

SECTION VII: SHORELAND AND FLOODPLAIN ZONING

21. Shoreland Zoning

Where does shoreland zoning apply?

Wisconsin statutes define shorelands as lands within 1,000 feet of the ordinary high-water mark (OHWM) of a navigable lake, pond, or flowage and lands within 300 feet or within the floodplain of a navigable river or stream, whichever distance is greater.

A state administrative rule (NR 115) sets minimum standards for local ordinances. The state requires counties to adopt and administer development standards for shorelands in unincorporated areas,¹ which are areas outside of cities and villages. Many counties have adopted standards that are more restrictive than state minimum standards. Towns may not opt out of county shoreland zoning, as they may general county zoning.² While cities and villages are not required to adopt shoreland zoning, shorelands within their municipal boundaries may be subject to shoreland zoning in three cases:³

1. When official state maps describe wetlands within shoreland areas,
2. When a city or village has annexed unincorporated shorelands,⁴ and
3. When cities or villages have voluntarily enacted their own shoreland zoning requirements.

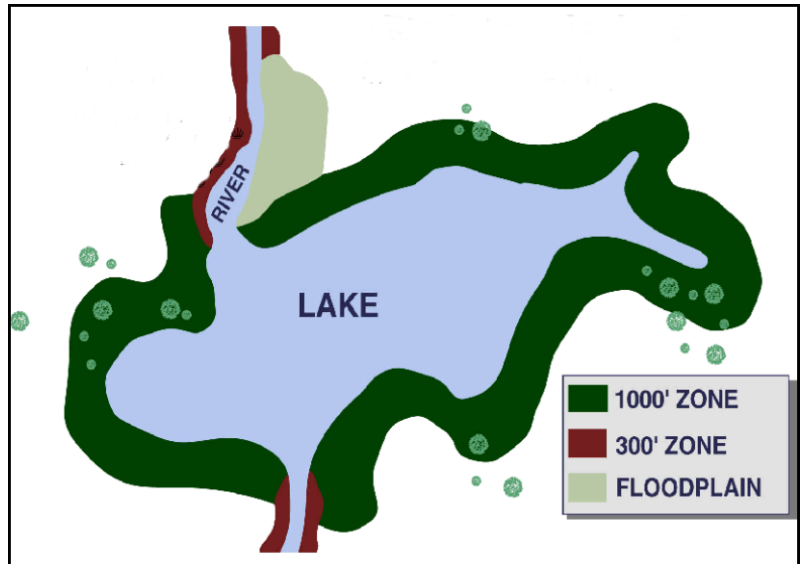
Purposes of shoreland zoning

The specific purposes of a shoreland zoning ordinance should be considered when deciding whether to grant variances, conditional uses, and administrative appeals for properties in the shoreland zone, just as with any other ordinance.

The purposes of shoreland zoning, as defined by the state, are to:

- Maintain safe and healthful conditions;
- Prevent and control water pollution;
- Protect spawning grounds, fish, and aquatic life;
- Control building sites, placement of structures, and uses; and

Figure 34: Areas Where Shoreland Zoning Applies



¹ Wis. Stat. § 59.692; Wis. Admin. Code § NR115.

² Wis. Stat. § 59.692(2)(a)

³ Kent, Paul G. and Tamara A. Dudiak. *Wisconsin Water Law: A Guide to Water Rights and Regulations*, 2nd Ed., 2001, p. 38.

⁴ Wis. Stat. § 59.692(7)(a)

- Reserve shore cover and natural beauty.⁵

In addition, shoreland zoning protects the rights of all Wisconsin residents to access the water, fish, swim, boat, and enjoy the scenic beauty, which is also known as the public interest.

How do our shoreland decisions affect property values, water quality, fisheries and wildlife?

Extensive research exists describing how land use along lakes and streams affects water quality, fisheries, and wildlife. Here is a very brief summary of the research and a few references if you would like to learn more.

The quality of our lakes and streams is ultimately a reflection of how we take care of our land. Specifically, how our communities develop and redevelop the land around lakes and streams plays a large role in whether those lakes and streams remain healthy for generations to come or are degraded and become a detriment to the community.

