

We All Live 'Near the Water'



In a sense, we are all 'waterfront landowners' because we all live in a watershed—even that storm drain at the end of the driveway or street eventually leads to a waterway. Storm water flowing over roads, lawns, and yards picks up dirt, lawn fertilizers, pesticides, herbicides, toxic heavy metals, pet waste and other pollutants that do not belong in our lakes and rivers.

Whether you own property on a large lake or a small stream, the water and shorelands are altered by what happens on your home turf. When natural shorelands are replaced, an important filtering system is lost, allowing polluted runoff to flow directly into the lake or stream.

Protecting & Restoring Shorelands

Did you know that many of the pleasurable aspects of your favorite lake or river are dependent on healthy, well-vegetated shorelands? The next time you're out in the boat fishing, swimming on a hot July afternoon, or just listening to loons calling over a still lake, consider the central role shorelands play in maintaining these activities. Natural shorelands contain a lush mixture of native grasses, flowers, shrubs and trees that help to filter polluted runoff and provide important habitat for animals in the water and on the land. Flourishing shorelands provide some of the most effective protection for water resources in Wisconsin. Literally, without shorelands and their diversity, the 'nature show' cannot go on.

Natural Shorelands: How They Work

It's a fact: natural, thriving shorelands can solve many water quality problems on lakes and waterways. The loss of natural shorelands is not only a threat to water quality, it also can create other troubles. For example:

- **Erosion:** Removing shoreland vegetation destabilizes the shoreline and can lead to loss of land. Shorelines must stand up to scouring currents, fluctuating water levels, moving ice, flooding, surface runoff from higher ground,

boat wakes, and wind-driven waves.



- **Flooding:** Land development leads to increased runoff from impervious surfaces such as roofs, roads, driveways, and parking lots. More water reaching lakes and rivers at faster rates can cause flooding during heavy rains.
- **Unsightly algae blooms:** Just as fertilizers make your lawn green, they make your lake or river green by feeding algae and aquatic weeds.
- **Damage to fisheries:** Clearing trees exposes water to more sunlight, raising water temperatures, lowering oxygen levels, and stressing fish and their food supplies.
- **Loss of habitat:** The water's edge is prime real estate for birds and other wildlife. Backyard bird feeders are no substitute for good plant cover and natural food.
- **Loss of privacy:** Boaters, anglers, water-skiers, jet-skiers, and swimmers all love Wisconsin's lakes and rivers. Shoreland vegetation screens homes from public view and helps to reduce noise from boats and jet-skis on the water. ■

The Shoreland Tour

So, natural shorelands can benefit the average shoreland homeowner in significant ways. But how do they benefit the natural world? The following section gives a quick tutorial on the precise ways that natural shorelands work with the entire lake or river ecosystem. And yes, that includes humans.

Water Quality

Shoreland vegetation traps and filters sediment and debris from rainfall and snow melt. Depending on the size (length and depth) and complexity of the shoreland, 50%—100% of the solid particles can settle out as plants slow sediment-laden runoff. In general, wider shorelands are more effective than narrower shorelands, and trees, shrubs, and grasses are more effective than just grass. For slopes less than 15%, most sediment-settling occurs within the first 35 feet. Greater widths are needed on steeper slopes or where sediment loads are particularly high. To filter fine-grained sediments such as silt or clay, more depth may also be needed.

Flood Control

By slowing the flow of runoff, shoreland vegetation allows water to soak into the soil and replenish the groundwater supply. Groundwater reaches lakes and rivers at a much slower and constant rate than surface runoff. This helps limit flooding and maintain water flows during the driest times of the year. If you build on a floodplain, not only is the natural ability of the floodplain to absorb high waters reduced, but you are also risking damage to your property. By preserving the natural vegetation found on floodplains, the severity of floods may be reduced.

Shoreline Stability

Native plants can help stabilize shorelines and reduce erosion. In the water, aquatic plants, such as



Fiber logs are one option for stabilizing the shore.

water lilies and pickerel weed, help protect shorelines by deflecting and absorbing the cutting action of waves, ice and boat wakes. As you move onto the land, the deep root systems of native plants provide a framework that helps to hold banks together. Plant stems also protect banks by slowing storm water runoff, allowing more time for the runoff to soak into the soil and preventing erosion. If there is active bank erosion, at least 30 feet of natural vegetation may be necessary to address erosion from upland runoff. Severe bank erosion usually requires an engineered solution to stabilize and rehabilitate the bank—but this engineering can incorporate plants.

