



Natural Shorelines

Necessary rainwater filters and valuable habitat

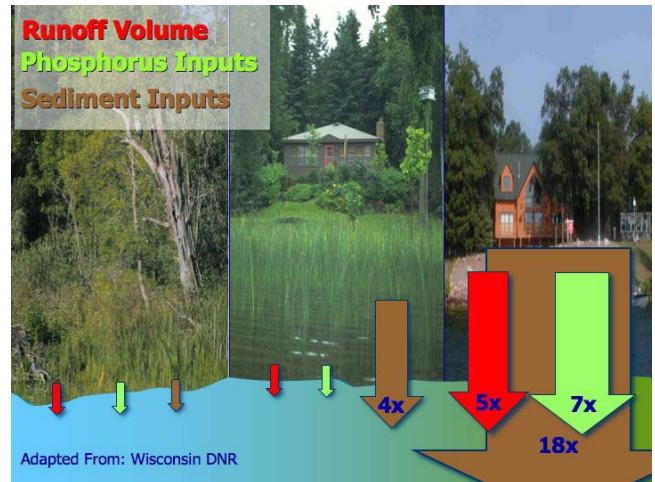


Converting a natural shoreline with native vegetation to a developed, “lawn-to-lake” style of shoreline has adverse impacts on water quality. A lawn-to-lake style destroys annual and perennial ground cover for small animals. With ground cover gone, amphibians lose shelter and songbirds lose habitat. Most importantly, nutrient runoff to the lake or river increases dramatically.

Hydrologists and chemists have also found interesting differences between the lawn-to-lake style of shoreline and a natural, native-vegetated shoreline. In residential areas, the largest source of phosphorus is runoff from lawns and impervious surfaces. Rainwater runoff amounts from lawn-to-lake shoreline are five times to 10 times higher than forested shorelines. Runoff from lawns occurs more frequently than previously thought with a high percentage of storms resulting in runoff. Lawns and urban soils are often very compacted; as the soil becomes more compacted, rainwater runoff increases. Lawns often constitute the largest fraction of land area within residentially developed shoreland, and they often have similarities with impervious surfaces. Water flowing over lawn surfaces then picks up dirt, pesticides, toxic chemicals, pet waste, and other pollutants.

Affecting lake water quality, the lawn-to-lake shoreline allows seven times to nine times more phosphorus to enter the lake than a more natural, native-vegetated shoreline. Phosphorus is a plant nutrient, and Minnesota soils are usually phosphorus rich. Increasing the amount entering the lake causes more algae growth, resulting in lower water clarity (0.2 pound of phosphorus can produce 100 pounds of algae). While absolute values of phosphorus entering the lake from a developed shoreline lot vary because of soil, slope, and other site-specific conditions, a lawn-to-lake lot may average 0.2 pound per summer compared to 0.03 pound per summer for a lot with a natural, native-vegetated shoreline. For many lots, the phosphorus yield to the lake resulting from the alteration of the natural nearshore vegetation may exceed the phosphorus yield from all other sources. Excess nitrogen will also be transported to lakes from these land uses. Nitrogen will enter attached to soil particles as organic matter or dissolved in the form of nitrite, nitrate, or ammonia—forms that are readily usable by algae and rooted plants.

Shoreline buffers are corridors of natural vegetation along rivers, streams, and lakes that help to protect water quality by providing a transition between upland development and adjoining public water. A shoreline buffer of natural vegetation traps, filters, and impedes runoff. Buffers stabilize banks of lakes and rivers, offer scenic screening of shoreland development, reduce erosion, control sedimentation, and provide habitat for shoreline species.



(above) The increasing size of the arrows represent the increasing volume of runoff and nutrients as shorelines become more developed.

(below) This picture shows a forested buffer along the shoreline.