Property values

A recent study of over 1,000 waterfront properties found that, when all other factors were equal, properties on lakes with clearer water commanded significantly higher property prices. In other words, people prefer clean water and will pay more to live on lakes with better water quality.⁶

Water quality, fisheries and wildlife

Maintaining good water quality, fisheries and wildlife in lakes and streams depends on three steps:



Figure 35: Land Use Affects Water Quality

⁵ Wis. Stat. § 281.31

⁶ Krysel, Charles et al. *Lakeshore property values and water quality: Evidence from property sales in the Mississippi headwaters region*. June 2003. Mississippi Headwaters Board. Available: www.mhbriverwatch.dst.mn.us/publications/lakeshore_property.pdf

1. Curb pollutants

Curb pollutants at their source – fertilizers, eroding soils, malfunctioning septic systems, household toxins and agricultural runoff.

Phosphorus is an essential nutrient for plants. However, when too much phosphorus makes its way into our lakes and streams, it promotes the rapid growth of weeds and algae and decreases water clarity, often turning lakes green. Decaying algae also deplete oxygen in the water, so that fish can no longer thrive. Human activities contribute a great deal to the amount of phosphorus that enters a lake or stream.

Consider this – one pound of phosphorus in runoff can result in up to 500 pounds of algae growth! Phosphorus comes from soils and fertilizers, which are easily washed into lakes.

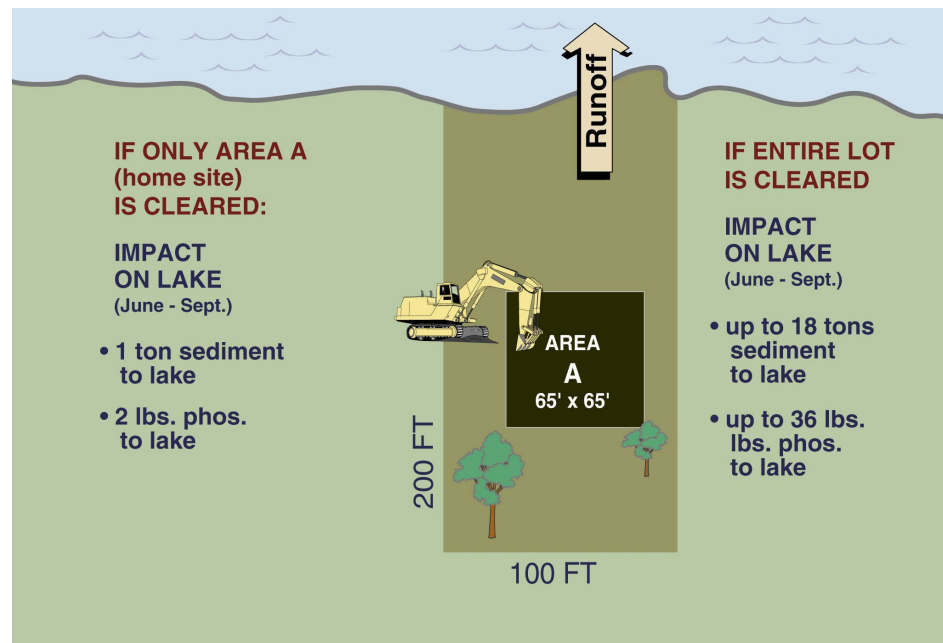
Since phosphorus is often bound to soil particles, one key to keeping phosphorus out of lakes and streams is to minimize the amount of land that is cleared or otherwise disturbed, so that soil erosion is minimized. Another approach is to attempt to capture the eroded soil before it enters the waterbody. As Figure 37 illustrates, completely clearing a half-acre lot can add up to 36 pounds of phosphorus to a lake or stream.

In addition to phosphorus, many other chemicals – from antifreeze to zylene – can pollute lakes and streams.



Figure 36: Effects of Excessive Phosphorus
One pound of phosphorus can result in up to 500 pounds of algae growth.

Figure 37: Less land clearing limits the amount of phosphorus entering a lake or stream.



To curb pollutants, zoning board members may apply the following conditions. Land conservation employees or private licensed engineers may help create erosion control plans.

