

Governor's Clean Water Initiative: Shoreland Standards Update Project

Article Number 1

Your Lake, Our Lakes: We Need Modern Shoreland Standards

By Paul Radomski and Russ Schultz

In 1939, logging was still the most common activity around many lakes in Minnesota's lakes areas. For example, in a 1939 DNR aerial photograph of White Sand and Perch lakes now in the city of Baxter in the Brainerd Lakes Area, one can see logging of jack pine. Only one house on White Sand Lake and a handful on Perch Lake are visible in this photograph.

Things have changed. Today both lakes have more than 20 homes per shoreline mile, and the forest watershed has been converted to buildings, lawns, and pavement. But, has this landscape change resulted in a degradation of lake quality? Unfortunately the answer is yes for many lakes in north central Minnesota. Today's development pressures are outpacing the state's 1970s-era shoreland development standards.

Many of us use our memories to determine how the lake we live on or the lake we visit has changed. Scientists, however, can use paleolimnology techniques, which allow reconstruction of past conditions. Their studies have documented the consequences of shoreland development on lake water quality.

These studies usually show several key events for a lake.

- First, in many lakes, there is an increase in lake sediment accumulation in the early 20th century due to logging and other land disturbances.
- Second, the initial shoreland development on a lake generally had minimal impact on lake water quality.
- Third, the highest sediment accumulation often occurred during the peak construction phase of converting shoreland cabins to year-round homes. Water clarity may have remained stable, however, in many low-alkalinity lakes, water clarity decreased with development.
- These studies found no difference in phosphorus levels or water clarity from 1750 to 1995 for Itasca County lakes, but substantial increases in phosphorus levels and resulting decreases in water clarity were found for this same time period for central Minnesota lakes due to urbanization or agriculture.

In addition to water quality degradation, there is loss of habitat. Initially the greatest impact of shoreland development is habitat alterations, which results in declines in fish and wildlife populations. Then, as a lake's watershed becomes more urbanized, nutrient levels increase and water clarity decreases due to pollutant runoff, poor stormwater management, and shoreline phosphorus inputs from shoreland septic systems and lawns to the lake.

The north central lakes region is growing fast, and the rate of development is predicted to increase. Many people are concerned about the consequences of poor development on water quality and fish and wildlife habitat. They should be.

However, development done right can reduce the negative consequences, while increasing property values. In addition, for some deeper lakes that are resilient to the additions of nutrients and pollution, restoring shoreline vegetation, rehabilitating rainwater infiltration in the watershed, and using conservation or low-impact development designs may reverse lake quality degradation.

The State of Minnesota sets minimum shoreland development standards that guide the use and development of shoreland property. These guidelines include minimum lot size, minimum water frontage, building setbacks, and subdivision and planned unit development regulations. The intent of these standards is to preserve and enhance the water quality, conserve the economic and natural environmental values of shorelands, and provide for wise use of water and land.

However, these standards were developed in 1970 when small cabins were the predominant form of development. These shoreland standards needed to be updated to provide better tools to address water quality declines and habitat losses, while reflecting local resource conditions and needs.

The Governor's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. The Alternative Standards may serve as model for local governments to adopt into their administered ordinances. Details of the shoreland standards update project can be found at: <http://www.dnr.state.mn.us/waters> [click on the Shoreland Standards Update link], and comments can be emailed to shorelandupdate@dnr.state.mn.us.

Paul Radomski, research scientist, and Russ Schultz, hydrologist, both work at the DNR at the Brainerd area office.

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Article Number 2

Your Lake, Our Lakes: Lawn-to-lake shorelines no longer are ecologically smart

By Paul Radomski and Russ Schultz

Many people like to look out across a beautiful lake or enjoy nature by fishing or boating. You can see the evidence of this on the highways heading north out of the cities on Friday afternoon. Visitor surveys note that the top reason people visit the area is to escape to natural areas.

Perhaps we should not put our best asset at risk. In a recent survey of Minnesotans, 85% cite development as a cause of decline in scenic quality. But, development does not have to harm scenic quality.