Aquatic Habitat

Shorelands protect aquatic habitat by improving the quality of adjacent waters through shading, filtering, and moderating water flow. For cold-water fisheries such as trout streams, trees or tall grasses shade the stream channel. Shade maintains cooler, more constant temperatures, especially on small streams. Cooler water holds more oxygen, and reduces stress on fish and other aquatic creatures. A few degrees difference in temperature can have a major effect on their survival. Warm-water fisheries do not require as much shade, but the fish and aquatic insects still benefit from the cleaner water filtered through natural shorelands. In fact, most game fish in Wisconsin are sight feeders and do best in clean water.



Leaves, twigs, and other organic matter from shoreland vegetation are both lunch and breeding grounds for aquatic insects. These insects in turn feed many others up the food chain. Besides providing insects with the food and cover they need, trees supply woody cover in lakes and streams, such as fallen logs and branches that fish use for places to rest and hide from predators. Birds and turtles also use the woody cover along the shore as resting places and basking spots.

The rich diversity of emergent, floating and submergent plants found just offshore provide important habitat for aquatic animals. Some fish, like bluegills, graze directly on the leaves and stems of these aquatic plants, while other fish feed off the bugs and other delicacies found



living on or beneath the plants. These shallow plant beds are also important spawning areas for a number of fish including bass, bluegills, and northern pike.

Aquatic plants also offer food, shelter and nesting materials for waterfowl, shorebirds and aquatic mammals such as mink and muskrats. Beds of aquatic plants hide young ducklings from predators and provide protection from wave action. Common loons also depend on these plants to build their mounded nests.

Terrestrial Wildlife Habitat

Shorelands are a place of transition where all manner of creatures from land, air and water live together. This area has the unique ability to support species



from both adjacent uplands and waterways. As roads and houses creep into shoreland areas, the behavior, reproduction, and survival of animals can be affected as human activities and structures degrade the surrounding wildlife habitat. Although researchers have estimated that animal habitat can be affected up to 1,500 feet away from human activities and structures, it may not be realistic to provide such a wide berth. But preserving and restoring shoreland vegetation can help limit the impact of these disturbances, which might include subtle changes in vegetation and animal travel patterns. In other words, how you manage your shoreline will determine how attractive it is to birds, frogs, turtles and other wildlife.

Recommendations on shoreland habitat widths vary, depending on the animal and its needs. General recommendations to preserve wildlife habitat vary from 30 feet to over 300 feet, with some recommendations exceeding 1,500 feet. If you look at needs of specific animals, 30 feet will suffice for muskrats feeding and denning, while at least 100 feet to more than 300 feet will satisfy most of the needs of frogs and turtles. For wood ducks, 250 to 600 feet will provide nesting area. Wood duck nests, on average, are located about 250 feet from water.

Size is not the only factor limiting the use of shorelands by wildlife. The quality of the shoreland—the vegetation structure and composition—is also important. Wood ducks, for example, use trees with a minimum diameter of 14 inches (at breast height) for nesting, but prefer trees between 24 and 30 inches in diameter, while kingfishers use shrub cover along the water to conceal their broods. If these vital shoreland habitats are not protected, many shoreland-dependent species, including birds, frogs, mammals and reptiles, will disappear and can eventually be lost from entire lake and river systems.

Recreation and Aesthetics

Shoreland vegetation can be especially valuable in providing a “green screen” along waterways, blocking views of nearby development, and allowing privacy for waterfront property owners. Shoreland buffers can enhance such recreational activities as bird watching, hiking and camping. They can also provide the time to enjoy these hobbies because natural shorelands require less maintenance than traditional lawns and gardens. They can also act as a noise buffer to a certain degree.

