

# Protecting Wisconsin's Legacy of Lakes

The Case for Stronger  
Shoreland Zoning Rules

Eliza Simon

WISPIRG Foundation

# Acknowledgements

The WISPIRG Foundation gratefully acknowledges Lynn Markham of the University of Wisconsin-Extension Center For Land Use Education for peer review and research assistance. Thanks also to Elizabeth Moriarty for research assistance and to Bob Korth of the University of Wisconsin-Extension for the use of his photographs. Thanks to Ken Markrof of the Big Eau Pleine Homeowners Association, Rod Olson of the Desair Lakes Association, Inc., Mike Buroker of Buroker's Taxidermy, Bait, and Tackle, Paul J. Hansen, Licensed Fishing Guide, and William Burse of the Lake Jacqueline Management District for sharing their personal stories of experiences with overdeveloped lakes. Thanks to Jennifer Giegerich and John Rumpler for editorial assistance.

Cover photograph: University of Wisconsin-Extension Lakes Program.

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WISPIRG Foundation  
210 N. Bassett St., Suite 200  
Madison, WI 53703

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# Executive Summary

Wisconsin's lakes are unhealthy and overdevelopment is a principal cause. Despite the exponential increase in the amount of lakeside development over the last forty years, the statewide rules regulating shoreland development (NR115) have not been meaningfully updated since the 1960s. Overdevelopment causes many of the water quality problems we face today in Wisconsin, and unless this development is curbed, our lakes will continue to be endangered.

This report documents the danger that overdevelopment poses to lake water quality, wildlife, and to Wisconsin's economy. It also outlines the changes in the shoreland zoning rules that are necessary to adequately protect Wisconsin's lakes.

***Wisconsin's lakes are overdeveloped and, as a result, face severe water quality problems.***

In the last forty years, lakeside development has increased as much as 216% in parts of the state. At the current rate of development, all Northern Wisconsin lakes not in public ownership will be completely developed by the year 2015.

As a result of overdevelopment, over 80% of Wisconsin's lakes are dangerously contaminated with phosphorous, a nutrient that causes excessive plant growth, algae blooms, and endangers fish and wildlife populations. Modern styles of development increase both runoff pollution and sediment loading from erosion, the primary causes of phosphorous pollution. Today's development has been shown to increase

phosphorous inputs by as much as 700% and sediment loading by 18 times.

Phosphorous decreases oxygen levels and increases water temperature in lakes, which leads to fish kills and shrinks wildlife populations. In recent years, toxins produced by blue-green algae have also been linked to the deaths of both a dog and a person in Wisconsin, and new research suggests links between these toxins and diseases such as Alzheimer's, Parkinson's disease, and ALS.

***Shoreland development causes habitat destruction and decreases scenic beauty.***

Development destroys wildlife habitat around lakes and as a result, populations of songbirds and green frogs are dwindling across the state. The privacy and tranquility of our lakes are also compromised by overdevelopment; natural scenic beauty is replaced by driveways and sprawling homes.

***Overdevelopment threatens not only Wisconsin's environment, but also its economy.***

Inadequate NR115 protections endanger our property values. Clean water adds as much as \$200 per frontage foot to a lot's value. Moreover, while Wisconsinites have spent millions of dollars on lake clean-ups, this money goes to waste because overdevelopment continues unabated. The \$7 million rehabilitation of Delavan Lake, for example, already shows signs of reversing itself because shoreland zoning policies have not changed there.

Weak shoreland zoning rules also put our tourist economy at risk. Lake

recreation is the backbone of Wisconsin's \$11.71 billion tourist industry, which will survive only if our lakes are safe for swimming, boating, and fishing. This industry also supports over 300,000 jobs statewide.

***The current NR115 is insufficient because it does not adequately regulate modern development.***

The most harmful aspects of modern shoreland development allowed under NR115 include:

- *Destruction of natural buffer zones.* A natural buffer is the lakeside vegetation that filters pollutants, prevents erosion, and provides wildlife habitat. But the thirty-five foot buffer required under NR115 is too small to be sufficiently protective, and, worse, NR115 allows these areas to be essentially clear-cut.
- *Increased impervious surface area.* Paved-over surfaces like driveways and rooftops do not filter rainwater and greatly increase the amount of runoff that can enter a lake. The current NR115 does not regulate impervious surfaces at all.
- *Insufficient lot sizes.* Adequate lot sizes protect waterways by decreasing housing density and leaving more land to filter pollutants. The current NR115 does not require large enough lot sizes for single- or multi-unit dwellings

***The current shoreland zoning rules must be updated.***

NR115 must be updated immediately to adequately protect Wisconsin's lakes from the dangers of increased development. The DNR's Natural Resources Board should vote stronger shoreland zoning rules out for public comment in May, and the legislature

should approve these rules. An improved NR 115 should include:

- A minimum lot size of 20,000 square feet and a 100-foot average width for single-unit structures;
- Larger minimum lot size standards for multi-unit structures;
- An impervious surface limitation of 20%;
- A natural buffer requirement of 50 feet.

***Stronger statewide minimum standards will prevent future harm to our lakes and our economy, ensure equal competition among counties across Wisconsin, and safeguard a vital part of Wisconsin's heritage and culture.***

## Introduction: Shoreland Development in Wisconsin

The word “Wisconsin” is said to mean “gathering of waters,” and no state could be more appropriately named. Wisconsin is home to more than 50,000 miles of rivers and streams, more than 1,751 square miles of Great Lakes estuaries and bays, 1,017 miles of Great Lakes shoreline, and more than 5.3 million acres of wetlands. Wisconsin also boasts 15,081 inland lakes – more than any other state in the Union, and one of the highest concentrations of lakes in the world.<sup>1</sup>

Wisconsinites love their waters, and lakes in particular. Our lakes are renowned for their beauty and tranquility, and fishing, boating, and swimming are favorite activities for Wisconsinites and out-of-state visitors, alike. But our lakes are not what they once were: water quality is declining, wildlife populations are dwindling, and scenic beauty is disappearing. At the same time, our lakeshores are becoming increasingly crowded, our wetlands continue to be paved over, and our shady trees are being replaced by houses and driveways. Shoreland development has now gotten out of hand.