All of us, personally and as a community, can protect our lakes and shorelines, through individual acts and through shoreland development standards and ordinances that regulate development around our lakes.

Recent research has shown that current shoreland rules are not providing enough protection. There are approximately 225,000 residential lake lots in Minnesota. And, while most lakeshore owners leave or restore native vegetation along the shore, more than 25% have a mowed lawn down to the lake. The cumulative impact of those lawns is substantial.

Biologists have found that the trees, shrubs, and the forest understory near the shore declined over time on developed shoreline. This change in lakeshore habitat leads to different bird communities. Common suburban-style birds like chickadees, blue jays, and grackles replace the uncommon 'species of special concern' birds like warblers and vireos along developed shores.

The loss of trees along shore means less trees that fall into the water. Fallen trees provide habitat for fish. Biologists have determined that this loss of trees due to development will negatively affect fish for centuries.

Green frogs, which are often common along shore, disappeared where development exceeded 30 homes per mile (or where the average lot width is 180 feet). Male green frogs establish breeding territories within two feet of the lake's edge, and disturbance to the shoreline vegetation eliminates their habitat.

Jeff Reed, a biologist studying crappie nesting in three Alexandria area lakes, found only 24 of the 897 crappie nests near developed shoreline. Crappies were selecting undeveloped shorelines for their spawning and nesting activity at significantly higher

rates. Why? Nearly 90% of the crappie nests were near bulrush, and this emergent plant is sensitive to recreational activity and often declines near developed shore.

Hydrologists and chemists have also found interesting differences with the 'lawn to lake' style of shoreline compared to a native vegetated shoreline. Rainwater runoff from 'lawn to lake' shoreline was measured to be 5 to 10 times higher than forested shorelines. The 'lawn to lake' shoreline allows 7 to 9 times more phosphorus to enter the lake than a more natural native vegetated shoreline. Phosphorus is plant nutrient, and more of it entering the lake means more algae resulting in lower water clarity.

A lawn down to the lake is bad. It diminishes fish and wildlife, reduces water quality, and degrades the scenic quality of the lake. Because of this, many people are seeking higher shoreline vegetation standards that local communities can add to their ordinances.

For example, new standards could require lakehome owners to preserve or establish a native forest buffer along the lake. The timber harvest industry and farmers, must leave a vegetative buffer along lakes to protect water quality. To be fair, why not require the same of lakehome owners?

Alternatively, some people suggest incentives are needed to promote good shoreline management. Burnett County in Wisconsin has an interesting incentive program. To protect forest buffers along lakes, Burnett County gives participants a one-time payment of \$250 and an annual \$50 property tax credit in exchange for the landowner's agreement to maintain a minimum 35-foot forested buffer next to the lake.

Your shoreline is a portrait of your values and ecological wisdom. A forested shoreline shows that you understand your duty to our lakes. Citizens working on the Shoreland Standards Update project understood their community responsibility, and they recommended both higher shoreline vegetation standards and incentive programs to protect our lakes.

The Governor's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. Details of the Shoreland Standards Update project can be found at: <http://www.dnr.state.mn.us/waters> [click on the Shoreland Standards Update link], and comments can be emailed to shorelandupdate@dnr.state.mn.us .

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Article Number 3

Your Lake, Our Lakes: Shorelands Deserve Conservation Designs for Subdivisions and Planned Unit Developments

By Paul Radomski and Russ Schultz

Shorelands are Minnesota's greatest asset, and they are easily degraded. Traditional lot and block development and Minnesota's current planned unit development standards are not preserving our shoreland asset.

Conventional subdivisions with uniform lots and blocks spread development throughout a parcel of land without considering natural or cultural features. And planned unit developments (PUDs), which were encouraged under Minnesota's 1970s-era shoreland development standards, allowed greater home densities along the lake with the expectation of preserving open space. Unfortunately, these standards have given us higher densities near the water, with few useful natural features preserved for recreation or wildlife habitat.

