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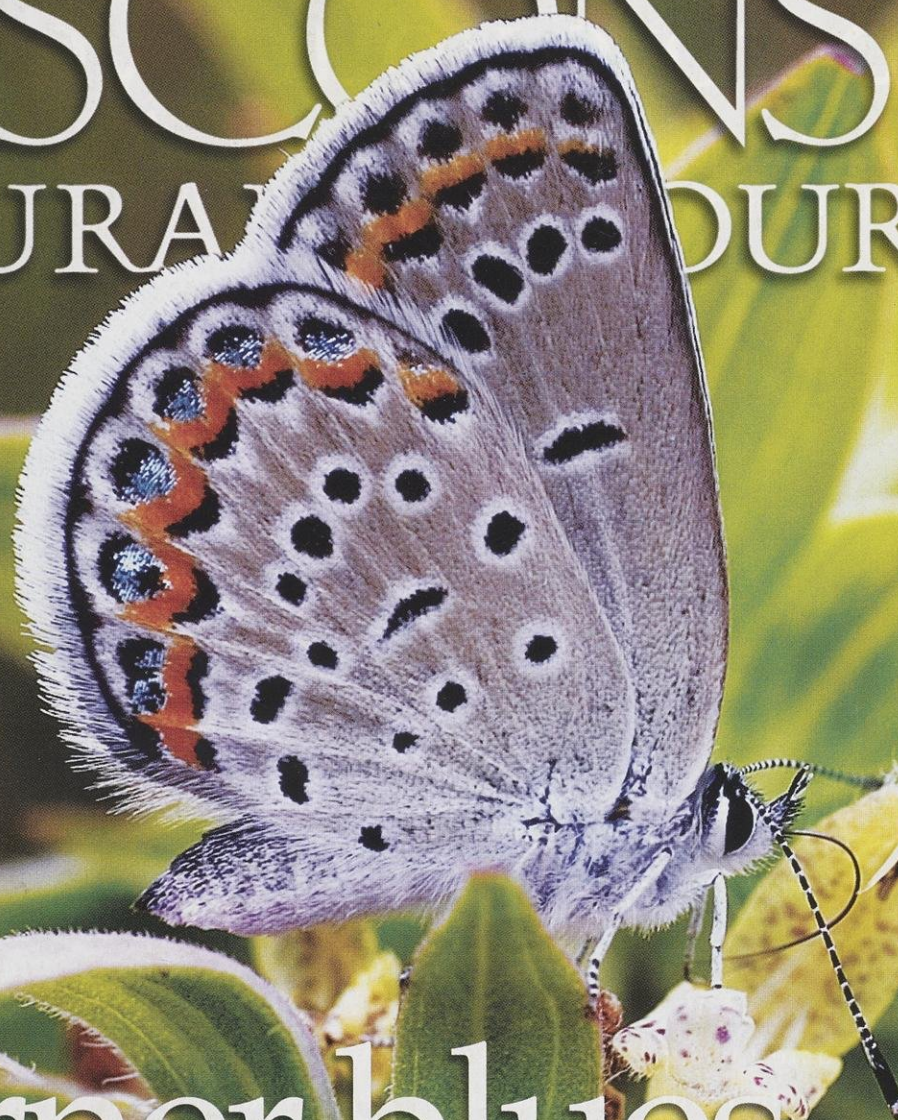
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WISCONSIN NATURAL RESOURCES

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Karner blues

Small, blue
and bountiful

Rehabbing spring ponds

A safeguard for the Great Lakes

Small floaters before your eyes

Tiny one-inch jellyfish are at home in at least 40 state waters.
How did they get here and why do they vanish?

Sandy Engel

It's a good thing they are considered harmless and "friendly." The Department of Homeland Security would be no match in keeping out tiny exotic plants and animals that periodically find a foothold in waters across Wisconsin. One of the small ones is a freshwater jellyfish that is less than one inch long at full size. It has an interesting, if sporadic, history here.

Freshwater jellyfish (*Craspedacusta sowerbii*) are thought to be native to China. They were first reported in North America as early as 1884 and the first sightings in Wisconsin date to 1969. The freshwater jellyfish exhibit a varied life cycle comprising three stages: egg, polyp and medusa. Two kinds of larvae and a cyst stage also form, so open up those biology books for a short remedial lesson.

The jellies start as **eggs** produced by female medusae. If fertilized, each egg hatches into a tiny, flat larva called a **planula** that is hard to see with the naked eye. It swims

for a few days among zooplankton before settling down on an underwater plant, log, rock or piece of sediment. The planula then becomes a **polyp** that looks like a miniature hydra, sort of a bitty little bud without tentacles that has stinging cells to stun equally small prey. The tiny polyp soon forms a bud near its base that stays attached and develops into a second polyp. These two polyps are identical twins since they formed asexually. Soon, the twins form yet more fixed buds and expand into a polyp colony of perhaps 2-12 buds. Don't expect some massive colony here. You'd still need a hand lens or microscope to study them.

Now and then the jellyfish polyps form a second kind of detachable bud that develops into a tiny, cigar-shaped larva. This larva frees itself from its parent polyp and either crawls a few inches away or is carried off by flowing water before it settles down to start forming polyps of its own.

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FRONT COVER: Karner blue butterflies are the size of your thumbnail and the little blue flits are easily confused with other tiny fliers. See our story p.17.

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BACK COVER: Rocky Run Oak Savanna State Natural Area in Columbia County. For more information, contact the State Natural Areas Program, Bureau of Endangered Resources, DNR, P.O. Box 7921, Madison, WI 53707 or visit dnr.wi.gov/org/land/er/sna.

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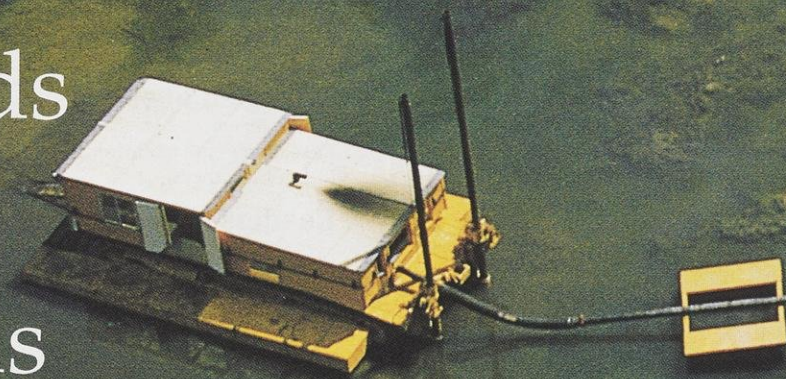


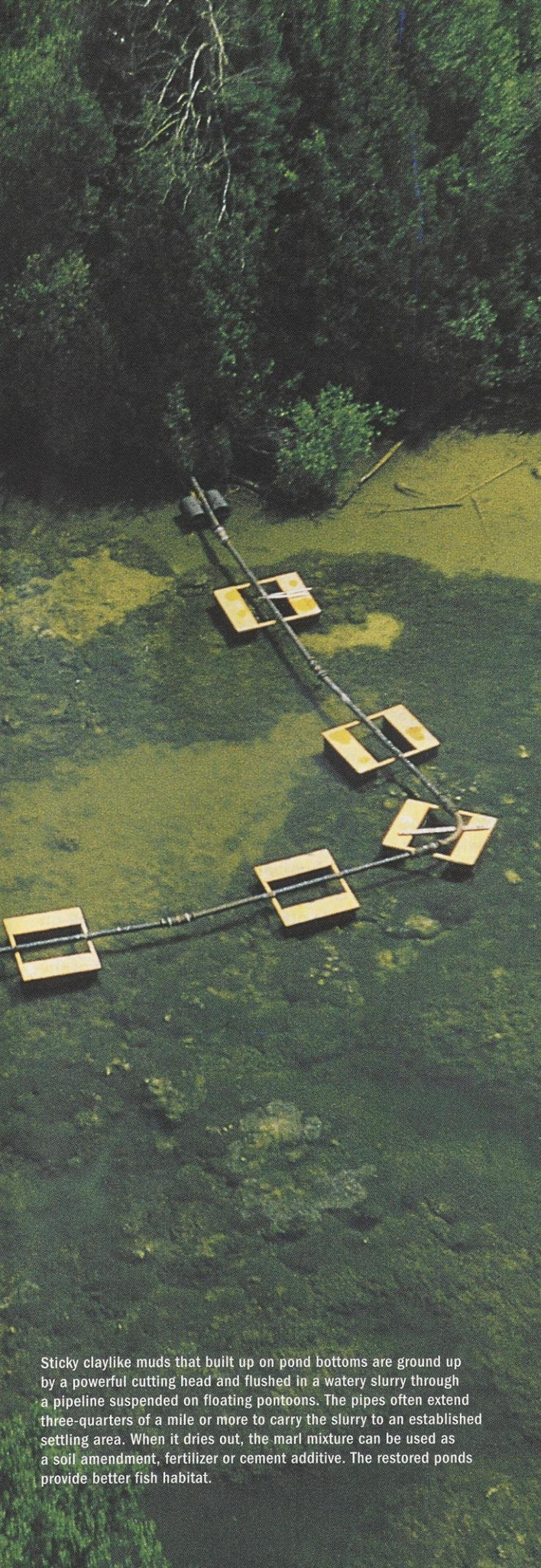
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Spring cleaning a fishery

Rehabbing
spring ponds
pumps up
Northwoods
trout streams.

Story and photos by Peter M. Segerson

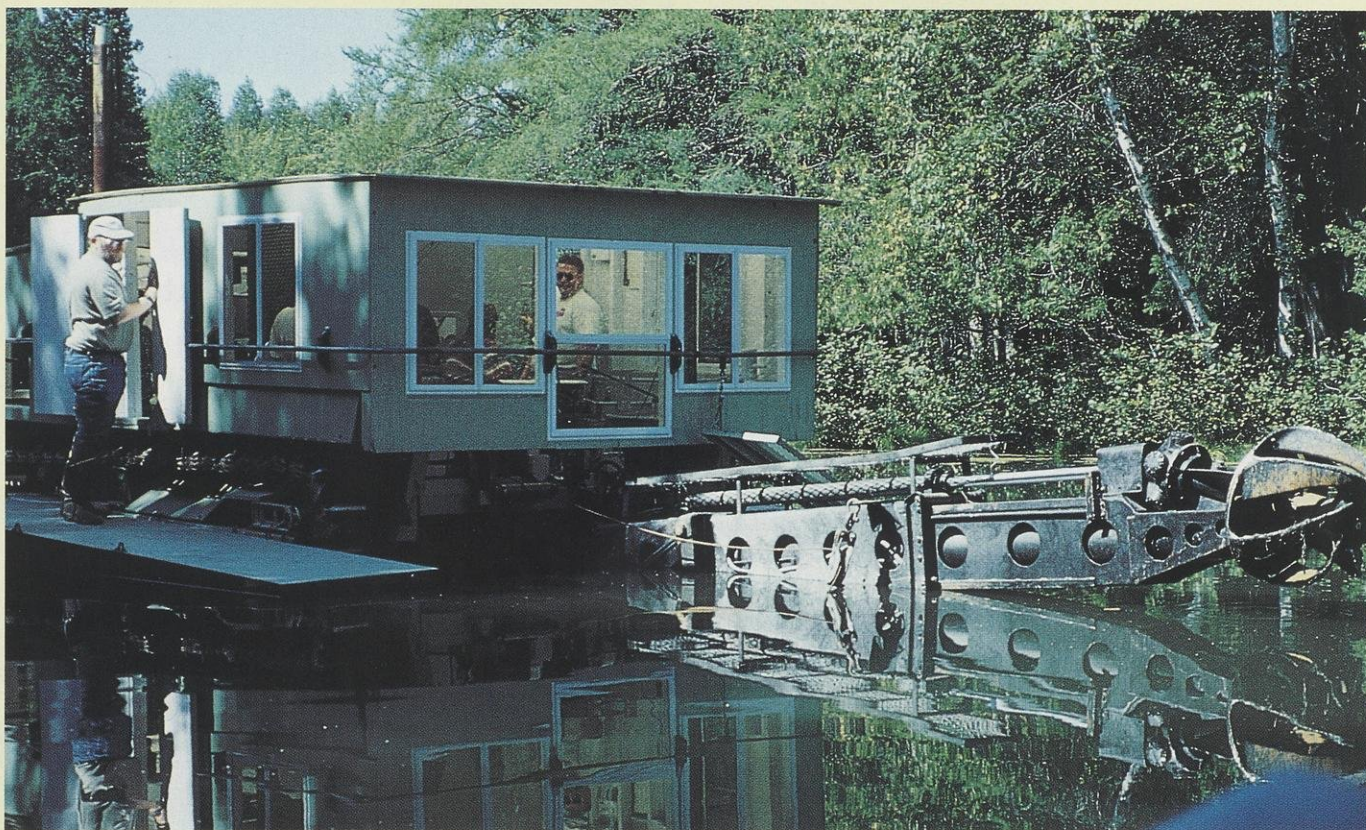




Sticky claylike muds that built up on pond bottoms are ground up by a powerful cutting head and flushed in a watery slurry through a pipeline suspended on floating pontoons. The pipes often extend three-quarters of a mile or more to carry the slurry to an established settling area. When it dries out, the marl mixture can be used as a soil amendment, fertilizer or cement additive. The restored ponds provide better fish habitat.

There is a saying among limnologists that all lakes are born to die. It's not that scientists are gloomy, brooding people. After all, they get to spend a lot of their time outdoors looking at lakes. It's just that if you take the long view of what happens to waters over hundreds or thousands of years, as soon as lakes are carved out of the landscape they start aging, just like people. In lakes, this natural process is called ecological succession and the lakes start filling in again to become pockets of bog, swamp or some other natural community.

When the Wisconsin glaciers finished their geologic shoving match more than 11,000 years ago, they pushed ahead and left behind large glacial lakes, river dells, rubble and cobble moraines, boulders, outwash plains of sand and gravel, and countless kettle holes. In northeastern Wisconsin, some of those kettles remain as spring lakes and ponds; small pot-holes where groundwater wells up to the surface. In northern Wisconsin soils, conifers surround these fertile, clear ponds and the alkaline waters take on a unique hue and character.



Floating hydraulic dredges were crafted by modifying World War II tracked amphibious landing vehicles. The operator's cab looks a bit like a floating office.

In the northern clime, many trout streams begin as the outlet of a warm-water lake or as bog and swamp drainage. These waters, draining a larger area, combine with the cold waters flowing from spring ponds to form headwater streams where trout will thrive.

Langlade County, where I worked, is true headwaters country. At least 200 spring ponds (the most of any Wisconsin county) feed many streams and rivers including the Wolf, Oconto, Prairie, Plover and Eau Claire rivers.

Back in the 1930s and '40s, trout anglers and the Wisconsin Conservation Department recognized that these spring ponds formed the lifeblood of fine fishing and began protecting and acquiring these small ponds. Hundreds of parcels were purchased throughout the state to protect springs and coldwater streams. Some of those spring ponds saw considerable disturbance from their natural state. They were used to water livestock, bottle soda pop and grow trout raised at private fish hatcheries. Various structures like beaver dams, manmade impoundments and poorly designed road culverts also dis-

rupted water flow. Purchasing the ponds and rehabilitating them was an important step to sustain a flow of clear, cold water to trout streams.

The Conservation Department and private landowners experimented with assorted dredging equipment, pumps and draglines to rehabilitate spring ponds in the 1950s. Most attempts were not successful. In 1965 the department purchased two amphibious cutter head hydraulic dredges from National Dredge in Beloit. It is testament to the military engineers who crafted these dredges from American-made steel and the mechanical ingenuity of several DNR employees that one of the machines is still operating on a daily basis.

The dredge was built from a 1943 military tracked landing vehicle, so it has a rock steady base with a Detroit Diesel power plant. During the seventies and eighties, ingenious fisheries technicians Marvin Zaddack, Irvin Aird and Lawrence Pomasl added a swinging ladder, an all-weather cab and pontoon flotation to the dredge. In 1992, Jeff Reissmann led a major overhaul of the

Antigo dredge at the DNR's Tomahawk Equipment Facility. Numerous parts were fabricated and the Spooner dredge was cannibalized to make one unit out of two. The whole device looks a bit like a little office with windows sitting on top of an amphibious tank with a giant arm at the front end. At the end of the arm, a rotating cutting tool looks a bit diabolical, like it was invented by some deranged villain to drill through buildings, thick steel-walled safes or concrete walls to reach some cloistered treasure. In fact, the bit has to dig through material that at times seems nearly as tough and thick.