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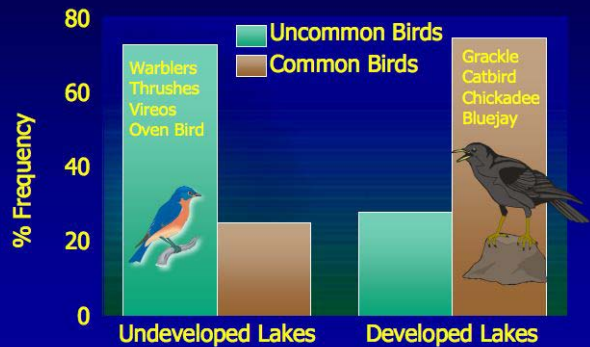
Biologists have found that trees, shrubs, and the forest understory near the shore have declined over time on developed shoreline. This change in lakeshore habitat leads to changes in bird communities. Common suburban-style birds like chickadees, cowbirds, blue jays, and grackles replace the uncommon bird “species of special concern” like warblers, loons, and vireos along developed shores (see graphic at upper right). Bald eagles will nest on developed, altered shores but most nest in areas of less alteration and disturbance; thus, they have to spend significantly more time and energy feeding. Since loons are shoreline nesters that can be sensitive to human disturbance, it has been shown that the probability of loons on the lake decreases with increasing housing density. Loons are unlikely to nest on a groomed and manicured beach. They prefer to nest near shore on vegetated hummocks, small islands, or masses of emergent vegetation. Therefore, excessive alteration of nearshore vegetation has affected loons and the structure of native bird communities.

Green frogs, which are often common along shores, disappear where development exceeds 30 homes per mile or where the average lot width is 180 feet (see graphic at right). The density of homes is not the causal mechanism, but the direct alteration of riparian areas associated with shoreline development is. Male green frogs establish breeding territories within 2 feet of the lake’s edge, and disturbance to the shoreline vegetation eliminates their habitat. It is these critical areas that are often altered or destroyed. Lakehome owners who develop a lawn-to-lake shoreline fragment the nearshore habitat. Fragmented habitat forces frogs and other amphibians to spend extra time and energy seeking access to nesting, basking, and feeding sites. Extensive alteration, such as is now found on many Minnesota lakes, causes these animal species to become isolated or wiped out. Over time, the removal and alteration of the natural, nearshore vegetation has destroyed or degraded habitat along most of Minnesota lakes, with increasing impacts on wildlife populations.

A lawn down to the lake’s edge is bad. It diminishes fish and wildlife, reduces water quality, and degrades the scenic quality of the lake. The alternative shoreland management standards ask lakehome owners to preserve or establish a native forest buffer along the lake. The voluntary alternative standards are “tools in the toolbox” that local governments may choose to adopt to deal with issues identified through the pilot project. For more information on the alternative shoreland management standards, see the following DNR website: http://www.dnr.state.mn.us/waters/watermgmt_section/shoreland/shoreland_rules_update.html.

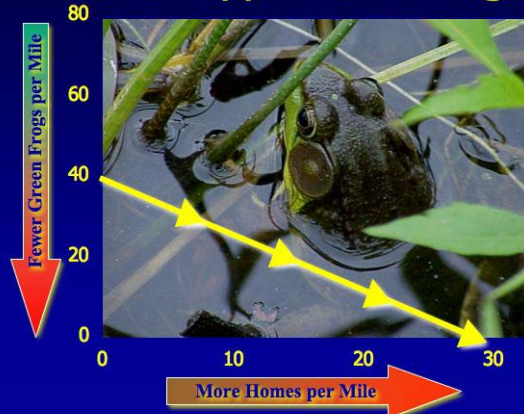
The comments in this brochure address jurisdictional matters and concerns of the DNR, Division of Waters. Please contact your DNR Area Hydrologist to discuss issues relating to your project or this brochure.

What’s Happened to Songbirds?



Meyer et al. 1997, Wisconsin DNR, Lindsay et al. 2002

What’s Happened to Frogs?



Meyer et al. 1997, Wisconsin DNR, Woodford and Meyer 2003