One good development alternative is conservation subdivisions. This method of development is characterized by clustering homes adjacent to permanently preserved common open space.

Conservation subdivisions are similar to golf course developments. First, critical natural areas and community recreational areas are identified and protected. Then, buildable areas are identified and a majority of the lots and homes are clustered around these protected areas.

Developers can still build at full residential densities, and they often sell lots at a premium because many of us prefer living next to permanently preserved open space.

Conservation subdivisions have additional benefits. They create a greater sense of community and more interaction with the outdoor environment. Open spaces provide walking and biking areas, play areas, and community gathering places. Protected natural areas mean lower development costs, preservation of wildlife habitat, and less pollution runoff into lakes and wetlands.

All this leads to both higher property values and higher community value, which strengthens local economies. In addition, these developments do not require public entities or charities to establish open space areas for our communities.

Planned unit developments were envisioned to achieve the same benefits as conservation subdivisions, however, the 1970s-era open space standards were ambiguous and weak. Thus, many of the open space amenity benefits never were realized.

Many people sought higher standards for planned unit developments that local communities can add to their ordinances. These new standards define clustering, include both quantity and quality of open space, and use residential housing densities without density bonuses.

New standards also include density disincentives for conventional subdivisions, so developers who do not include community open space would need to use significantly larger lots.

The Governor's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. Citizens that worked on the Shoreland Standards Update project recommended higher planned unit development standards and the new conservation subdivision standards to protect lake water quality. The Alternative Standards could serve as the foundation for local government administered ordinances.

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Article Number 4

Your Lake, Our Lakes: Where does the Rainwater go?

By Paul Radomski and Russ Schultz

If you are concerned about lake water quality, then you should ask, where does each raindrop go once it falls in the lakes area? How many raindrops are infiltrating into the ground near where they fell? The more raindrops that infiltrate where they fell, the better water quality will be for our lakes.

The Pollution Control Agency has estimated that about a quarter of the area lakes do not fully meet aquatic recreational use criteria due to excessive nutrients running into them. Nationally, the U.S. Environmental Protection Agency has determined that poorly managed rainwater is responsible for 15 percent of lake impairments.

Rainwater runoff originates from our roads, parking lots, roofs and lawns. Rainwater that does not infiltrate into the ground or evaporate runs down hill to our lakes or lake inlets. Runoff carries pollutants, such as oil, pesticides, suspended solids, pet waste and nutrients. However, if the water infiltrates into the ground, the soil and plants can clean it.

Nutrient additions to a lake increase with the intensity of land use. When nutrient levels increase in a lake, water clarity decreases due to an increase in algae. One predictor of nutrient runoff to our lakes is the amount of impervious surface coverage.

Your home's roof is an impervious surface, as is your paved driveway and other constructed hard surfaces that prevent or retard rainwater infiltration. Impervious surfaces inhibit recharge of groundwater, and they provide an express route for pollutants to our lakes.

As impervious surface coverage increases on a lot or in a watershed, the amount of nutrients entering our lakes increases linearly. Hydrology research consistently shows that when impervious surface coverage exceeds about 12 percent, water quality is negatively impacted.

In areas with low amounts of imperviousness, only 10 percent of the rainwater runs off. Around our more developed lakes, 50 percent of the rainwater becomes runoff.

There are two ways to manage rainwater. The traditional way has been to move water off fast. The "five C's" were the predominant rainwater management philosophy: collect, concentrate, convey, centralize and control. This approach uses stormwater sewers, pipes and ponds. Unfortunately, after we used this expensive approach across many areas, civil engineers found that the approach did not work well. Often, the only outcome was the creation of larger problems downstream or downhill. The traditional way is now seen as a failed system.

The new way of managing rainwater is to get the water into the ground near where it falls. This approach uses infiltration basins, rain gardens, grass overflow parking areas, grass swales, porous or pervious pavers, parking lot infiltration islands and overall less imperviousness. The key principle of this new way to deal with rainwater is to get back to infiltrating most of the rainwater where it falls, with only 10 percent running off. This approach reduces pollutants and nutrients entering into our lakes, thus protecting the lake water quality.