Spring pond rehabilitation has two major goals: to clean gravel sites to restore the flow of upwelling groundwater, and to remove accumulated silt, marl and organic debris. The upwelling groundwater is vital for brook trout reproduction. Removing marl and peat layers deepens the ponds, providing living space for trout and aquatic plants, insects and other animals.

Over decades and centuries, the bottom of these clogged up ponds built up a thick sediment layer of decaying leaves,

boggy plants and muds. This “marl” is a thick, sticky mass of clay, bits of shell and calcium carbonate that is light in color. When wet, marl has the thick consistency of slippery modeling clay. The whirling cutting bit loosens up the muddy marl that is sucked through a pipe in the middle of the bit using a powerful sand and gravel pump — powerful enough to carry fist-sized rocks and mud in a floating pipeline then uphill more than a 100-foot grade. The sticky slurry then drains into a nearby bermed storage area on land.

Water settles out of the slurry quickly. What’s left is a rich material that can be used for fertilizer on lime-deficient soils or a soil conditioner for sandy soils. The lime in marl cements sand grains together and also has the opposite effect of loosening up clay soils. The calcium carbonate in marl is also a component of Portland cement, so clean marl can be sold. Peat layers in the dredged mix come out of the pipe as a black slurry. As these dry out, they form a rich mix that can be used as a soil conditioner or potting soil. More often than not the spoil piles from such dredging operations are left in a depression and after a few growing seasons the organic soils can be planted and managed to form wildlife cover or food plots.

Before dredging begins, a short access road of cut timber (called a corduroy log mat) is laid down to provide a path to get the heavy dredge into and out of the water. The launch site is restored as part of the project after the dredge is removed.

Dredging operations start at the upper end of a spring pond and work downstream toward the outlet. Before any dredging begins, sediment mats and floating oil boom equipment are placed at the outlet to trap sediments stirred up during dredging and prevent downstream problems.

The dredging crews suck out the organic, muddy sediments until they reach underlying layers of sand, gravel and rubble. These clean, hard layers can be colonized by plants, invertebrate insects and small fish to start building a full fish community. Trout also return as the ponds, redds and beds recover. The dredging crew often fells some trees



To gain access to some of the pothole ponds, DNR staff get permits to construct a temporary corduroy log mat to get the dredge into the water. Once dredging is completed, these logs are removed and the narrow cleared space is renovated as a launch site to reach restored waters.



Canoes, float tubes and small rowboats provide a means to reach trout holes. Other boaters just enjoy the quiet surroundings of these small, cleaned-up ponds in the northeastern Wisconsin forestlands.

along the shoreline to provide some secure overhead cover for trout. Reptiles like painted turtles, wood turtles and northern water snakes as well as dragonflies and other insects, find refuge and resting areas on these dropped trees.

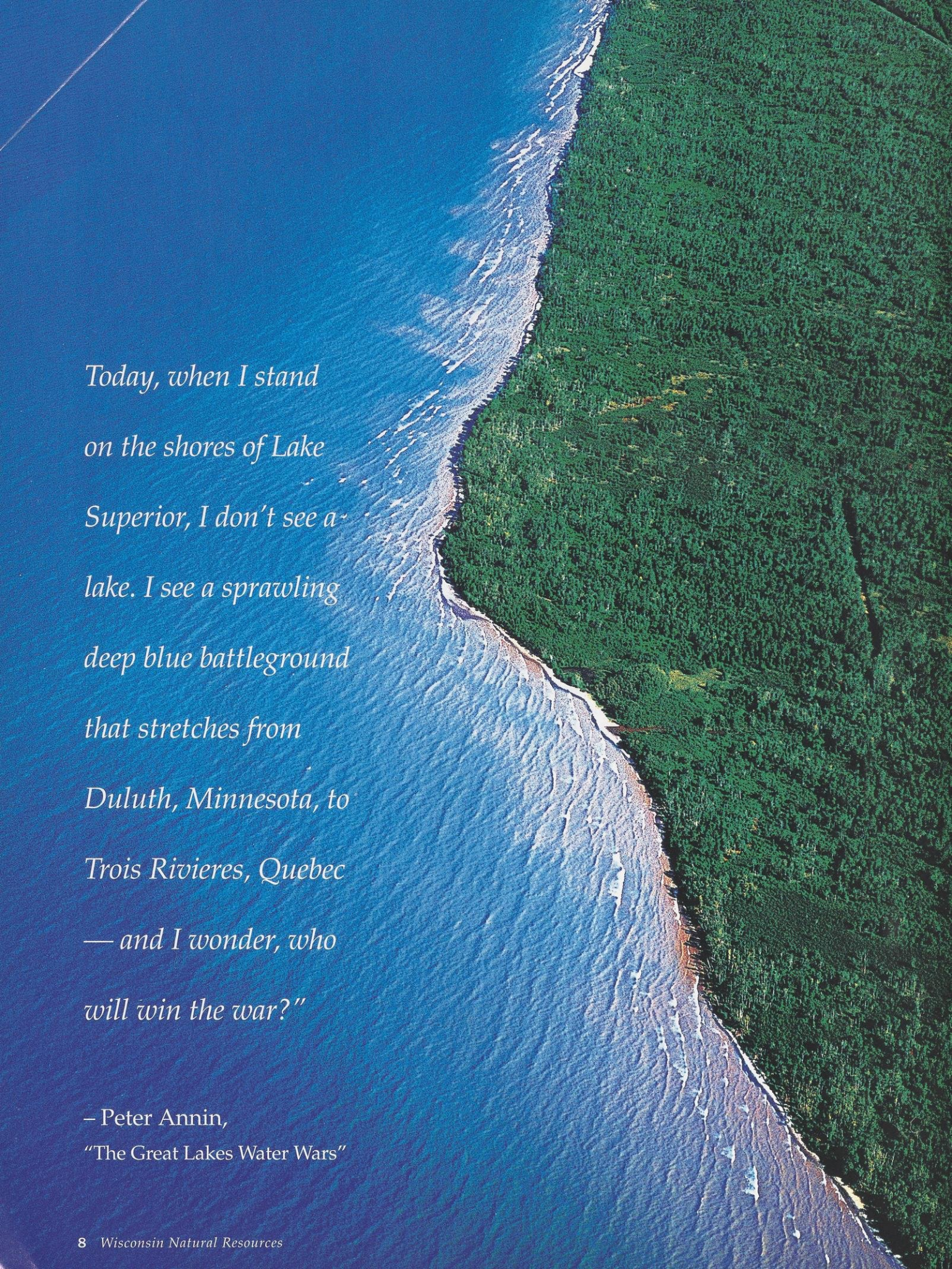
Anglers come back to these recovered waters seeking trout. Brook trout are Wisconsin’s only native stream trout and their Latin name, *Salvelinus fontinalis*, translates as “char of headwater ponds.” Studies of rehabilitated spring ponds have found three to five times more biomass (lbs/acre) of trout after ponds are dredged and the cold-water community starts to naturally restore itself.

A dedicated following of anglers has learned how to fish these ponds. Shore fishing here is difficult and soggy due to boggy, cedar-lined banks. Wade fishing can be downright dangerous due to deep, sticky marl and silty areas, so local anglers became accustomed to fishing from canoes and small pram type boats. Float tubes have recently become the watercraft of choice as anglers can easily carry them into remote access points on these ponds. Fly fishers find

success using small streamers, wet and dry flies with specialized local patterns. Live bait dunkers and artificial lure pitchers also fish these spring ponds effectively.

These waters open for fishing during the general trout season from the first Saturday in May through the last day of September. Fishing regulations vary and are tailored to the size of the pond, potential trout growth and the particular trout species. Nearly all the ponds hold brook trout, some also have brown trout, and a few have rainbows. There is little stocking of spring ponds since nearly all support excellent natural reproduction of trout. Come and try your luck and enjoy the scenery in these cozy settings surrounded by conifers and restored, clean, cold waters. ■

Peter M. Segerson now oversees fisheries operations for the Department of Natural Resources in the Black River Falls area. For further information on the spring ponds in the Antigo area, contact fisheries biologist Dave Seibel or pond habitat crew leader Jeff Reissmann at the DNR Service Center, 223 E. Steinfest Road in Antigo, (715) 627-4317. Call ahead for office hours.

An aerial photograph of a shoreline, likely Lake Superior, showing a deep blue body of water on the left and a dense, green forested land on the right. The shoreline is irregular, with small inlets and points. The water has a textured appearance with small waves or ripples. The forest is thick and covers the entire land area shown.

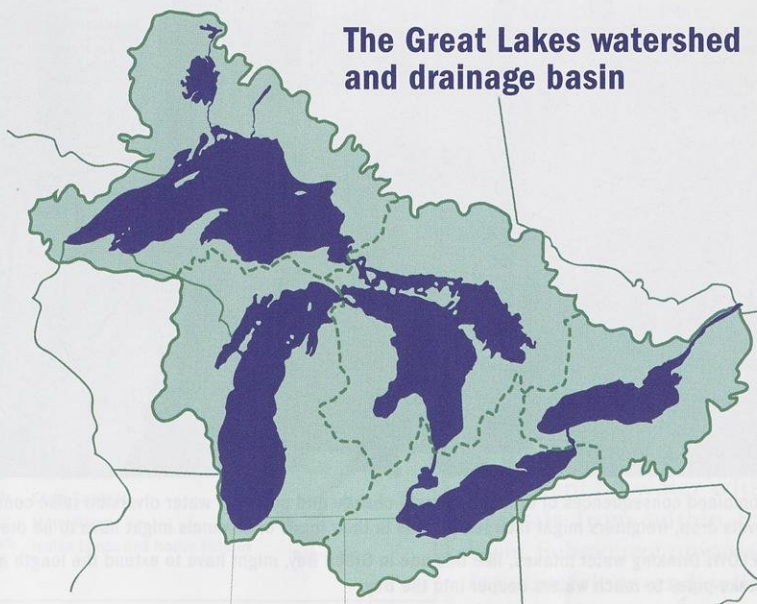
*Today, when I stand
on the shores of Lake
Superior, I don't see a
lake. I see a sprawling
deep blue battleground
that stretches from
Duluth, Minnesota, to
Trois Rivières, Quebec
— and I wonder, who
will win the war?"*

– Peter Annin,
“The Great Lakes Water Wars”

A firm hand on the spigot

A compact of Great Lakes states and provinces aims to protect this liquid treasure from a thirsty world.

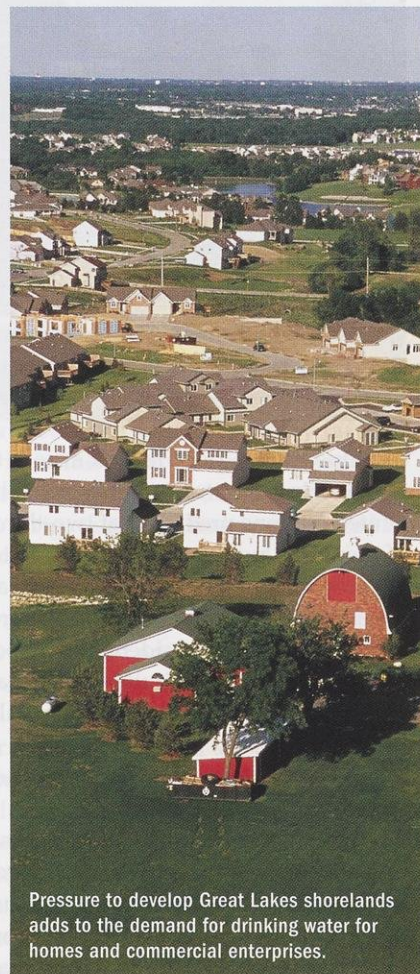
Lisa Gaumnitz and Shaili Pfeiffer



GREAT LAKES AQUATIC HABITAT NETWORK AND FUND

Warships likely won't patrol the lower Great Lakes as during the War of 1812, nor will citizens take to the streets with guns, knives and pitchforks as Waukesha residents did in 1892 to protect their storied "healing" springs. But tension over who can lay claim to Great Lakes' water is rising rapidly and will hit the high water mark this century, Annin argues in his book, "The Great Lakes Water Wars," and during an interview in a Madison coffee shop.

A growing global water shortage will put tremendous pressure on the water-rich regions of the world to open up the spigots. Pressure will be particularly intense on the Great Lakes — repository of fully 18 percent of all the fresh surface water in the world, neighbor to thirsty western U.S. states, and home to a growing number of communities facing replacing contaminated groundwater supplies.



Pressure to develop Great Lakes shorelands adds to the demand for drinking water for homes and commercial enterprises.

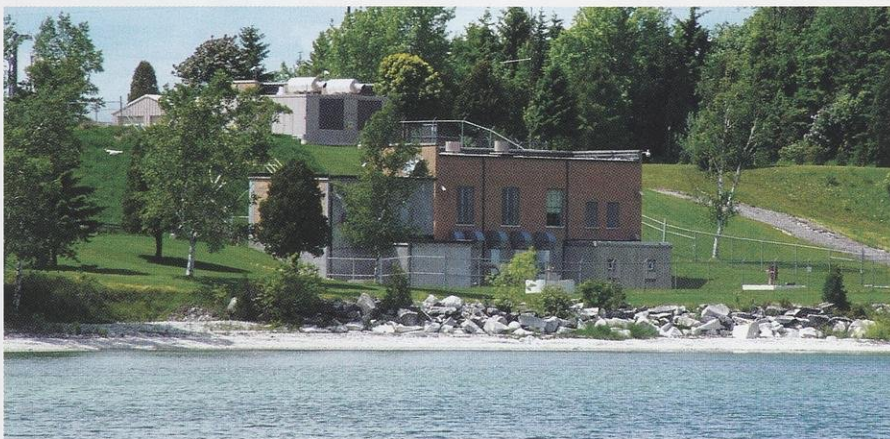
LYNN BETTS, NATURAL RESOURCES CONSERVATION SERVICE



BROWN COUNTY PORT OF GREEN BAY, COURTESY OF DEAN HÄEN

Combined consequences of drought, climate change and potential water diversion raise concerns. If water levels drop, freighters might face restrictions in their loads or channels might have to be dredged deeper.

BELOW: Drinking water intakes, like this one in Green Bay, might have to extend the length and depth of intake pipes to reach waters deeper into the Bay.



PAUL PEETERS

"One billion people lack access to clean drinking water today and the United Nations predicts that two-thirds of the global population will face water shortages by 2025," says Annin, an award-winning former *Newsweek* correspondent, Madison resident and associate director of the Institutes for Journalism and Natural Resources in Missoula, Montana. "They're not knocking at the door right now, but the fear is they will be."

The good news is the region has a tremendous opportunity to be prepared for the inevitable conflict. A water use agreement signed Dec. 13, 2005, by governors and premiers of the Great Lakes

states and provinces (and a companion "compact" that was signed by the U.S. governors) lay the foundation for the region to work together to sustain and to meet the water needs of citizens living in the Great Lakes states.

Each state's legislature and the U.S. Congress must ratify the agreement for it to be binding, an uphill climb but one that's underway right now in Wisconsin and other Great Lakes states. Annin says it's disappointing but not unexpected that special interests "have begun to pick away" at the compact.

"We're losing the big picture," he says. "In particular, a lot of local officials and politicians are thinking locally,

selfishly you could argue, and that ultimately could break down what the governors and premiers have worked so hard to build.

"The region should seize the opportunity when it's at hand," he says. "We have the Saudi Arabia of water on two of our coasts of Wisconsin. If people in the Great Lakes region don't figure out a way to manage and protect this internationally significant resource, somebody else will do it for us."

A vast but vulnerable resource

The glaciers that receded from North America 11,000 years ago left behind a watery legacy — Lakes Erie, Huron, Michigan, Superior and Ontario. Together, they contain 6 quadrillion gallons of water, enough to cover the lower 48 states to a depth of 9.5 feet.

The lakes, tributaries and more than 200,000 square miles of land that drain into these waters create one of the world's largest ecosystems. They are home to 40 million Americans and Canadians. They anchor the world's third largest economy and they serve as the nation's playground. Fully one-third of the boats registered in the United States are in Great Lakes states and recreation such as fishing, boating, hunting and wildlife watching generates \$50 billion annually in the region.

Yet these vast inland seas are vulnerable. They're much cleaner than a generation ago, thanks to Clean Water Act requirements that greatly decreased pollution from municipal and wastewater treatment plants. But the lakes continue to be threatened by stormwater, barnyard runoff, contaminated sediments, airborne mercury and sewerage overflows. An onslaught of invasive species is remaking the ecosystem. And people are beginning to realize that the lakes are vast, but not bottomless.

A 2000 report by the International Joint Commission, comprised of U.S. and Canadian officials, noted that less than one percent of the Great Lakes waters are replenished every year through rain, melting snow and groundwater. Further, there is no "surplus" water in the system if all of the basin's water uses are considered, including hy-

dropower and the water needed to sustain the environment.

