SPECIAL SECTION

Embracing the benefits of aquatic plants

New ways of thinking help to ensure a healthy future for Wisconsin's treasured lakes

To learn is to love our state's abundant lakes

Healthy waterbodies depend on continuing research and evolving management strategies

ALEX SMITH

PAUL SKAWINSKI

BY PETER JURICH

Though retired, Diane Miesbauer finds herself hard at work scuba diving under the surface of the water in Clear Lake, which sits just at the northern tip of Lincoln County near where Highways 8 and 51 meet. She lugs with her through the water a giant suction tube as she slowly claws her way across the muddy lake bottom.

"When you're down there and the sun is filtering down through the water, it's like being in an aquarium," she says. "You could see all the other different plants, and the little fish are looking at you and chasing you around. It's kind of fun that way."

Miesbauer is by no means off on a leisurely swim. She's ridding her lake — albeit very slowly, one plant at a time — of non-native Eurasian watermilfoil, or EWM.

The giant vacuum she has with her is a part of a DASH boat, which stands for Diver Assisted Suction Harvester. She's pulling each individual watermilfoil up by the root and depositing them in the vacuum, which transfers them to a receptacle on a boat not far away.

"It's kind of like weeding the garden," she says. "Once you pull a plant out by the roots, it's less likely to come back so fast, whereas if you just cut it off, it's probably going to grow back.

"Dandelions pop up the next day if you just cut them off, so it's the same thing with this."

DASH is a technique that has gained much momentum in the last couple of years. It can be very selective because workers are actually under the water picking which plants they want to remove and which ones they don't.

But as effective as this technique is, it can be incredibly resource intensive when you consider not just the technology involved, but the gas for the boat and the vacuum, the labor of the divers and the boat drivers, and the amount of time it takes to clear out even a small focused patch of EWM.

Miesbauer and her community of fellow volunteers hired a DASH boat in 2016, but decided it was just cheaper to build one themselves. So they salvaged an old pontoon boat, hooked it up with a vacuum and put together this makeshift vessel for, she estimates, about $6,500.

In addition to clearing out the lakebed, Miesbauer also collects data on the lake for the Wisconsin Department of Natural Resources. She records her findings every summer, checking the water clarity and temperature as well as phosphorus and chlorophyll levels.

She and teammate Dave Owen gathered data six times in the summer of 2019. It's all part of a very concerted effort by the DNR, lake associations and riparian homeowners to better understand and work in concert with not just native aquatic plants, but the non-native ones like EWM, too.

"We've changed our strategy," Miesbauer says, "from trying to eradicate the milfoil to learning how to manage it so we can live with it."

'A GROCERY STORE FOR FISH'

Kurt Justice has been a fishing guide in the Minocqua area for 28 years and says he's fished with "just about every kind of person." He is also the owner of Kurt's Island Sports Shop, which he's owned for the last two decades, putting him especially in tune with the kind of lake health anglers enjoy.

He mentions several times in an interview his appreciation for large-leaf pondweed, which he calls "musky cabbage."

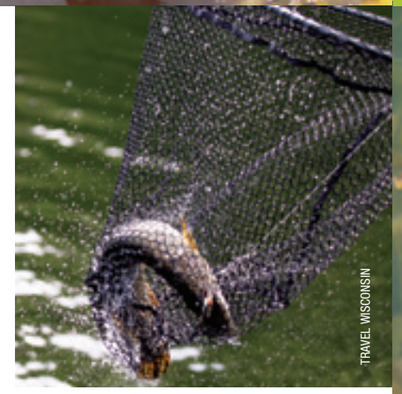
"They don't grow as tight together," he says. It grows in such a way that provides pockets of space between bunches where you can see the fish you're looking for on a calm, clear day. As an added perk, you can run your line through them much easier.

Justice emphasizes the importance of healthy plant life in lakes not as part of a food chain, but as part of a "life chain." Aquatic plants, he says, provide much needed shelter for smaller fish.

He knows this because many of his larger catches have happened around the edges of a group of aquatic plants. Those large fish hang

Fishing is a big part of outdoor recreation in Wisconsin, and healthy fish need healthy lakes. Protecting native plants like large-leaf pondweed, or "musky cabbage" (below), and preventing the introduction of non-native aquatic species like Eurasian watermilfoil (inset opposite page) are two ways to improve lake health.

