



# LAKE TIDES

*The newsletter for people interested in Wisconsin lakes*

## Silence is Golden Noise Pollution

**Volume 23, No. 4  
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*It's 6:30 Sunday morning. You shuffle over to the coffeepot, pour a steaming cup of brew and head for the dock. The morning is perfect... it promises to be an exquisite autumn day. The early sun reflects a tangerine color in the mist rising from the water. A chickadee calls, a fish jumps, you can hear the wing beats of a blue heron as it passes by—peace and quiet. Then, like fingernails dragging down a blackboard, the solitude is shattered by the snarl of a leaf blower springing to life. The mood is broken, your pulse quickens and after a few more minutes of the droning noise you decide to head for the house and turn on the morning news.*

The term noise is derived from the Latin word for “nausea” meaning seasickness. The sounds of our world can be beautiful and enlightening, but when does sound turn to noise? Noise is among the most pervasive pollutants of our times. Unwanted sounds, unnatural sounds and overwhelming sounds can become noise. The noise from leaf blowers, chain saws, boom boxes, personal watercraft, and many other unwanted sounds are routinely broadcast into the air. The technology of sound reproduction has advanced to the point that speakers can faithfully reproduce music at 120 decibels (at 120dB your ears begin to hurt and there is a risk of hearing loss). The allure of noisy recreational activities seems to be greater now than it was a decade ago.

### Tragedy of the Commons

The air through which second hand noise travels is a public “commons,” used by all but belonging to no one and everyone. The Noise Pollution Clearinghouse, based in Montpelier, Vermont, believes that people do not have unlimited rights to broadcast noise as they please, as if the effect of noise was limited only to their private property. People who disregard the obligation to not interfere with others’ use and enjoyment of the commons by producing unnecessary noise are like schoolyard bullies.

Unwanted sound, “noise,” is one type of pollution that disappears when the source is shut off. But noise can have long-lasting effects. Exposure to loud sounds can have a harmful impact on hearing. Annoying and loud sounds can also speed up your pulse, respiratory rates and increase stress. The American National Standards Institute (ANSI) recommends a maximum sound level of 55dB for parks and residential neighborhoods. The World Health Organization (WHO) recognizes noise as “a major threat to human well being.” WHO also recommends 55dB for residential neighborhoods. The Environmental Protection Agency (EPA) recommends certain limits to exposure (see graph). This means your exposure to 100dB should be less than 85 seconds per day. (Note: at the 1998 Lake



**Wisconsin Lakes  
Partnership**



Conference workshop on noise offered by the Noise Pollution Clearinghouse, 90% of the participants thought 45dB to 55dB was the limit they would prefer for noise pollution.)

Noise can also impact wildlife. Disturbances range from mild, such as an increase in heart rate, to more damaging effects on metabolism and hormone balance. Panic and escape behavior results from more severe disturbances.

### What's noise?

To better understand the effects of sound and noise let's take a brief look at its physical properties. Sound is the result of pressure change in a medium (usually air) caused by vibration or turbulence. The range of these pressure changes is stated in terms of sound levels and the rate of the vibrations is its frequency. Sound is measured in decibels (dB) and sound frequency is stated in terms of cycles per second, or Hertz (Hz).

### EPA Recommendations for Noise Exposure

| Decibels | Time in Hours |
|----------|---------------|
| 70       | 24            |
| 73       | 12            |
| 76       | 6             |
| 79       | 3             |
| 82       | 1.5           |
| 85       | .75           |
| 88       | .375          |
| 91       | .1875         |
| 94       | .0935         |
| 97       | .04687        |
| 100      | .024375       |

Your exposure to noise of 100dB should be less than 85 seconds per day to prevent hearing loss.

The sound pressure level corresponds to loudness and the frequency, to the pitch. In general, a 10dB increase in sound pressure is equivalent to a doubling of the loudness. A typical Wisconsin lake, with no wind or waves, and without the sound of internal combustion engines, is typically 30-40dB, depending on loons, frogs and crickets. A typical suburban neighborhood (without leaf blowers and lawn mowers) will have noise levels in the 40-50 dB

range. The sound pressure level generally decreases by 6dB for every doubling of distance. Noise from watercraft therefore varies depending on the distance from shore.