Development around lakes has long existed, but until recently it took the form of low-impact dwellings like small seasonal cabins. By the 1960s, however, the need for rules regulating lakeside development became clear: development was affecting both lake water quality and scenic beauty. A team of experts from state and federal agencies and the University of Wisconsin recommended the minimum standards that became the Water Resources Act. Enacted in 1966,

this became one of the first shoreland zoning programs in the United States.<sup>2</sup>

The Wisconsin Administrative Code defines shoreland to include land within 1,000 of the Ordinary High Water Mark of any navigable lake, pond, or flowage.<sup>3</sup> The shoreland zoning rules were adopted in the late 1960s and early 1970s to protect water quality, wildlife habitat, and natural scenic beauty from the impacts of development. These rules comprise chapter NR115 of the Wisconsin Administrative Code and have remained essentially unchanged since they were written.\*

Development has changed significantly since NR115 was enacted. The amount of development in the last 30 years equals or even exceeds the development of the 100 years previous to that. Furthermore, models predict that lakeshore development will double in the next 15 years and that in 20 years all remaining undeveloped lakes ten acres and larger will be developed. At the current rate of development, all of Northern Wisconsin’s remaining privately owned shoreland will be developed by the year 2015.<sup>4</sup>

The rules regulating shoreland development are no longer sufficient to address the impacts of modern development on Wisconsin’s lakes. The Wisconsin Department of Natural Resources (DNR) and the state legislature should update these rules immediately to protect one of Wisconsin’s most beloved and valuable resources.

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\* Wetlands provisions were added to NR115 in 1980 (Bernthal and Jones 1997).

# Wisconsin's Unhealthy Lakes

Wisconsin's water quality has declined significantly, riparian wildlife is disappearing, and the beauty and tranquility of our lakes is being destroyed. The poor quality of some of our lakes threatens not only Wisconsin's natural resources, but also the state's economy: billions of dollars in tourist and tax revenues and hundreds of thousands of jobs depend on our lakes remaining both beautiful and usable. Many lakes are already brimming with algae and clogged with sediment, and the current shoreland zoning rules are inadequate to alleviate this problem.

## Poor Water Quality: Phosphorous Pollution

Many factors contribute to Wisconsin's water quality problems, but perhaps the single biggest issue facing Wisconsin's lakes today is phosphorous pollution. More than 80% of Wisconsin's lakes contain unsafe levels of phosphorous, a nutrient found in human and animal wastes, fertilizers, soil, and septic systems (among other sources).<sup>5</sup> This nutrient enters lakes primarily through runoff from farmland and lawns, and erosion.

Phosphorous causes excessive plant growth and algae blooms, which decrease water clarity and endanger wildlife. The nutrient also leads to decreased oxygen levels and increased water temperature, which can be deadly for fish. Lakes filled with algae and aquatic plants are unsightly, and difficult or impossible to boat, swim, or fish.

## *Overdevelopment and Phosphorous*

Shoreland development is a primary facilitator of phosphorous pollution because it can compromise or destroy a lake ecosystem's natural self-protections against runoff pollution. The grass lawns that often accompany modern development do little to protect lakes from this pollutant, and fertilizers used to maintain lawns only compound the problem.

Every pound of phosphorous that enters a lake can cause up to 500 pounds of algae or aquatic plant growth. And a study of the Lauderdale Lakes in Southeast Wisconsin found that for each acre of shoreland development with houses and lawns within 200 feet of a lake, up to 1.6 pounds of phosphorous entered the water.<sup>6</sup>



*Phosphorous contamination can cause lakes to look like this algae-ridden and plant-filled lake in Wisconsin.*

The construction that necessarily accompanies development can further damage water quality. A study examined the sediment loads from two small construction sites – one commercial, the other residential – and

found loads 10 times larger than those from rural and urban land uses in Wisconsin. The increase in sediment loading that accompanies construction smothers animal and plant habitat, muddying lakes and the shoreline. It also carries even more phosphorous into water.<sup>7</sup>

Overdeveloped, phosphorous-filled lakes are not the tranquil fishing lakes that Wisconsinites and out-of-state visitors have always enjoyed. And the longer that the state leaves shoreland development ineffectively regulated, the worse this problem will become.

### *The Dangers of Phosphorous*

Phosphorous pollution is dangerous not only for lakes, but also for the humans and animals that are accustomed to enjoying them. Two recent studies have linked toxins produced by blue-green algae to neurodegenerative diseases like Alzheimer's, Parkinson's disease, and ALS. According to the Milwaukee Journal Sentinel, the "international team of researchers that reported the finding... suggested that public health officials now should consider monitoring for the neurotoxin in waters that have blue-green algae "blooms," including water from the Great Lakes and smaller inland waters."<sup>8</sup> Wisconsin's lakes could contain this dangerous toxin.

This research remains preliminary, but the dangers of blue-green algae toxins have been proven in Wisconsin by two deaths in the last several years.

### *Lake Kegonsa*

In June 2004, a dog had seizures and eventually died after swimming in Lake Kegonsa, in Dane County. Three different species of blue-green algae were found in the lake and in a nearby private pond, and all three are species

that can produce dangerous toxins.<sup>9</sup> These toxins are believed to have caused the dog's illness and death.

After the dog's death, the lake's beaches were closed. The following health precautions were released by Dane County: "[County Health Advisor Gareth] Johnson advises that people who choose to swim, boat, or use any of the lakes or any other waterbody take precautions if they see thick accumulations of algae." Johnson also warned: "If you choose to swim in lakes where the algae is present, do not ingest any water. Rinse off after you get out of the water, and do not allow pets or children to swim in water where there is algae present."<sup>10</sup>

Phosphorous pollution endangers our lakes, our ability to enjoy them, and even our lives. And shoreline development is a primary facilitator of this kind of pollution.