- Limit the area of grading and other disturbance and make the remainder of the parcel off-limits to heavy equipment.
- Maintain established trees and native plants with deep root systems to hold soil in place.
- Require a complete erosion control plan and inspection of erosion control measures prior to and during construction. Require bonding to repair damage if erosion control measures fail.
- Require a list of the chemicals and of the maximum quantities of them that will be used or stored in the shoreland zone.
 - For instance, a nursery may use or store quantities of fertilizers and pesticides that could have a large impact on a nearby lake or stream. Gasoline and other toxic chemicals should also be considered. Use this information to decide whether the proposed use is reasonably suited for the location.
- To ensure that conditions are met, require self-reporting or independent inspections and use bonding or specific predetermined fines.

Keeping phosphorus or any other chemical 100% contained over a long timeframe is not feasible. Thus, the zoning board may decide that the potential for water pollution is too great on a site and deny the permit.

2. Cut runoff

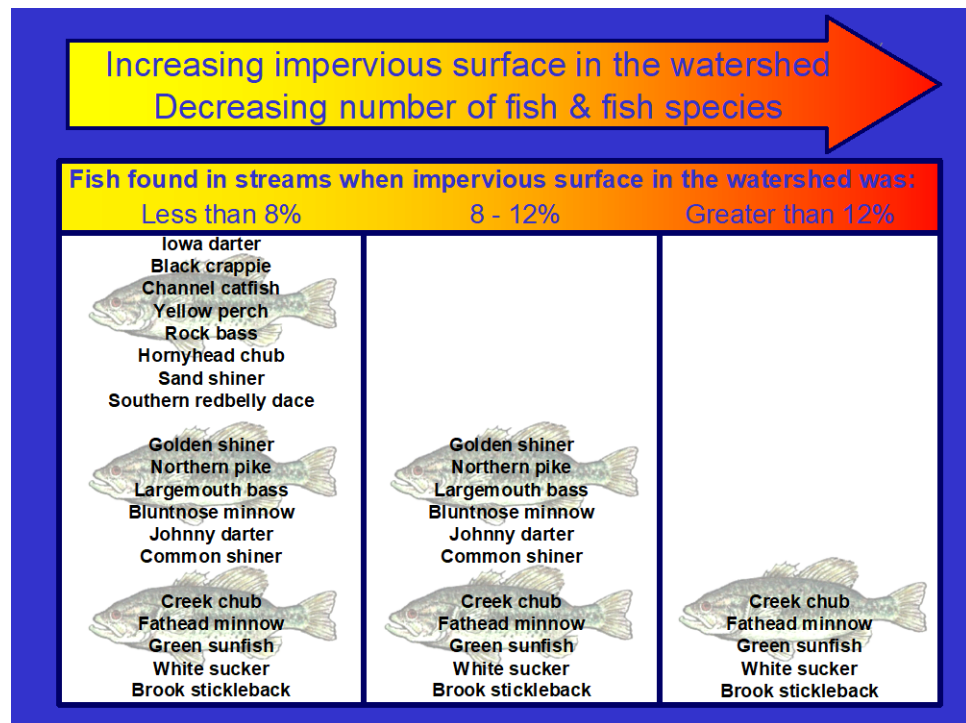
Runoff is excess water that comes from hard surfaces like rooftops, driveways, parking areas, sidewalks, decks, and compacted soils. Gravel areas quickly become compacted and create nearly as much runoff as paved surfaces. Runoff water washes soil, fertilizer, car fluids and other pollutants into our lakes and streams. To reduce runoff, let water soak into the ground.

Lawns absorb little rainfall. In fact, a recent Wisconsin study found that lawns created much more runoff than wooded areas. As a consequence, the runoff from unfertilized lawns carried eight times more phosphorus to the lake than the runoff from similar sized wooded areas.⁷

Runoff also affects fisheries. Researchers studied 47 Wisconsin streams and found that fish and insect populations decline dramatically when more than 8-10% of the watershed is covered with hard surfaces such as rooftops, roads, and driveway.