**If the sound pressure is 86dB at 50 feet it is likely to be 80dB at 100 feet, 74dB at 200 feet and 68dB at 400 feet.**

Long-lasting, high sound levels are the most hazardous to hearing and the most annoying. Forty dB is considered quiet; 80dB is perceived as noisy.

### Sources of Noise

There can be many sources of noise found near the lake: chain saws, loud boom boxes, lawn mowers, gas weed cutters, dogs barking, and power tools, to name a few. A fairly new product is the gas-powered leaf blower with sound levels at the operator's position ranging from 103 to 112dB. On the water, the most annoying noise award goes to personal watercraft (PWCs); operators experience sounds at around 85-105dB. Outboard motor operators experience sound levels of 80-100dB.

### Legal Remedies

1998 has seen some landmark legislation dealing with noise pollution on the water. According to Jerry Banta, supervisor at the Apostle Islands National Lakeshore, "PWC noise is a complaint from many park users. PWCs have been banned from National Parks (on a park by park basis) until each park passes rules regarding their use in that park." Banta reminds us that "all loud noise sources are discouraged in our national parks."

In July the Washington State Supreme Court upheld a county ordinance that bans PWCs in the San Juan Islands. In Maine, new state laws went into effect regulating noise from all motor boats on certain lakes and ponds. Maryland and Idaho are also adopting similar legislation and Vermont bans PWCs on lakes smaller than 300 acres.





## What Is Being Done and What Can I Do to Limit Noise?

The distance relationship rule (6dB drop per doubling of distance) suggests that 200 feet is not sufficient to protect residents or meet the EPA, WHO or ANSI recommendations. In August a new law went into effect in Wisconsin that requires PWCs to proceed at no wake speeds within 200 feet of the shore on all lakes. According to some experts, 200 feet is a start; but reduction of noise at the source is another important step.

PWC manufacturers are aware of the noise issue and are working on it. Bombardier has introduced the D-Sea-Bel sound reduction system that will lower sound pressure levels by as much as 50%. They will quiet all models for 1999. Most major outboard manufacturers are quieting down outboard motors; the new four stroke engines are very quiet (and run cleaner than two strokes), especially at idle speeds.

You can also lessen annoying sounds around your lake home. Try dampening sound through a vegetative buffer. There are many good reasons to leave native trees and shrubs in front of your home—limiting noise from reaching your home may be another. So, an important reminder: be aware of the noise you make and the time of the day that you do it.

**Remember—silence is golden.**

*Lake Tides* wants to thank Les Bomberg of the Noise Pollution Clearinghouse for technical assistance on this article. For more information on noise pollution contact the Noise Pollution Clearinghouse Web Site at: <http://www.nonoise.org/> or call 1-888-200-8332; Email: npc@nonoise.org



## 1999 Wisconsin Lakes Convention—A Common Vision

Few states have anything to compare with the Wisconsin Lakes Conference, one of the largest forums on lake-related topics in the nation. For twenty-one years, folks from across the state and region have been gathering to find solutions to preserve and protect our legacy of lakes. If you have been frustrated with the amount of time it takes ferreting out information that you need to assist your lake organization, this three-day event is the perfect format to gain cutting edge technology, insights on the latest issues, and personal contacts to help your lake organization reach its goals.

**Mark Your Calendars!** The 1999 Wisconsin Lakes Convention is right around the corner. The dates are March 11-12-13, so make your lodging reservations now (Stevens Point Holiday Inn, 715/341-1340 or 800-922-7880). Look for agenda and registration materials in the Winter issue of *Lake Tides* (January 1999).

This year's conference will focus on the people: volunteerism and working together, finding balance among all our daily commitments, stress management, and successful strategies for working in partnership toward our common vision. As always, the convention will include the normal fare of workshops relating to lake law, insurance, aquatic plants, shoreland management and development issues.

**If you've never attended before, plan to attend this year's conference!**





# The Domestication of Wisconsin's Shorelands

*Recently an EPA funded study on the effectiveness of Wisconsin's Shoreland Zoning standards (Wisconsin Administrative code NR 115) in meeting its statutory objectives was completed. This article and enclosed survey reflect actions taken as a result of that study.*

## NR 115... What is it?

Wisconsin's Shoreland Management Program (NR115) is a partnership between state and local government. The Program requires development near navigable lakes and streams to meet statewide minimum standards. Shoreland zoning jurisdiction lies within 1,000 feet of the shore of lakes, ponds and flowages, within 300 feet of rivers and streams, and within floodplains. Counties must adopt ordinances which meet or exceed the minimum state standards. The administrative rules which implement the state shoreland program were developed in the late 1960s. They are based on a combination of the best available scientific information, best professional judgement, and the feasibility of implementation at that time. The rules for lot width minimums, restrictions on vegetative cutting, and building setback distance create a buffer intended to minimize disturbances to water resources and preserve the natural beauty of our lakes, rivers, and streams. With the exception of the wetland protection provisions added in the early 1980s, the rules have essentially remained unchanged.