### *A Dane County Pond*

Wisconsinites have known first-hand the dangers of blue-green algae poisoning since well before the dog's death in June 2004, however. In July 2002, Dane Rogers, a seventeen-year-old boy from Cottage Grove, went into shock and seizure, and eventually died of heart failure after ingesting a strain of blue-green algae and its toxin. Two days before his death, the boy had been playing in an algae-filled pond on a golf course in Dane County and had swallowed mouthfuls of the algae-ridden water. After more than a year of investigation, the Dane County coroner concluded that Dane Rogers' death "likely was the first in the nation caused by exposure to a toxin released by algae."<sup>11</sup>

Although the pond in which Dane Rogers was swimming was dirtier than the worst lakes, his fatal story should not

be disregarded. Phosphorous has already infected our lakes with dangerous algae and, if left uncontrolled, could become an even bigger health threat than it currently is.

## Wildlife in Danger

Natural shoreland areas are some of the most populated and diverse wildlife habitats that exist. There is 500% more species diversity near the water's edge than can be found on the nearby uplands, and 80% of plants and animals on the endangered species list live all or part of their life cycles in the littoral, or near-shore, area.<sup>12</sup>

But today, populations of green frogs, birds, and fish are shrinking and disappearing. The once-rich shoreland areas have been stripped of native vegetation and wildlife. And so far, the state has done little to address this problem.

### *Green Frogs*

Scientists take green frog populations as an indicator of lake health. Green frog habitat and abundance have diminished tremendously in the last forty years, corresponding with the increase in shoreline development activities over the same time period. Many studies have found the current NR115 allows green frog populations to decline – as Woodford and Meyer of the DNR put it, “our study and others suggest that current regulations and enforcement are not protecting the shoreline habitat that is crucial to sensitive amphibian species.”<sup>13</sup> Now, overdevelopment threatens green frog populations in Wisconsin with extinction.

### *Birds*

As development increases, songbirds and loons are also disappearing. These creatures are particularly threatened because shoreland development favors “city birds” over native species.<sup>14</sup> Moreover, the current NR115 does nothing to protect these birds, but rather “permits a level of habitat alteration that will result in a dramatic change in the songbird community associated with Northern Wisconsin Lakes.”<sup>15</sup>

### *Fish*

Perhaps the most popular lake-related pastime in Wisconsin is fishing, but populations of many fish species are dying out across the state due to the effects of shoreland development. A study of 14 lakes in Northern Wisconsin and Michigan's Upper Peninsula found that the growth rates of bluegill declined as the intensity of lakeshore development increased.<sup>16</sup> Another study of 16 Wisconsin lakes found that in 13 of them, populations of northern pike declined steadily between 1960 and 1990, and that this corresponded with wetland loss associated with development.<sup>17</sup>

According to a study of Northern Wisconsin lakes, “alterations of riparian and littoral habitat resulting from shoreland development have reduced the capacity of lakes to maintain productive fish populations and changes in local land use patterns are beginning to compromise the ecological integrity of lake ecosystems.”<sup>18</sup> Wildlife populations are suffering the effects of overdevelopment and this is sure to continue if new standards are not adopted and enforced.

### *Diminished Scenic Beauty*

The scenic beauty of lakes is difficult to quantify, but equally difficult to discount in any discussion of the importance of lakes in Wisconsin. Wisconsinites appreciate their lakes for natural beauty, for a change in scenery from a more urban life, and for the unperturbed tranquility they provide. Scenic beauty and relaxation were also the number one

reason tourists cited for spending \$11.4 billion in Wisconsin in 2001.<sup>19</sup>

But today, this beauty is disappearing. Trees and natural scenery are being replaced by lawns, buildings, and driveways. The peaceful lake atmosphere is disturbed by overcrowding, noise, and decreased privacy. Excessive development threatens the aspects of lakeside living

## ***A Property Owner's Perspective...***

Ken Markrof, President

Big Eau Pleine Homeowners Association, Mosinee

**“I have lived on the Big Eau Pleine Reservoir for over sixteen years and I have seen development turn into overdevelopment. As a salesman, I travel across the state and see lakes that were once lightly developed and tree-lined surrounded by homes that look like developments you would see in the suburbs of Chicago.**

**“Every year, more people are building on or using the reservoir, and every year it gets noisier. When you don't have a lot of water around, like in Marathon County, the lakes become everybody's weekend playground, and you get a lot of noise and disruption from jet skis, ATVs, high-powered boats, etc. Sound really travels and amplifies across water.**

**“The more our reservoir becomes developed and used, the greener it seems to get. We can still fish, but the algae bloom gets greener every year, and shows up earlier every year. There is only a short time when the reservoir has any clarity, and that's early spring. Otherwise, it's either frozen or in bloom.**

**“When I first moved to this reservoir, I saw bald eagles regularly, and foxes and loons often. But now I only see domesticated deer and rabbits, and we're trying to hang on to our native birds. What we once had has now been pushed out of our area. I live on one of the least-used bodies of water in the area, but it's seeing more and more activity. And with more people, the peace and quiet disappears along with the wildlife.**

**“Already, there aren't many places left in Wisconsin where you can see wildlife in a natural setting and enjoy pristine, natural lakes. If we don't do something to protect our lakes from overdevelopment right now, there won't be anywhere left in our state to have a full wilderness experience on water. In the future, the only difference between northern and southern Wisconsin will be the temperature – the uniqueness of the Northwoods lakes will be gone.”**

that people value highest: a survey in Minnesota found that over 85% of waterfront property owners and lake users cited cabin and home development as the primary factor disrupting the scenic quality of the lake they used most. Other elements topping this list included the installation of docks and boatlifts and the removal of trees and shrubs in the shoreland area, all of which can accompany shoreland development.<sup>20</sup>

#### The Pheasant Branch Watershed

The story of the Pheasant Branch watershed illustrates the current problems caused by excessive development particularly well. The southern fork of this river, located near Madison, is highly commercially developed land with 31% connected impervious surface. (Impervious surfaces are paved-over areas like driveways and roofs that do not filter water and therefore increase runoff.) The northern fork, on the other hand, is largely agricultural land with little impervious surface. The amount of runoff from the paved shoreland of the southern fork is 690% that of the northern fork.