TRAVEL WISCONSIN



TRAVEL WISCONSIN

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JIM ARNOLD


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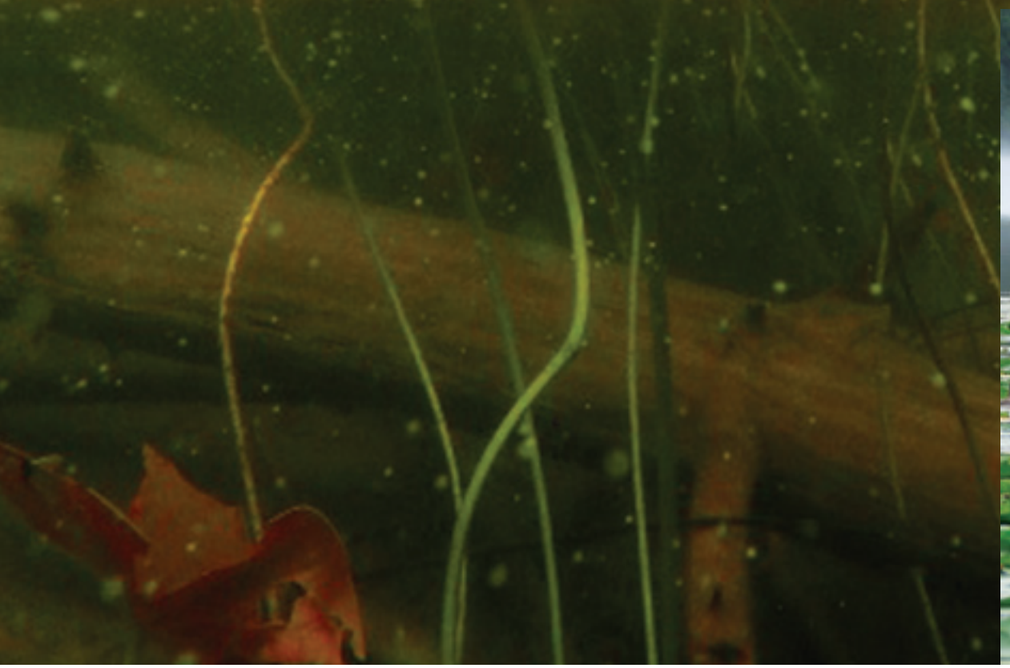

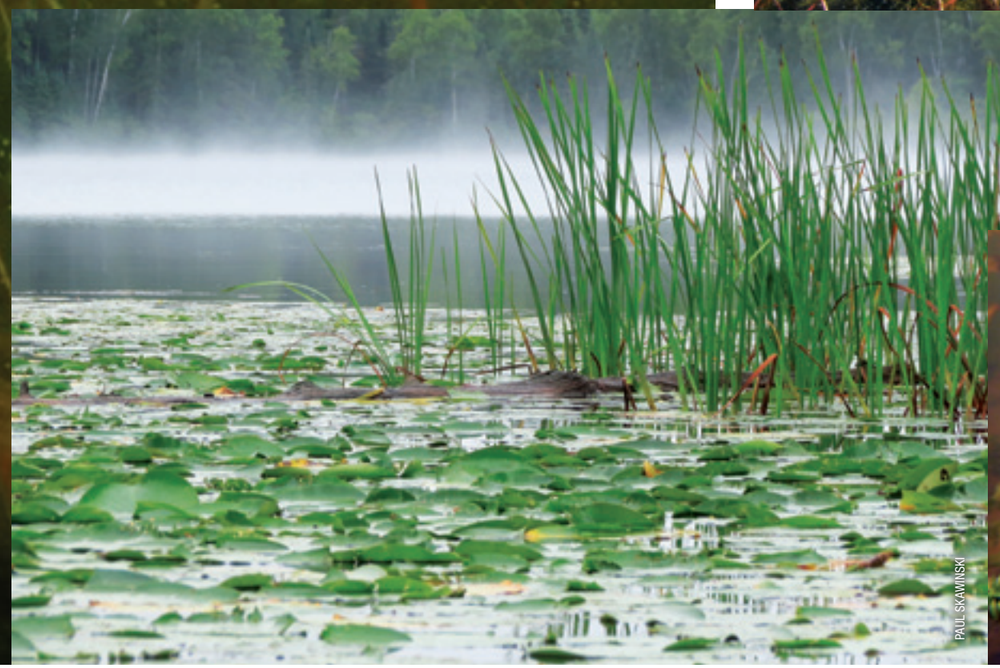
PAUL SKAWINSKI


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Plant diversity is important to sustain fish diversity in the underwater world of Wisconsin's lakes. Richardson's pondweed (below), water lily (left) and Eurasian watermilfoil (above) are among the plants that can provide habitat, though the latter two also create user conflicts when found in overabundance.

around there because they know that's where small fish are hiding.

"There are some types of little worms that climb around on the native cabbage plants," he says. "And in my mind, those small fish feed on those and then the larger fish come into those areas to feed on the small fish.

"Let's put it this way: It's kind of a grocery store for fish."

Justice mentions a few times that he's not a scientist and he is just speculating based on his observations, but his observations are also accurate. And just as with shoppers at a grocery store, there should be multiple options for fish, too.

HELP FROM HABITAT DIVERSITY

A diversity of plants sustains a diversity of fish as a part of a complicated underwater food web. Justice's astute observations place aquatic plants at the very beginning of that food web.