Current development trends pose major challenges to the shoreland management program. Waterfront development is booming in northern Wisconsin, with property values increasing up to 400% for some counties. In southeastern Wisconsin, most lakes larger than 10 acres have totally developed shorelines; much of the development took place before shoreland zoning rules went into effect. Home-owners and visitors seek out lakes and rivers as places to enjoy natural beauty in a quiet setting, yet the sheer number of users and owners can create conflicts and

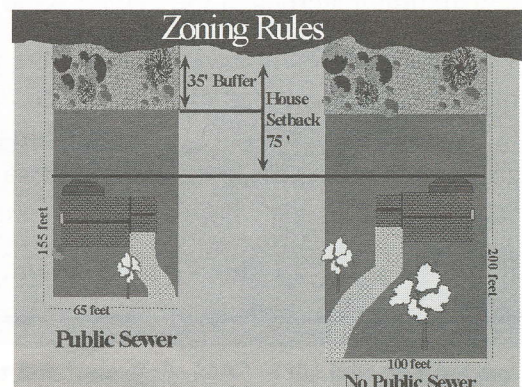
put pressure on limited resources. The scarcity of prime waterfront lands means that areas once passed over for residential development, because they were too steep, too wet, or too rocky, are now being developed.

## Key Standards

Four major aspects of the rules are designed to control density of development and create a protective buffer of vegetation along public waterways. **Lot size:** Sewered lots must have a minimum average width of 65 feet and a minimum area of 10,000 square feet. Lots not served by a public sanitary sewer must have a minimum average width of 100 feet and a minimum area of 20,000 square feet. **Buffer Strip:** Clear-cutting of trees and shrubs is not allowed in the strip of land from the shore to a point 35 feet inland, except for a 30 foot wide path down to the water. **Setbacks:** All buildings and structures, except piers, boat-hoists, and boathouses must be set back 75 feet from shore. When an existing pattern of setbacks exists counties may allow new homes to be built closer than 75 feet from shore. **"Grandfathering"** homes allows the continued use of homes that were built before shoreland rules were enacted, even if they are too close to the water. The county may prohibit

## Changes to NR115, the State's Shoreland Zoning Standards

*In many cases the present rules are not effectively providing long-term protection of Wisconsin's public waters.*





alteration, major repairs, or additions to “grandfathered” homes if the renovation costs exceed one-half the assessed value.

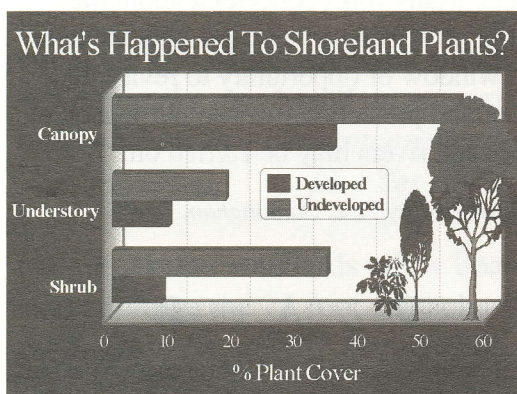
### Are the Rules Working?

Over the last three years biologists have spent more time studying the impacts of humans on waters and shorelands. This work and a review of the recent scientific literature (*Shoreland Management Program Assessment - 1997*) concludes that the present rules provide minimal protection of habitat and water quality.