This new way is small-scale and decentralized, and it mimics the natural hydrologic cycle. In addition to infiltration basins, rain gardens and other practices, the approach also includes protecting natural areas important for water transport and filtering, such as wetlands, streams and vegetated buffers near water.

Homeowners can use rain gardens to manage rainwater on their property. Rain gardens are landscaped areas planted with wild flowers and other native vegetation that soak up rainwater coming right off the roof and driveway. The rain garden fills with water after a rain, and the water slowly infiltrates rather than contributing to the runoff problem.

Cumulatively, numerous rain gardens in a neighborhood can have substantial positive environmental benefits. They can reduce drainage problems and pollutants entering lakes and streams, and they can recharge groundwater and create bird and butterfly habitat.

In the lakes area, many governments and people concerned about degrading lake water quality are looking for more effective, less expensive rainwater management systems.

The Governor's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. Citizens that worked on the Shoreland Standards Update project recommended higher rainwater management standards to protect lake water quality. The Alternative Standards developed by this project could serve as the foundation for local government ordinances.

Details of the Shoreland Standards Update project can be found at: <http://www.dnr.state.mn.us/waters> [click on the Shoreland Standards Update link]. Email comments to shorelandupdate@dnr.state.mn.us .

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Article Number 5

Your Lake, Our Lakes: Resorts are important to Minnesota

By Paul Radomski and Russ Schultz

Minnesota is blessed with hundreds of lake resorts. Families from across the country and abroad spend time at these wonderful places to connect with nature and reaffirm family ties.

Resorts provide us the opportunity to live near a lakeshore, even though it is usually for only a short time. And given the increasing cost of lakehome ownership, resorts represent an affordable way for many of us to explore our lakes. Minnesota resort vacations offer a range activities, from viewing wildlife, swimming and waterskiing, catching fish, exploring nearby small communities, playing golf, to getting away from the daily routine. Accommodations range from suites to rustic cabins.

Minnesota resorts have adapted to changing vacation styles and demands. In the early 1900s, lake resorts hosted vacationing families and were often retreats for wealthy city dwellers. In the mid part of the last century, the typical up north resort consisted of small lakeside cabins to serve the simple and rustic needs of fishermen. Today, resorts cater both to middle-class and wealthy families seeking recreation in natural environments. Resorts have also adjusted to different lengths of vacation, from several weeks to the average of four days today.

Resorts are also vital to our north central Minnesota economy. Resort visits annually generate millions of dollars to local economies. And their guests contribute to the success of other businesses when they explore restaurants, shops, and local entertainment.

While there are several large resorts in the state, many of which are located in the Brainerd Lakes Area, 90 percent of the resorts in north central Minnesota have less than 20 cabins. About half the resorts are 10 acres or less in size, and most resorts are seasonal, being fully operational from May to September. Most resorts are also family businesses. Many of these entrepreneurs have gross sales between \$25,000 and \$100,000. While it is a hard job, there are considerable lifestyle and family benefits of owning a resort.

The increasing value of lakeshore property negatively affects resort properties. For some resorts the land value of the resort exceeds the value of the business. Add this factor to increasing operating costs from higher insurance and the necessity for more amenities for guests, resort owners face issues of sustainability.

Resort owners have told us about the need for flexible shoreland development regulations for Minnesota's resorts. Currently, resorts are classed as planned unit developments within Minnesota's shoreland development standards, and thus, they are similarly classed in many local ordinances across Minnesota. However, many people are now seeking

higher standards for planned unit developments that local communities can add to their ordinances. These new standards could define clustering, include both quantity and quality of open space, and use residential housing densities without density bonuses.

Such changes, while needed to address shortcomings of existing planned unit development standards, are not appropriate for resorts. Given their cultural and economic value to the state, creating standards specific to resorts that give flexibility, while improving rainwater management and promoting natural shorelines, would be beneficial.

