in Sparta.

The wetlands restored on private lands in the Whittlesey Creek watershed are an example of restoration goals that are set at a watershed level. The creek, which empties to Lake Superior, is part of the state's priority watershed program, singled out for its unique water and habitat potential, and for the controllable problems threatening the stream's water quality. Historically the 12,000-acre watershed, 5,000 acres of which are within the Chequamegon National Forest, provided important spawning habitat for coaster brook trout, a large fish native to Lake Superior. With deforestation caused by logging and conversion to farmland in the late 1800s and early 1900s, and with the loss of wetlands, these native trout disappeared from the watershed and the Wisconsin shores of Lake Superior.

The deforestation led to more rapid snow melt and increased surface water runoff in upper regions of the watershed, causing large quantities of sandy sediments to be deposited downstream. In the lower stretch of the watershed, farmers graded wetlands that were adjacent the creek to drain runoff more efficiently. The highly erodible red clay soils in the lower watershed were then no longer trapped by wetlands. Fine sediment filled in the cobbled streambed once attractive to coaster brook trout. As a result, the fish are unable to spawn in the creek where sediment has covered the beds and the mouth of the stream has become too shallow for fish to enter.

Streambank stabilization within the Whittlesey Creek Watershed.

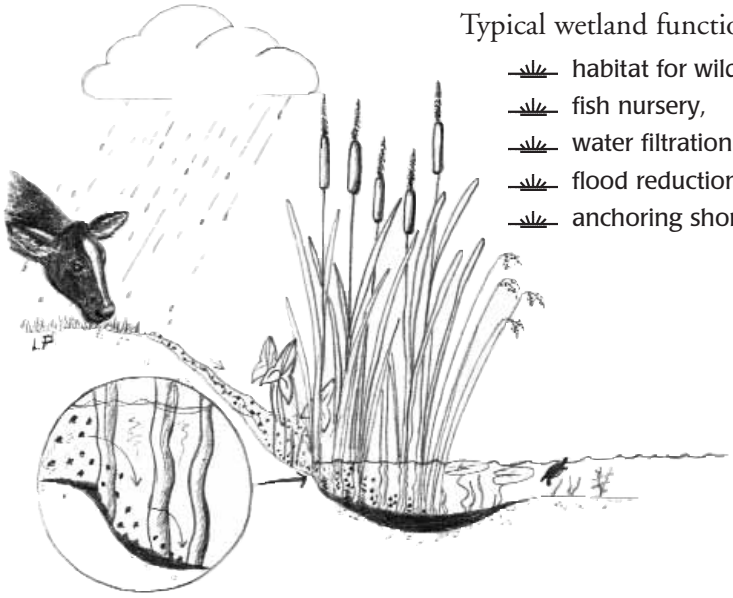
United States Fish and Wildlife Service

The lost wetlands and forest no longer slow runoff, leading to floods much higher than historically recorded levels and more likely to damage stream banks and associated habitats.

Recently the United States Fish and Wildlife Service created a national refuge to protect the creek. Upstream farms have been encouraged to restore wetlands through financial help from Partners for Wildlife, Ducks Unlimited, and The Whittlesey Creek Priority Watershed Project. Typically, wetland restorations consist of berms and shallow scrapes (see Case Study #1, Chapter 13) designed to retain water and slow the rate of runoff, though they also attract waterfowl and shorebirds. Multiple scrapes, each about a tenth of an acre, are being excavated on private property. The wildlife refuge has begun stream monitoring to track the success of the project. As the stream recovers, native coaster brook trout eventually will be released to return to spawn in these waters.

Wetlands... What Are They Good For?

Scientists investigating wetland ecosystems have found that wetlands have many functions and provide numerous benefits to the environment and to us. These benefits vary from wetland to wetland, and depend on the type of wetland, its size, its proximity to other wetlands and natural ecosystems, and the degree of disturbance, among other factors.



Typical wetland functions include:

- habitat for wildlife and plants,
- fish nursery,
- water filtration and cleansing,
- flood reduction, and
- anchoring shorelines.

Many values are associated with these wetland functions. Hunting, fishing, canoeing, bird watching, and aesthetic enjoyment are direct wetland values that offer us obvious and immediate benefits. In addition, wetland functions such as water filtration, flood control, and reduced soil erosion may provide direct or indirect benefits to society and to the environment in general. Some wetland values are subtle and understanding their importance requires a good working knowledge of land, soils, and hydrology.

The primary wetland values include ecological, aesthetic, recreational, economic, and environmental "services."

Ecological Values

Wetlands are our most biologically productive ecosystems, providing habitat for a rich diversity of plant and animal species. Nationally, more than one third of endangered species are associated with wetlands even though wetlands cover only 5 percent of the landscape. Wetlands serve as spawning grounds for many of the state's game fish, nesting grounds for abundant waterfowl, and year-round habitat for deer, mink, beaver, and other fur-bearers. Bald eagles and osprey generally nest in tall trees along lakeshores and in floodplain forests along rivers. A variety of insects, frogs, salamanders, snakes, turtles, and other organisms that play valuable roles in the ecological web of life live in wetlands. The sensitivity of a wetland's frogs to environmental contaminants makes them potential indicators of environmental pollution.