### What is Lost?

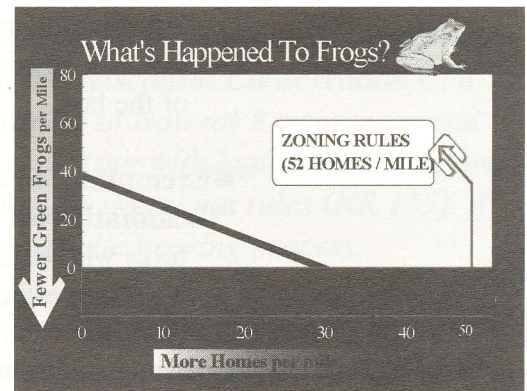
**Water Quality...** Recent trends in shoreland development have had measurable impacts on water quality, particularly due to increased runoff and poor vegetation management practices. Phosphorus and sediment entering our lakes has greatly increased with recent suburban-style developments occurring around lakes.

**Loss of shoreland vegetation...** Clearing trees and shrubs eliminates protective buffer strips along waterways. Studies show that understory trees and shrubs are reduced to very low levels along developed shorelines.



**Loss of shallow water habitat...** Studies show that increased development can reduce critical shallow water habitat. For example, clearing live, dying, and dead shoreline trees and shrubs eliminates a source of habitat that would otherwise fall into the water. These “tree-falls” can provide habitat for many years to come.

**Loss of aquatic plants...** Removing plants eliminates valuable habitat for a whole host of critters, like fish and frogs. Recent information shows that green frogs and their habitat would be essentially eliminated from lakes developed to their maximum under the current rule (52 homes/mile of shoreline).

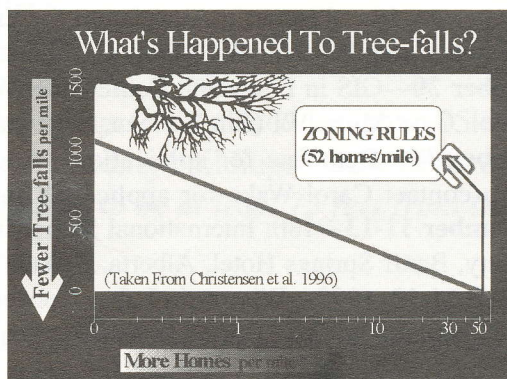


**Loss of Songbirds...** Songbird surveys show that development has altered species composition of birds. The impact is greatest on the less common songbirds that migrate to the tropics. Some of these neotropical migrants are of special concern due to their recent population declines. The common suburban-style birds like blue jays, crows, goldfinches, and grackles were more abundant on developed lakes. The current rule does permit habitat alteration and this affects birds. Large-scale lakeshore habitat changes will place some of our less common songbirds at a greater risk.

### What are the problems with the current rules?

The greatest weaknesses identified in the rules are clauses that are difficult to interpret and enforce, forming loopholes that frustrate the intent of the law.

- **Loopholes in the no clear-cut rule** The intent was to create a 35 foot buffer around waters. However, if one tree is





left standing and the rest is lawn the owner is in compliance with the letter of the law.

■ **Exemptions to the 75 foot setback**

■ **“Grandfathered” homes**—To be fair to folks who built homes before the rules went into effect, the rule “grandfathers” in existing structures that are too close to shore. The rule sets restrictions on expanding them. Unfortunately, the rules for how much expansion is permitted are based on cumbersome formulas involving the assessed value of the structure, and the process is poorly understood by the public. As a result, limits on expansion are either poorly enforced or when they are enforced, are extremely controversial.

■ **Setback Averaging**—The rule allows for new homes to be built at the average “setback,” where there is an existing “pattern of development.” But the rule didn’t anticipate lakes or rivers entirely surrounded by year-round homes. Setback averaging has a “leap-frog” effect, allowing construction of new homes to avoid the 75 foot setback rule.

■ **Boathouses**—Boathouses are exempt from setback requirements. While this may have made sense in the days of heavy wooden boats, today’s lightweight aluminum and fiberglass craft can more easily be stored away from the

shore during the off-season. Many boathouses are not used for storing boats but have become a way of legally building a structure on the immediate shoreline.

■ **Small lots in sewered subdivisions**—

Many of the problems from development come from runoff, not sewage. Just the presence of buildings and pavement where there used to be trees, grasses and shrubs can have some drastic effects on the water. Smaller lot sizes and widths in sewered subdivisions increase the overall loss of shoreland and near-shore habitat. With that in mind, trading sewers for more lakeshore homes is a poor deal for our waters. Over half the counties in the state already have larger lot sizes for sewered subdivisions.

So, that's the story on Shoreland Zoning. We have some decisions to make that need to balance the opportunities of today's society against the possibilities of tomorrow's.