Property Values

Restored shorelands increase property values. One study found that home values near stream restoration projects were 3% to 13% higher than similar homes on unrestored streams. The perceived value of the restored streams included the enhanced shoreland buffer, wildlife habitat, and recreation

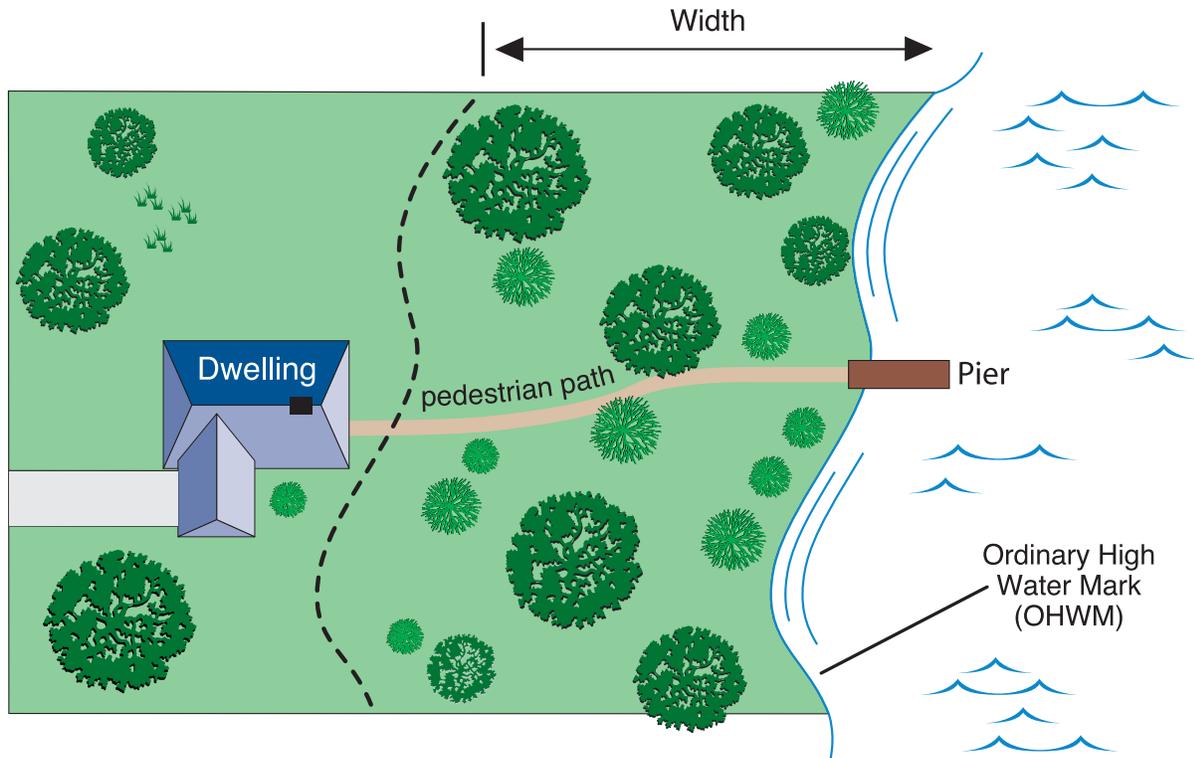


opportunities resulting from the restoration. Another study found that good water quality, which natural shorelands help to protect, added as much as \$200 per frontage foot to the value of shoreland properties. ■