"You can't expect to have a sustainable fish population or fishery if those species don't have the habitat that they require in order to complete their life histories," says Greg Sass, Ph.D., team lead of the DNR fisheries research program. "Seeing a diversity of habitats in a lake often results in a pretty healthy fishery."

Occasionally, a non-native plant moves into a lake and lowers the chances of keeping that diversity. The EWM that Miesbauer was diving for is sometimes — but not always — an example of this. Since these aquatic invasive species (AIS) have no natural predator in the area, they can flourish and accumulate many of the resources that, in their absence, are usually spread out in a way that establishes an equilibrium.

"In some places, Eurasian watermilfoil just creates a big mat and chokes out the native species that we're used to seeing," Justice says. "Fish tend to use edges and the edges aren't there anymore.

"In a lot of cases where a certain species of plant might grow to a certain depth of sunlight penetration and then the next species of plant takes over, Eurasian watermilfoil just seems to take over."

It's so thick in some places, Justice says, you can't even paddle a canoe through it. And that isn't good for the overall health of the fish, Sass adds.

"You've almost got too much refuge for little fish," Sass says. "It doesn't matter how many piscivorous fish we stock, they just can't get to the prey.

"What we've noticed in those situations is we'll see an overabundance of slow growing bluegills."

It's worth noting that this slow growth is true in any lake that has an overabundance of aquatic plants and is not necessarily specific to EWM.

ROLE OF PHOSPHORUS

Miesbauer's annual report, which she publishes publicly for other residents, shows Clear Lake to be oligotrophic. It's one of three classifications for lakes on the Trophic State Index: oligotrophic, with no to little productivity or presence of flora; mesotrophic, a moderate level of productivity; and eutrophic, or a high amount of productivity.

Her last report in 2019 showed phosphorus levels in the lake were then 9.2 micrograms per liter. For context, a lake with over 20 micro-

grams per liter experiences algal blooms on the surface that block out the sun for many native macrophytes — or easily seen aquatic plants — that keep lakes healthy.

"Those macrophytes are using up phosphorus in the water column and the sediment in order to grow," Sass says. "And so they're essentially sequestering that phosphorus within the plant material and keeping it from some of the harmful algae that we might see in some of the lakes."

Phosphorus, a nutrient vital to plant growth, can enter a water body in several ways, the most prevalent being runoff. Runoff occurs when an excess of water accumulates on land, either naturally or unnaturally, so quickly that not all of it can infiltrate the soil.

Because that water must go somewhere, it "runs off" into streams, rivers and lakes. Runoff is a prime mover of phosphorus into a lake system and is more prevalent in farming areas where crops require lots of phosphorus-heavy fertilizer and water.

Miesbauer says Clear Lake is lucky not to have a lot of agricultural runoff, but many residents on the lake do still use fertilizer. "Some people are more helpful than others," she says with a laugh.

Compounding that problem is Clear Lake's proximity to the highway. Miesbauer says sediment from the highway deposits into the lake, creating a muddy floor. And EWM, she says, "just loves a mucky, soft bottom."

ALL ABOUT RESEARCH

Lake health is difficult to perceive with the naked eye. People are, by nature, experiential learners, so much of our knowledge comes from what we can witness firsthand.

An angler, for example, may base their perception of lake health on catch rates because they had a good day on the water.

"We usually don't have our heads under the water, right?" Sass says. "We're not taking a look by snorkeling or scuba diving to see how fish are interacting with various habitats, how they're behaving."

But this is where research comes in. Because we can't easily see below the surface, those insights about lake health — and communicating those insights — become more important.

With that information and additional understanding, humans have measurable results of the impacts we have on the water and how to control those impacts.

It is research that dictates the DNR's catch limits and size limits for fishing, informs the techniques both state and non-state managers alike can implement to handle invasive species, and determines what is or is not an invasive.

In short, that research gives us a glimpse below the surface that we otherwise couldn't get, to keep waters in Wisconsin healthy.

New understanding helps to refine efforts

Diane Miesbauer grew up on Clear Lake on a property that her great-grandmother purchased in 1903.

"I've been there a long time and watched a lot of the ecology of the lake change over time," she says.

She describes the lake nowadays as "not as pristine as it used to be, darker" and adds that today there are fewer water lilies, frogs and turtles. And more of the invasive Eurasian watermilfoil.

Back in the 1960s, resource managers began discovering that non-native aquatic plants like EWM were spreading to new waterbodies across the state, so an intense operation was conducted that revolved around education and outreach. Boaters were encouraged to clean off their equipment of unwanted "hitchhikers" before moving between lakes.

In the 1990s, however, the DNR refocused its attention and began researching exactly how many lakes in Wisconsin had EWM.

"They found out it was pretty widespread," says Michelle Nault, the DNR's statewide lakes and reservoir ecologist. "There were actually hundreds of lakes across the state that had it."

Once it was discovered just how widespread the problem was, the focus shifted from eradication of the invasive towards temporarily or seasonally mitigating the problems caused by EWM.

"There wasn't a whole lot of systematic rhyme or reason to how people were managing plants," Nault says.