We seem to be slowly but surely losing the very things that draw us to our lakes and rivers. Many folks concerned about the future of Wisconsin's waters believe there is a window of opportunity to revise the shoreland protection rules so our legacy of lakes and rivers may be carried on.

*Contributed by Paul Cunningham*

\*\*\* C A L E N D A R \*\*\*

**October 16-18**—Wisconsin Association for Environmental Education Fall Conference, Wisconsin Lions Camp, Rosholt WI (Ginny Carlton at 715/346-3805)

**October 30**—GIS in Education Conference: Watershed Connections, North Crawford High School, Gays Mills, WI (Jim Lorman, Edgewood College, at 608/257-4861)

**October 30**—**Deadline** for applications, Adopt-A-Lake Coordinator position, UW-Stevens Point (contact Carol Wake for application materials, 715/346-3942)

**November 11-13**—18th International Symposium of the North American Lake Management Society, Banff Springs Hotel, Alberta, Canada (Barbara Timmell, NALMS, at 608/233-2836)

**March 11-13, 1999**—Wisconsin Lakes Convention, Holiday Inn and Conference Center, Stevens Point (Dorothy Snyder at 715/346-2116 or Jo Ellen Seiser, WAL, at 800-542-5253)





Many of you are aware that there has recently been a great deal of interest in development occurring on Wisconsin's shorelands. The following questions were posed to the Wisconsin Conservation Congress by the DNR's Bureau of Fish & Aquatic Habitat. The Department of Natural Resources would value your input on shoreland protection rules! The Department is working with legislators, WAL and other special interest groups to begin a dialogue on possible changes to shoreland rules (NR 115). If there is enough interest to pursue changes, the DNR will consider a public hearing process.

**We are asking for your opinion on these five ideas to improve the statewide minimum standards for shoreland protection. Please take a few minutes to complete this questionnaire and return to the WDNR. Simply, tear out this page, fold, tape, and drop it in the mail—postage is paid! Please feel free to send any written comments, as well.**



(1) Current standards prohibit "clear-cutting" of "trees and shrubbery" within 35 feet of the water, except for one 30-foot corridor for every 100 feet of frontage. *Do you favor eliminating loopholes so that no cutting, brushing, mowing, raking, or burning would be permitted within 35 feet of the water (to re-establish a buffer of native vegetation), except for one 30-foot viewing and access corridor per lot, and except for approved habitat restoration plans?*

☐ Yes

☐ No

(2) Current standards allow lots in sewered subdivisions to be 65 feet wide and 10,000 square feet in area. *Do you favor eliminating the provision for smaller lots on sewered subdivisions so that any new lot, whether sewered or not, would be required to be at least 100 feet wide and at least 20,000 square feet in area?*

☐ Yes

☐ No

(3) Current standards "grandfather-in" nonconforming structures that existed closer to the water than 75 feet before the ordinance went into effect, but suggest a cumulative expansion /renovation cap equal to 50% of the assessed value of the structure. *To ease enforcement and tracking, do you favor replacing the cap based on assessed value with one based on square footage, and setting an absolute limit on how large a nonconforming structure can be?*

☐ Yes

☐ No

(4) Current standards allow boathouses to be built directly on the water's edge, one of the few exceptions to the 75 foot setback requirement. *Do you favor requiring new boathouses (storage garages) to be at least 75 feet from the water?*

☐ Yes

☐ No

(5) Current standards allow some new buildings to be placed less than 75 feet from the water, based on the average distance from the water of surrounding buildings. *Do you favor eliminating this practice, so that all new buildings would be required to be at least 75 feet from the water?*

☐ Yes

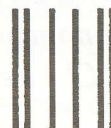
☐ No

**Your assistance is important to all of us. Thank you.**



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## ADOPT-A-LAKE INCLUDES RIVER STUDIES!

*The students of Marquette High School in Milwaukee are very active in monitoring the rivers in the southeastern part of the state. They have also been instrumental in the creation of a web page that displays their data and methods. It is their hope that by sharing their web page, other schools and community groups will develop river and lake water monitoring programs.*

For the past five summers a team of students, armed with collecting nets, have waded into the Milwaukee and Menomonee Rivers to survey the aquatic invertebrates in the riffle areas. The collected invertebrates are classified to the family level of their



taxonomy scheme and using the pollution rating system developed by the University of Wisconsin, the water quality of the river is determined.