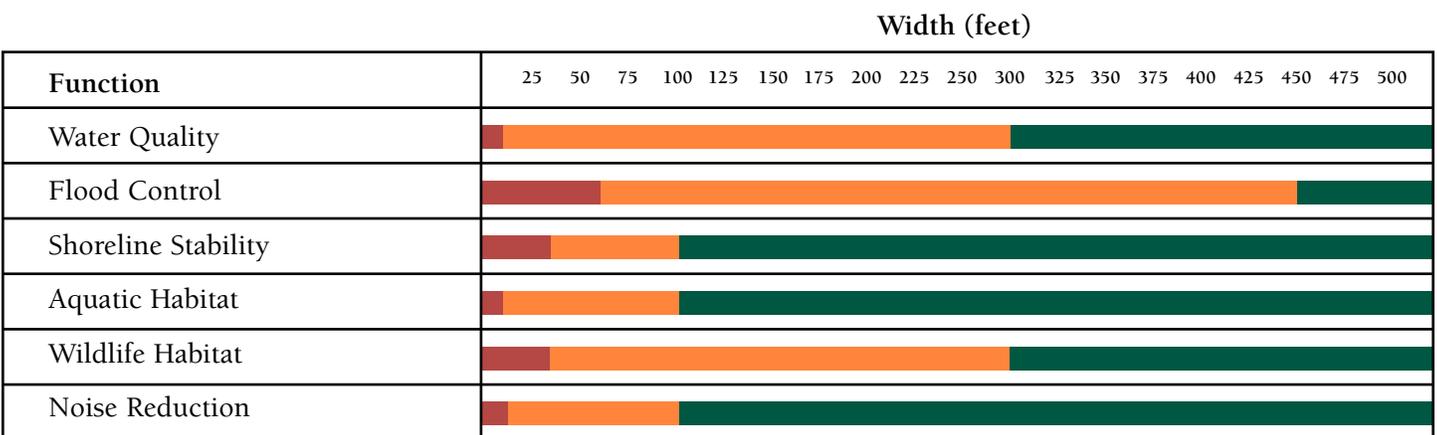
Putting Shorelands to Work

How much of the shoreland needs to be protected? It depends on what you want the shoreland to be. There is not a “one-size-fits-all” width that will keep the water clean, stabilize the bank, protect fish and wildlife, and satisfy human demands on the land. Many localities have a minimum width requirement—be sure to

check with your local planning or zoning office to find out if one applies to your property. The minimum width should provide acceptable levels of all needed benefits at an acceptable cost. However, any amount of natural shoreland is better than none. ■



How well a shoreland works depends on slope, soil, natural vegetation, and other factors.



Unlikely to meet goal
 Meets goal with varying success depending on site conditions
 Exceeds goal

Shoreland Restorations:

The Influence of Site Characteristics

Whether it is erosion control, wildlife habitat, or visual screening that you're interested in, the size and quality of shorelands are affected by the conditions found on your property. It's a good idea to learn about the unique features of your site before undertaking any restoration plan.

Topography

The topography, or terrain, of your site—the slopes, depressions or hills—will direct where the water runs when it rains or the snow melts. If water quality protection is your main concern, preserving natural vegetation is important in areas that collect runoff and deliver it to lakes and rivers, and less critical on land that slopes away from the water. Generally the steeper the hills, the more speed the water gains. As water gains speed, it can eat away the soil, creating gullies and eroding banks. As water moves faster, it can also carry more sediment. As a result, steeper slopes usually need more area to provide enough room for vegetation to slow the runoff, capture sediments and allow the water to soak into soil.

Hydrology and Soil

Soil's ability to remove pollutants and nutrients from surface and ground water depends on the type of soil, its depth, and relation to the water table. Soil contains pore spaces, or little holes, that can hold water. The size of these pores is dependent on the soil type. Pore size determines how much water the soil can hold and how quickly it drains away. Sandy soils generally have large pore spaces and drain very quickly. Heavy clay soils have very small pores and can remain saturated for a very long time after a rainstorm. Compacted soil, where the

pore spaces are squeezed smaller, can be a particular problem on some sites. Heavy equipment used during construction and even regular foot traffic can lead to compacted soils, preventing water from soaking into the soil.

The depth of the soil and the depth to the water table will also affect how much water the soil can hold. If your soil is only a foot or so deep, with bedrock underneath or on top of the water table, the soil will not be able to hold much water before all the pore spaces become filled. Once the pore spaces are filled, the water will just run off the surface.

If your site has compacted soils or shallow soils, it will be important to have enough area available for the soil to treat runoff. You may want to install rain gardens—small depressions landscaped with native wildflowers. They capture runoff, allowing more time for the water to soak into the soil, rather than running off into your lake or river.

Wetlands

The native vegetation found in wetlands, such as tussock sedge and soft-stem bulrush, helps to slow runoff from roads, roofs, and lawns, allowing sediments to settle out and water to soak in. Wetland plants also use nutrients in the runoff to feed their growth. The natural ability of wetlands to act as a “living filter” can be overwhelmed, however, if runoff is excessive.