Streams with more than 12% hard surfaces have consistently poor fish communities.⁸ Not surprisingly, impervious surfaces closer to the water have a greater impact because there is less opportunity for the runoff from these areas to soak into the ground or be filtered before reaching the lake or stream.⁹ Hard surfaces harm fisheries because:

Figure 38: Impervious surfaces greater than 8% of the watershed decrease fish in streams.



⁷ Graczyk, David J. et al. *Hydrology, nutrient concentrations, and nutrient yields in nearshore areas of four lakes in northern Wisconsin, 1999-2001*, 2003. USGS Water Resources Investigation Report 03-4144, p.41. Available: <http://pubs.usgs.gov/wri/wrir-03-4144>

⁸ Wang, L., J. Lyons, P. Kanehl, R. Bannerman, and E. Emmons 2000. "Watershed Urbanization and Changes in Fish Communities in Southeastern Wisconsin Streams." *Journal of the American Water Resources Association*. 36:5(1173-1187); Wang, L., J. Lyons, and P. Kanehl 2001. "Impacts of Urbanization on Stream Habitat and Fish across Multiple Spatial Scales." *Environmental Management*. 28(2):255-266.

⁹ Wang, L., J. Lyons, and P. Kanehl 2001. "Impacts of Urbanization on Stream Habitat and Fish across Multiple Spatial Scales." *Environmental Management*. 28(2):255-266.

- Warm runoff from roads and other hard surfaces raises water temperatures and decreases oxygen levels, eliminating some fish species;
- Sediment carried in the runoff creates cloudy water, so fish that hunt by sight have a hard time finding dinner;
- Sediment covers spawning areas and clogs the gills of some fish; and
- Streams become ‘flashy’, meaning runoff occurs more quickly after a storm, peak flows become larger, and critical dry season flows decrease because less groundwater recharge is available.

To cut runoff, zoning board members may apply the following conditions. Land conservation employees or private engineers can help design or approve effective designs.

- Limit the area of impervious surfaces. This can be done by narrowing roads and driveways and building up rather than out or by replacing conventional hard surfaces with alternatives such as green roofs and pervious pavers.
- Locate impervious surfaces as far as possible from lakes and streams and in locations where their runoff will soak into the ground or at least be substantially filtered prior to entering the water body.
- Maintain established trees and native plants whose deep root systems hold soil in place and extend each year to create new pores in the soil that allow water to soak in.
- Limit the area of compacted soils that prevent water from soaking in. To do this, limit the area compacted by heavy equipment and other vehicles.
- Minimize grading that removes the natural divots where water naturally collects and has time to soak in.
- Consider requiring landowners to decompact soil after construction in areas where compaction is not necessary to support buildings, roads, or driveways. A review of methods that are and are not effective is available from the Center for Land Use Education.
- To ensure that conditions are met, require self-reporting or independent inspections and use bonding or specific predetermined fines.
 - To impress upon a contractor that he was serious about not removing unmarked trees, a landowner having a motel built on his shoreland property included a fine of \$10,000 per unmarked tree that was damaged.

A proposal may create more runoff than can soak in on the lot. To avoid adversely affecting neighboring landowners, lakes, or streams, the zoning board may decide to deny the permit.

3. Capture and cleanse

If pollutants are present and hard surfaces increase the amount of runoff carrying pollutants toward the lake, the last line of defense is to capture and cleanse the runoff before it reaches the waterway by using shoreland buffers, rain gardens, rain barrels or engineered approaches.

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. Trees and branches that have fallen in the water

provide another important component of wildlife habitat—natural fish cribs, basking areas for reptiles and feeding sites. If a property has lawn to the water's edge, the best place to start planting to improve water quality is in the main area where water runs off your property. Larger areas of natural shoreline provide more benefits.

A mature native buffer represents many years of nature at work and discourages undesirable, exotic plants and animals while attracting songbirds, butterflies, turtles and frogs.

Figure 39: Intact Shoreland Buffers Cleanse Runoff



To capture and cleanse runoff, zoning board members may apply the following conditions. Land conservation employees, professional licensed engineers and natural landscaping professionals may help create storm water management plans.