The method of choice at the time was chemical treatment, but new science has resource managers shifting away from solely relying on that approach.

STATEWIDE OUTREACH

Nault explains that around the time she started at the DNR in the mid-2000s, the department was just beginning to refine its efforts into understanding not only how many lakes had EWM, but just how pervasive in each individual lake the plant really was.

"We started to go out and collect this baseline data on all these lakes that had Eurasian watermilfoil," Nault says, "so that if we understood them better, we'd know how to manage EWM more effectively."

The DNR's Aquatic Plant Management program has incorporated those new understandings into how it manages what APM statewide coordinator Madison Johansen calls "nuisance aquatic plants."

This includes organizing public outreach measures for the public to increase general understanding of the issues facing lakes and waterbodies.

"Aquatic plants are a vital foundation to lake ecosystems," Johansen says. "We (at the DNR) want to engage with the public and spread that message as much as we can."

The APM program is a statewide effort. Each of the DNR's regional offices has an APM coordinator who handles any inquiries or issues pertaining to aquatic plants in that region, along with an aquatic invasive species specialist who coordinates communications coming out of the offices when new invasive species findings are reported.

The APM program receives over 1,900 permits per year from lake associations, anglers and individuals who seek to manage the conditions of their waters through various management techniques.

"We're fortunate in Wisconsin to have all waters as part of a public trust," Johansen says. "And with that trust, the DNR plays an important role in ensuring that our resource is protected and preserved for generations to come. That includes using the best research we have and sharing it with the public."

New research over the years from the APM program has led to a shift in the DNR's understanding of both native and non-native aquatic plant species and, subsequently, a shift in management techniques.

Today, the department focuses not on the aggressive management techniques of the past, but on a more holistic approach that works with AIS rather than against them.

"The department is moving toward integrated pest management decision-making," Johansen says.

SHIFTING PERSPECTIVES

Diver Assisted Suction Harvesters, or DASH equipment, is only one option currently available to lake associations and riparians seeking to eliminate invasives in an integrated pest management approach.

In 2018, the Clear Lake community purchased mechanical harvesting equipment with the intent of using it specifically for their EWM problem. Harvesters are not uncommon for lake associations to own nowadays.

The residents of Clear Lake are trying to eliminate any outside elements into the water to keep their lake healthy. This includes chemical treatments that have been so very pervasive through the early decades of aquatic plant management.

"Somewhere along the way, we realized we were putting on chemicals every year and it wasn't getting better," Miesbauer says. "The plants are pretty tall, so it would lob the top off, but the chemical would just disperse and not really kill the plants." Every year, the plants would come back.

Clear Lake's last use of chemical treatment was in 2013. Their approach today is one of many available to resource managers across the state.

"We've been less focused on the aquatic plant management and more focused on the health of the lake," Miesbauer says. "The important thing is to keep it healthy and then the lake can fight back against the (invasive) plants."

— PETER JURICH

DNR FILES

Lake management strategies have evolved over the years. Better understanding of aquatic plants has led to better management and enhanced enjoyment of lakes throughout the state.

BENJI PIERSON

BACKGROUND PHOTO BY PAUL SKAWINSKI

ABOUT THE PUBLIC TRUST DOCTRINE

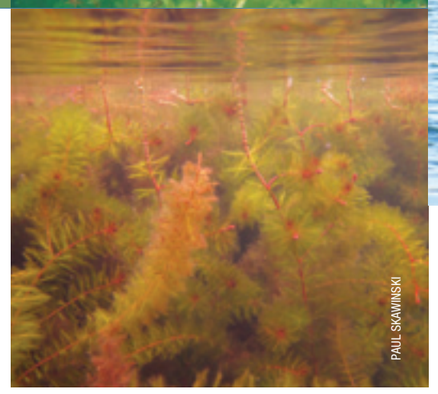
Wisconsin's public trust doctrine, which stems from the State Constitution, declares Wisconsin's lakes and rivers to be public resources, owned in common by the people of Wisconsin. Simply put, that means the state's rich water resources — its lakes, rivers, ponds and streams — belong to all of us, and everyone has the right to access and enjoy them.

MICHELLE NAULT

Time to reconsider language of the past

Recent findings support nuance and new ways of thinking

ALEX SMITH



PAUL SKAWINSKI

BY PETER JURICH

The history of managing invasive species in Wisconsin's lakes — and how that management has evolved — goes hand-in-hand with the history and evolution of how we talk about invasive species in Wisconsin.

The term "invasive species" itself can be uncomfortable: It implies something that not only shouldn't be there but is hoarding precious resources for itself and destroying the native ecology. It implies an enemy.

"The inflammatory language used in the past implies we are waging war on a species rather than looking at it from a holistic perspective," says Madison Johansen, statewide coordinator for the DNR's Aquatic Plant Management program.

Michelle Nault, the DNR's statewide lakes and reservoir ecologist, adds that language used in talking about aquatic invasive species also carried certain implications.