Using organisms to determine water quality is a valuable teaching tool because it helps students understand the relationship between organisms and their habitat. In the teaching of environmental science, one of the more difficult concepts for students to understand is how and why certain organisms are found in specific environments. Once this concept called "niche" is understood by students, they begin to comprehend the cause and effect relationships that exist within the ecosystem. These interrelations can be easily

disrupted by humans, resulting in habitat destruction and the loss of species.

Our program not only teaches students to understand this relationship but strives to empower students with the chance of having a positive impact on community. Many students have taken it upon themselves to volunteer with river clean up projects while others have written letters to occupants along the river, encouraging them to take better care of the waterway. Some students have presented at environmental conferences and created a "river studies" web page.

The Marquette High School students are also a part of "testing the waters." This is a water monitoring program that involves over 30 other high schools in the Milwaukee River Watershed. This program measures river water quality by analyzing the results of nine chemical and physical tests performed on the river water as recommended by the National Sanitation Foundation. More information on this method of water testing can be found by viewing the "testing the waters" web page. This page not only includes the monitoring data compiled by the participating schools but also contains a bibliography that lists sources to help teachers and community groups start their own river water education program.

The student groups from Marquette High School have been recognized for their involvement in dealing with the environment. They were one of the recipients of the Environmental Excellence Awards for Environmental Service awarded by Sea World/Busch Gardens. They have also received the President's Environmental Youth Award from the United States Environmental Protection Agency and the National Award for Environmental Sustainability from the National Awards Council. Their work is listed in Renew America's Environmental Success Index, a guide which showcases successful environmental programs to serve as models for other students, schools and organizations.

### CHECK THEM OUT!

#### Biotic indexing

<http://muhs.edu/activities/riverstudies/index.html>

#### Testing the Waters

<http://muhs.edu/activities/riverstudies/ttw.html>

*Contributed by GERALD FRIDAY, Biology and Environmental Science Teacher at Marquette High School in Milwaukee, Wisconsin.*

# Adopt-A-Lake/Project WET







## Volunteers Protect Turtle Lake

Dick and Elaine Gronert are one dynamic duo. From their home overlooking Turtle Lake, they focus much of their abundant energy on protecting this 160-acre marl lake in Walworth County. The mild, sweet scent of healthy algae blew with the wind the hot July day I visited their home. A tour of Turtle Lake took us past the steep, residential north shore, a section of dense oak-hickory forest, and a large open campground. The final half of the shoreline, graced by a beautiful cattail wetland, provides a home for sandhill cranes, great blue herons, and red-wing blackbirds.

Dick and Elaine have monitored Turtle Lake's water quality since 1993. After learning to identify aquatic plants, they found a dense patch of the invasive, exotic Eurasian watermilfoil (EWM) in a channel near the boat ramp. They've taught their lake association neighbors (and even their grandchildren!) what EWM looks like, so everyone can take an active role in protecting the lake. Not only do they teach which plant to pull out by the roots, but which not to pull to protect the diverse plant community. Dick related that this common cause has generated much excitement and unity within the lake association.

With the cooperation of the affected property owners, the Gronerts worked with DNR aquatic plant specialists and had the patch chemically treated last May. Since the treatment, not a single EWM plant has been found among the water celery, coontail and chara—an early but sweet success in protecting the rest of the lake. Diligent monitoring from the active network of Turtle Lake

EWM "spotters" will assure long term success.

Only moderately nutrient-rich, Turtle Lake is a small gem in agriculturally rich southern Wisconsin. To help protect the water quality, Dick and Elaine work to keep soil and nutrients where they belong. They share information with their fellow lake residents about the benefits of shoreline buffer zones and have reestablished a buffer zone along their entire shore to demonstrate what can be done. The native grasses and sedges will be enhanced next spring when Elaine adds purple cone-flower plants she's been nurturing. This plant buffer complements terraced gardens planted with perennials and provides a neat border for the small lawn they maintain for volleyball and other play.

Even as they spend their energy protecting the lake, they are re-energized by it. Dick and Elaine and various members of their family use the lake daily, even swimming under the stars at night as they are serenaded by frogs and toads. They aren't bothered by the tickle of plants as they swim. They know humans play just one part in the rich symphony of life in and around Turtle lake.