Governor Pawlenty's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. Citizens that worked on the Shoreland Standards Update project recommended specific resort standards that offer protection to lake water quality, while addressing the interests of resort owners. The Alternative Standards could serve as the foundation for local government ordinances.

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Article Number 6

Your Lake, Our Lakes: The Science of Septic Systems

By Paul Radomski and Russ Schultz

We drain our sinks and flush our toilets without thinking about where the waste goes. For many people living around lakes, sewer systems are not available. They must rely on Individual Sewage Treatment Systems (ISTS), commonly called septic systems, to treat and disperse waste and recycle water.

A septic system consists of a septic tank and a drainfield. The septic tank captures solid material and anaerobic bacteria decompose some of the solids. The wastewater that leaves the septic tank, or effluent, contains significant amounts of pathogens, pollutants, and nutrients, such as nitrogen and phosphorus. The drainfield, with a system of perforated pipes, distributes the effluent to a large area so that aerobic bacteria can further break down pathogens and the soil can absorb phosphorus and filter the effluent.

Septic systems that are properly installed and maintained in areas with appropriate soils do meet public health standards. However, septic systems have limited capabilities and have the potential to pollute groundwater and lakes.

Conventional septic systems are relatively ineffective in removing nitrogen. Nitrogen (in the form of nitrate) can flow with groundwater through the soil and end up in well water or lakes. Nitrate in drinking water increases the risk to infants of methemoglobinemia, or blue baby syndrome. Nitrate that gets into the lake will increase aquatic plant and algae growth.

Phosphorus is another concern because it is usually the limiting nutrient for lake algae. One pound of phosphorus can produce 500 pounds of algae. A household produces about two pounds of phosphorus per person each year, and it is discharged to septic systems. Conventional septic systems can be effective at removing phosphorus. Drainfield soils usually absorb or mineralize phosphorus. However, certain soil conditions and close proximity of drainfields to lakes can result in phosphorus pollution.

The Minnesota Pollution Control Agency has found that elevated phosphorus concentrations in groundwater are usually within 50 feet from functioning septic systems. However, some phosphorus plumes have been found to extend 66 feet from drainfields. Other evidence suggests that drainfields should be at least 100 feet from the lake to minimize the risk of phosphorus reaching the lake.

Maintenance of septic systems is critical. Sludge builds up in the septic tank and should be pumped out every two to three years. If sludge accumulates to the level of the outlet pipe, clogging will occur. This will damage the drainfield, reducing the life expectancy of the system. Drainfields can also fail when they are overloaded, either with too much water or with garbage disposal waste in volumes higher than designed for the system.

The average life of a drainfield is 10 to 20 years. Minnesota shoreland development standards require that each residential lot in areas not served by sewer systems have sufficient area for two septic systems. This provides one backup area for system replacement when the drainfield fails. For sensitive lakes or places with poor soils for drainfields, higher standards may be necessary to accommodate permanent and year-round housing.

Lakehome owner management of septic systems is sometimes inadequate. Regular pumping of the septic tank is needed to minimize pollution problems. Some areas have developed comprehensive management programs that track routine maintenance and compliance with public health standards. These programs can save homeowners money, because regular maintenance and inspection costs are much less than replacement of failed systems.

New septic systems are available that provide additional treatment of septic tank effluent. Recirculating sand filters, aerobic treatment systems, and peat filters can prolong the life of drainfields. Information on these systems, plus tips on septic system operation and maintenance can be found online at the Water Resources Center at <http://septic.umn.edu>.

Minnesota has rules for location, design, installation, maintenance, and use of septic systems. Minnesota shoreland development rules also specify septic system setbacks from lakes and rivers. Given recent research on phosphorus migration from septic systems, existing setbacks that are less than 100 feet may be insufficient.

Governor Pawlenty's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. Citizens that worked on the Shoreland Standards Update project recommended higher sanitary standards to protect lake water quality. The Alternative Standards give local governments options for use in local ordinances.