Because of this excessive runoff, the City of Middleton has spent over \$25 million over the last 25 years in the attempt to protect bridges and sewer lines from erosion. This tremendous amount of pollution, facilitated by overdevelopment, has not only endangered wildlife and damaged water quality, but also has been extremely costly.<sup>21</sup>

#### The Costs of Overdevelopment

Excessive development poses a risk not only to our environment, but also to our

economy. The money spent by the City of Middleton cited above is but one example among many of the financial toll overdevelopment can or could take on property owners, towns, counties, and the state as a whole.

#### *Wisconsin Pays*

Right now, Wisconsinites risk losing money without even knowing it. By the time water quality problems become apparent, it is often too late to prevent them because “[t]he processes leading to degraded water resources are often triggered well before the public recognizes that a problem exists.” At this point, it “may be too late to avoid large private and public expenditures” to address these problems.<sup>22</sup>

Indeed, lake restoration and rehabilitation is extremely costly. Because the Madison-area chain of lakes is so polluted, the DNR must stock 300,000 hatchery-raised fish each year, spending \$225,000 annually.<sup>23</sup> The rehabilitation of Delavan Lake in Walworth County, which had been pronounced “dead,” cost \$7 million over several years. Other recent and expensive cleanup efforts include Big Muskeo Lake in Waukesha County (\$1 million), Silver Lake in Manitowoc (\$750,000) and Devils Lake in Sauk County (\$350,000).<sup>24</sup>

The cost to individuals and local lake associations can also be quite high. William Burse, who owns lakefront property in Custer, and his lake association spend as much as \$8,100 each year to rehabilitate and maintain tiny Lake Jacqueline. Rod Olson, President of the Desair Lake Association, Inc. in Rice Lake (see inset, p. 12) has spent more than \$25,000 out of his own pocket over the last 10 years to protect and restore Desair Lake, even

as development and pollution increase with each passing year.

Inadequate lake protections result in financial losses for both the state and private citizens – and ultimately, much of this money is wasted. According to Lynn Markham, a Shoreland and Land Use Specialist with the UW-Extension Center for Land Use Education, “unless land use is improved to minimize phosphorous and sediment loading, the rehabilitation money is wasted on short-term effects that quickly reverse themselves.”<sup>25</sup>

### *Property Value*

Opponents of updated shoreland zoning rules claim that changes to NR115 would infringe upon property rights. But, setting aside the fact that all waters in Wisconsin are publicly owned, inadequate shoreland zoning protections threaten the value of lakeshore property.

Shoreland zoning rules protect the peace and privacy that attract potential property owners to lakes.<sup>26</sup> But when natural beauty is disrupted by development, people are less inclined to buy lakeshore land and property values decrease. Land also loses its value if

water is unhealthy and unsightly.

A five-year study of 900 lakefront properties on 34 lakes in six regional markets of Maine found that declining water quality yielded a 10 to 20% decline in property selling price. This same study estimated that because lake water quality fell below the regional average, the state experienced \$256 to \$512 million in property value loss.<sup>27</sup>

What’s true in Maine is true in Wisconsin, as well. Studies in Wisconsin have shown that good water quality can add as much as \$200 per frontage foot to a property’s value. The value of a home near a stream restoration project is as much as 13% higher than the value of a similar home on an unrestored stream.<sup>28</sup> Inadequate water quality protections put the investments of private citizens at risk.

### *Lake Delavan*

A recent study by the University of Wisconsin-Whitewater found that property values along Delavan Lake increased 352% between 1987 and 1995, coinciding with a \$7 million dollar lake restoration project that dramatically improved the lake’s water quality. But

## ***A Property Owner’s Perspective...***

Rod Olson, MD, President and Founder  
Desair Lake Restoration Inc., Rice Lake

“I’ve been president of our lake association for 15 years, and I founded it at the start. I work on erosion control because our lake has major algae blooms. We’ve been working to prevent our lake from getting worse, but we have problems because of nearby farming, and development increases each year. We’re trying stop nutrients from flowing into the water, and I have worked to get other landowners to leave their shorelines alone and their lawns natural. But the problem is still what flows into the lake. I have spent at least \$25,700 out of my own pocket over the last ten years to protect Desair Lake, and have put in thousands of hours of work.”

## ***An Angler's Perspective...***

Paul J. Hansen, Licensed Fishing Guide  
Eagle River

“I take people out on the lakes for a living – I’m a fishing guide. I see problems of overdevelopment all around me: invasive species, riprap suddenly appearing everywhere, and the logs and trees are suddenly gone. The lakes around here are very heavily populated with seasonal homes. I live on a very small lake with lots of shoreline left with big, tall, beautiful weeds. I have frogs, but they’re disappearing, and even I never see minnows anymore. Overdevelopment is shrinking these populations and ruining the natural beauty of our lakes.”

despite this costly and effective cleanup effort, property owners around Lake Delavan are already beginning to see water quality decline.

This degradation is largely attributable to the inadequate regulation of development. Since 1981, the number of homes around the lake increased from 2,000 to nearly 3,000. Kevin MacKinnon, administrator of the Delavan Lakes Sanitary District, told the Milwaukee Journal Sentinel increased development led to more impervious surface area, which in turn has sent more runoff into the lake. While water clarity improved from 4 feet to 13.3 feet between 1986 and 2001, MacKinnon said, it has now declined to only 6.7 feet because of runoff pollution.<sup>29</sup> The \$7 million spent to rehabilitate Delavan Lake will go to waste unless the underlying problems are addressed.