*Contributed by Susan Graham, Coordinator for the DNR Self-Help Volunteer Monitoring Program.*



*Elaine is just "one of the kids" in the lake on a hot day.*



# The Mystery of the Red Bloom

The appearance of an unidentifiable orange-colored mass along the shore of Beauregard Lake in Douglas county in early July of this year precipitated a call for help to our office. Richard Falconer, a lake shore resident, was looking for anyone who could offer assistance. Craig Roesler, a DNR biologist in Spooner, met with Mr. Falconer at the lake to try to bring light to what was fast becoming the local lake mystery. It appeared that a three foot wide bright orange band resembling a “stringy glob” had formed along several hundred yards of the shoreline. The substance tended to float, but could be readily mixed with the water through wave action or other disturbance. The growth, which had the effect of making the water in the immediate vicinity turn bright orange, was unlike anything that had been observed in the area before.

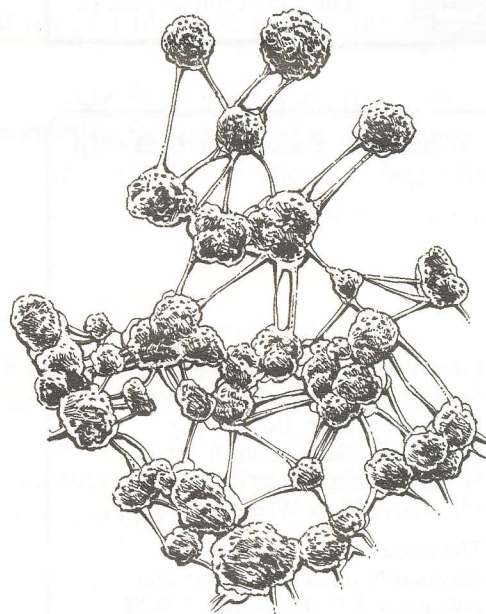
## The investigation and identification

Samples of the substance were collected from along the shore and water samples were collected from the center of the lake. Microscopic investigations followed. After some examination, Craig Roesler with the assistance of Chris Sands, also from the DNR, concluded that the unknown substance was a type of algae known as *Botryococcus* sp. Examination of the water sample showed that the algae was also abundant in the center of the lake where it accounted for over half of all of the planktonic algae present. Apparently, it was not present in concentrations high enough to noticeably color the water. But what accounts for that unusual red color? Read on!

## About *Botryococcus* sp.

This variety of green algae (phylum Chlorophyta) grows in colonies of cells of varied shape which are embedded within a tough envelope of mucus. The cells may be squeezed out of these envelopes which are so firm that they retain their shape. Smaller colonies are often united by interconnections of the mucus which may form larger clusters of the algae and may explain the algae’s stringy appearance. As for the distinctive red color, although opinions vary as to what exactly causes it, there is general agreement that it is characteristic of aging colonies. Some suggest that the orange or red bloom develops as a result of low nitrogen levels and generally precedes a no growth or dormant stage (Aaronson et al., 1982). Others think that the color change is indicative of algal colonies which have lost a peripheral layer of cells (Wake, 1983). This part of the story may remain a mystery...

The presence of this algae does not pose a health risk. This algae is, in fact, quite common and plays a vital role in a healthy lake system, particularly as a source of food for a number of fish species. So don’t panic if you see a distinctive red growth on your lake one morning. Take heart that you are merely witness to another notable phenomenon of the aquatic world.



*Botryococcus* sp.

Aaronson et al.: 1982, Some Observations on the green planktonic alga, *Botryococcus braunii* and its bloom form, *Journal of Plankton Research*, 5(5), 693-700.

Wake: 1983, Characteristics of Resting State Colonies of the Alga *Botryococcus braunii* Obtained from a Bloom of the Organism, *Aust. J. Bot.*, 31, 605-614.





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**Wisconsin Lakes Partnership**



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**The Masterpiece**

Autumn is the masterpiece of seasons... nature's interlude  
Mature players act out their parts in full glory,  
before the final scene  
Hazy backdrops fade to a crisp night sky  
Carpets of golden hue enrobe the earth  
Choruses of crickets ritard their refrain  
Fanfares crescendo as flocks gather  
Trees shed their colorful costumes  
before the blanket is laid  
Crystal roofs creep across the set,  
Under the surface creatures take their final bow  
A silence falls as the drama unfolds  
In the next act behind the scenes

—Marilyn Leffler, 1998