The supply will get even tighter as global climate change heats us. Experts predict that water levels on the Great Lakes will likely fall — some models suggest as much as eight feet — as warmer temperatures and shorter ice cover lead to significantly more evaporation.

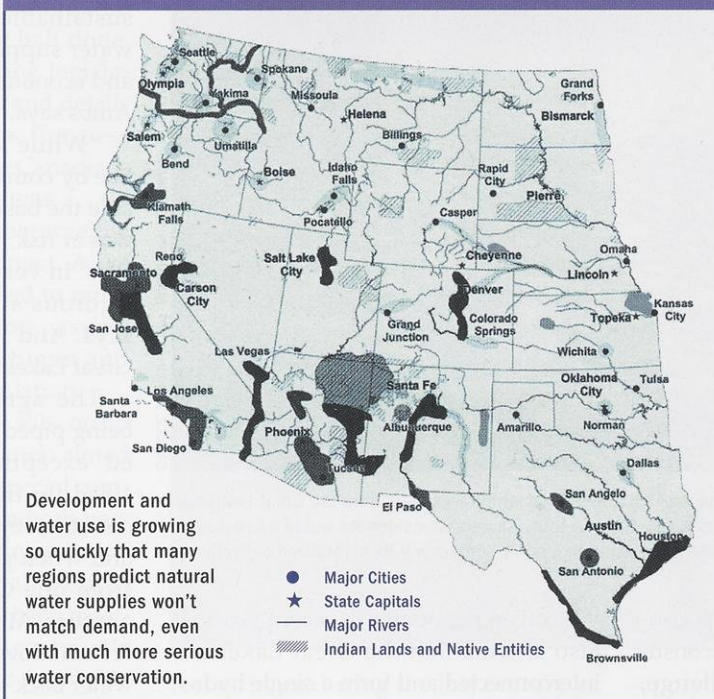
The loss will bring steep economic and ecological costs. Freighters will have to reduce the amount of cargo they carry. Ports will need to increase dredging at a tremendous cost. Recreational boating, hydropower generation and water supply systems will need to extend their reach to water. Fish and other aquatic organisms dependent on shallow water habitats will also suffer as critical spawning areas, food and forage areas are left high and dry, says Keith Reopelle, program director for Clean Wisconsin, a statewide environmental group that's been working to ratify the compact in Wisconsin.

"The Great Lakes are huge lakes, so people may not appreciate how vulnerable they are," Reopelle says. The net effect of climate change might lower Lake Michigan by three to eight feet. "We really should be concerned about every drop of water we take out of the lake," notes Reopelle.

A good faith agreement on water has its flaws

Great Lakes governors and premiers have been keeping a wary eye on Great Lakes water for more than a century and exhibiting, as Annin titles one of his chapters, "An Aversion to Diversion." Wisconsin, in fact, led efforts starting in the early 1900s to contest Chicago's ability to take water out of Lake Michigan and send it down the

WESTERN REGIONS FACING POTENTIAL WATER SUPPLY CRISES BY 2025



Chicago River to flush away and dilute the stockyard and other waste clogging its namesake river. Chicago now uses Lake Michigan water primarily to provide drinking water to its citizens and growing suburbs. A 1967 U.S. Supreme Court decision limited the Windy City's take to 2.1 billion gallons a day.

Efforts to manage water use in the Great Lakes basin have intensified in the last quarter-century in the wake of several proposals floated to send water westward. Alarmed Great Lakes governors and premiers signed a good-faith agreement in 1985, the Great Lakes Charter, to govern future diversion requests from outsiders and withdrawal requests from users within the basin. The charter committed the signatories to provide notice and consultation for any requests from outside the basin to withdraw over five million gallons per day. Importantly, it also committed the signatories to providing "notice" and "consultation" to one another when applicants inside the basin sought new or increased water use that would result in a water loss of five million gallons per day or more from the basin. Water experts consider water "lost" to a basin when it evaporates naturally, evaporates

in utility cooling towers, or if it's incorporated into that bottle of beer you're drinking or the canned peaches you're eating.

Congress took action on this issue back in 1986, passing the Water Resources Development Act (WRDA) that prohibited any water diversions out of the Great Lakes basin unless the eight Great lakes governors unanimously approved them. Minnesota and Wisconsin quickly enacted measures into law while Michigan didn't do so until 2006.

The Great Lakes governors had a way to say "No" to diversions, but WRDA was silent on water withdrawals from within the basin. Subsequent proposals for diversions and withdrawals revealed the law's

flaws — a lack of standards to evaluate proposals, and no set ways to appeal a decision. It led, in some eyes, to arbitrary decisions. Under WRDA, Michigan vetoed a proposal by Lowell, Ind., a city less than five miles outside the basin boundary, that was under federal orders to improve its drinking water. Lowell wanted to tap a million gallons a day of Great Lakes water to replace a water supply contaminated with excessive fluoride. Then, despite objections raised by other states, Michigan approved a withdrawal plan by farmers within the basin that would require 20 percent more water than Lowell sought to irrigate crops already produced in great surplus in the United States.

Other questions came up. How long would other governors have to respond to a proposal and what if no response was received?

Furthermore, WRDA didn't apply across the border, as the region discovered to its dismay in 1998 when a Canadian entrepreneur proposed filling tankers and shipping 158 million gallons of Great Lakes water to Asia every year. The resulting outcry from the U.S. and Canada killed that particular export proposal. Subsequent review of

U.S. DEPARTMENT OF INTERIOR MAY 2003 STUDY



CAROLE Y. SWINEHART, MICHIGAN SEA GRANT INSTITUTE

The agreement and Great Lakes Compact limit which areas could withdraw waters from the Great Lakes for residential, community, commercial, industrial and energy needs. Shoreland residences would be covered, but inland demands, especially those outside the watershed basin's borders will be scrutinized collectively by Great Lakes states and provinces.

WRDA by top water law experts concluded that the law was likely unconstitutional and ripe for legal challenge, Annin writes. The commerce clause of the U.S. Constitution severely limits individual states from turning away outsiders seeking Great Lakes waters, the legal team concluded.

That concern motivated the region's governors and premiers to develop stronger, more binding protections for the Great Lakes. After four years of negotiations by regional water managers (whom Annin calls "unsung heroes"); advisory meetings with industry, environmental and municipal stakeholders; and two rounds of public meetings, the Great Lakes governors and premiers signed the two documents in Milwaukee in December 2005: a Great Lakes-St. Lawrence Seaway Basin Sustainable Water Use Agreement and a companion "compact" on the U.S. side of the border.

Better protection for a shared resource

The agreement affirms that the Great Lakes are a precious public natural resource shared and held in trust by the states and provinces — not a commodity to be sold to the highest bidder, says Todd Ambs, Wisconsin DNR water division administrator and the lead

Wisconsin negotiator in recent years. It also affirms that the Great Lakes are interconnected and form a single hydrologic system, defining Great Lakes water to include rivers and groundwater within the basin.

"What we are trying to do is create a system that says people who use water in Milwaukee have an impact on the people who live in Cleveland or Toronto, and these people ought to have a say in that," Ambs says. "That's huge."

Importantly, the compact establishes that water management in the basin aims to protect, conserve, restore and improve the Great Lakes — not grant

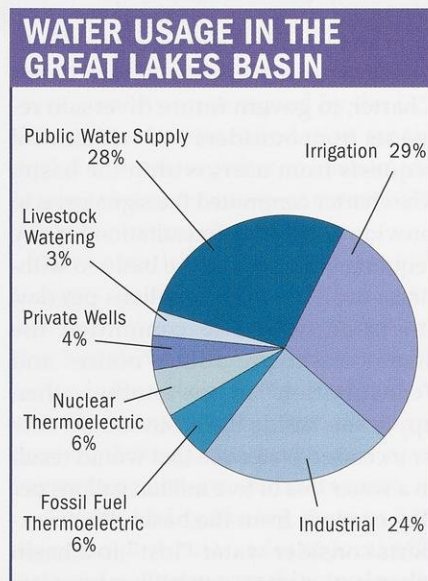
every request to use the water or let it die the death of 1,000 cuts. The agreement also recognizes that continued sustainable, accessible and adequate water supplies are vital for the people and economy of the Great Lakes region, Ambs says.

"While WRDA said 'No' to water use by communities or applicants outside the basin even when public health was at risk, the compact is a way to say 'Yes' in very limited situations when rigorous standards are met," Ambs says. And it sets standards for using Great Lakes water within the basin.

The agreement bans water from being piped out of the basin with limited exceptions: when communities straddle the basin boundary, when counties straddle the basin boundaries, and when proposing to transfer water from one Great Lakes watershed to another. All such uses must guarantee "return flow" by sending treated wastewater back to the basin.

Water users within the basin are affected by the compact as well. The agreement requires states and provinces to regulate water use by municipal utilities, industry, agriculture and other users to ensure that water is used efficiently without harm to the Great Lakes. It requires each jurisdiction to develop a water conservation plan if they expect outsiders to meet tough standards as well, Ambs says. This is a key part of the compact, Ambs says. We could not place stringent prohibitions on users outside of the Great Lakes without demonstrating we were using water efficiently within the basin, he says.

The compact makes sense for the economic health as well as the environmental health of the Great Lakes region. We are blessed with a water resource we will have for generations to come, if it is sustainably managed. Many parts of the country already can't say that, Ambs says. A 2003 U.S. Department of the Interior map highlighting areas where water supplies are not adequate to meet water demands for people, farms and the environment shows problems in nearly all the western states except South Dakota, but particularly in Arizona, Texas, California, New Mexico, Colorado, Utah and Nevada.



INTERNATIONAL JOINT COMMISSION

Our stake in getting strong water protections in place

Though five years in the making, the agreement's journey is only half done. Each state must pass enabling legislation that ratifies the compact and details water management programs. Congress must adopt the compact. The Canadians need to adopt similar regulations.

In February, Minnesota became the first state to ratify the compact. As of April 2007, Illinois was poised to ratify the compact with legislation passing both houses; Indiana, Michigan and New York all had active legislation.

Work is underway in the Wisconsin legislature to develop legislation aimed at ratifying the compact. A special committee with lawmakers from both parties and stakeholders including municipal utilities, environmental groups, industry and agriculture has been meeting for months to turn the compact's broad language into specific standards and draft legislation.

Michigan and Wisconsin will be key tests. Michigan citizens and political leadership have long fought against allowing any water to be piped across basin boundaries, which the compact would allow in limited cases. In part, that opposition reflects the strong emotional connections Michiganders have to the four lakes that define its boundaries, says Ambs, a born and bred Michigander. And because 99 percent of Michigan's land lies within the basin, the reality is that no Michigan communities have to worry about being allowed to get Great Lakes water, so the political calculus is much different for that state. It's easier for their politicians to propose banning all diversions than in states where less of the land area is within the Great Lakes basin.

Only one-third of Wisconsin's land drains to the Great Lakes and a growing number of Wisconsin communities that straddle the basin boundary or are just outside of it are actively seeking new water sources. They are currently dependent on groundwater drawn through rock layers that contain natural contaminants and the groundwater levels in parts of southeastern and northeastern Wisconsin have been drawn down 150



MICHAEL SEIDER

Sustained drought that has lowered Lake Superior to its second lowest level this year provides a vision of our concerns for increased water demand. TOP: Dried out sloughs on Fish Creek in April 2007.

BELOW: The boat ramp built on Bono Creek in Bayfield County in 1987 did not reach the water back in 2001. The waterline has receded even farther today.



STEVE SCHRAM

feet or more during the last century as water has been pumped out more quickly than it has been replaced naturally. The Great Lakes represent a tempting source of water communities would like to tap.

Bottom line, the compact is good for Wisconsin, says Reopelle, who serves on the committee developing legislation. It provides protection and would give communities that are on or near the Great Lakes border clear standards and a clear process to apply for access to use Great Lakes water. Currently any proposal a state receives to consider a water diversion faces an up or down vote by all eight states' governors. In the absence of clear, objective standards, a single dissenting vote could seal an applicant's fate.

While Reopelle thinks that Wisconsin and the rest of the Great Lakes states will ultimately ratify the compact, Ed Wilusz, a fellow member of the special legislative committee and a vice president of environmental relations for the Wisconsin Paper Council, isn't so sure.

He considers the compact "smart planning and a good idea," but puts the chances of ratifying the compact at 50-50. There are serious and very complex problems that need to be resolved, Wilusz says. Regulatory programs that

apply to existing users and new water users could have negative economic consequences unless they are done right. We are committed to working through these issues and finding ways to make the compact work, but it will take time and will not be easy. The governor, DNR staff and legislators are also committed to making the compact work, so hopefully we can come up with an implementation strategy that works for everyone, he says.

Annin observes that after years and years of negotiations, the Great Lakes Basin is at a historical crossroads. The question is, will regional officials take action to protect the lakes or bicker among themselves, creating legislative gridlock that leaves the lakes vulnerable in the future?

In the interim, any community or business in the Great Lakes region that files a lawsuit against WRDA and is successful in getting it thrown out will be seen as a pariah. "Then the floodgates [for water diversion] would be wide open to them and everyone else from Las Vegas to Phoenix to Beijing." ■

Lisa Gaumnitz is public affairs manager for DNR's water programs. Shaili Pfeiffer is a water resources specialist with DNR's Great Lakes program.

LEARN TO BEAR HUNT

Summer workshops offer teens the chance to learn bear biology and management, and to participate in a hunt.

A team of us started a Learn to Bear Hunt (LTBH) program two years ago to give students who would not normally have such an opportunity a chance to experience a bear hunt under the guidance of experienced mentors. We modeled the workshops and special hunt after similar Learn to Hunt programs offered at DNR's Sandhill Outdoor Skills Center. I was fortunate to have been part of that Sandhill team as superintendent for 10 years. On a statewide basis, these programs were set up to introduce recent hunter education graduates in Wisconsin to pheasant, turkey, small game and deer hunting, and they've been going strong since 1996. Like these other programs, the bear program offers the students a combination of classroom training with practical talks, good food, the chance to meet a community of enthusiastic hunters, and hands-on hunting opportunities that stress safety and fun. These bear hunting workshops started modestly in northern Wisconsin in 2005 with 15 students in two locations. Last year, the program expanded and 52 students in 15 northern counties were offered training workshops in mid-August and special two-day hunts in late August. These special youth hunts are scheduled in advance of the 35-day bear season that runs in September and October.



KATHY OGINSKI

Workshops in advance of the hunt round out students' understanding of black bear ecology, lifestyle and management. The hands-on program even includes practice sessions at a shooting range with individual instruction.

For those students chosen for the program, a bear hunt is a rare treat. Black bears have low reproductive rates and hunting quotas are tightly regulated to avoid overharvest. Demand for the approximate 2,500 bear permits available statewide is so high that hunters typically have to wait six to nine years to receive a harvest permit. For this student training program, we intentionally selected students who do not have access to bear hunters through their families or friends. Some of the participants are selected for this rare opportunity because it is a welcome change from trying circumstances that they have already faced in their short lives. For instance, some spaces in the program are offered to young students who have life-threatening illnesses and long-term disabilities.

The program starts with a workshop where all the participating students are invited to gather in one location to learn about black bear biology, management and hunting tactics. Parents are invited to the session to share this part of the experience with their son or daughter. The training was developed by a team of conservation wardens, wildlife biologists

and volunteer instructors from the Wisconsin Bear Hunters' Association — seasoned hunters who “talk bear” lifestyles and habits.

Biologists explain how bear populations are estimated and how these field surveys are used to set harvest quotas that sustain the slowly growing statewide bear population. The field specialists also explain management issues caused by spreading bear populations and even faster spreading human populations. We explain how land development can lead to bears causing agricultural damage or concerns if bears become habituated to people. If they are deemed “nuisances” in neighborhoods or camping areas, bears are live-trapped and relocated.

The training workshop also covers bear hunting ethics, firearm safety, and rules and regulations specific to bear hunting. Students also learn about the two prevalent methods of hunting bear over bait or by pursuit with hounds.

Students are then matched up with mentors and about a week later get to go on a bear hunt. Groups providing instructors, chaperones and hunting mentors during the first two years of the

Learn To Bear Hunt Program included the Wisconsin Bear Hunters' Association, the Wisconsin Department of Natural Resources, the Wisconsin Conservation Congress, the Great Lakes Indian Fish and Wildlife Commission, the U.S. Forest Service, Safe Hunters of Tomorrow, the United Special Sportsmen Alliance, county forest staff, and hunters who have participated in other Learn To Hunt courses.