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Article Number 7

Your Lake, Our Lakes: Boat density can be a problem

By Paul Radomski and Russ Schultz

We are often contradictory in our opinions of lake development. We want to preserve the natural character of our lakes, yet we don't like limits to development. We do not want others to infringe on our freedom to enjoy our lakes, yet we want additional regulations on those who detract from our experiences. Our population continues to grow unabated and the miles of shoreline remain static, so conflict arises.

Today's human demand exceeds available natural resource supplies, whether it is ducks, sunfish, or lakeshore. The economics of supply and demand produce higher costs for lakeshore property, greater need for public boat launches, and more interest in private boat mooring areas. Increasingly, this leads to conflicts that are difficult for governments to address.

How many boats are too many? Safety standards for boat density vary; however, two common standards are 20 acres per boat on lakes with high-speed watercraft and 9 acres per boat on small lakes with low-powered watercraft.

Most north central Minnesota lakes currently do not exceed those standards. One can estimate when boat densities may approach or exceed standards. DNR boat surveys show that 10 percent of the total number of lakehome owners are out boating during high use weekend afternoons.

If every lake in the state had the maximum number of lakehomes (using existing state shoreland standard lot dimensions) and 10 percent of those lakeshore residents would be boating on nice summer weekends, a large percentage of our lakes would exceed safe boating capacity.

Many Midwest lakes already exceed safe boating capacities, and several Minnesota lakes have also reached that point. Naturally, local governments have responded to overcrowding with regulations for those waterbodies to promote safe enjoyment of these public spaces.

For example, Lake Minnetonka has an ordinance related to boating activity, including size of watercraft, no wake zones, quiet times, speed of watercraft, and docking. In addition, mooring areas and multiple dock areas are regulated on Lake Minnetonka so that boat density criteria and goals are obtained.

White Bear Lake also has a docking ordinance to deal with overcrowding. And recently, Wisconsin DNR discussed the merits of limiting boat docking to two boat slips per the first 50 feet of shoreline and one slip for each additional 50 feet of shoreline owned.

Local governments are also debating the wisdom of controlled access lots. Controlled access lots give accesses to public waters for owners of non-lakeshore lots. Both Crow Wing and Cass counties prohibit the use of controlled access lots.

DNR has created many public boat launching facilities across Minnesota, so that all of us have good public access to hundreds of fishing lakes. Thus, the often-cited reason for the allowance of these lots appears no longer relevant. And given that future development may result in potential overcrowding, the creation of additional controlled access lots may not be appropriate.

Governor Pawlenty's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. Citizens that worked on the Shoreland Standards Update project recommended prohibiting the use of controlled access lots and their derivatives. The Alternative Standards give local governments options for use in local ordinances.

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Article Number 8

Your Lake, Our Lakes: Variances must not alter the local character of a place

By Paul Radomski and Russ Schultz

You spent your hard-earned money on a lake lot where you want to build your dream retreat. Unfortunately, you find out you need a variance. What is a variance, when can it be granted, and what conditions may be imposed on a variance to protect adjacent property owner values and the public interest?

A variance is a process that governments use to give citizens the permission to break their own zoning ordinance rules for reasons of exceptional circumstance. Variances can only be granted when they are in harmony with the intent of the ordinance. In Minnesota, granting of variances also depends on determination of undue hardship. Undue hardship, as defined by Minnesota law, requires three conditions.

First, the property can't be put to a reasonable use if used under conditions of the ordinance. For example, if a substandard lot was created, you perhaps would not receive a variance to build a lakehome because you still could use the lot reasonably as a picnic site and a place to access the lake. Alternatively, say a property owner had a 25,000 square foot lot where 30,000 square foot lots are required, a variance to allow a building site might have a good chance of being granted.