"We had historically said that Eurasian watermilfoil is going to 'choke' the lake and 'strangle' other plants," Nault says. "It's no doubt that someone hearing this would be fearful and have the mentality that we need to fight against this invader at all costs."

Nault cautions against conflating invasive species with non-native species.

"For example, a tulip or a daffodil is non-native in the United States," she says. "They're originally from European and Asian continents, but they're not necessarily invasive. Non-native species can be invasive in some scenarios, but not invasive in all scenarios."

So, while tulips are not native, they also don't suck up so much of the available resources that other plants struggle to maintain their communities.

Differentiating between non-native species and true invasives is essential for lake health, Nault says.

The general public, she notes, has been educated to believe any non-native species is invasive and the impacts of those species will "always be the worst-case scenario." But there is nuance there that doesn't often get communicated properly, such as a species that may be invasive in one environment but not merit the same label in another environment.

What's more, she adds, many times the treatment of invasive species has unintended consequences for native species.

"All management activities do have some level of risk and non-target impacts associated with them," Nault says. "And much of our research has focused on chemical treatments since they are the most commonly used technique for managing aquatic plants in Wisconsin."

SCIENCE SETS THE COURSE

A recent research study led by Alison Mikulyuk, Ph.D., of the DNR's Bureau of Water Quality, explored these unintended consequences. The study, titled "Is the cure worse than the disease?" uses data on over 400 lakes to compare the ecological effects associated with EWM to those associated with lake-wide herbicide treatments using aquatic herbicides for control.

"Lake associations across Wisconsin had observed unexpected native declines following lake-wide herbicide treatments before, but we weren't sure if those declines were, ecologically speaking, 'worth it,'" Mikulyuk says. "And that became the central aim of our study."

The researchers knew that while some EWM populations were highly abundant, most of them were not, leading researchers to question whether the species was as often ecologically damaging as previously thought. At the same time, lake-wide herbicide treatments were forwarded as a proactive solution that could limit EWM expansion or selectively eradicate the species entirely.

To better understand the issue, the researchers used data to address a simple question: How does the relationship between native plants and EWM compare to the relationship between native plants and lake-wide herbicide treatment?

The findings of the paper were surprising: More native species had a negative association with lake-wide herbicide treatments than they did with EWM.

In fact, Mikulyuk says that when she and other researchers looked at similar plant communities, they often saw that the relationship between native species and EWM was positive. This means that when there were greater invasive populations, the native populations were often larger, too.

"I think this speaks to the importance of other factors that determine how suitable a lake is for plants, regardless of whether we're talking about a native or non-native species," she says. "Across lakes, and even after controlling for water chemistry, it seems that EWM and natives are responding to favorable conditions together.

"This is likely swamping any negative relationships that might be playing out in a few waterbodies."

DNR FILES

DNR FILES

Led by Michelle Nault (at left on boat), a DNR field crew conducts a plant point intercept survey. The data collected informs best practices for herbicide treatments (equipment above) and other management of non-native aquatic plants like curly-leaf pondweed (opposite top) and Eurasian watermilfoil (opposite bottom).

Perhaps whether lake-wide herbicide treatment makes sense as a management tool depends on the situation. While this large study reveals an important ecological cost to consider, Mikulyuk cautions against a one-size-fits-all interpretation.

"Management decisions should always be made in careful consideration of the unique circumstances in which they occur," she says. "The decision to use lake-wide herbicide treatments will always depend on the ecological context and stakeholder goals."

Whether the lake-specific effects of the invasive species are adverse enough to justify the risk posed by lake-wide herbicide treatment deserves much more careful consideration than has occurred in the past. Thankfully, integrated pest management can help do just that.

READ THE STUDY

"Is the cure worse than the disease? Comparing the ecological effects of an invasive aquatic plant and the herbicide treatments used to control it" examines the impacts of invasive species relative to the effects of invasive species control using data from 442 Wisconsin lakes sampled between May 2005 and October 2012. The paper, published May 28 in the Canadian science journal Facets, was researched and written by Alison Mikulyuk, Ellen Kujawa, Michelle E. Nault, Scott Van Egeren, Kelly I. Wagner, Martha Barton, Jennifer Hauxwell and M. Jake Vander Zanden. Find details on the study here: www.facetsjournal.com/doi/10.1139/facets-2020-0002.

PAUL SKAWINSKI

For best results, recognize your lake

Landscape position and geography contribute to a lake's trophic state, but activities on the surrounding land that create increased runoff can change the classification. The quantity of aquatic plants, including Eurasian watermilfoil (left), is affected by nutrients in the waterbody. Lakes are more nutrient rich and often have more plants in the heavily populated and widely farmed areas of the state.

DENNIS FABER

DNR FILES

BY PETER JURICH

At a 2001 annual meeting of Wisconsin Lakes — a statewide partnership among the Department of Natural Resources, the University of Wisconsin System and local lake associations — the DNR announced that going forward, individuals would need permits from the agency to do any mechanical harvesting of aquatic plants. Listeners and stakeholders were upset and vocal in their opposition.