The mentors and kids have a great time together so all the coordination and planning really pays off. Students hunting over bait may go afield with one or two mentors, but those hunting with hounds may need an entourage of up to eight people for every young hunter given what it takes to handle dogs and get ready. Students who don't have their own hunting gear are often loaned appropriate boots, clothing, safety equipment and firearms. The hunting experience includes checking baits for signs of bears, learning to track moving bears, handling hounds, firearm safety, approaching bears and coaching on shooting.

I'm often asked “How successful were the students?” My answer is

always the same. They are all successful, whether they harvest a bear or not. In fact, the students do about as well as seasoned hunters. Almost 71 percent of the students harvest a bear during the two-day special hunt (last year 37 of our 52 students). We attribute this to matching the students to highly motivated mentors who put their heart and soul into the students' hunt. We also show the students how harvested bears are tagged, registered, measured, weighed and aged. A tooth and rib are collected from each bear as part of on-going research programs. Students also learn how the hide and meat are processed.

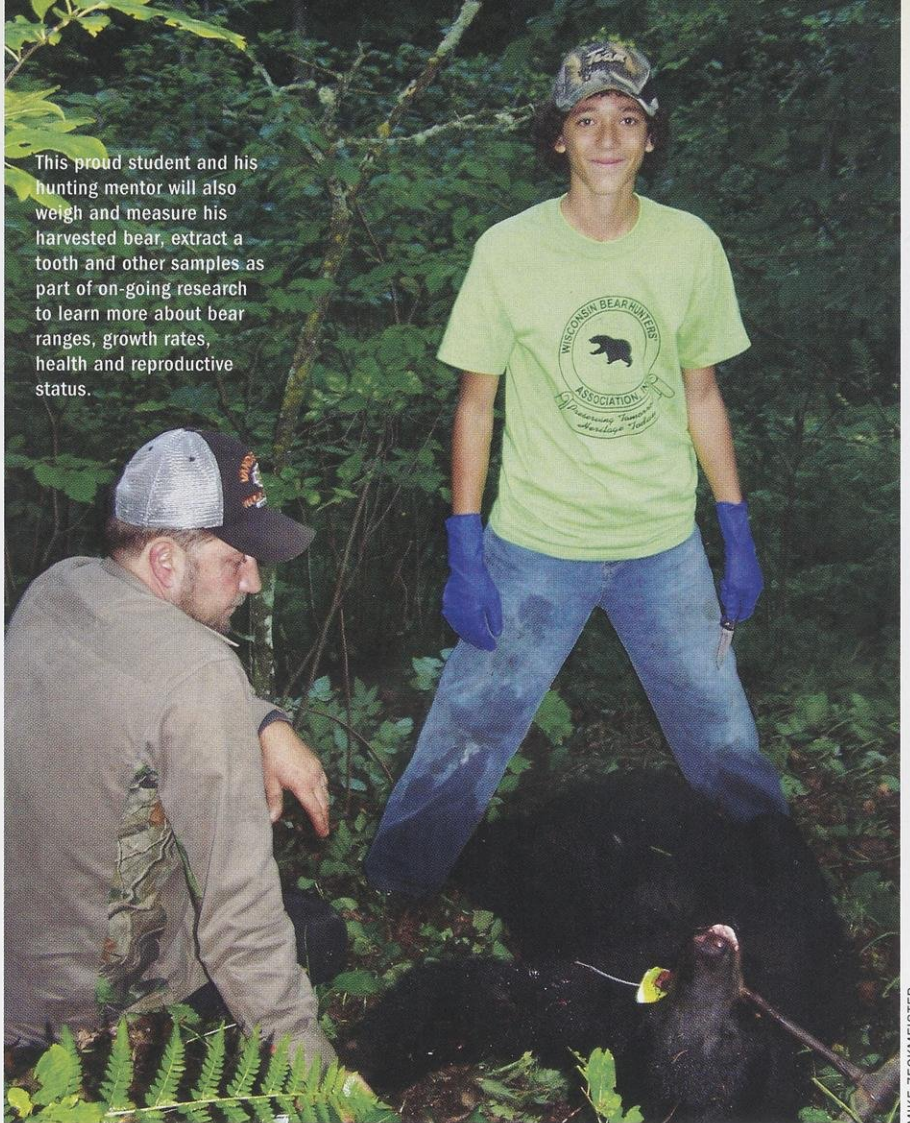
Through this Learn to Hunt experience, the students bond to veteran bear hunters, volunteers and the DNR staff like extended family. We estimate that 50-60 people from the community (including family and friends) get positive impressions about the program for each student who attends. I think it has to do with the committed volunteers who invest a part of themselves into each program.

"This was my best hunting experience," said Jordan, a 17-year-old. "I will never forget it."

"This program meant a lot to me," said Emily Beer, 15. "Without it, I would never have gone bear hunting. It meant a lot to get all that help from the warden and other volunteers on the field day. They donated time to help me better understand all the work that goes into bear hunting, but they also showed me the fun and thrill of the hunt. I appreciated the guides. They were a lot of fun to hunt with and were a great group of people. They helped answer my questions so I would know what to do during and after the hunt, and they made me feel comfortable doing everything."

Learn to Bear Hunt workshops are limited to those counties with larger bear populations, typically in northern Wisconsin. If a Learn to Bear Hunt program will be offered, wildlife managers will announce they are accepting applications through notices in local newspapers and postings at northern DNR Service Centers in late July and early August. The number of class openings varies each year depending on the number of unclaimed bear harvest

This proud student and his hunting mentor will also weigh and measure his harvested bear, extract a tooth and other samples as part of on-going research to learn more about bear ranges, growth rates, health and reproductive status.

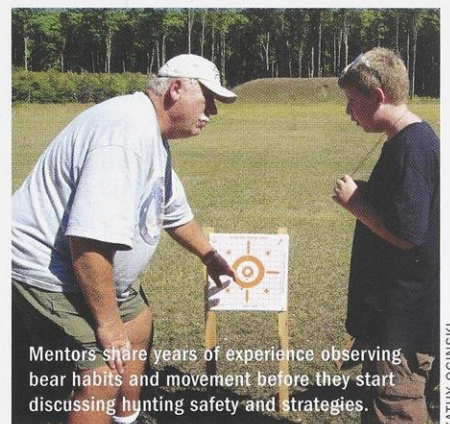


MIKE ZECKMEISTER

permits. DNR wildlife and law enforcement staff make workshop arrangements and contact potential sponsors. The sponsoring organizations send out applications that may ask for basic contact information and include an essay question. Applications are reviewed by a panel of teachers, hunter education instructors and DNR staff who will recommend students for the hunt. Only 50-65 students may be offered this opportunity in a given year, so participation is limited. You can contact local DNR wildlife managers in late July to find out if your county will be participating.

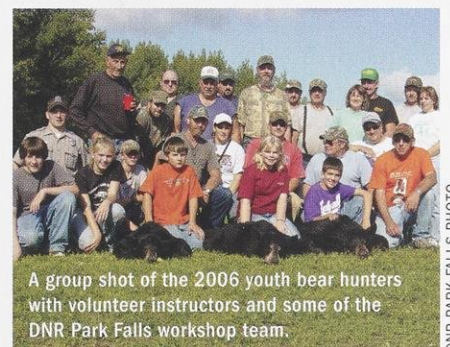
As the program grows in popularity and more regions of the state offer a chance for kids to take part, we hope to keep providing a consistently high-quality experience that is rewarding for students and volunteers alike.

Mike Zeckmeister is the regional wildlife supervisor at DNR's Antigo Service Center.



Mentors share years of experience observing bear habits and movement before they start discussing hunting safety and strategies.

KATHY OGINSKI



A group shot of the 2006 youth bear hunters with volunteer instructors and some of the DNR Park Falls workshop team.

DNR PARK FALLS PHOTO



FRANK J. KOSHERE

Practical advice to recognize and minimize the consequences of invasive species.

Julia Solomon

If another article about the perils of plant and animal invaders makes you sigh, shake your head, and skip to the next story, you're not alone.

Invasive species have received a lot of press in the past few years, most of it bad and some downright alarming. From the emerald ash borer to the Asian carp to the giant hogweed, it seems there is always a new monster lurking at the borders just waiting for the chance to wreak havoc on our beloved woods and waters.

It can be tempting to tune out all this bad news and assume the problem will go away, that someone else will fix it, or worse, that it's hopeless. Each one of these assumptions is understandable, but none is accurate, and none brings us any closer to a solution.

It's time for an honest look at the reality of invasive species in Wisconsin, and examining these assumptions is a good place to start.

Won't invasives just go away?

The short answer: no. A variety of factors, from global commerce to climate change, are making it ever easier for organisms to move around and find new homes. The rate of species introduc-

tions has accelerated in recent decades and increasing numbers of non-native species are becoming established in Wisconsin.

Scientists call this "biotic homogenization" — the global mixing of plants

and animals from around the world. Over the millennia, each region of the world evolved its own unique flora and fauna. But now that people and goods move around more quickly and freely than ever before, remote places are no longer so isolated. It is not unusual for species to jump from one continent to another, much less across state lines. Some are carried intentionally, as new landscape plants or sport fish. Others come in as hitchhikers in wood products, forage, soil or boating equipment.

This number of jet-setting species is likely to increase, which means those doomsday headlines about the next big invader are probably going to keep coming. Even if we figure out ways to control today's invasive species, there will likely be more arriving tomorrow, dumped from the ballast water of ocean-going ships, swimming up a manmade channel, or creeping up from southern states as the climate becomes warmer.

Once they are here, invasive species are difficult — often impossible — to



BROCK WOODS

Understanding invasive species provides many teaching moments to identify plants and look-alikes, learn how they spread, appreciate different controls and value the contributions of volunteers.

eradicate completely. Unfortunately, the problem of invasives is here to stay.

This fact, though sobering, should not be cause for despair. Yes, we are in for a long haul. No, there are not likely to be miraculous quick-fix solutions. And, yes, these unwelcome guests will affect Wisconsin's environment — indeed, they already have. But those impacts do not need to be catastrophic. Not every lake, forest or bog is destined to be overrun. With diligent monitoring and containment, many of our ecological gems can be protected.

Strategic investment in prevention, early detection, and control of invasive species will help the natural and human communities of Wisconsin adapt to the reality of life in the biotic fast lane. We can learn to live with some inevitable changes while preserving what we love.

Isn't it somebody else's job?

Investment is a loaded word. It means not only money, but time: hours spent pulling garlic mustard from a neighborhood forest, inspecting trees for new pests, cleaning zebra mussels off drinking water intakes. It also means devoting dollars to everything from scientific research to signs at boat launches and state parks.

Confronting the reality of invasive species is a daunting task — surely there is someone who is responsible for dealing with the problem? There is, and it is all of us.

It's easy to place blame for invasive species and there's often a lot of finger-pointing when these organisms are discovered: We have invasive plants in our lakes because visiting boaters bring them in. Emerald ash borers arrive on firewood visitors bring from other states. New species arrive in the Great Lakes because federal ballast water regulations aren't strict enough. Scientific researchers should come up with more effective methods of control. The cost of invasives should be borne by the town, the state, the federal government, not by outdoor users.

Whether or not these claims are true, they miss the point. Invasive species are a long-term, large-scale problem that will not be solved by pointing fingers. True solutions will require many partners, substantial funding, and, yes, a lot of volunteer hours. It's an investment we will all have to make. Government officials, resource managers, researchers and local citizens all have a role to play.

What's the use?

In some ways, this is the easiest question to answer. Throwing up our hands in surrender will not slow the spread. Keeping invasive species at bay can be costly and tiring, but when your back aches from pulling buckthorn, stop for a moment and imagine the alternative.

Wisconsinites share a deep love for our natural places and the native species that make this land feel like

home. We will not stand aside to watch our flora and fauna be choked out by invasive species. We cannot afford to. Three of the state's top industries — agriculture, tourism and forestry — all depend on natural resources and are threatened by invaders.

But the reasons for working against invasives go far beyond economics. Rituals such as watching for the first trillium bloom and pulling panfish from a familiar lake are part of Wisconsin culture, and we care about them passionately. Invasive species put these rituals at risk. Ultimately, it is our love of home that motivates citizens and policymakers to confront the problem of invasives with realism, persistence and optimism.

That optimism is not unfounded. As in the rest of life, bad news about invasive species tends to grab the headlines while successes often slip by unnoticed. In these pages you will find stories of the hard work going on around the state and learn about the progress being made. You'll also find out about the many ways you can help protect Wisconsin's native species.

Take heart, and read on!

Julia Solomon is an educator explaining aquatic invasive species issues for the Department of Natural Resources and UW-Extension.

- 1 Reasonable expectations**
Practical advice and positive directions to recognize and minimize the consequences of invasive species.
- 3 Sentinels to sound the alarm**
Your rapid identification of the latest group of invasive plant species to plague Wisconsin may stem an unwelcome infestation.
- 7 Unwelcome guests, unwelcome costs**
- 8 Beetle brigades and weevil squadrons**
Introducing carefully selected predators to rein in invasive plants can work, but human vigilance is still the best defense.
- 12 Invasion at a slow crawl**
Exotic earthworms are nosing into northern forests at an unnatural pace.
- 14 Only YOU can stop the invasion**
- 15 Alternative plants for landscaping**
- 16 Keeping up to speed**



FRANK J. KOSHERE

Your rapid identification of the latest group of invasive plant species to plague Wisconsin may stem an unwelcome infestation.

Kelly Kearns and Nicole Hayes

It's a basic defense technique right out of the Middle Ages: Put more eyes on the lookout for invaders, and the interlopers will have less of a chance to scale the castle walls. ■ When the DNR and the UW-Madison Herbarium put out a call for volunteers to join Wisconsin's Invasive Plants of the Future initiative — a program with the aim of locating and controlling populations of new invasive plants likely to cause trouble in the future — many people took up the sentry posts, scouting their own backyards, nearby fields, and favorite parks, lakes and forests for troublesome species.

These alert volunteers keep their eyes open, and they've seen plenty. Thanks to their observations and reports, populations of unwelcome invasives we alerted you to in 2006, including Japanese hedge parsley, common and cut-leaf teasel, European marsh thistle, flowering rush, Japanese hops and black swallow-wort, have been identified. Control work is underway on a number of the plants found in forested areas, supported by a grant from the U.S. Forest Service and the diligent effort of several landowners, private contractors and community organizations. Giant hogweed infestations have spawned the development of a Cooperative Weed Management Area to contain

this plant on both sides of the Wisconsin/Michigan border.

Fortunately, we do not yet know of any populations in Wisconsin of other plants in our past alert — Japanese stilt grass, spreading hedge parsley, pale swallow-wort, wineberry, European frog-bit, hydrilla or water chestnut. Keep watching for these species — they may show up at any time. The key to prevention is early spotting and prompt removal.

Here's a list of a new group of plants we expect to start spreading in Wisconsin very soon. Please keep an eye out for these invasives, and if you find any of these species, take a photo, collect a voucher specimen and quickly report the find to the Department of Natural Resources.



Tree of heaven
(*Ailanthus altissima*)

CHUCK BARGERON, UNIVERSITY OF GEORGIA

Ironically named, this weedy tree grows fast, adding three feet a year and reaching up to 80 feet. It is primarily found in urban areas in southern Wisconsin. However, it is rapidly spreading in forests in the states to our south and east. In forests it quickly reaches the canopy and shades out mature trees. Leaves and flowers may cause contact dermatitis in some people. It also produces toxins that can prevent the establishment of other plant species. In cities, its aggressive root system damages sewers, sidewalks and foundations. When cut, it produces suckers and stump sprouts. A single tree can bear up to 325,000 wind-dispersed seeds each year. The most distinctive characteristics of this deciduous tree are its foul odor and its four-foot-long compound leaves.

Please report any *Ailanthus* found in forested areas, including urban parks.

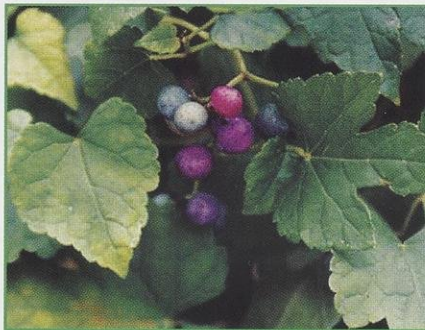


Oriental bittersweet
(*Celastrus orbiculata*)

CHRIS EVANS, RIVER TO RIVER, CWMA

Easily confused with the native American bittersweet, Oriental bittersweet is a serious threat to grasslands, woodland edges, forests, roadsides and beaches. This woody climbing vine is capable of over-topping tall trees, shading, girdling, and eventually pulling them down. Oriental bittersweet vines grow up to 60 feet high and four inches in diameter. The fruit's yellow membrane eventually splits to reveal a red inner fruit. Birds and mammals disperse the seeds. There are a number of scattered

infestations known in Wisconsin, but it is not yet widespread. Wreaths and floral arrangements with bittersweet or other seeds should be disposed of in the trash rather than in compost or brush piles. Be sure you've identified the correct bittersweet: our native American bittersweet has leaves with a more tapered tip and larger fruit clusters at the ends of stems, and the fruits are produced in small clusters at the leaf axils.