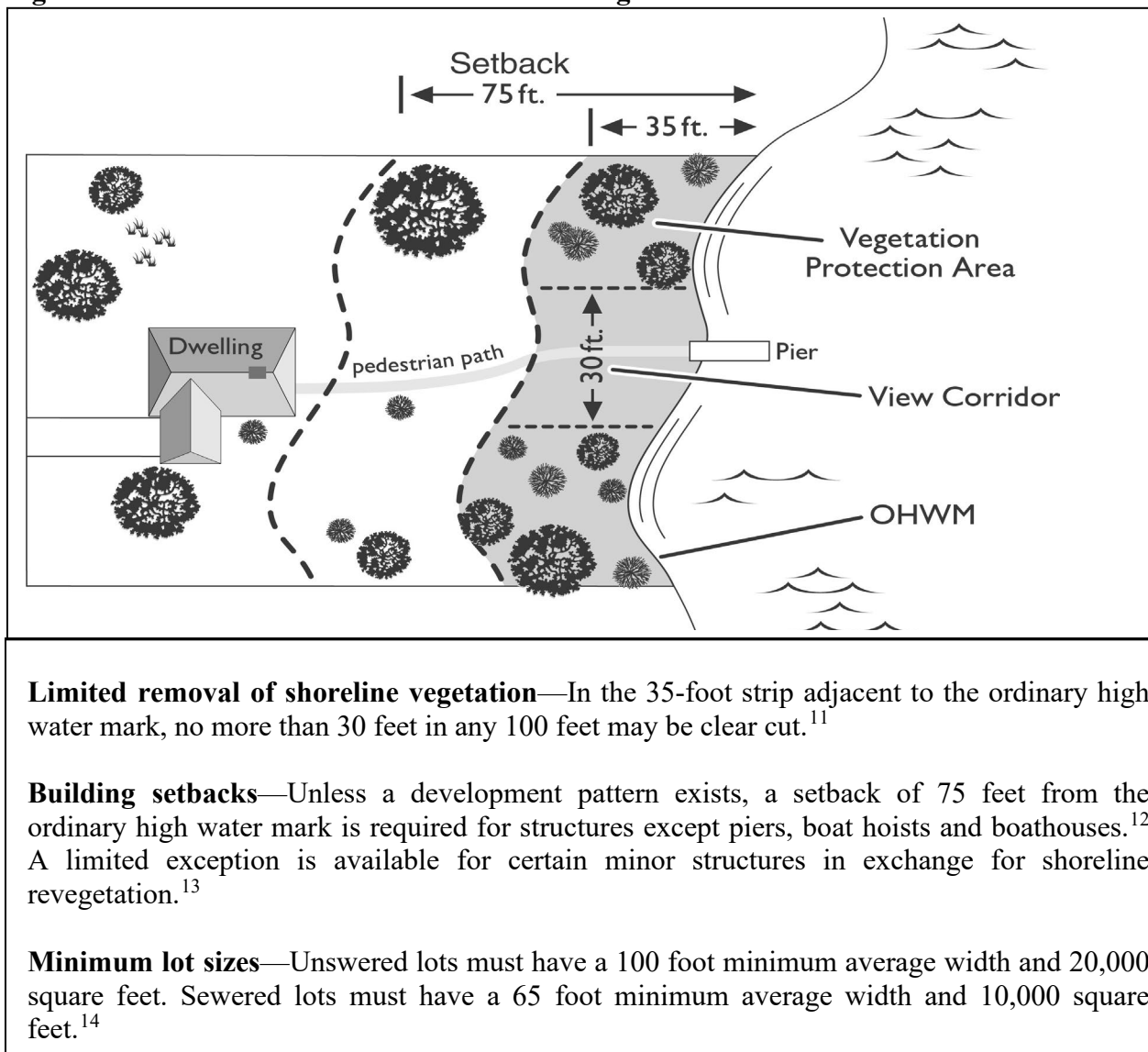
- Require a storm water management plan with a defined performance standard (e.g., no net increase in storm water runoff from a 50 year storm). Storm water practices may include green rooftops, pervious pavers, infiltration basins/raingardens, buffer strips, etc.
- Maintain established plants, including trees and native plants with stiff stems, to slow down and filter runoff while the plants also provide essential food and habitat for wildlife.
- Require downspouts to be directed to lawn or landscaping, not onto hard surfaces.
- Require rain gardens that collect water during wet times and serve as beautiful gardens all the time. They are landscaped areas planted to wildflowers and other native vegetation to replace areas of lawn. The gardens fill with a few inches of water and allow the water to slowly filter into the ground. To determine the necessary size to capture runoff from hard surfaces, see the publication *Rain Gardens: A How-To Manual for Homeowners* (<http://clean-water.uwex.edu/pubs/pdf/home.rgmanual.pdf>).
- Require shoreline buffer restoration or expansion to filter runoff. See the publication *Protecting and Restoring Shorelands* at <http://clean-water.uwex.edu/pubs/pdf/shore.protect.pdf> to find out how large of a buffer is needed to achieve various benefits.
- To ensure that conditions are met, require self-reporting or independent inspections and use bonding or specific predetermined fines.