This study also pointed out that dirty water affects local economies. It found that spending in the Lake Delavan area would decrease by as much as \$5 million to \$6 million each year if the lake’s water quality were to decline again.<sup>30</sup>

### ***Tourism***

The current NR115 regulations have the potential to endanger Wisconsin’s tourist industry. Tourism is integral to the state’s overall economy, bringing \$11.71 billion into the Wisconsin in 2003.<sup>31</sup>

Tourism also provides 311,117 full-time jobs, which in turn generate another \$1.9 billion for state and local governments. And lakes are a critical part of this industry: a study by the Department of Tourism found that swimming and fishing were cited by tourists as the top reasons for visiting Wisconsin.<sup>32</sup>

Fishing, alone, creates tremendous revenue for the state. Each year, more than 1.5 million anglers participate in 17 million fishing days, generating \$2.1 billion. Sport fishing supports 30,000 jobs and brings over \$75 million in tax revenues, which in turn funds programs like education and healthcare.<sup>33</sup>

Certain counties are particularly tied to tourism. In Vilas County, for example, the hospitality-recreation industry accounts for two-thirds of all economic activity.<sup>34</sup> Visitors cite fishing, relaxing, and sightseeing as the top reasons for visiting.

Likewise, tourism in Marinette County brings in more than \$43 million annually and supports more than 1,100 tourism-related jobs. One study found that 70 to 80% of property owners and visitors said that water-based recreation was an important factor in choosing a vacation site in Marinette County.<sup>35</sup>

Unless stronger water protection rules are enacted, water-based tourism in Wisconsin will be threatened.

# The Current Shoreland Zoning Rules: No Longer Sufficient

The current statewide shoreline development rules do not protect Wisconsin's lakes against the dangers of modern development, which can increase pollutant loading into lake water, compromise wildlife habitat, remove native vegetation, and destroy natural scenic beauty. And now, Wisconsin's lakes, wildlife, and citizens are suffering the consequences of these inadequate regulations.

## Changes in Shoreland Development

NR115 has not been meaningfully updated since the 1960s, but development around lakes has transformed in the last 45 years. Today, 60% of previously undeveloped lakes 10 acres or larger are home to at least one dwelling. The number of homes on 235 lakes studied in Northern Wisconsin increased 216% between the 1960s and 1990s. And since the 1960s, development has increased 800% on lakes 500 to 900 acres large, the second-largest size of lake in Wisconsin.<sup>36</sup>

Not only has the sheer number of homes and structures increased substantially since NR115 was adopted, but development practices have changed, as well. Today, people continue to build new structures by lakes as they did in the 1960s, but now they also enlarge or rebuild existing homes while maintaining the same lot size. For example, a study in Waukesha County found that 79% of lake lot variance requests made were to enlarge or rebuild

a home.<sup>37</sup> Houses in Wisconsin are growing, but lot sizes are not, which means that less land is available to mitigate runoff pollution.

Perhaps the most significant difference between older styles of development and modern ones is the kind of structures built. Compared to the protection a natural buffer provides, a 1940s-style small or seasonal cabin has no measurable effect on the amount of phosphorous loading into lake waters, and causes only four times more sediment loading. These earlier styles of construction also include a very narrow grass corridor and a minimal amount of impervious surface area.<sup>38</sup>

But 1990s-style structures have been found to increase phosphorous inputs by more than 700% and to increase sediment loading 18 times over. They also tend to feature large, unnatural grass lawns, and greatly increased impervious surface area.<sup>39</sup>

## The Inadequacies of the Current Shoreland Zoning Rules

The current NR115 fails on several counts, but three in particular should be highlighted: regulation of natural buffer size and composition; limitation of impervious surface area; and lot size allowances. The poor regulation of these three components, taken together or separately, is a tremendous threat to Wisconsin's lakes.

### *Natural Buffers*

The natural vegetation leading up to the water's edge comprises a primary buffer. This buffer is essential to maintaining the health of a lake and of riparian wildlife. Buffers filter pollutants and nutrients, prevent erosion by holding soil in place, and provide critical wildlife habitat – as much as 90% of wildlife in lakes and streams is found along the shallow margins and shore areas.<sup>40</sup> Many studies show that the larger a buffer is, the more effective it can be in both the short- and long-term.

But too often, lakeshore property owners replace natural vegetation with smooth grass lawns, or even build right up to the water. Grass lawns do little to filter runoff pollution and virtually nothing to prevent soil erosion.

The current NR115 requires that major structures be built at least 75 feet back from the OHWM of a lake or other body of water, and that the 35 feet closest to the water's edge be left a buffer. But NR115 only stipulates that this buffer not be clear-cut – as long as a homeowner leaves a few shrubs or trees in place, he or she remains within the law. In many cases, buffer zones are all but clear-cut, and while legal, do little to protect the lake from pollutants like

phosphorous. The current NR115 allows far too much of a lake's natural buffer to be destroyed, leaving lakes defenseless in the face of harmful human activities.

Moreover, the 35-foot requirement would be insufficient even if buffers were required to remain largely unchanged, because a buffer this size cannot adequately mitigate the impacts of runoff pollution. According to one study, even a buffer of 40 feet allows as much as 40% of the phosphorous that runs off of shoreland to enter a lake.<sup>41</sup> Another study found that a minimum buffer size of 49 feet was necessary to provide any meaningful protection from stormwater runoff.<sup>42</sup> Given this evidence, a minimum buffer requirement of 50 feet is necessary to adequately protect our lakes from the dangers associated with shoreland development.

### *Impervious Surfaces*

As defined in s. NR 151.002 of the Wisconsin Administrative Code, an impervious surface is “any paved or structural surface that limits or impedes infiltration or causes additional runoff.”<sup>43</sup> Common examples of impervious surfaces include roofs, driveways, decks, patios, parking lots,

## ***A Business-Owner's Perspective...***

Mike Buroker, Owner

Buroker's Taxidermy, Bait and Tackle, Eau Claire

“Everyone knows that our lakes are overdeveloped, and we can't undo what's already been done. But I wish people would soften it a little – put in natural trees and vegetation, and make it look a little nicer. I like natural shoreline. We have a lot of people who want to live on our lakes and to use this resource, but if we don't do something to protect the lakes, there's a good chance future generations won't enjoy lakes as we do today.”

and walkways. The current NR115 does not regulate impervious surfaces at all.