Porcelain berry
(*Ampelopsis brevipedunculata*)

ELIZABETH J. CZARAPATA

Sometimes planted as an ornamental, porcelain berry is a deciduous, woody vine in the grape family. It can be extremely aggressive, shading out native vegetation by blanketing the ground, and climbing trees and shrubs using its tendrils. In forests in the mid-Atlantic states it grows rapidly along forest edges, trails, roadsides, riparian and open areas. Wildlife eat the distinctive pink, blue and lavender fruits, then disperse the seeds. We know of only a few infestations in Wisconsin, although it is much more abundant to the south. Reports indicate only the green-leaved variety is invasive; the variegated cultivar appears to be benign.

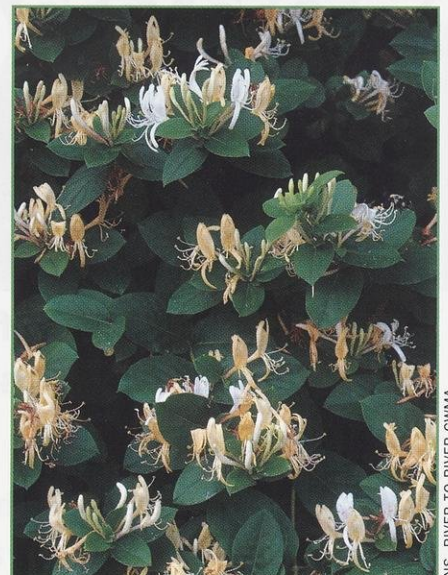


Kudzu
(*Pueraria lobata*)

RANDY CYR, GREENTREE TECHNOLOGIES

Notorious as "The vine that ate the South," kudzu is known for its ability to cover large trees, forest edges, utility lines, billboards, abandoned houses and anything in its path. Nearby vegetation dies for lack of sunlight. A single kudzu

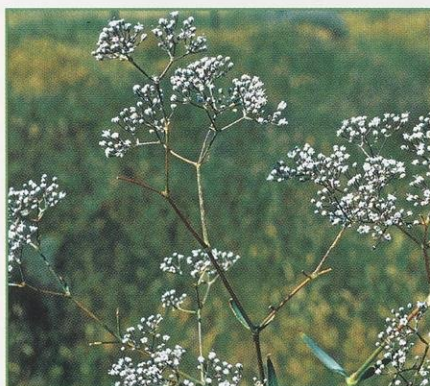
root can produce up to 30 vines capable of growing up to a foot a day and 60 feet per summer. It quickly girdles and blankets shrubs and trees, breaking branches and uprooting entire trees under its weight. Kudzu reproduces via runners, rhizomes, vines that root at the nodes, and hard-coated seeds dispersed by wind, water and animals. This perennial legume has large three-part leaves and reddish-purple flowers that produce flat, brown, pea-like pods. Although no populations have been found in Wisconsin, recent research showed the northernmost population has been producing viable seed. Those plants were located in Evanston, Illinois — about 30 miles south of the border.



Japanese honeysuckle
(*Lonicera japonica*)

CHRIS EVANS, RIVER TO RIVER, CWMA

This semi-evergreen woody vine resembles native honeysuckle vines, but it has pairs of white, cream or pink flowers, hairy opposite leaves, and produces purplish black berries. Japanese honeysuckle spreads in woodland edges, floodplains, fields and roadsides. The vines typically grow six to ten feet in height, but can reach up to 30 feet, forming dense intertwining mats that outcompete native vegetation for light, water and nutrients, and topple shrubs and trees. Japanese honeysuckle reproduces via underground stems (rhizomes) and seed dispersed by birds. Toxins from the vine may inhibit the regeneration of some trees. It is abundant in central Illinois and seems to be expanding northward. There may be ornamental cultivars that are not invasive.



STEVE DEWEY, UTAH STATE UNIVERSITY

Baby's breath
(*Gypsophila paniculata*)

One of the most commonly used plants in the floriculture industry, baby's breath is troublesome only when it gets into Great Lakes dunes. On these shores it can form a huge taproot and stabilize naturally shifting sand dunes to the point of significantly changing the open dune habitat certain native plants need, as is the case with the federally threatened dune thistle (*Cirsium pitcheri*) in Michigan. It is currently invading the Michigan shore of Lake Michigan, but has not yet been found on Wisconsin's west shore of the lake. Baby's breath is a perennial forb growing up to three feet tall with a thick, deep taproot and branched stem. It has narrow opposite leaves and white or pink flowers with five petals.



TOM HEUTTE, USDA FOREST SERVICE

Japanese knotweed
(*Polygonum cuspidatum*, syn.
Fallopia japonica)

Often erroneously referred to as "Mexican bamboo," this semi-woody perennial in the buckwheat family is found in urban areas where it was planted years ago. It spreads rapidly by rhizomes, forming large, dense thickets that eliminate native vegetation and wildlife habitat. Although it is already somewhat widespread in much of the state, it is generally not yet in the habitats where it is likely to become extremely invasive. Once it gets into the shore of a river, stream or lake, knotweed can

spread by root fragments, forming thickets that line the shore for miles and cause extensive shoreline erosion. Once established, large dense stands are difficult to eradicate. Thick bamboo-like stems reaching six to eight feet, with large heart-shaped leaves and terminal lacy clusters of white flowers make it very easy to identify this plant.



STEVE DEWEY, UTAH STATE UNIVERSITY

Poison hemlock
(*Conium maculatum*)

One of the most poisonous plants in the world, poison hemlock is a biennial forb in the parsley family. In Indiana and Illinois it is abundant along roadsides, from which it spreads into moist sites such as stream banks, wet meadows and ditches, although it can thrive in drier sites. Only a few patches have been reported in Wisconsin, although it is spreading in some sites and is likely to become more abundant soon. Taller than most plants in this family, it can reach over seven feet and has pinnately compound leaves, green stems with purple or black spots and multiple umbels of white flowers.



WWW.FORESTRYIMAGES.ORG

Wild chervil
(*Anthriscus sylvestris*)

Although not currently widespread in the upper Midwest, wild chervil, native to Europe, is prolific in areas where it is found. It has spread rapidly in the northeast in recent years. While reportedly not a problem in cultivated fields, this biennial or short-lived perennial

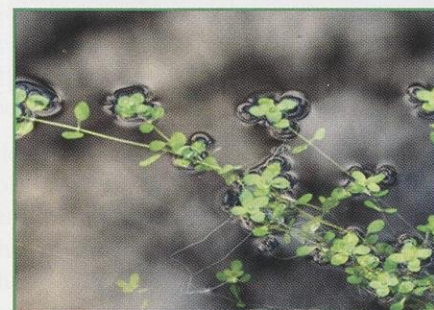
forb in the parsley family competes aggressively with forage crops for light, water and nutrients, and shades out surrounding vegetation. It can also spread along roadsides into grasslands and open woods. It has finely compound leaves and a taproot. In the second year, the plants produce hollow flower stems, usually three to four feet tall (it can reach six feet). Tiny white flowers form in umbels, like umbrellas.



BARBARA TOKARSKA-GUZIK

Hill mustard
(*Bunias orientalis*)

A new invader just recently sighted in Wisconsin, hill mustard appears to invade open grassland sites, rapidly forming dense patches that exclude other plants. Although it can be a biennial, the plants known in southern Wisconsin appear to be perennials. From a distance, this plant looks like the common yellow rocket with its bright yellow, four petaled flowers. However, the leaves are up to twelve inches long on the lower part of the flowering stem, getting smaller as they go up the stem. They look somewhat like dandelion leaves. The warty bumps on the stem are distinctive.



UBC BOTANICAL GARDEN

Pond water-starwort
(*Callitriche stagnalis*)

This floating aquatic plant has been found in states in the northeast, northwest and a few sites in Wisconsin. Pond water-starwort grows in ponds, marshes and streams. It is capable of creating locally dense mats of vegetation that may crowd out native aquatic

vegetation. The floating stems have small, densely packed oval leaves that form overlaid crosses and tiny inconspicuous flowers.



Yellow floating heart
(*Nymphoides peltata*)

M. MALCHOFF, UNIVERSITY OF FLORIDA CAIS

Looking like a small yellow water lily, yellow floating heart is a floating aquatic perennial. This plant often is used as an ornamental in water gardens. It can form large floating mats in slow-moving rivers, lakes, reservoirs, ponds and swamps. Infestations occur in northern Indiana and northern Illinois, but have not yet been found in Wisconsin.



Brazilian waterweed
(*Egeria densa*)

LESLIE MEHRHOFF, IPANE

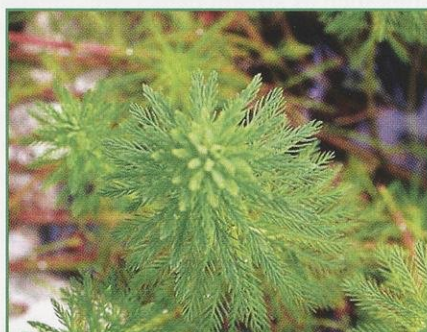
Sold for use in aquariums or water gardens, Brazilian waterweed can form stands that crowd out native aquatic plants in lakes, rivers, ponds and springs. It provides poor habitat for fish and waterfowl, interferes with recreational activities, and supports large populations of mosquitoes. It has been found as far north as Oregon, Illinois and Vermont. During winter, it survives along the bottom and resumes growing when waters reach 50 degrees Fahrenheit. It is a submerged species that resembles our native elodea, but with more showy emergent flowers with three white petals and a yellow center.



Fanwort
(*Cabomba caroliniana*)

KERRY DRESSLER

A submersed or sometimes floating aquatic perennial, fanwort is sometimes sold for use in aquariums. It often finds its way into local ponds and streams where it forms dense stands, crowding out other vegetation, clogging streams and interfering with recreational uses. As with many aquatic plants, a small fragment can regenerate a whole plant. Considered weedy even in its native range, it has created severe nuisance conditions as far north as New York, Michigan and Oregon. It has both submersed and floating leaves of different shapes. The white flowers are held above the water on a stalk.



Parrot feather
(*Myriophyllum aquaticum*)

Closely related to and easily mistaken for Eurasian water-milfoil, parrot feather is an aquatic perennial in the milfoil family. Commonly sold by the aquarium trade — often under other names — parrot feather has both submersed and emergent leaves. Small fragments can quickly grow into dense mats, providing ideal mosquito larvae habitat and shading out native algae that serve as the basis for the aquatic food chain. Infestations can also hinder water and boat movement in lakes, ponds and streams. It has naturalized throughout the southern states and northward as far as Idaho, Washington and New York. Research studies showed it could survive average Minneapolis winter temperatures.

Still on the watch list

The following invasive species should also be reported. To read more about the species listed below and see photos of each, review a copy of the June 2006 story in *Wisconsin Natural Resources* magazine, "Green invaders on the horizon" by David Eagan. Review it online at www.wnrmag.com/stories/2006/jun06/invoke.htm

Report the following plants wherever they are found:

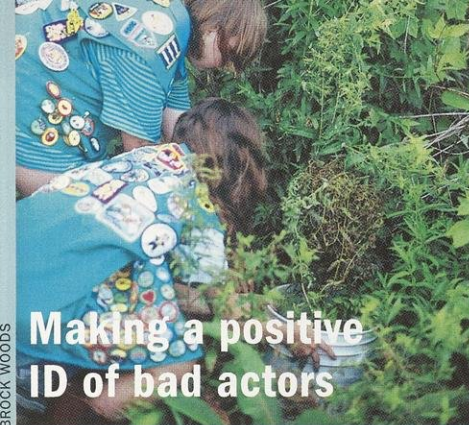
- Mile-a-minute** (*Polygonum perfoliatum*)
- Chinese yam** (*Dioscorea oppositifolia*)
- Japanese stilt grass** (*Microstegium vimineum*)
- Spreading hedge parsley** (*Torilis arvensis*)
- Black swallow-wort** (*Vincetoxicum nigrum*)
- Pale swallow-wort** (*Vincetoxicum rossicum*, syn. *Cynanchum rossicum*)
- Wineberry** (*Rubus phoenicolasius*)
- Japanese hops** (*Humulus japonicus*)
- Giant hogweed** (*Heracleum mantegazzianum*)
- European frog-bit** (*Hydrocharis morsus-ranae*)
- Hydrilla** (*Hydrilla verticillata*)
- Water chestnut** (*Trapa natans*)

Report the following plants if found in these habitats:

- **Tree of heaven** (*Ailanthus altissima*)
forests and woodland edges
- **Oriental bittersweet** (*Celastrus orbiculata*)
forests, woodland edges, grasslands
- **Porcelain-berry** (*Ampelopsis brevipedunculata*)
forests, woodland edges and grasslands
- **Japanese honeysuckle** (*Lonicera japonica*)
any plants growing in the wild
- **Japanese hedge parsley** (*Torilis japonicus*)
forests and woodland edges
- **Lesser celandine** (*Ranunculus ficaria*)
forests and woodland edges
- **Common teasel**
(*Dipsacus fullonum* subsp. *sylvestris*)
wetlands and native or restored prairies
- **Cut-leaf teasel** (*Dipsacus laciniatus*)
wetlands and native or restored prairies
- **Japanese knotweed**
(*Polygonum cuspidatum*, syn. *Fallopia japonica*)
wetlands, lakes, streams or shorelines
- **European marsh thistle** (*Cirsium palustre*)
wetlands, barrens and forests
- **Flowering rush** (*Butomus umbellatus*)
wetlands, lakes, streams or shorelines
- **Baby's breath** (*Gypsophila paniculata*)
Great Lakes dunes or beaches

Please report any occurrences of these species along with a detailed description of the location, photo and/or voucher specimen. Send to: Kelly Kearns, Endangered Resources Program, WI DNR, 101 S. Webster St., Madison, WI 53707-7921, 608-267-5066, kelly.kearns@wisconsin.gov

Kelly Kearns manages plant conservation programs for DNR's Bureau of Endangered Resources. Nicole Hayes studies native and exotic invertebrates at the UW-Madison Center for Limnology.



Making a positive ID of bad actors

Unwelcome guests, unwelcome costs

Julia Solomon

If you've ever spent the day pulling garlic mustard from your woods or cleaning zebra mussels off the local beach, you know invasive species are a major pain. But did you know they are also a major expense?

Invasive species cost the United States an estimated \$120 billion dollars every year (Pimentel 2005). If you're wondering how that's possible, take a minute to think about some of the ways invasive species harm the economy as well as the environment.

■ **Prevention** — Governments, private organizations and individual citizens all spend money to prevent the spread of invasive species. Costs associated with prevention programs range from printing educational materials to maintaining high-tech devices like the two-way electrical barrier that keeps Asian carp from moving up the Illinois River into Lake Michigan and Great Lakes invaders from heading downstream toward the Mississippi. Although prevention can be expensive, it is the most cost-effective way to combat invasive species.

■ **Control** — Invasive species can be controlled through mechanical methods (removal by hand or machine), chemical methods (herbicides and pesticides), and biological methods (introduction of pests, competitors or other organisms that limit the spread of an invader). Although these techniques can be helpful in keeping invaders in check, they can be costly and labor-intensive. Invasive control is a long-term commitment and often requires repeated effort over many years. Complete eradication of invaders is seldom possible.

■ **Equipment damage** — Some invaders, such as zebra and quagga mussels, cause major damage to equipment and facilities. Power plants and water treatment facilities spend millions every year to clean mussels off their water intake equipment. Invasive mussels can also damage recreational watercraft.

■ **Lost revenue** — Invasive weeds decrease crop and forage yields. Forest pests harm valuable timber stands. Invasive plants such as honeysuckle, buckthorn and garlic mustard can prevent tree regeneration and reduce growth rates on older trees. In communities that rely on tourism and recreation as an economic mainstay, the presence of troublesome invaders such as Eurasian water-milfoil can devastate recreational resources and decrease tourism, reducing property values or causing local businesses to close.

■ **Health hazards** — Invasive species also pose health risks to humans and livestock. Each year thousands of people are burned when they mow or brush up against wild parsnip. The toxins in this plant interact with skin and sunlight to cause burns that can take months to heal. Zebra and quagga mussels wash up on beaches by the thousands, where their razor-sharp shells are hazardous to beachgoers. Spotted knapweed, leafy spurge, hoary alyssum and other plants can be toxic to grazing cattle and horses.