To preserve the filtering functions of wetlands, as well as to prevent degradation of wildlife habitat, measure the recommended shoreland width at the wetland boundary, rather than at the water's edge. ■

Know Local, State & Federal Regulations: It's the Law

Local, state and federal authorities protect shorelands in several ways. Local ordinances often establish minimum setbacks for

structures, septic systems, and wells. Many communities regulate the removal of vegetation



along the shoreland. Permits may also be needed for land disturbance activities, such as grading or filling, to ensure that proper soil erosion control plans are implemented.

The State of Wisconsin regulates activities occurring below the ordinary high water mark of lakes and rivers. The ordinary high water mark is the point on the bank or shore where the water leaves a distinct mark and is often located above “normal” water levels. Large grading projects on the banks of lakes and rivers are also regulated by the state. Both the state and the United States Army Corps of Engineers can be involved in any wetland projects. Be certain to get all required permits before starting any work in shorelands, floodplains, or wetlands. ■

Restoring Your Shorelands: The First Steps

Curious how your shoreland is performing some of its functions on your property? Or maybe you suspect that, with a little effort, you can maximize the performance of an already functioning shoreland. The first thing you need to do is spend some time outside during or immediately after a heavy rainstorm. Watch your property to see where the water goes. Shoreland vegetation does the best job of filtering runoff when the water spreads out like a sheet and does not flow in narrow rivulets straight into the lake or river. Look for opportunities to divert runoff into flatter areas where it can spread out and soak in. If your land receives runoff from a road, an engineer's advice may be useful.

You should also evaluate the stability of your streambank or lakeshore since shoreland vegetation can help protect unstable banks. Bioengineering, a new approach to address shoreline erosion problems, uses fiber logs, bundles of willow branches, and other natural materials to incorporate living plant materials into the shore protection design. Riprap and retaining walls are generally limited to areas where bioengineering techniques cannot prevent significant loss of land. If you already have riprap, you can install some plants between the rocks to "soften" the shoreline. If you have a retaining wall or a seawall, when it comes time for repairs, it would be an ideal opportunity to replace the wall with an alternative protection design.

If Natural Vegetation Remains

Consider retaining the natural beauty of the shoreland by preserving the native vegetation. You might like the carefree collection of native plants that already exist on the land. If that's what you have, the best option for you and wildlife is to leave nature alone.

If You Have Lawn to the Water's Edge

To restore a shoreland, you can replant native trees, shrubs, grasses, and wildflowers along your shoreline. Stop mowing around the edges of your lawn or at the water's edge. Add native plants to these unmowed islands to attract songbirds and butterflies. Allow these wildflower islands to expand until they create a continuous ribbon of natural growth along the water. You can create an appealing waterfront landscape while eliminating expensive and time-consuming lawn care and watering.

Access to the Water

Take advantage of naturally occurring clearings for views and access to the water. Use the existing vegetation to frame your view of the water, or carefully prune some branches from trees if needed. If you want foot access to the water, lay out a curved path and plant around it. Building a raised walkway on steep slopes may be better than regrading the slope to construct a walking path.



Use Native Plants

When restoring your shoreland, it is far better to use plants native to Wisconsin than non-natives from other regions or countries. Aggressive exotics such as purple loosestrife and glossy buckthorn can overwhelm native plants and turn your yard into a monotypic desert. Adding non-native plants to a lake, river or wetland will also require a permit from the Department of Natural Resources.

Using native plants does not mean you have to settle for a dull shoreland. Many native plants are particularly attractive, with showy flowers, berries, interesting barks and branching habits, and provide you with a number of other benefits.

To begin selecting plants, visit some nearby natural areas to see what grows there. You are better off copying Mother Nature because these plants have proven that they can survive with little care. They resist most diseases and insects, and are adapted to the local climate. Wildlife thrives on native plants since they have also adapted to the plants and rely on them for food, shelter, and cover.

Since developed shorelands act as a transition from the human to the natural world, the most successful shoreland plantings aim for a less manicured look than one might expect on the street side of the traditional suburban home. Group plants in a variety of clusters and repeat plants across the waterfront for a natural effect.