Impervious surfaces increase the amount of runoff entering a lake. These surfaces are “impervious” because they cannot be penetrated by water, and therefore also cannot filter out pollutants. According to Lynn Markham, “impervious surfaces significantly increase the amount of runoff [entering lakes] and the speed it moves across the landscape.”<sup>44</sup>

This increase, in turn, allows runoff to carry far more phosphorous and sediment into a water body, which contributes to water quality problems. Studies show that if more than 10 to 15% of a lakeside lot is impervious, both water quality and wildlife populations are significantly damaged.<sup>45</sup>

The proximity of impervious surfaces to the water’s edge can also lead to increased water pollution. A study of 47 watersheds in southeast Wisconsin found that the effect of one acre of impervious surface within 100 meters (about 330 feet) of a stream was equivalent to that of 10 acres of impervious surface more than 100 meters from the stream.<sup>46</sup> That is, the closer building occurs to the water’s edge, the greater the impact on water quality and wildlife habitat.

As development has changed, the amount of impervious surface near lakes has skyrocketed – as has the amount of runoff pollution. The lack of NR115 regulation of impervious surfaces is

another factor leading to the degraded lakes we see today in Wisconsin.

### *Lot Size*

In order to sell and develop lakeshore land, it must be divided into lots. Larger lot sizes are protective, but small lots leave less land to filter runoff pollution and protect water quality. Small lots also allow houses to be built closer together and permit a larger proportion of a lot to be covered by impervious surface.

The current NR115 provides for minimum lot sizes, the purpose of which is to manage development density, preserve animal habitat, and protect natural

scenic beauty. Under the current NR115, a sewered lot must have a minimum average width of 65 feet and a minimum area of 10,000 square feet. Unsewered lots must have a minimum average width of 100 feet and a minimum area of 20,000 square feet. These standards apply to single-unit and multi-unit dwellings, alike.<sup>47</sup>

The standards of the current NR115, however, are not adequate to the job. The benefits to water quality that sewered lots may bring are offset by the additional density smaller lots allow. This density not only increases impervious surfaces and phosphorous pollution carried in runoff, but also damages wildlife habitats.<sup>48</sup>

Moreover, the current standards do not differentiate between single-unit



*An example of buffer destruction and excessive impervious surface on the Waupaca Chain of Lakes. (Credit: Bob Korth)*

structures like family cottages, and multi-unit structures like resorts, condominiums, and hotels. These structures have a far greater impact on lakes and the surrounding vegetation because of their larger size and the large number of people who use them.

## Conclusion

Shoreland land is a lake's last line of defense, and the closer development occurs to the water's edge, the greater its impact can be. The current shoreland zoning rules do not adequately protect lakes from the pollution development can cause and in many cases may exacerbate it. The longer we leave these



*Small lot sizes lead to dense housing and overcrowded lakes. (Credit: Bob Korth)*

problems unaddressed, the more serious they may become for the environment, for public health, and for the economy. The need for immediate improvements to NR115 is clear.

# The Solution: Stronger Shoreland Zoning Rules

## The Importance of Statewide Minimums

The current shoreland zoning rules provide a set of minimum guidelines that must be met in all unincorporated areas of Wisconsin. While the needs of watersheds vary from area to area, statewide minimums are necessary to protect both lakes and the counties that govern them. Statewide rules ensure a minimum level of protection for lakes in all counties, whether or not counties have already adopted even stronger protections. Overdevelopment is a statewide problem that requires a statewide solution.

As Lynn Markham has put it, “based on current conditions and knowledge, NR 115 is clearly not sufficient to protect Wisconsin’s lakes.”<sup>49</sup> Every county should have the right and ability to tailor its shoreland zoning ordinance to its specific needs, but no county should be able to endanger public waters, or to give local developers an unfair economic advantage by holding them to lax regulations. An adequately protective NR115 would allow counties that are already regulating shoreland development well to continue their good work, and would hold less diligent counties to an appropriately protective standard.

## Necessary Changes to NR115

An updated NR115 is necessary to ensure the health of Wisconsin’s lakes, citizens, and economy. Any new rule should include a more protective natural

buffer requirement, a meaningful limit on impervious surfaces, and revised minimum lot size standards.

### *Natural Buffer Size*

Current NR115 standard:  
35 ft. of 75 ft. setback may not be clear-cut

WISPIRG’s recommendation:  
50 ft. of 75 ft. setback should be primary buffer\*

Natural buffers are essential to the effective regulation and protection of a lake. A healthy primary buffer maintains water quality, provides flood control, creates shoreline stability by mitigating and preventing erosion, and protects aquatic and shoreline habitats. Indeed, “[f]lourishing shorelands provide some of the most effective protection for water resources in Wisconsin.”<sup>50</sup>

The buffer size necessary to protect a body of water varies with the watershed’s sensitivity and other factors such as land slope, soil quality, and adjacent land uses.<sup>51</sup> But studies show that a minimum buffer size of 35 feet – which is all the antiquated NR115 requires – is not adequate to protect even the healthiest lakes from development. While 35-foot buffers do provide “minimal control from runoff of sediments and nutrients,” they do “not provide for wildlife habitat, fecal coliform control, water temperature control, or storm-water runoff control.”<sup>52</sup>

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\* WISPIRG supports the current NR115 stipulation that for every 100 feet of lake frontage, 30 feet may be clear-cut for a corridor down to the water’s edge.

A minimum requirement of 50 feet, however, would set a more meaningful base standard to protect Wisconsin's waters. From this starting point, counties and local authorities could regulate more sensitive or unique lakes on a case-by-case basis. The updated NR115 should also clearly articulate that primary buffers should be left essentially untouched.

The multi-purpose nature of buffers further justifies the need for statewide minimums. Buffers maintain not only water quality, but also fish and wildlife habitat, and natural scenic beauty. The current standard of 35 feet is insufficient to protect all of these important factors, but a 50-foot buffer would be more adequate to the job.