Second, undue hardship also means that your predicament is due to circumstances unique to the property, not something you created. For example, you built a lake cabin on the lot so that the place you wish to now build your garage or addition would be closer to the lake than the required setback. You created this dilemma, and a variance might not be granted. Whereas, say a small wetland was in the middle of your lot and you request a variance such that you could build your cabin closer to the lake than the required setback. Here, since your predicament is due to the natural character of your lot, you might receive a variance.

Third, if a variance was granted it would not alter the essential character of the locality. For example, you wish to built a large, tall home on the lake that would exceed the maximum height of structures allowed of 35 feet. If the character of development in the area is mostly single story homes less than 35 feet, it is possible that a variance might not be given since a large visually dominating structure might be perceived as altering the character of the area.

All these three conditions must be considered and applied to each variance request, and the burden of establishing undue hardship rests with the person requesting the variance. And under law, economic or financial hardship alone does not constitute a hardship.

In addition, no variance can be granted that would allow any use that is prohibited in the zoning district in which the property is located. For example, you could not receive a variance to allow a commercial use in a residential district that prohibits commercial uses.

A Board of Adjustment grants or denies variance requests. People who serve on these boards deserve a lot of respect. They must make difficult, impartial decisions that often are subjective. They must determine the facts, apply the criteria in the ordinance, examine alternatives, consider conditions, make a reasoned and objective decision, and document the process. Board decisions have important consequences. Zoning ordinances and their compliance over time defines a community, and when done right they can increase the economic and natural resource value of an area.

Governor Pawlenty's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. Citizens that worked on the project recommended various conditions be attached to variances to mitigate water quality impacts of shoreland development and to protect adjacent property values. The Alternative Standards give local governments options for use in local ordinances.

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Article Number 9

Your Lake, Our Lakes: Identifying sensitive shorelines allows for greater protection

By Paul Radomski and Russ Schultz

Not all shorelines are created equal. This is true both in the eyes of men and fish.

For many of us, the perfect lakeshore has a gentle slope, clean and clear water, a sand beach with no aquatic vegetation, and a reasonable distance to deep water for boat access. Lakeshore lots with these characteristics demand more in our free economic market.

Fish, who have no regard for our economics, do not generally share our preferences in shorelines. Clean water, of course, is as important, if not more important to fish, but they need more than water, just like birds need more than air.

All fish are dependent on the shore at one time in their life. And for many fish species, a sand beach is not desirable habitat. Walleyes, for example, select clean, wave-washed gravel and cobble shorelines for spawning.

Northern pike move into the shallows to spawn after the ice breaks up. Eggs are deposited on last year's emergent vegetation in 6 to 10 inches of water. Fertilized eggs hatch in 12-14 days. A newly hatched fry, which does not have a developed mouth, hides in the vegetation using a sucker-type membrane on the top of the head to adhere to vegetation. As it grows it feeds on plankton, insects, and then small fish (darters, minnows, and perch). This young northern pike will stay in the vegetation all summer to avoid being eaten by predators.

Many fish and amphibians choose bulrushes for spawning. Fish and wildlife depend on aquatic plants for food and shelter. So, areas rich in aquatic and wetland plants are often viewed as sensitive or critical shoreline areas.

Areas that provide habitat to unique and valuable wildlife species are also sensitive shoreline areas. Loons will not likely nest on a groomed and manicured beach – they prefer to nest near shore on vegetated hummocks, small islands, or masses of emergent vegetation.

And, shoreline areas with clean gravel used by walleye as spawning sites may also be considered a sensitive or critical shoreline area.

Shorelines along lakes may vary greatly with a variety of ecological characteristics that provide varying habitats for wildlife and fish species, and performing different water quality functions. Yet, state shoreline rules treat all shoreline within a lake class the same.

Determining where significant fish and wildlife habitat occurs is helpful in regulating shoreland and public waters development, including structures, bridges, culverts, water alterations, excavation, and destruction of aquatic plants.

Other states identify and map significant fish and wildlife shoreline habitat. Wisconsin has a sensitive area designation program which identifies and protects key fish and wildlife habitat and provides specific management recommendations to lake organizations, shoreline property owners, county zoning officials, DNR personnel, and others.