Ideally, plants should be nursery-grown by a responsible supplier. If you are thinking of using plants from the wild, it is important to keep in mind a few words of caution. First and most importantly, get the landowner's permission before transplanting. If you are thinking of removing (or planting) any plants in the water or in a wetland, contact your local DNR aquatic plant management specialist for advice and to determine if a permit is required. Then make sure you can identify the native plants and be

certain that you are not bringing invasive species onto your property. Look around where you will be digging up plants, being careful not to choose species near exotics, since the seeds and roots of close-by plants can be easily transferred in your transplants.

For the most success, transplant in the early or late part of the day, and in early spring or late fall. To find the plants, mark them with flags or ribbons when they are blooming so it is easy to locate them when it comes time to transplant.

When transplanting, make sure to leave enough plants behind to replace the ones taken. Never dig up rare or unusual plants—they often require very specific habitat needs that cannot be duplicated. The only exception to these guidelines is if a property is slated for development and the plants would be lost regardless.



Your local UW-Extension Master Gardener program is a good resource to start with since they can often provide assistance in naturalizing waterfronts and shorelands. They may also sponsor seminars or courses on shoreland restoration. ■

Recognizing the Benefits of Native Shoreland Vegetation

Benefit	Grasses	Shrubs	Trees
Stabilize shoreland	M	H	H
Filter sediment and the nutrients and pesticides bound to it	H	M	H
Filter nutrients, pesticides, and microbes from surface runoff	M	L	M
Protect against flooding	L	M	H
Improve aquatic habitat	L	M	H
Improve wildlife habitat for grassland animals	H	M	L
Improve habitat for forest animals	L	M	H
Provide visual interest	L	M	H

L = Low, M = Moderate, H = High
Adapted from Agroforestry Notes, AF Note 4 Jan 1997, USDA Forest Service/NRCS

Looking Long-term: What About Maintenance?

The best care is no care when it comes to shorelands. Resist the urge to tidy up. A natural forest floor, with its “litter” of fallen leaves and twigs, helps the buffer slow down runoff and soak up water. Raking or removing this “litter” only defeats the purpose of natural shoreland vegetation.

Fish appreciate logs, branches, leaves, and other woody cover that fall into the water and provide hiding places and resting pools. If a large tree is threatening to fall from a steep bank, cut the tree if you are concerned it will pull the bank with it, (a permit may be required) but leave the root system in place to hold the soil. Plant a new tree to replace the one you cut down. Make sure to check with your local zoning office for permission to remove any vegetation from the shoreland zone.

Native plants need less help from you so you can spend more time doing what you enjoy!

Mulch with pine needles or bark chips in highly visible areas if you wish, and leave the rest alone or shield the forest floor with ferns and other herbaceous plants. Fresh wood chips should compost for six to twelve months before use. If you must fertilize near the water, use phosphorus-free fertilizers. Phosphorus is the middle number on bags of fertilizer (6 – 0 – 6). Slow-release fertilizer should be placed in the planting hole rather than broadcast over the shoreland.

A Vision for the Future

Wisconsin's lakes, rivers and shorelands provide us with many benefits. Some are as simple as enjoying the view from the end of a pier, while others are more complex and less apparent, like protecting water quality and preventing shoreline erosion. Next time you take a trip to the water's edge, take a moment to appreciate the diversity and beauty found there. Whether you enjoy fishing, water-skiing, or the simple beauty of a white water lily, protecting and restoring our shorelands will help ensure that clean water, abundant fish and wildlife and beautiful vistas are enjoyed for many years to come. ■

Additional Resources

Lakescaping for Wildlife and Water Quality—Minnesota Department of Natural Resources, 1-800-657-3757

Life on the Edge: Owning Waterfront Property—Wisconsin Lakes Partnership, (715) 346-2116

Rain Gardens (GWQ034)—UWEX Publications, (877) WIS-PUBS (947-7827) or (WT- 731-2002)—Available from local DNR service centers

The Water's Edge: Helping fish and wildlife on your waterfront property (FH-428-00)—Available from local DNR service centers

Through the Looking Glass: A Field Guide to Aquatic Plants (Item No. A12)—North American Lake Management Society, (608) 233-2836

Shoreland Stewardship Series:

This is the second fact sheet in the shoreland stewardship series. The entire series is available from the county UW-Extension offices, Extension Publications (1-877-947-7827), or Wisconsin DNR service centers. It is also available online at <http://clean-water.uwex.edu/pubs/shore>.

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