When it was Dennis Faber's turn to speak, however, he added some necessary context that beseeched listeners to think of the permits in a different light.

Faber lives on Camp Lake near the village of Salem. It's a 461-acre lake that sits within a heavy agricultural watershed just north of the Illinois border between Lake Geneva and Kenosha.

A few years before that 2001 meeting, Faber and his neighbors had purchased two harvesters to control their lake's Eurasian watermilfoil problem.

"When we first got our equipment, we were so excited to get rid of that terrible Eurasian watermilfoil that we just went out and cut the dickens out of it and we had big smiles on our faces," he recalls telling the conference attendees. "We were so happy."

And then one evening, he says, a neighbor who'd lived on the lake longer than Faber told him they had cut the native coontail as well. Crappies love to spawn on coontail vegetation, this person had warned.

"It hit me like a brick that we've got to be careful because you can do some real harm if you don't get educated and know what you're doing," Faber says. "We've really got to understand what in the world we're doing. You don't just go out there and cut carte-blanche."

After Faber spoke up, some people were still upset about the permits, but many at least understood their value. Faber says the DNR representative at the time told him he wished he'd thought to say that.

CONDITIONS DICTATE APPROACH

Faber has been involved in the stewardship of Camp Lake since 1995. A year later was when the then-town acquired its two harvesters. In those days, the harvesters ran from 7 a.m. to 7 p.m., and that first summer, the town harvested 1,611 loads of watermilfoil.

"We started on mechanical harvesting because our citizens were not comfortable putting chemicals in our lake," Faber says.

After years passed and more research came out about chemical use, the village grew comfortable with aquatic herbicides and began using a mixed management approach — they use harvesters for the problematic natives and chemicals to target EWM.

Activities each year can depend on conditions. In 2018, for example, the village harvested only 36 loads of aquatic plants, while in 2019, they harvested 220 loads. That increase was attributed to heavy rainfall and, therefore, more nutrient runoff.

"Over all those years, we've made quite an impact," Faber says proudly.

Faber, who is also a member of the Salem Village Board, knows that lake management activities can't please all people all the time.

"There are people here that don't like me at all because I'm trying to make them understand you have to behave a little bit," he says. "You have to regulate your enthusiasm."

SPOTLIGHT ON SOUTHERN LAKES

Like Clear Lake in northern Wisconsin, Camp Lake in the southeast has a predominantly mucky bottom. Faber says it is eutrophic, referencing the Trophic State Index that classifies lakes in three categories — oligotrophic, mesotrophic and eutrophic — based on biological productivity levels.

According to Craig Helker, a DNR lakes and streams biologist in southeast Wisconsin, many lakes in southern Wisconsin are mesotrophic trending toward eutrophic, which means more plant activity caused by greater nutrient levels in the water.

"As that classification changes, then there are more nutrients available and you pick up a good number of different species of plants," he says.

As a water body in southern Wisconsin, Camp Lake is bound to have more issues with productivity due to the heavy agriculture industry in the region.

"The mobility of finer sediment — I think that's the expression of this area," Helker says. "When you have development that's been going on for 150 years, our lakes are just a natural sink for that material."

Because the southern part of the state is more populated and more agriculture-heavy, it's more susceptible to runoff. That could be simple bank erosion, historical sediment from streams or added by-product of nutrient addition to soil.

"Eutrophication speed has been enhanced down here as opposed to, say, northern Wisconsin where they might not be dealing with the density of homes or the density of use," Helker says.

WHAT HEALTHY LOOKS LIKE

Unfortunately, lakes with a high biological productivity are often stigmatized as being of poor quality. Helker worked last year with riparian homeowners who had preconceived notions of what a healthy lake looks like.

Clear northern lakes from their childhood with very few plants, he says, became their idealized version of what a lake is, and they were disappointed with the land or house they had


TRAVEL WISCONSIN

Nothing beats a lake sunrise (like Elkhart Lake, right) except perhaps a sunset, though that's certainly a matter of personal preference. Like lake views, plant activity and diversity at a given lake depend in part on the sun and especially how much light reaches into the water's depths.


PAUL SKAWINSKI

purchased on a different sort of lake. The relationship, therefore, between people and plants becomes adversarial and ultimately unhelpful to the health of the lake.

"But if they're in a southern lake," he says, "even if it's medium to high quality, there's going to be a high number of plants."

Faber echoes that sentiment: "One thing about southern (Wisconsin) lakes is people think they have a northern sand bottom. They buy a home here in late fall or winter and they say, 'Wow, I'm on the lake!'

"Then spring rolls around, and there's a whole bunch of vegetation out there. 'What's this?' they'll say. Well, they didn't do their due diligence."

Even so, Faber says you can't beat the views on Camp Lake.