■ **Ecological harm** — It's impossible to put a dollar value on the ecological effects of invasive species, but they are profound. Invasive species compete with — and sometimes consume — native species. They can make it harder for native species to survive, and can cause significant population declines for rare and endangered species. In many cases they reduce the species diversity of the systems they invade. In Wisconsin, hundreds of lakes and millions of acres of land have been altered permanently by invading plants and animals.

Voucher specimens are plant samples that provide physical evidence to confirm that an invasive species is present in a specific location. Botanists examine these leaves, stems, flowers, roots and fruits to verify species identification.

When collecting a fresh specimen make sure you wear gloves as some plant stems and juices contain irritants. Also take detailed and close-up photos showing how widespread the stand of plants may be and close-ups that clearly show plant features like flowers, general shape, seed heads, leaf shape and arrangement. Sometimes close, clear photographs are sufficient to identify plants that have distinctive leaves, flowers and fruits. In photos, place a coin, pencil or ruler for scale. If you can send a specimen and take a photo, all the better.

Fill out a short invasive plant report that pinpoints where the plant was collected, estimates how widespread an area the plant covers and provides a description of the habitat type (forest, field, prairie, wetland, open water, lawn, garden, etc.). The DNR's invasive plants website details information needed in these accounts and provides a reporting form. Visit the website dnr.wi.gov/invasives/futureplants/reporting.htm

To send a dried sample, press the plant specimen carefully between several layers of newspapers sandwiched between sheets of cardboard and weighted down. Change the newspapers frequently until the plant is dry. Ship by enclosing the dried specimen between pieces of cardboard in a large envelope. Fresh plant samples should be enclosed in a plastic bag with a moist paper towel and mailed right away.

Instructions for packaging and shipping fresh plants or dried samples are available from Invasive Plant Reporting, DNR Endangered Resources Program, P.O. Box 7921, 101 S. Webster St., Madison, WI 53707-7921. E-mail information and photos to: kelly.kearns@wisconsin.gov. You can also get questions answered about voucher samples or look for more details at this link on the DNR's invasive plant website: dnr.wi.gov/invasives/futureplants/voucher.htm.

Beetle brigades and weevil squadrons

When infestations are small, purple loosestrife can be pulled by hand, but where larger stands are discovered, it makes sense to let beetles that specifically feed on this invasive plant help control the spread.



BROCK WOODS

Introducing carefully selected predators to rein in invasive plants can work, but human vigilance is still the best defense.

Brock Woods

To control non-native invasive plants established in our state, it seems we've been sentenced to a life of hard labor. The continual digging, chopping, spraying and hauling — all the conventional control methods we find so laborious, expensive or disruptive — are they the only means we have to cope?

We may never be able to completely do away with shovels and herbicides, but we can get some help from nature itself. By introducing the natural predators that keep these plants in check in their own homelands, we can bring some invasives to heel here in Wisconsin.

Biocontrol methods reconnect “old friends” in the hope that the introduced plant predators will do here what they do at home — without attacking any of our native or economically valuable plants. The technique has met with great success against purple loosestrife, and it has slowed the spread of several other invasive species.

In Wisconsin, most organisms introduced to control plants are insects that have evolved to live on just one pest plant. These insects' reproduction is closely tuned to the plant's unique chemical makeup and growth habits, and they do not have the capacity to change their own habits quickly. These traits make host shifting difficult, except over long time periods. Both traits are found in the four insect species chosen to control purple loosestrife. These insects have been specific to their host plant for more than a dozen years since their initial introductions in 1994. It's unlikely we will see these insects shift to eating other plants for a very long time, if ever.

Like the purple loosestrife insects, any new biocontrol organism must be well-researched before it is released to ensure it will not disrupt ecosystems. If follow-up monitoring also shows it to be effective, the biocontrol species should provide more benign and cheaper control in the long run than most conventional methods, including herbicide use. Once established, a biocontrol insect may be able to control a stand of invasive plants without constant replenishment. It is especially useful if it can disperse itself to new patches of the pest plant. All four loosestrife control insects have not only passed all safety standards, but have also established well in our temperate climate, and proven effective for over a decade. Some have even traveled as far as 10 miles to new infestations.

Successful and efficient control of many invasive plants will, however, require both biocontrol and conventional control. This is the case for purple loosestrife, though more research is necessary to understand how to best integrate the methods.

The best method: Your eyes and hands

Conventional prevention efforts, such as pulling, cutting or digging the first plants of an invasive species to appear in a new neighborhood, remain our primary (and cheapest) defense. New, small purple loosestrife plants are easily pulled with all their roots intact, making this simple



Volunteers raise young loosestrife plants in pots covered with netting. Beetles used as biocontrols grow on these nurse plants for several weeks throughout the summer. More than 500 volunteer groups have been trained to raise and release beetles since the program began in 1997.

BROCK WOODS



Later in the growing season the pots that are now full of hungry beetles are placed in loosestrife stands and unwrapped so the beetles can spread into the stands and eat the invasive plants.

BROCK WOODS

operation extremely effective at preventing new and larger infestations.

You are your neighborhood's first line of defense against increasing numbers of invasive species. Educate yourself about local native flora, as well as established and new invasive plants, so you can correctly identify an invader and distinguish it from similar native species, ideally even before flowers and seeds are produced. When you can recognize new invaders, you can remove them in time to prevent seed from contaminating a site for years to come.

Sensible prevention efforts should also include careful scrutiny of any plant before it is allowed into the country; all new plant species should be observed in trial horticultural settings and

immediately eliminated if determined to be invasive. Such a policy could greatly reduce the need for expensive and laborious control programs.

Once a pest plant has established itself on a site, the most efficient conventional control methods, such as herbicide use, are usually only cheap when the infestation is still relatively small. As the invasive plants spread, biocontrol often becomes the only affordable and acceptable control option available.

Beetles put the bite on loosestrife

Almost 16 million new control beetles are at work on purple loosestrife at over 1,200 sites statewide, thanks to more



BROCK WOODS

Biocontrol projects still require hands-on, tiring work. Here clumps of loosestrife plants that were marked with flags in spring and summer are dug out and removed in fall after the growing season. Loosestrife plants are also used as host plants for raising beetles.

than 500 citizens and citizen groups who took the time to rear and release control insects since 1997. Research at selected release sites has shown a significant reduction in loosestrife flowering, stem heights, number of stems and cover, along with increased mortality. With weakened loosestrife populations, native plants have regained a foothold at some sites. Declines in seed set have also reduced loosestrife's ability to spread to new sites. Ultimately, we hope biocontrol can supplant most conventional controls, but time will tell.

Understanding some of the reasons for the early success of this program can help us duplicate its results with other invasive plants. First, evolution provided predator insects dependent on purple loosestrife. Then, the Department of Natural Resources helped fund research in Europe and the U.S. that found the most likely control insects; tested them carefully; identified the four safe, effective and hardy insect species we now use; and created simple, backyard rearing procedures that allow citizens with little ecological experience to easily multiply insect

numbers at home or school for release in their local wetlands. The Department of Natural Resources also provided funds and joined with the University of Wisconsin-Extension and other state partners to educate citizens about loosestrife, explain biocontrols and provide rearing materials.

There is still much biocontrol work to be done with purple loosestrife — and you can help! Control beetles have been released on only about 10 percent of Wisconsin's loosestrife-infested acreage, so plenty of opportunities remain for citizens to help rear and release beetles across the state. We also need help with a road survey to find out how widespread loosestrife control has been to date. E-mail Brock Woods at brock.woods@wisconsin.gov or call (608) 221-6349 to receive more information about helping.

Coupled with programs in other states to control plants of mutual concern, Wisconsin could apply the "loosestrife approach" to efficiently check the spread of other established invasive plants. While biocontrol may not work on all of them, prudence and

efficiency suggest funding additional studies on those plants that are the most damaging in the state. Until effective biocontrols are found for any particular species, it is very important to continue applying all effective and safe conventional control methods, especially to prevent further spread.

Ultimately, both efforts will likely be needed to keep a species in check. Some other invasive plants infesting Wisconsin and with known control insects include Eurasian water-milfoil, spotted knapweed, leafy spurge, non-native thistles and multiflora rose.

Eurasian water-milfoil is a submersed aquatic plant that under the right growing conditions creates dense mats in lakes, making recreational use difficult and harming wildlife and fish populations. Several Eurasian water-milfoil herbivores have been investigated as possible biocontrols. A native weevil has been shown to reduce the plant in some Wisconsin lakes. Effective biocontrol of this plant will require more funding for research since many factors may influence possible control insects. For example, we know that maintaining or restoring undeveloped shorelines allows larger populations of the native weevil to grow. On the other hand, lakes with large bluegill populations might not improve as much since bluegills feed on these weevils. Developing cheap, long-term biocontrols for milfoil-infested lakes will take time, so funding the work now is critical for the long-term health of our waters.

Leafy spurge, a deep-rooted perennial herb, forms large, dense patches and can dominate mesic pastures, prairies, roadsides and other open areas. It reduces forage, can kill livestock and significantly reduces native plant populations and wildlife. This invader has increased its spread and density on Wisconsin sites in the last several years. Six species of flightless *Aphthona* beetles have been imported from Europe and show some promise as control agents, though they do not appear to move very far on their own. Two species of *Aphthona* have been available in Wisconsin in late June for the last several years through the United States Fish and Wildlife Service and the DNR.

E-mail Kelly Kearns at kelly.kearns@wisconsin.gov for information.

Spotted knapweed, a hardy perennial herb, infests dry roadsides, prairies, pastures and fields, reducing their value for grazing. It suppresses native plants, especially grasses, through allelopathy (producing compounds that inhibit the growth of adjacent plants). Sixteen insect species have been imported into the U.S. to control knapweed. Two species of *Urophora* flies are already established in Wisconsin and at work reducing knapweed seed production. More biocontrol help is needed. It may come from a moth and several weevils being tested in the state. These insects show real promise and may become available for general use within several years. Contact Wade Oehmichen at wade.oehmichen@wisconsin.gov for specifics on knapweed biocontrol.

Canada, musk, bull and other thistles are all common Eurasian weeds that infest a range of habitats, degrade forage, and reduce crop values, as well as compete successfully with native plants. A variety of insect species were imported to control these species with some good results. Unfortunately, one of them, *Rhinocyllus conicus*, established in the state in 1978 before the current research protocols were in place and is now prohibited because it may also attack rare native thistles. A native bacterial disease has shown some promise in decreasing the vigor and flowering of Canada thistle, but further study is needed.

Multiflora rose is another invasive that may be controlled best with a disease, rather than an insect. It is an Asian shrub that used to be planted to provide wildlife habitat. Years of use reveal that this incredibly thorny hedge rose renders pastures unusable and reduces native plants on over 45 million acres in the U.S. A domestic search revealed a minute wasp, accidentally imported from Japan, and a European stem-girdling beetle may have some effect. A native viral disease, rose rosette disease, and a mite that

spreads this virus hold promise as control agents. Although the virus can also affect other rose species, it is fatal primarily to multiflora rose. This disease is present in southwestern Wisconsin and is spreading slowly by the mite and wind. Grafting an infected stem onto an uninfected plant can introduce the disease to new and established rose stands.

Native insects in other countries that naturally feed on garlic mustard, black swallow-wort, buckthorn, common reed grass and Japanese knotweed have been found. A biocontrol program for garlic mustard is in the latter stages of development, but few of the other insects have been tested. We need more funding for research to learn if these potential controls can safely be made available to contain these pest plants.

Garlic mustard, a Eurasian biennial herb, is a serious invader of forested areas in Wisconsin, especially in the southern and eastern parts of the state. Massive stands frequently and drastically crowd out native forest herbs and reduce forest productivity. Five weevils and one flea beetle are being evaluated as potential biocontrols. Two *Ceutorhynchus* weevils are currently being tested in quarantine in Minnesota and

may be available for experimental release in 2008 or 2009 at Wisconsin research sites if deemed safe by a federal oversight committee.

It's clear that insects and other natural disease controls hold promise for containing many of the troublesome plants that are establishing themselves here. If we're lucky, some may do their job so well that ongoing human control work will no longer be necessary. Wisconsin must join other states in supporting the research to identify which control species are available, be sure they are safe and figure out how best to apply them in combination with conventional control methods. Lacking these sensible and cheap approaches, we may well have to expend a lot more time, effort and money in the struggle to check the advance of invasive plants — a struggle likely to last as long as we want to have healthy, functioning native ecosystems.

Brock Woods is a research ecologist who also educates and trains community volunteers willing to undertake biocontrol programs to contain invasive plant species. Mr. Woods has a joint appointment with the Department of Natural Resources and the University of Wisconsin-Extension.



Part of the scientific work to document if we are making headway requires setting up sample transects, measuring plant densities of invasive species and noting changes over time.

BROCK WOODS

Invasion at a slow crawl

Exotic earthworms are nosing into northern forests at an unnatural pace.

David L. Sperling

What could be more natural than an earthworm? As discussed in a previous story ("Worming into new territory," *Wisconsin Natural Resources*, August 2005), at least since the last Ice Age earthworms have not been part of the native mix of invertebrates that inhabited the soils across the upper Midwest. While earthworms in farm country are prized for aerating and tilling farm and garden soils, that simply is not the case in the northern hardwood forests across Minnesota, Wisconsin and upper Michigan.

Normally in these forest soils, fungi and bacteria would more slowly decompose leaf litter forming a light, spongy "duff" layer that allows seedlings and understory plants to grow slowly. Earthworms in these same soils digest both leaf litter and nutrients much more quickly. Their castings make denser, claylike pellets of the light subsoil layers. Where earthworms gain a foothold, fewer soil nutrients are available, the soil becomes heavier, more compacted, and the understory vegetation grows more sparsely, says Cindy M. Hale, research associate and environmental educator at the University of Minnesota-Duluth. Her research during the last ten years shows that different earthworm species live in differ-

Asian worm species of the genus *Amyntus* are brought into the U.S. because these "jumping"

worm species are especially active on a hook. They are not native here and can do serious damage if they are released in forest soils or garden soils, or if they infiltrate landscape plant nurseries.

ent soil zones — some near the surface in leaf litter, some in the top soil layers, and some burrow deep into the subsoil. Their combined actions can leave forest soil less able to absorb water or support plant life.

Forest types are not equally vulnerable to earthworm invasion or damage. Hale's work shows that sugar maple forests like those found in the Chippewa National Forest in Minnesota and the Chequamegon National Forest in Wisconsin, are more susceptible. During the

last two years, other University of Minnesota researchers examining beech forest soils at Pictured Rocks National Lakeshore in Michigan and aspen/spruce/fir soils at Voyageurs National Park in Minnesota found these different forest types contain different mixes of earthworm species. The maple forests are twice as susceptible to earthworm damage as the beech forests and four times as susceptible as the spruce/aspen forests.

More recent studies suggest that



earthworms found in northern forest habitat can disrupt how tiny mycorrhizal fungi interact with plant roots, slowing down the nutrient absorption rate in fine root hairs. Other researchers are expanding these investigations of earthworms in different kinds of forested environments. DePaul University scientists are examining how earthworm disturbance may open the way for invasive plants like buckthorn to expand their range once soil is disturbed. Dennis Burton at the University of Pennsylvania is examining the pathways in which earthworms pave the way for exotic plant spread as native understory plants die back. Projects at the Smithsonian Institution are looking at maple seedling changes, and at the University of Georgia in Athens, researchers are studying how earthworm invasions may reduce food supplies available to juvenile salamanders. At Cornell University, scientists are investigating how the combined effects of worm invasion and deer browsing can cause long term changes to plant composition on the forest floor.

Given that earthworm populations would naturally spread their range at perhaps half a mile in 100 years, how have these worm populations become so mobile? People. The 16 worm species and the dusky slug that now occur across the Great Lakes region are mainly European species that were brought in accidentally as worm egg cases hatched from the soils in landscaping plants, trees, mulch and compost. Unused fishing worms cast aside near boat launches, landings and resorts established beachheads to start new worm colonies. Mail-ordered worms for vermicomposting may inadvertently contain some eggs of other worm species. Several Asian species of the genus *Amyntus* are spreading along the East Coast and moving westward. These species are especially wiggly and active on a fishing hook and are being marketed as “jumping” worms. They can harm both forest habitats and garden soils and have raised serious problems for some plant nurseries.

How can you help stem the wiggling invasion? Start by educating yourselves and your gardening and fishing friends.