Here in Minnesota, Cass County started a pilot project on six lakes to study the feasibility of zoning by shoreline sensitivity. The county developed criteria for determining resource protection (or critical area) districts, and has applied the criteria to the pilot lakes. The county held public hearings on this approach of protecting significant fish and wildlife habitat, and it is evaluating the feedback it received.

The state of Minnesota could also establish a program to identify and map fish and wildlife shoreline habitat so that shoreline rules and standards could protect sensitive or critical shoreline areas. For example, lot sizes, structure setbacks, shoreline and lake vegetation alteration rules could be more protective in sensitive areas.

Governor Pawlenty's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. Citizens that worked on the project recommended higher standards for sensitive or critical shorelines. The Alternative Standards give local governments options for use in local ordinances.

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Article Number 10

Your Lake, Our Lakes: Loss of ducks with development

By Paul Radomski and Russ Schultz

Hunters and bird watchers are wondering what is happening to duck populations. There appears to be fewer ducks nesting in the local area and fewer migrating ducks stopping over. Minnesota's breeding duck population has been at historical low levels, according to recent annual aerial survey data. The recent duck hunting harvest have been down.

So, why are there fewer ducks? Loss of habitat and reduced quality of remaining habitat are probably large factors.

Migrating ducks, in recent years, have seemed to find Minnesota waters less hospitable than in the past. This may be, at least in part, because today our waters generally have more disturbances from motorized watercraft, less aquatic vegetation, and fewer invertebrates for ducks to eat.

Nesting ducks need quality places to raise their young. Minnesota once had vast areas of high quality wetland/grassland duck nesting habitat. Development has largely reduced those quality duck rearing areas. Our vast prairies and associated wetlands are gone. And, with the loss of wetlands and prairies has come the loss of ducks.

Shallow lakes across Minnesota play an important role as well. These shallow lakes have an abundance of aquatic plants and invertebrates, which makes them valuable to ducks and other wildlife. However, these aquatic plant communities are vulnerable to shoreline activities.

Lakeshore development in the forested region of the state has also resulted in a loss of duck habitat. Many north central Minnesota clear water lakes are extensively developed, leading to fewer wood ducks, hooded mergansers, and ring-necked ducks.

And the few remaining pockets of undeveloped shoreline both in the prairie and forested areas of the state are under increased pressure for development. Given that realization, some citizens are advocating for higher development standards for lakes, especially on shallow lakes that offer quality duck habitat. Higher development standards could include larger lot sizes, larger lot widths, and greater structure setbacks from the water. Such standards could help preserve significant natural resources, including those valuable to ducks.

In addition to better duck habitat, the higher standards would help protect water quality. Shallow lakes especially are sensitive to the addition of nutrients like phosphorus – a chemical that can lead to algae blooms.

Wild rice often is found in these shallow lakes, and it is important food and cover for waterfowl broods and migrating ducks. Wild rice lakes also have important social and cultural value for many Minnesotans.

Beltrami County led an effort to develop science-based criteria that was used to identify special-protection lakes and ponds. The criteria included: percentage of lakeshore fringed with wetlands, maximum depth, percent of surface area less than 15 feet in depth, percent of lake covered with floating-leaf or emergent plants, presence of wild rice, documented endangered, threatened and special concern species in shoreland areas, and presence of special or unique fish or wildlife habitat, and others.

Beltrami County's work is an example of doing something positive about a known and difficult problem. Others are encouraged by their example.

Governor Pawlenty's Clean Water Initiative pilot project brought people together to create an alternative set of shoreland development standards. Citizens that worked on the project recommended a special protection lake class and to allow bays within some lakes to be classified as natural environment. The Alternative Standards give local governments options for use in local ordinances.

Details of the Shoreland Standards Update project are online at www.dnr.state.mn.us/waters (Click on the Shoreland Standards Update link). Email comments to shorelandupdate@dnr.state.mn.us.

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