"The western sunsets are very popular with the homeowners who live on the east side of the lake," he says. "I happen to live on the west side, so I get to see the sun come up."

After a pause, he lightheartedly adds his own thoughts on the matter: "If you're going to live on the lake, live on the west side."

GLACIER ECOLOGY

There's a good reason lakes can look different depending on where in Wisconsin you live — 11,000 years ago, the last of the glaciers in Wisconsin retreated, leaving behind silt, clay, sand, gravel and all other kinds of glacial drift.

"Wisconsin lakes by and large reflect the glaciers," says Scott Van Egeren, a DNR lakes biologist in northern Wisconsin. "When the glaciers receded, they left chunks of ice that were stuck into the earth and melted. Most of the lakes in Wisconsin are of glacial origin."

This glaciation led to different soil factors in different parts of the state. There tends to be more sand in northern parts of the state and more loam and limestone in the southern parts. Even today, after all these years, the kinds of native plants found in every lake in Wisconsin is determined by the last glaciation period.


JIM ARNOLD

Van Egeren says there are two primary factors that determine lake productivity. The first is landscape position, or how high up in the watershed the lake is.

If it sits at a higher elevation, it is generally a seepage lake. These lakes tend to have a greater volume of water from groundwater, rain and runoff from a smaller area. They are not as susceptible to sediment and nutrients from runoff.

Lower lakes are called drainage lakes, which have stream or river inflow and bigger drainage areas. They are the most productive in the watershed since they're bringing in nutrients from many other areas via streams and riverbanks.

The second factor that determines productivity is depth.

"Depth, which was largely derived from the glacier and how big that chunk of ice was, really plays a role in how many and what kinds of plants there are," Van Egeren says. "Light can only reach a certain depth in water. So, in deep lakes, it's only in the areas close to shore where aquatic plants can grow."

The glacial history has also played into where European settlers populated the state. Soil conditions left behind by the glaciers allowed for much better farming in the southern two-thirds of the state, whereas it was more difficult to the north — where lumber, not farming, has been the primary agricultural industry.

"The university system encouraged people to farm that land (in northern Wisconsin), but it was too rocky and too sandy," Van Egeren says.

Over time, geographic soil differences have only been exacerbated by additional agriculture and nutrient additions in the southern part of the state.

Lakes in ceded territories foster historic crop, known as 'manoomin'


WADE DEMICHEN

Crop farming in Wisconsin is generally associated with the southern part of the state, but that's not to say agriculture isn't present in the north. In fact, crops in northern Wisconsin can be plentiful and rewarding for anyone who takes the time to understand them.

Lisa David is a biologist for the Great Lakes Indian Fish and Wildlife Commission, or GLIFWC, a natural resources agency that represents 11 Ojibwe tribes in Wisconsin, Minnesota and Michigan in the upper Great Lakes region.

"GLIFWC works to conserve and protect ceded territory natural resources to support treaty-reserved Anishinaabe lifeways and to meet the spiritual, cultural, medicinal, subsistence and economic needs of its member tribes," David says.

The ceded territories make up roughly the upper third of the state, which the tribes ceded to the U.S. government through multiple treaties in the 1800s. Though they ceded the territories, they retain the right to hunt, fish and gather on them.

David's focus within the ceded territories is on manoomin, which English-speakers refer to as wild rice. Her work centers on the stewardship and enhancement of manoomin as part of an ongoing GLIFWC program that tracks manoomin harvest, population monitoring and restoration efforts throughout the ceded territories in cooperation with other resource stewards.

David also reviews DNR mechanical and chemical permits to treat aquatic plants, treatments that may affect the ecology of the ceded territory lakes.

"The fact that the global distribution of wild rice centers on northern Minnesota, northern Wisconsin and adjoining Canadian lands explains why the Anishinaabe are located in this region and continue to value, respect, harvest and protect this culturally significant resource," she says. "These tribes have a cultural responsibility to steward the resource for future generations."


PAUL SKAWINSKI

"Manoomin," also known as wild rice, is an important crop found throughout Wisconsin, but most frequently in the ceded territories.

Currently, 1% of manoomin harvested in the state comes from outside of the ceded territories. There are opportunities to harvest the more labor-intensive "southern" manoomin in the southern two-thirds of the state, but those opportunities are limited. Local ecologies have simply changed too much through agriculture, development and dam management, to name a few reasons.