GREAT LAKES WORM WATCH
NATURAL RESOURCES RESEARCH INSTITUTE, UNIVERSITY OF MINNESOTA-DULUTH

Workshops train volunteers where and how to look for signs of worm damage in forested areas of the northern Midwest. Worms are more often found near the water's edge on fishing lakes, near boat ramps, resorts and other areas people frequent.

Websites, like the Great Lakes Worm Watch, www.nrri.umn.edu/worms/ provide background information to understand earthworm behavior and identify each species. The site also offers educational materials like fact sheets, posters and brochures to explain this issue to others. A new field guide, *Earthworms of the Great Lakes Region*, is also available through their website. Worm Watch workshops that train volunteers to look for signs of earthworm invasions are offered periodically through the Great Lakes Worm Watch website. Workshops on worm identification and control have recently been sponsored at the University of Wisconsin-Stevens Point Learning, Experiences & Activities in Forestry (LEAF) program, www.uwsp.edu/cnr/leaf, and the Beaver Creek Reserve (www.beavercreekreserve.org).

Second, take steps to avoid introducing earthworms to new areas, especially near forested areas. Dispose of unused fishing bait in the trash. If you are moving small amounts of compost

from one area to another and it is practical, freeze compost for a week to kill off live worms and worm egg casings before you use it. For larger amounts, spread the compost thin and let it freeze

solid over winter before collecting it for use elsewhere. Also don't transport leaves, compost or mulch long distances to avoid spreading worms from one

location to another. When planting wildflowers, trees or shrubs into forested areas, remove soil and rinse the roots in a location away from the woods before planting. And clean the dirt off of ATVs, motorcycles and other vehicles that might hold soil in their treads.

Finally, consider joining or starting a local worm watch program, especially if you live in or travel to northern forest country where these worms are not part of the native mix of invertebrates. Again, the Great Lakes Worm Watch program can suggest how to get going to slow the spread of these invasive species.

David L. Sperling edits Wisconsin Natural Resources magazine.





BROCK WOODS

Julia Solomon

Everyone who enjoys the natural treasures of Wisconsin can take steps to prevent the spread of invasive species. Whether your passion is fish or flowers, your actions are a vital part of the statewide campaign to control invasive species.

WHO: Boaters and Anglers

ACTION: Each time you get ready to leave a water body, make sure to:

- **Inspect** your boat, trailer and equipment and remove visible aquatic plants, animals and mud.
- **Drain** water from your boat, motor, bilge, live wells and bait containers.
- **Dispose** of leftover bait in the trash, not in the water or on the land.
- **Rinse** your boat and recreational equipment with hot water OR dry for at least five days.

WHO: Aquarium and Pond Owners

ACTION: Do not release any aquatic plants or animals into the environment. If you have unwanted specimens, consider trading with another hobbyist, returning to the retailer or donating to a school. Make sure that your pond is constructed to withstand heavy rains — overflow can carry organisms from your pond into nearby streams and lakes.

WHO: Campers

ACTION: Leave firewood at home and purchase firewood at or near your campsite location. Look for dry, aged wood that is less likely to contain pests.

Burn all wood during your trip — do not leave firewood behind and do not transport it to other locations. Also inspect clothing and equipment for mud and stowaways (seeds, insects, etc.) before leaving your camping area.

WHO: Hunters, Hikers, Bikers and Horseback Riders

ACTION: Seeds, eggs and other materials can be spread by the tread on your shoes and bike tires, on your clothes, and in your pets' fur, hooves and manure. Try to avoid walking through known populations of invaders and check for mud and seeds before moving to a new area. Dispose of any hitchhikers in a plastic bag in the trash. Horseback riders can feed their animals weed-free hay and feed for several days before venturing into wild areas.

WHO: Gardeners

ACTION: Use native plant species whenever possible. Contact your local UW-Extension office to learn more about landscaping with natives. Get to know which plants might be invasive and avoid planting them anywhere where they might spread.

WHO: Parents and Educators

ACTION: Teach kids about the environmental damage invasive species can cause. Get kids outside to appreciate Wisconsin's natural environment and involve them in education projects such as raising purple loosestrife biocontrol beetles. Contact DNR outdoor educators to learn more about environmental education opportunities, including Project WET, Project WILD, Project Learning Tree, and the *Invasors of the Forest* activity guide.

WHO: Waterfront Property Owners

ACTION: Practice good lake stewardship — limit runoff, protect native plants, etc. — to keep your lake healthy and resilient. Work with neighbors to educate lake residents and visitors about ways to limit the spread of existing invaders and avoid introducing new aquatic invaders. Consider participating in Clean Boats, Clean Waters — Wisconsin's volunteer watercraft inspection program. Monitor your lake for invasives, and if any problem species are found, inform DNR lakes staff and work with the agency on control options.

WHO: All Nature-Lovers

ACTION: Learn to recognize your local native plants and animals. Then be on the lookout for invasive species on your property and in the places you visit. Begin work immediately to contain any new invaders — don't wait until they get out of hand. Early detection is often the key to controlling an invasion.

If you think you have spotted a new invader in your area, contact the DNR regional ecologist. When reporting an invasive species, collect a specimen or take a photo and record details such as exactly where and when you found it.

Alternative plants for landscaping

There are hundreds of native and non-native alternatives to invasive species that look beautiful in your garden and do not pose a threat to the natural world. Non-invasive plants can offer stunning color, wildlife forage and interesting growth habits. If you have some invasives in your yard, try replacing them with some of these non-invasive plants.

INVASIVE SPECIES	NATIVE AND NON-NATIVE ALTERNATIVES
TREES/SHRUBS	
Japanese barberry (<i>Berberis thunbergii</i>)	False indigo (<i>Amorpha fruticosa</i>) American witch hazel (<i>Hamamelis virginiana</i>) Boxwood 'Glencoe' or 'Green Velvet' (<i>Buxus cultivars</i>)* Alpine currant (<i>Ribes alpinum</i>)* Spreading cotoneaster (<i>Cotoneaster divaricatus</i>)* Winterberry holly (<i>Ilex verticillata</i>) Ninebark (<i>Physocarpus opulifolius</i>) Cutleaf stephanandra (<i>Stephanandra incisa</i>)*
Common buckthorn (<i>Rhamnus cathartica</i>)	Speckled alder (<i>Alnus incana</i>) American hazelnut (<i>Corylus americana</i>) Dwarf alder (<i>Rhamnus alnifolia</i>)
Glossy buckthorn (<i>Rhamnus frangula 'columnaris'</i>)	Eastern arborvitae (<i>Thuja occidentalis</i>) Gray dogwood (<i>Cornus racemosa</i>) High-bush cranberry (<i>Viburnum opulus</i> subsp. <i>trilobum</i>) Chokecherry (<i>Prunus virginiana</i>) Black chokeberry (<i>Aronia melanocarpa</i>) Eastern red cedar (<i>Juniperus virginiana</i>) Freeman maple (<i>Acer x freemanii</i> 'Armstrong')
Morrow honeysuckle (<i>Lonicera morrowii</i>)	Serviceberry (<i>Amelanchier arborea</i> , <i>A. laevis</i> , <i>A. spicata</i>)
Tatarian honeysuckle (<i>Lonicera tatarica</i>)	Beautybush (<i>Kolkwitzia amabilis</i>)*
Showy pink honeysuckle (<i>Lonicera x bella</i>)	American elderberry (<i>Sambucus canadensis</i>)
Amur honeysuckle (<i>Lonicera maackii</i>)	American red elderberry (<i>Sambucus pubens</i>) Red honeysuckle (<i>Lonicera dioica</i>) Seven-son flower (<i>Heptacodium miconioides</i>)* Swamp fly honeysuckle (<i>Lonicera oblongifolia</i>)
Autumn olive (<i>Elaeagnus umbellatus</i>)	Rabbit-berry (<i>Shepherdia canadensis</i>) Silverberry (<i>Elaeagnus commutata</i>)* Silky willow (<i>Salix sericea</i>) Red osier dogwood (<i>Cornus sericea</i>) Gray dogwood (<i>Cornus racemosa</i>) Silky dogwood (<i>Cornus amomum</i>)
Norway maple (<i>Acer platanoides</i>)	Sugar maple (<i>Acer saccharum</i>) Red maple (<i>Acer rubrum</i>) Freeman maple (<i>Acer x freemanii</i> 'Armstrong')* Miyabei maple (<i>Acer miyabei</i>)* Ginkgo (<i>Ginkgo biloba</i>)* Littleleaf linden (<i>Tilia cordata</i>)*
VINES	
Oriental bittersweet (<i>Celastrus orbiculatus</i>)	American bittersweet (<i>Celastrus scandens</i>) Virgin's bower (<i>Clematis virginiana</i>) Virginia creeper (<i>Parthenocissus quinquefolia</i>) Trumpet vine (<i>Campsis radicans</i>)* American wisteria (<i>Wisteria frutescens</i>)*

Sources:
Midwest Invasive Plant Network, Landscape Alternatives for Invasive Plants of the Midwest
Alternatives to Ohio's Invasive Plant Species. www.oipc.info/ohioresources.html
Burrell, Colston C., Brooklyn Botanic Garden All-Region Guides, Native Alternatives to Invasive Plants. Brooklyn Botanic Garden, Inc.
Edited Abbey, Timothy M. Alternatives for Invasive Ornamental Plant species. Connecticut Invasive Plant Working Group. www.hort.uconn.edu/CIPWG/

INVASIVE SPECIES	NATIVE AND NON-NATIVE ALTERNATIVES
GROUND COVER	
Crown vetch (<i>Coronilla varia</i>)	Whorled milkweed (<i>Asclepias verticillata</i>)
Birds-foot trefoil (<i>Lotus corniculatus</i>)	Spreading dogbane (<i>Apocynum androsaemifolium</i>) Moss phlox (<i>Phlox subulata</i>) Canadian milk vetch (<i>Astragalus canadensis</i>) American vetch (<i>Vicia americana</i>) Goat's rue (<i>Tephrosia virginiana</i>) Common lupine (<i>Lupinus perennis</i>) Common tick trefoil (<i>Desmodium canadense</i>) Cream wild indigo (<i>Baptisia bracteata</i>)
WILDFLOWERS	
Dames rocket (<i>Hesperis matronalis</i>)	Garden phlox (<i>Phlox paniculata</i>) Carolina phlox (<i>Phlox carolina</i>) Wild bergamont (<i>Monarda fistulosa</i>)
Purple loosestrife (<i>Lythrum salicaria</i>)	Marsh blazing star (<i>Liatris spicata</i>) Prairie blazing star (<i>Liatris pycnostachya</i>) Dotted gayfeather (<i>Liatris punctata</i>) Wild bergamont (<i>Monarda fistulosa</i>) Joe-pye weed (<i>Eupatorium maculatum</i>) Purple coneflower (<i>Echinacea purpurea</i>) Queen-of-the-prairie (<i>Filipendula rubra</i>) Monkeyflower (<i>Mimulus lewisii</i>)
Yellow iris (<i>Iris pseudacorus</i>)	Blue flag iris (<i>Iris versicolor</i>) Marsh marigold (<i>Caltha palustris</i>) Cardinal flower (<i>Lobelia cardinalis</i>)
GRASSES	
Maiden grass (<i>Miscanthus sinensis</i>) <i>Note — the 'species' is the invasive form. Most ornamental cultivars do not spread by seed, although some could spread vegetatively.</i>	Prairie cordgrass (<i>Spartina pectinata</i>) Indian grass (<i>Sorghastrum nutans</i>) Little bluestem (<i>Schizachyrium scoparium</i>) Big bluestem (<i>Andropogon gerardii</i>) Prairie dropseed (<i>Sporobolus heterolepis</i>)
Reed canary grass (<i>Phalaris arundinacea</i>) includes variegated cultivar	Switchgrass (<i>Panicum virgatum</i>) Prairie cordgrass (<i>Spartina pectinata</i>) Big bluestem (<i>Andropogon gerardii</i>) Canada wild-rye (<i>Elymus canadensis</i>) Ice dance sedge (<i>Carex morrowii</i>) Autumn moor grass (<i>Sesleria autumnalis</i>)
AQUATIC	
Flowering rush (<i>Butomus umbellatus</i>)	Common rush, Soft rush (<i>Juncus effusus</i>) Common threesquare (<i>Schoenoplectus pungens</i>) Hardstem bulrush (<i>Schoenoplectus acutus</i>) River bulrush (<i>Scirpus fluviatilis</i>)
Water lettuce (<i>Pistia stratiotes</i>)	Spatterdock (<i>Nuphar variegata</i>)
Water hyacinth (<i>Eichhornia crassipes</i>)	White water lily (<i>Nymphaea odorata</i>) American lotus (<i>Nelumbo lutea</i>)
Yellow floating heart (<i>Nymphoides peltata</i>)	Pickering weed (<i>Pontederia cordata</i>) Water hyssop (<i>Bacopa monnieri</i>) Yellow pond lily (<i>Nuphar microphylla</i>)

* Not native to Wisconsin, but seem to be non-invasive.

We hope this helps add beauty to your garden. Happy planting!

Keeping up to speed

To stay current on the latest information about known invasive species and spreading species under investigation, try these websites and contacts:

INVASIVE PLANTS

dnr.wi.gov/invasives — Wisconsin Department of Natural Resources general invasives information. A good starting point to learn about invasive plants and animals with details about programs to manage invasive species that affect forests, wildlife, parklands and aquatic environments. The site also has an excellent photo gallery of both invasive and non-native plants.

dnr.wi.gov/invasives/futureplants/reporting.htm — Guidelines for reporting sightings of invasive species

dnr.wi.gov/invasives/pubs/ — Other resources and publications about invasive species

tncweeds.ucdavis.edu — The Nature Conservancy's Wildland Weeds page

na.fs.fed.us/fhp/invasive_plants/index.shtml — The U.S. Forest Service website on invasive plants in our region

AQUATIC INVASIVE SPECIES

dnr.wi.gov/invasives/aquatic/ — DNR Aquatic Invasive Species web page

www.dnr.wi.gov/invasives/aquatic/resrep.htm — DNR publications on aquatic invasive species

www.uwsp.edu/cnr/uwexlakes/ — UW-Extension Lakes Program website

seagrant.wisc.edu/ais/ — UW Sea Grant Aquatic Invasive Species website

www.uwex.edu/erc/AquaInvHandbook.html — A Handbook for Education Efforts on aquatic invasive species (downloadable)

ORGANIZATIONS

www.ipaw.org — The Invasive Plants Association of Wisconsin offers many services including a speakers bureau, educational resources and a wonderful list serve.

www.mipn.org — Midwest Invasive Plant Network

www.nps.gov/plants/alien — Plant Conservation Alliance's workgroup on alien plant invaders of natural areas

www.invasivespeciesinfo.gov — The National Invasive Species Information Center

www.nrri.umn.edu/worms/ — Great Lakes Worm Watch

GENERAL PLANT IDENTIFICATION AND INFORMATION

www.botany.wisc.edu/wisflora — The Wisconsin State Herbarium database and descriptions of Wisconsin vascular plants

wisplants.uwsp.edu — The UW-Stevens Point vascular plant database

plants.usda.gov — U.S. Department of Agriculture plant database

www.inhs.uiuc.edu/~kenr/prairieplants.A.html — The Illinois Natural History Survey website contains macro photographs of seeds, fruits and flowers of native species.

RECOMMENDED BOOKS

Invasive Plants of the Upper Midwest, by Elizabeth Czarapata, 2005, University of Wisconsin Press

Field Guide to the Invasive Plants of the Midwest, Midwest Invasive Plant Network

Pocket Naturalist Guide to the Invasive Plants of the Eastern United States, Waterford Press (available in fall 2007)

Earthworms of the Great Lakes Region, Great Lakes Worm Watch, Natural Resources Research Institute, 5013 Miller Trunk Highway, Duluth, MN 55811, (218) 720-4294

CONTACTS

Kelly Kearns, DNR plant conservation program manager, (608) 267-5066

Julia Solomon, DNR/UWEX aquatic invasive species educator, (608) 267-3531 (DNR); (608) 261-1092 (UWEX)

Brock Woods, Wisconsin purple loosestrife control coordinator, (608) 221-6349

Tom Boos, DNR forestry invasive plant specialist, (608) 266-9276

Jane Cummings-Carlson, DNR forest health coordinator, (608) 275-3273

Ron Martin, DNR aquatic invasive species specialist, (608) 266-9270

Armund Bartz, DNR West Central regional ecologist, (608) 785-9019

Owen Boyle, DNR Southeast regional ecologist, (414) 263-8681

Joe Henry, DNR Northeast regional ecologist, (920) 662-5194

Ryan Magana, DNR Northern regional ecologist, (715) 635-4153

DNR South Central regional ecologist, (608) 275-3276

Mark Wetter, curator, Wisconsin State Herbarium, UW-Madison (608) 262-2792

Ted Cochrane, curator, Wisconsin State Herbarium, UW-Madison (608) 262-2792

Mark Renz, perennial systems weed ecologist, UW-Madison Dept. of Agronomy (608) 263-7437

Also consider contacting UW-Extension county horticultural agents, county conservation departments, local offices of the Department of Natural Resources or the federal Natural Resources Conservation Service with questions about managing invasive species.