A proposal may create more runoff than can be captured and cleansed on the lot. To avoid adversely affecting neighboring landowners, lakes or streams the zoning board may decide to deny the permit.

Minimum statewide shoreland zoning standards

To achieve the purposes of shoreland zoning, the state sets minimum building setbacks, restrictions on shoreline vegetation removal, and minimum lot sizes to limit the density of development. Many counties have adopted standards that are more restrictive than state minimum standards. The state minimum standards are described generally in Figure 40.¹⁰

Figure 40: Minimum Statewide Shoreland Zoning Standards



¹⁰ Figure created by Jeffrey Strobel, Environmental Resources Center, for *Wisconsin Water Law: A Guide to Water Rights and Regulations*, 2nd Ed., 2001.

¹¹ Wis. Admin. Code § NR 115.05 (3)(c)

¹² Wis. Admin. Code § NR 115.05 (3)(b)

¹³ Wis. Stat. § 59.692(1v)

¹⁴ Wis. Admin. Code § NR 115.05 (3)(a)

Area variances in shoreland areas compromise water quality, fish and wildlife habitat, and natural scenic beauty. The effects of variances, though they may be imperceptible on an individual site, accumulate lot by lot throughout the shoreland. For instance, runoff from structures located too close to the shore quickly carries nutrients and sediment to a lake or stream with very little opportunity for a shoreland buffer to filter contaminants or infiltrate runoff. Consequently, many communities limit variances to minimize impacts on public waters.¹⁵

For more information about how shoreland management affects lakes and streams, read—

Phosphorus in Lawns, Landscapes and Lakes. 2004. Minnesota Department of Agriculture and partners. Phone: 651-296-6121 Available: www.mda.state.mn.us/appd/ace/phosphorusguide.pdf

Protecting Your Waterfront Investment: 10 Simple Shoreland Stewardship Practices. 2005. UWEX Publication GWQ044 and Wisconsin DNR (WT-821 2005). Available: www.uwsp.edu/cnr/landcenter/Publications/waterfront.pdf

Shoreland Development Density and Impervious Surfaces. (research summary) 2003. Center for Land Use Education. Available: www.uwsp.edu/cnr/landcenter/pdffiles/Imp_Surf_Shoreland_Dev_Density.pdf

Erosion Control for Homebuilders. 1996. UW-Extension (GWQ001) and Wisconsin DNR (WT-457-96) Available: <http://clean-water.uwex.edu/pubs/pdf/storm.erosio.pdf>

A Storm on the Horizon: An Educational Video on the Effects of Stormwater on Our Rivers. 18 minute video by Trout Unlimited. Phone: 715-386-7568 or andrewlamberson@hotmail.com

Rain Gardens: A How-To Manual for Homeowners. 2003. UW-Extension (GWQ037) and Wisconsin DNR (WT-776 2003) Phone: 608-267-7694 Available: <http://clean-water.uwex.edu/pubs/pdf/home.rgmanual.pdf>

The Waters Edge: Helping Fish and Wildlife on Your Waterfront Property. 2000. Wisconsin DNR (PUB-FH-428 00). Available: www.dnr.state.wi.us/org/water/fhp/fish/pubs/thewatersedge.pdf

¹⁵ *Creating an Effective Shoreland Zoning Ordinance: A Summary of Wisconsin Shoreland Zoning Ordinances*, 2000, DNR publication #WT-542-00. See Appendix C for ordering information.