This recommendation is particularly feasible because the 50-foot buffer would fit within the preexisting overall setback of 75 feet that is already required under NR115. Moreover, a strong precedent has already been set at the county level: Ashland, Barron, Bayfield, Burnett, Douglas, Langlade, and Marinette Counties have instated minimum buffer requirements of at least 50 feet, and ranging as high as 100 or 150 feet.<sup>53</sup> It is time for the state to follow the lead of its more progressive counties.

*Impervious Surfaces*

Current NR115 limitation:  
None

WISPIRG's recommendation:  
20% impervious surface maximum

The current NR115 does not provide any regulation of impervious surfaces because lots in the 1960s were far less paved-over than lots are today. But now

the need for regulation of impervious surfaces is pressing. Even 10 or 15% impervious surface coverage can do significant harm to fish populations and water quality, and many lots exceed this percentage.<sup>54</sup> The updated NR115 should include a maximum imperviousness limit of no more than 20% to provide much-needed protections for our lakes. This would provide a meaningful base off of which counties could create even stronger standards as appropriate.

Counties that have instated impervious surface standards that meet or exceed WISPIRG's recommendation include Bayfield, Calumet, Forest, Langlade, Lincoln, Sawyer, Sheboygan, and Waukesha. The respective standards are illustrated below:<sup>55</sup>

<b>County</b>	<b>Impervious Surface Limit</b>
Bayfield	Greater of 4500 square feet or 15% of lot
Calumet	15-20% <sup>*</sup>
Forest	20%
Langlade	Maximum 15% for buildings, 5% other surfaces
Lincoln	15-20%
Sawyer	15% <sup>+</sup>
Sheboygan	20%
Waukesha	10-15%

A precedent for impervious surface limitations has been set at the county level, but statewide minimums are necessary to ensure equality and protection across Wisconsin.

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\* A range indicates that the county determines impervious surface limits based on multiple criteria, and that these limits vary depending on those criteria.

<sup>+</sup> In Sawyer County, up to 25% imperviousness is allowed with a conditional use permit.

## *Minimum Lot Sizes*

Current NR115 standard:

Sewered: 10,000 sq. ft., 65 ft. avg. width

Unsewered: 20,000 sq. ft., 100 ft. avg. width

WISPIRG recommendation:

All lots: 20,000 sq. ft., 100 ft. average width

Minimum lot sizes should be increased to at least 20,000 square feet with an average width of 100 feet to allow for the tremendous impact that modern-style structures can have on lake health and scenic beauty. Larger lot sizes will protect water quality, animal and fish habitat, and natural scenic beauty. As cited above, modern homes can increase phosphorous inputs by more than 700% and sediment loading by 18 times.<sup>56</sup> But enough unpaved land will help to mitigate runoff and reduce the impact of phosphorous and other kinds of pollution. Larger minimum lot sizes will provide for this.

Moreover, the current NR115 allows for 30 of every 100 feet of frontage to be a clear-cut access corridor to the water's edge. A 30-foot corridor is far less obtrusive on a lot with an average width of 100 feet than on a lot with an average width of 65 feet. And a 10,000 square foot lot with 100 feet of lake frontage land would not have enough depth to also include a 75-foot setback and a road setback.<sup>57</sup>

Larger lot sizes should be required for multi-unit structures like resorts, hotels, condominiums because of the increased impact these structures have on lake health. While large structures were not common when the NR115 was adopted in the 1960s, today they can be

found across the state. A protective NR115 should account for the style of modern development and regulate larger structures appropriately.

Several Wisconsin counties have set impressive precedents for lot size regulation, further demonstrating that such rules can and should be implemented. For single-unit properties, Ashland, Burnett, Rusk, Sawyer, Vilas, and Washburn Counties, require lot sizes to range from 20,000 square feet with a 100-foot average width to as much as 62,500 square feet with a 250-foot average width. And Ashland, Bayfield, Burnett, Douglas, Langlade, Manitowoc, Marinette, Polk, Rusk, Vilas, and Washburn Counties all require multi-unit structures to meet higher standards for lot size than single-unit ones.<sup>58</sup>

## *The Economy*

As discussed above, stronger shoreland zoning rules will provide a necessary and important protection for Wisconsin's economy. In a state where an \$11.71 billion tourist industry depends heavily on water-based recreation, stronger lake protections make good fiscal sense. Wisconsin tourism also supports of thousands of jobs, generates billions of dollars for local governments, and millions in tax revenues.<sup>59</sup> Clean water is also essential to the maintenance of high property values.

Better shoreland zoning rules will not only protect the environment and the tourist industry, but also the overall economy of Wisconsin, saving both taxpayers and the state money in the long run.

## A Need for Action

Better shoreland zoning rules for Wisconsin are long overdue, and already over one-third of Wisconsin counties have updated their shoreland ordinances.<sup>60</sup> In the coming months, the DNR's Natural Resources Board (NRB), the state legislature, and the citizens of Wisconsin will have the chance to adopt stronger statewide shoreland zoning rules. If the NRB votes better rules out for public comment, citizens will have the opportunity to suggest improvements and alterations to the proposed rule. After this public hearing period, the NRB will be able to incorporate the public's suggestions before voting to send the rule to the Natural Resources Committees of the Senate and Assembly. From there, the rule could either be voted into law or sent to the Joint Committee for the Review of Administrative Rules (JCRAR) of the Wisconsin state legislature.

The Wisconsin Senate and Assembly will ultimately choose whether to vote a new, stronger, and more protective rule into law. Without question, they should do this. And any new rule should include:

- An increase of the minimum natural buffer size to 50 fully vegetated feet;
- An impervious surface limit of 20% of the total lot size;
- A minimum lot size requirement of 20,000 square feet with a 100-foot average width for single-unit structures; and
- Larger lot size requirements for multi-unit structures like condominiums and hotels.

The authors of a 1968 article on the dangers of excessive shoreland development wrote: "Wisconsin is concerned with shoreland problems not only because they affect the important recreation industry, but also because they prevent enjoyment of the public rights in navigable water which the state has a duty to protect."<sup>61</sup> Their words ring as true today as they did forty years ago, and should serve as a strong reminder to decision-makers in Wisconsin that our waters must be protected for the overall public good.