Wetlands slow the rate that sediments flow into waterways.

A GOOD REFERENCE:

BASIC GUIDE TO WISCONSIN'S WETLANDS AND THEIR BOUNDARIES

Wisconsin Dept. of Administration, Coastal Management Program (1995)

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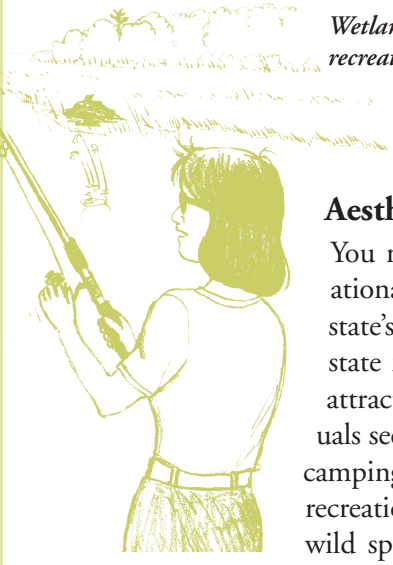
Price: $11.10 base price.

Please add applicable state, county, and stadium taxes unless exempt by law.



Wetland values include many recreational activities.

Aesthetic and Recreational Values

You may enjoy fishing, hunting, and other recreational uses on your privately owned wetlands. The state's national wildlife refuges, state parks, and state natural areas contain extensive wetland areas attractive to visitors. Annually, millions of individuals seek out public lands for bird watching, hiking, camping, skiing, fishing, and hunting, among other recreational uses. Some of Wisconsin's most striking wild spots contain marshes, coastal wetlands, bogs, and other wetlands, with spectacular scenic opportunities like a sunset silhouetting a flock of cranes coming to roost in Crex Meadows.

Economic Values

Intact wetlands often provide direct economic benefits to all of us. They may serve as a source of natural "products" or crops such as hay for cattle, wildlife such as fish, waterfowl, and furbearers, fruits, timber, and other valuable commodities such as wild rice. Private properties with wetlands are increasingly in demand as home sites, with property values increasing significantly due to the value of the open space. Communities with nearby healthy and protected wetlands often gain from tourism dollars spent by visitors attracted to the area for recreation. The "environmental services" provided by wetlands (see below) have tremendous economic value.

Environmental Services

Wetlands help reduce the frequency and intensity of floods, cleanse the excess nutrients and chemical pollutants from storm runoff, and reduce the impact of soil erosion by trapping sediments coming from upland areas. Furthermore, wetlands protect stream banks and shorelines from erosion and serve as a source of fresh water to maintain base flows in streams and rivers. Although these environmental values are hard to quantify, wetlands save millions of dollars each year in flood protection alone.

What Are Wetlands Bad For?

Wetlands are *not* good places for development. High water tables, the potential for flooding, and soils that seasonally shrink and swell can pose severe problems when a home, commercial enterprise, or road is built in a former wetland. Development in wetlands exacerbates flooding and runoff problems.

The best thing for a wetland to be is what it was naturally meant to be.

FISH AND WETLANDS

Healthy, functioning wetlands benefit our fisheries. Many sport and forage fish rely on wetlands for some part of their life cycle. Healthy wetlands filter water to remove excess nutrients and sediments and help maintain good water quality in streams, rivers, and lakes. Restored wetlands may also provide a continuous source of groundwater to streams. Native wetland vegetation—including sedges, grasses, and shrubs—provides shade and a substrate, or home base, for insects that are an important food source for fish and other stream life. In riparian zones—areas beside a waterway—wetlands serve as a refuge during flooding, providing shelter from the fast-moving water in the main channel.

Some wetlands provide critical nursery habitat for many fish. For example, northern pike deposit eggs on dense mats of aquatic vegetation-such as wetland grasses, sedges, rushes, and other shallow-water plants found in wetlands that occur along lake fringes and stream headwaters. After hatching, the fry attach themselves to wetland vegetation that provides protection and food. Other species such as walleye, muskellunge, bass, perch, bluegill, and various minnow species also use quality wetlands as nursery habitats. Sloughs in floodplain forests that are seasonally flooded provide important foraging and breeding areas for sport fish.

When lake-edge wetlands are destroyed and shorelines become heavily developed, fish populations suffer. For example, in the last 40 years, populations of northern pike in 16 southeastern Wisconsin lakes have declined 72 percent.

Wetland restoration is vital to the maintenance and enhancement of fish habitat. When your restoration project targets wetlands where fisheries were historically important—near streams, rivers, and lakes—you should consider attempting to reestablish the historical conditions and habitat favorable to the fish.

Isolated wetlands, those not connected with natural water bodies, typically are not good candidates for establishing fish populations, though they are important for reptiles and amphibians. In these wetlands, introduced fish may reduce or eliminate vulnerable frog and salamander populations by consuming the available food sources or preying on tadpoles. Fish also run the risk of winter kill, where ice depths or low oxygen levels kill the fish. Aerating such wetlands to provide oxygen is most often expensive and impractical.