22. Floodplain Zoning

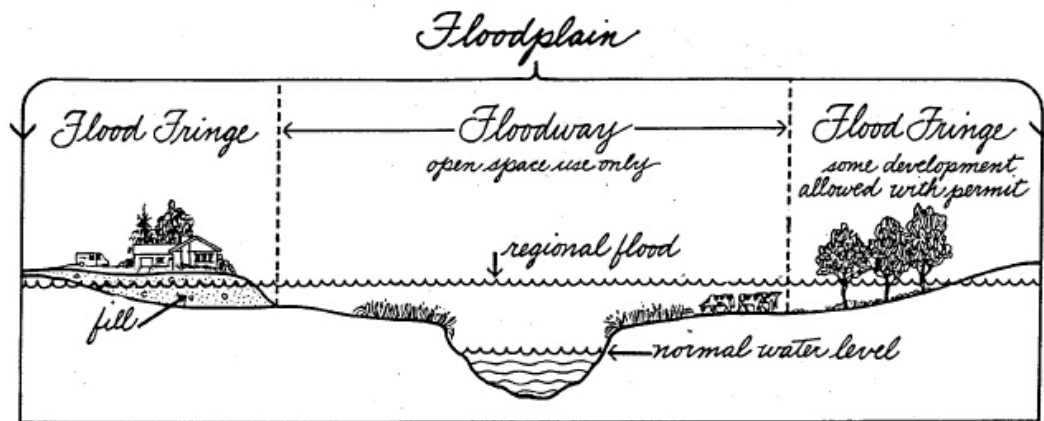
Where does floodplain zoning apply?

A community that has been issued official flood plain maps by the DNR must adopt and administer a floodplain zoning ordinance.¹⁶ As a consequence, citizens in the community become eligible to apply for federal flood insurance. A state administrative rule (NR 116) sets minimum standards for local ordinances.

The **floodplain** consists of lands that are subject to flooding during the regional flood. The floodplain includes floodway and flood fringe zones. Regional flood elevations are calculated by hydraulic models that consider the size of a drainage basin, amount of precipitation and land characteristics. They are also based on evidence of previous flooding.

The **floodway** consists of the channel of a river or stream, and those portions of the floodplain adjoining the channel that are required to carry the regional flood discharge. The floodway is the most dangerous part of the floodplain. It is characterized by deeper moving water.

Figure 41: Floodplain Illustration



The **flood fringe** is the portion of the floodplain landward of the floodway. It is generally associated with standing water rather than flowing water and with shallower depths.

What are the purposes of floodplain zoning?

The purposes of floodplain zoning are to protect human life, health and to minimize property damages and economic losses.

¹⁶ Wis. Stat. § 87.30(1)

Section VII – Review

Keywords

- Ordinary high water mark
- Floodplain
- Floodway
- Flood fringe

Test your Knowledge

Chapter 21 – Shoreland Zoning

- 1) Name the five statewide purposes of shoreland zoning.
 - a. Maintain safe and healthful conditions;
 - b. Prevent and control water pollution;
 - c. Protect spawning grounds, fish, and aquatic life;
 - d. Control building sites, placement of structures, and uses; and
 - e. Reserve shore cover and natural beauty.
- 2) Does your local shoreland zoning ordinance provide any additional purposes?
- 3) A recent study of waterfront properties found that one factor when found in lakes resulted in significantly higher property prices. What is that one factor?
 - a. Clearer water
- 4) Name three steps that zoning boards can take to maintain good water quality, fisheries and wildlife in lakes and streams.
 - a. Curb pollutants
 - b. Cut runoff
 - c. Capture and cleanse
- 5) When the impervious surfaces in a watershed exceed a certain percentage the number of fish and fish species decreases significantly. What percentage is this?
 - a. 8%

Chapter 22 – Floodplain Zoning

- 6) Name the purposes of floodplain zoning.
 - a. Protect human life and health
 - b. Minimize property damage and economic losses