# Notes

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- <sup>1</sup> Thomas W. Bernthal and Susan A. Jones, Wisconsin Department of Natural Resources (WI DNR), *Shoreland Management Program Assessment*, December 1997.
- <sup>2</sup> Ibid.
- <sup>3</sup> Ibid.
- <sup>4</sup> Wisconsin Association of Lakes, Inc. (WAL), *Protecting Our Lakes and Shorelands: Talking Points*, 19 June 2002; WI DNR, *Development Trends in Northern Wisconsin* (press release), 22 October 2002.
- <sup>5</sup> WI DNR, *Shoreland Development Density and Impervious Surfaces*, 9 June 2003.
- <sup>6</sup> WI DNR, *Changing Wisconsin's Shoreland Development Standards: How You Can Get Involved* (fact sheet), 2002.
- <sup>7</sup> J. Galli. *A Liminological Study of an Urban Stormwater Management Pond and Stream Ecosystem* (M.S. Thesis, George Mason University), 1988 in WI DNR, *Shoreland Development Density and Impervious Surfaces*, 9 June 2003.
- <sup>8</sup> Susanne Quick and John Fauber, "Brain Toxin Found in Algae in Water," *Milwaukee Journal Sentinel*, 4 April 2005.
- <sup>9</sup> "Dog Dies After Swimming in Lake Kegonsa," [www.channel3000.com/news](http://www.channel3000.com/news), 11 June 2004.
- <sup>10</sup> Dane County Executive's Office, *Dane Co. Public Health Closes Beach at Lake Kegonsa State Park After Water Samples Show High Level of Blue-Green Algae* (press release), 8 June 2004.
- <sup>11</sup> Don Behm, "Coroner Cites Algae in Teen's Death," *Milwaukee Journal Sentinel*, 5 September 2003.
- <sup>12</sup> WAL, *Protecting Our Lakes and Shorelands: Talking Points*, 19 June 2002
- <sup>13</sup> James E. Woodford and Michael W. Meyer, "Impact of Lakeshore Development on Green Frog Abundance," *Biological Conservation* 110, 2003.
- <sup>14</sup> See note 5.
- <sup>15</sup> See note 12; WI DNR, *Development Trends in Northern Wisconsin* (press release), 22 October 2002.
- <sup>16</sup> See note 6.
- <sup>17</sup> See note 12; WI DNR, *Development Trends in Northern Wisconsin* (press release), 22 October 2002.
- <sup>18</sup> D.E. Schindler, S.I. Geib, and M.R. Williams, "Patterns of Fish Growth along a Residential Development Gradient in Northern Temperate Lakes," *Ecosystems* 3: 229-237, 2000. in WI DNR, *Changing Wisconsin's Shoreland Development Standards: How You Can Get Involved* (fact sheet), 2002.
- <sup>19</sup> WI DNR, *Revising Wisconsin's Shoreland Management Program* (Presentation to Advisory Committee), November 2003, available at [www.dnr.state.wi.us](http://www.dnr.state.wi.us).
- <sup>20</sup> See note 6.
- <sup>21</sup> See note 5.
- <sup>22</sup> See note 1.
- <sup>23</sup> Ibid.
- <sup>24</sup> Lee Bergquist, "Study Finds Big Payoff in Clean Water," *Milwaukee Journal Sentinel*, 12 March 2005.
- <sup>25</sup> Lynn Markham, Shoreland and Land Use Specialist, UW-Extension Center for Land Use Education, personal communication, 28 March 2005.
- <sup>26</sup> Ibid.
- <sup>27</sup> Ibid.
- <sup>28</sup> University of Wisconsin-Extension, et al. "Protecting Our Living Shores," *The Shoreland Stewardship Series* (no. 3), 2003.
- <sup>29</sup> See note 24.
- <sup>30</sup> See note 29.
- <sup>31</sup> Wisconsin Department of Tourism (WISOT), *The Economic Impact of Expenditures By Travelers on Wisconsin Calendar Year 2003*, March 2004.
- <sup>32</sup> See note 19; See note 32.
- <sup>33</sup> See note 19.
- <sup>34</sup> See note 4.
- <sup>35</sup> See note 1.
- <sup>36</sup> WI DNR, *Development Trends in Northern Wisconsin* (press release), 22 October 2002.
- <sup>37</sup> Ibid.
- <sup>38</sup> See note 4.
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- <sup>40</sup> Ibid.
- <sup>41</sup> Alan Desbonnet, et al., Costal Resource Center, Rhode Island Sea Grant, University of Rhode Island, *Vegetated Buffers in the Costal Zone: A Summary View and Bibliography*, 1994.
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- <sup>43</sup> WI DNR, *Proposals to Update Wisconsin's Shoreland Management Program* (NR 115 Advisory Committee Preliminary Recommendations), December 2003.
- <sup>44</sup> See note 25.
- <sup>45</sup> See note 6.
- <sup>46</sup> See note 5.
- <sup>47</sup> See note 6.
- <sup>48</sup> See note 1.
- <sup>49</sup> See note 25.
- <sup>50</sup> University of Wisconsin-Extension, et al. "Protecting Our Living Shores," *The Shoreland Stewardship Series* (no. 2), 2003.
- <sup>51</sup> WI DNR, *Shoreland Setbacks and Buffers*, 21 January 2003.
- <sup>52</sup> See note 4; See note 37.
- <sup>53</sup> Elizabeth Moriarty, WISPIRG Legal Intern, Research May-July 2004.
- <sup>54</sup> See note 4; See note 37.
- <sup>55</sup> Source for table information: See note 53.
- <sup>56</sup> See note 4; See note 37.
- <sup>57</sup> See note 53.
- <sup>58</sup> Ibid.
- <sup>59</sup> See note 19.
- <sup>60</sup> See note 6; See note 5.
- <sup>61</sup> See note 1.