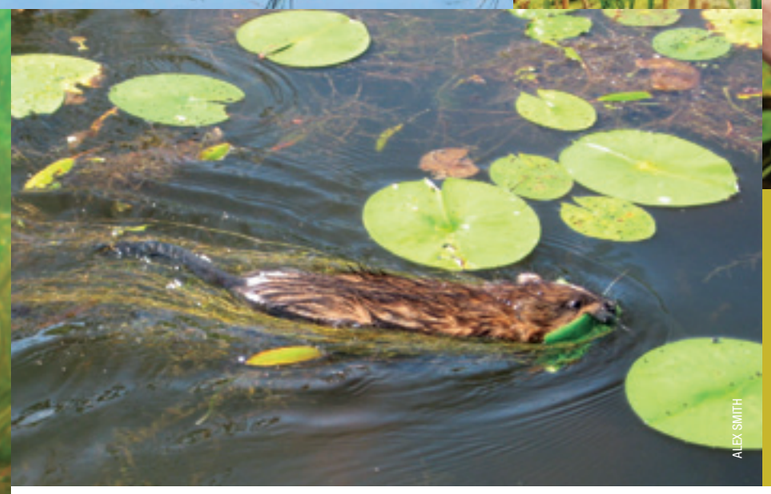
"While all these issues can be found in the north, too, the degradation of the habitat is generally less pronounced," David says. "In the most traditional view, manoomin is one of the 'more-than-human beings' that came before the people, that the tribes depend upon for their survival and which they have a responsibility to steward in appreciation."

— PETER JURICH

BACKGROUND PHOTO BY MICHELLE NAULT

Big boost for lake life

Expanded knowledge, integrative approaches, data driven decisions cultivate successful aquatic plant management



Scenes like the one at Upper Post Lake in northern Wisconsin (top) are common around the state. Lakes and their aquatic plant communities beautify the landscape, provide recreation opportunities and support a wide variety of wildlife. Everything from fish and dragonflies to birds like the American bittern to the busy muskrat depend on healthy lakes.

BY PETER JURICH

Stewardship of Wisconsin's thousands of lakes, as it relates to the aquatic plants they support, requires patience, understanding and even reframing our thoughts about aquatic plants in a way we may never have considered before.

During interviews conducted for the articles in this special section, a common theme cropped up more than others. The DNR's Madison Johansen says it most succinctly: "Aquatic plants are not weeds."

The importance of proper aquatic plant management is vital to healthy lakes, adds Johansen, statewide coordinator of the DNR's APM program, and it begins with education and understanding.

"They're an essential part of the aquatic habitat," she says, "and it's important that we see aquatic plants as more than something that gets in the way when we're boating.

"Aquatic plants can become overabundant, and when they are problematic, management may be warranted. But as responsible lake managers, we need to look at those plants as part of an underwater community."

Lisa David, Great Lakes Indian Fish and Wildlife Commission biologist, expresses a similar sentiment, a clear sign of her passion for aquatic biology: "Plants provide tremendous value to aquatic ecosystems by supplying structure for invertebrates and, therefore, fish food and fish nursery shelter, nest materials for ducks, loons, swans."

DNR lakes biologist Scott Van Egeren likes to tell people about the diversity of aquatic plants in a way they can understand and get excited about — much the way he is. If there's an ecological niche to fill, he says, there's an aquatic plant that can fill it.

"Some aquatic plants are even carnivorous and eat aquatic insects!" he says with discernible enthusiasm.

Aquatic plant management is not something to take lightly. Dennis Faber learned that when he accidentally cut up the native coontail in the very lake he was trying to protect, Diane Miesbauer has seen it in real time over the lifetime she's spent on Clear Lake, and fishing guide Kurt Justice sees it every day he takes clients out on the water.

The Aquatic Plant Management program and other areas within the DNR seek to educate stakeholders on the topic.

The denizens of Camp Lake, Clear Lake and beyond have been able to control their aquatic invasive species populations not by working against them, but by working with them in an integrative approach that takes into consideration multiple management techniques.

"What we've noticed now these last number of years as the milfoil population has gone down, the panfish have gotten substantially bigger," Faber says of Camp Lake.

David sees a similar means to controlling aquatic plants and endorses a more research-focused "assessment approach" that involves documenting the potential spread and displacement — or the possible coexistence — of the various aquatic plant communities.

Johansen stresses the importance of knowing how a plant interacts with a water body as well as the surrounding plant communities and wildlife so lake managers can "make informed management decisions with a plan to collect the data needed for future management decisions."

"As resource managers make decisions about the best management approach, we should first gather as much information as we can about the target species and broader aquatic community," she says.

The DNR's APM program is committed to learning more about the complex relationships within and between aquatic communities and humans. Continued partnerships across the state among researchers, resource managers, industry and the public are vital for responsible stewardship of Wisconsin waters.

INFORMATION

To learn more about the DNR's Aquatic Plant Management program and its role in helping to protect Wisconsin's thousands of beneficial and beautiful lakes, check the agency's Lakes program main page: dnr.wi.gov/lakes.

Wisconsin Lakes Partnership
dnr.wi.gov/lakes/lakespartnership/

UW-Extension Lakes
uwsp.edu/cnr/uwexlakes/

Wisconsin Lakes
wisconsinlakes.org

Clean Boats, Clean Waters
dnr.wi.gov/lakes/cbcw/

Citizen Lake Monitoring Network
dnr.wi.gov/lakes/CLMN/

River Alliance of Wisconsin
wisconsinrivers.org

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Sunset on Wildcat Lake - Madison Johansen