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Small, blue and bountiful

Wisconsin is home to more Karner blues than anywhere else in the world.

Natasha Kassulke

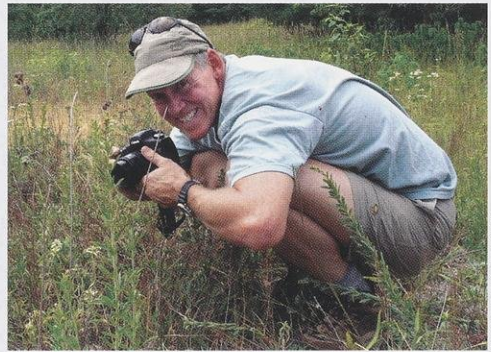
Steve Apps was on a mission to capture the Karner blue butterfly on camera as it dined and danced about the wild purple lupines and orange butterfly weed on his family land in Wild Rose, Wis.

No net. No jar. With just a Karner blue “Wisconsin Wildcard” in his pocket and a camera around his neck, he set out one sunny day last summer to stalk the thumbnail-sized federally endangered butterfly.

After a day scoping the central Wisconsin farmstead, Apps crouched down, focused his camera and claimed victory. He successfully photographed a tiny blue butterfly that was resting after a cruise across the sandy soil. But was it a Karner blue?

David Lentz, DNR Karner blue Habitat Conservation Plan implementation coordinator, confirmed it was a blue butterfly all right. But it wasn't a Karner blue.

You mean there is more than one tiny blue butterfly in Wisconsin? Sure, says Lentz. “There are lots of blue butterflies.” But, there is just one species that is a Karner blue (*Lycaeides melissa samuelis* Nabakov).



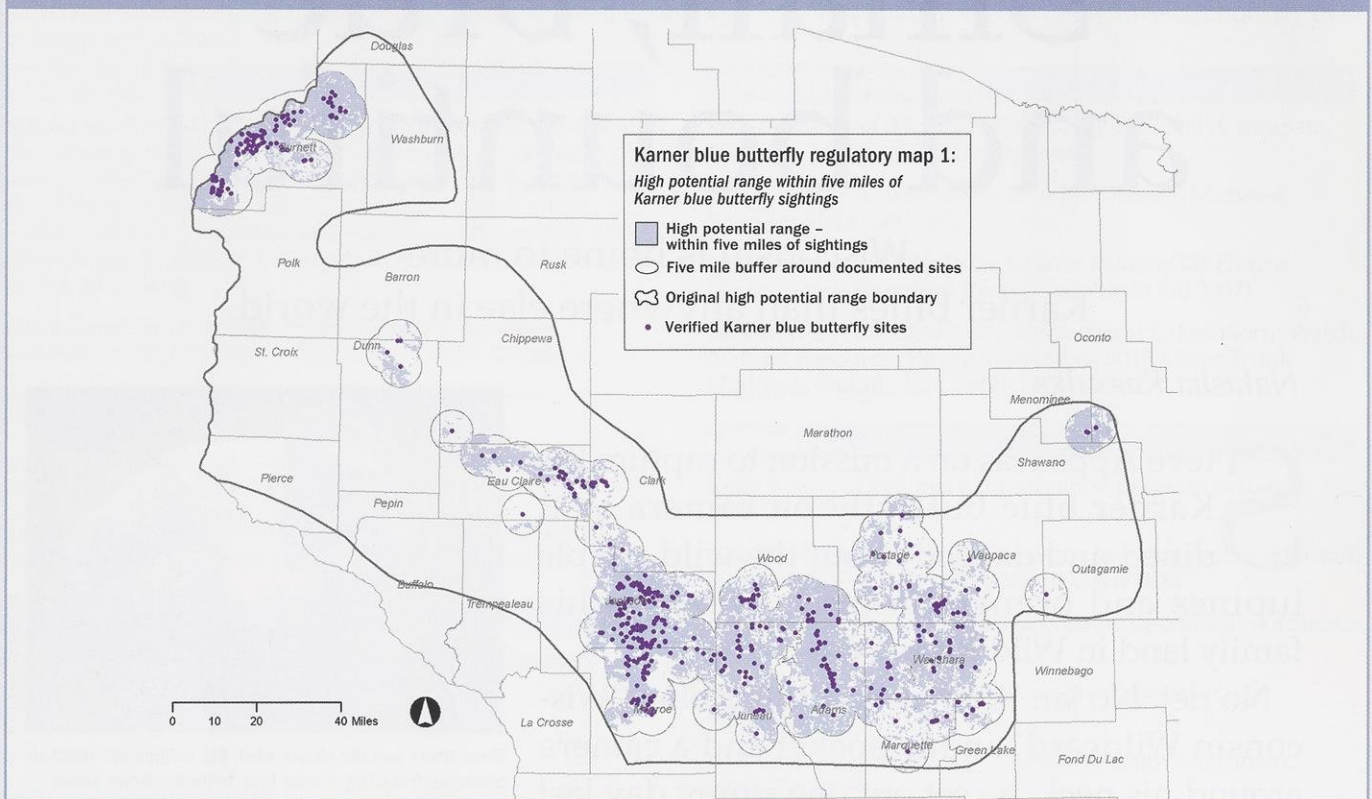
Three times was the charm when Steve Apps set about to photograph the tiny Karner blue butterfly shown below.

NATASHA KASSULKE



STEVE APPS

KARNER BLUE POTENTIAL RANGE



MAP PRODUCED 14 FEBRUARY 2007, FOREST LANDSCAPE ECOLOGY LAB, UNIVERSITY OF WISCONSIN-MADISON

Lupines grow best in dry soils and open clearings found in portions of east-central, central and western Wisconsin shown here. Dots show the locations of verified Karner blue butterfly sites. The five-mile range around those sightings are prime locations for habitat improvements to expand the range of the rare butterflies by encouraging lupines that feed Karner blues' caterpillars.

Lentz offered some advice for finding and identifying the Karner. The most vital piece of information: The Karner blue life cycle is dependent on the wild lupine (*Lupinus perennis*) plant, which prefers dry soils in open woods and clearings such as pine and oak savannas and barrens. Wild lupine leaves are the only food source of the Karner blue butterfly caterpillar. The presence of Karners can be confirmed by "instar damage" — chewing damage to the lupine leaves by the caterpillars.

Orange spots on the edge of the underwing distinguish Karner blues from other blue butterflies. Two generations of this butterfly occur each year. Karner blues do not migrate like the monarch. Instead, they survive Wisconsin winters as eggs and their caterpillars hatch in April. In early June the adult butterfly emerges and begins to feed. A couple of weeks later, the Karners lay eggs on or near wild lupine and the cycle begins again with adults emerging in mid-July. By mid-August, this second group of

adults lays eggs to overwinter.

Take two.

Apps returned to the extensive lupine patch his family had proudly preserved. He used the tried-and-true technique of butterfly stalking — go slow and stay low.

His patience paid off and he got a shot. It was blue. It was a butterfly. But, Lentz let him down gently, again confirming that the specimen was not a Karner blue.

Lentz offered additional advice. The male and female Karner blue differ in coloration and pattern. On the topside, the male's wings are a light silvery blue to dark blue with narrow black margins. On the female, the topside is grayish brown (especially on the outer portions) to blue, with irregular bands of orange crescents inside the narrow black border.

Wings of both male and female Karners have the same pale gray underside, with a continuous band of orange

crescents inside iridescent blue spots along the edges.

Take three.

With coaching from Lentz on best times to see the butterfly, Apps finally caught an image of a fluttering Karner blue as it landed on a lupine leaf.

The key to photographing a Karner blue, Apps concludes: "First you've got to find one. Keep your camera and your 'Wisconsin Wildcard' nearby. Check with an expert to confirm that you've got a Karner blue. Dave Lentz's advice was very valuable."

Habitat Conservation Plan

It's no surprise the Karner blue proved so elusive, even to an experienced photographer like Apps. Habitat loss in the eastern states of the Karner blue's national range due to development and farming caused Karner blue populations to decrease; the species was listed as federally endangered on Dec. 14,



STEVE APPS

Viewed from above, the male Karner blue's wing color ranges from a light silver to this dark, rich blue color with black margins. Females are grayish brown to blue on the top of their wings.



STEVE APPS

On the underside, both males and females have the same pale gray color with continuous bands of orange crescents and blue spots along the edges.

1992. This began a program to recover Karner blues across their entire national range.

Today there is great hope for the tiny lupine leap-frogger. Many healthy Karner blue populations are now known to occur in Wisconsin. In fact, there are more Karners found here than any other place on earth. Good populations of Karner blues also are found in Michigan and Indiana, with many fewer in New York, Minnesota, New Hampshire and Ohio.

The butterfly's continued survival in Wisconsin is the result of a DNR statewide habitat conservation plan (HCP). Formalized in 1999, the Wisconsin HCP helps protect the Karner blue butterfly and is the first comprehensive statewide conservation agreement authorized under the Endangered Species Act.

The agency works with the U.S. Fish and Wildlife Service, private landowners and public land managers to support sustainable Karner blue habitat management actions that are in step

with normal land management activities on the landscape.

The HCP agreement allows Wisconsin land managers to continue operating in and around Karner blue habitat provided they modify their activities to minimize the incidental take (death, harm or harassment) of Karner blues.

One innovative aspect of the HCP is a single incidental take permit for landowners in the state. The Wisconsin plan automatically covers all landowners who join it under one permit. The approach, Lentz says, reduces the administrative load for those involved and makes the process less arduous for landowners.

Landowners with a love of lupine

Brothers Jerry and Donald Apps are two Waushara County landowners with Karner blues on their adjacent properties. Jerry (Steve's father) owns 65 acres and Donald (Steve's uncle) owns another 35 acres. They became interested in the butterfly by first learning about lupine.

Jerry recalls that when he bought the property in 1966 there was one small patch of lupine on the southeast side. He researched the lupine and shared his findings in an outdoor column he authored. But he hadn't thought much about the Karner blue.

"I suspected that Karner blues were always there but didn't know what they looked like," Jerry says. "Now I've come to realize that I was looking at those little blue butterflies for 30 years and always thought they were cabbage worm butterflies." Jerry credits Lentz for setting him straight after a visit to the property.

Seven years ago, Jerry cleared a field south of his cabin. Realizing how difficult it can be to transplant lupine, he let nature do the work. Lupine seeds spread by the wind sprouted on the cleared ground. Now the field is packed with lupine plants. Last summer, Jerry found another patch had sprouted about a half-mile away.

"Now there are so many Karners at times you have to look out so you don't step on one," Jerry says. Donald also has been involved in Karner blue habi-

tat protection and has developed a fondness for the blue beauty.

"I noticed a lot of blue butterflies in the garden sitting in the sun," Donald says. "Once I saw about 50 of them. I like knowing that they are there and I keep the brush clear to make sure the lupines survive and the Karners have places to lay their eggs."

Benefiting the barrens

The Karner blue HCP is as much about protecting the rare pine barrens and oak savannas the Karner inhabits as it is about protecting the butterfly. These ecosystems have become increasingly rare in their natural ranges.

The 2.3 million acres of Wisconsin pine barrens have changed tremendously since European settlement. Originally a mosaic of open, grassy, fire-dependent communities, today's pine barrens thrive on only a fraction of the original acreage.

Fire is extremely important in maintaining the inherently diverse pine barrens. But fire suppression, extensive tree planting, and conversion to agriculture have drastically changed Wisconsin's landscape. The remaining barrens have become increasingly fragmented and isolated, too small to support wildlife species that depend on this specific habitat, like the Karner.

However, when an area is kept clear by periodic disturbances, such as prescribed burning, timber harvests and mowing, open spaces are created where native grasses and flowers have a chance to flourish. When the habitat is restored, the wildlife returns.

This partnership is implementing the Wisconsin HCP on more than 260,000 acres of potential and existing butterfly habitat. And it is working. The barrens are rebounding.

Partnerships with a conservation ethic

Mike Engel, of the Private Lands Office for the U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program, is working with about 150 landowners in the Karner blue range in Wisconsin, including municipalities, companies

and farmers. After gauging their interest in participating in a conservation plan, Engel meets with the landowners, walks the land and often sits down at their kitchen tables to discuss their goals and develop management plans.

The U.S. Fish and Wildlife Service also offers technical and financial assistance for habitat conservation in the Karner blue range because of the butterfly's endangered status. Engel asks interested landowners to sign a 10-year agreement to manage the land for Karner blue habitat.

"We use the 'Field of Dreams' approach," Engel says. "If we make smart decisions about the habitat and manage it for the Karner, the butterfly will come."

Engel says some landowners want to manage their land because of their specific interest in the Karner blue. Others want to make their land less fire-prone or create turkey habitat. "Good turkey habitat is good Karner habitat," Engel says.

It hasn't been difficult to get landowners to sign up. "Wisconsin has such a strong land ethic and conservation ethic that most landowners I work with want to do the right thing," says Engel.

Matt Krumenauer agrees. He served on the oversight committee for the corridor partners in the HCP and chaired the group for three years.

"The partners had a shared interest," Krumenauer says. "They needed the (incidental) take permit to get their work done and they needed the benefit of belonging to a larger group that could provide knowledge and resources to draw from. There was a lot of trust and interaction among the individuals involved."

Today, while no longer working for a utility, Krumenauer remains involved in Karner blue habitat protection.

"You'll see me popping up in a lupine patch or two this summer," Krumenauer says.

Echoing Engel, Krumenauer says he is most proud of seeing participants rally around a common cause and improve their conservation management skills because it is the right thing to do.

"It's not a bald eagle or a cute seal or a majestic tiger," Krumenauer says. "It's a butterfly. But people have really rallied around it and become engaged in



JOE HENRY

Forest edges in Karner blue range are periodically burned to clear out vegetation and maintain the openings where lupines can thrive.

habitat protection and management."

He says managing for Karner blue habitat is an excellent fit with managing utility corridors. Rights-of-way for utilities — transmission lines and pipelines — need to be relatively clear of vegetation to allow for easy access. These open canopy corridors also link otherwise separated land, creating a dispersal route that works like a railway for Karner blue movement.

Forty major land managers participate in the HCP as partners, including representatives from the forest industry, county forests, utility companies, The Nature Conservancy, Wisconsin Department of Agriculture and Consumer Protection and many roadway managers including the Wisconsin Department of Transportation. The partnership works with volunteer groups and concerned citizens across a vast area of Wisconsin to incorporate consideration of the Karner blue in land-use decisions and conservation work.

For instance, the Adams County Highway Department changed roadside mowing practices to accommodate the Karner blues.

"When we do ditch cleaning and road shoulder maintenance, we do some mitigation and replant the area

into prairie grasses and wildflowers including lupine," says Ron Chamberlain, county highway commissioner. "It's a win-win situation for the butterfly and our partners. It makes our job easier to cooperate upfront rather than be regulated after the fact."

Other wildlife species benefit from the Karner blue's celebrity and good fortune. Kirtland's warblers (*Dendroica kirtlandii*), slender glass lizards (*Ophisaurus attenuatus*), eastern massasauga rattlesnakes (*Sistrurus c. catenatus*), and Blanding's and wood turtles (*Emydoidea blandingi* and *Clemmys insculpta*) share Karner habitat and get a boost when that habitat is enhanced and increased.

Celebrating success

Education and outreach are paramount to the program's success. Lentz works with schools and communities to celebrate the Karner's rebound and help more people learn about the value of conservation.

His desk at the DNR central office in Madison is surrounded by awards, photos and cards thanking him for his efforts. Blue butterfly memorabilia appear mysteriously on his desk, left by other DNR staff. The attention is gratifying.

So is seeing a phenomenon that has become a festival. Black River Falls hosts the Karner Blue Butterfly Festival on the second Saturday every July (this year July 14th), attracting more than 2,000 people. Why Black River Falls? Prime Karner blue habitat is adjacent to the Black River State Forest in Jackson County.

Lentz attended the first festival in 1996 and has been going ever since. Many festival participants, from Harley-riding bikers to sunscreen-slathered butterfly stalkers, arrive wearing blue wings as a sign of solidarity with the butterfly. The reigning Karner Blue Butterfly Princess must learn as much as she can about the species. Trol-

ley tours skirt the nearby Bauer Brockway Barrens habitat site and participants can visit the Karner Blue Education Center at the festival to learn more. The festival celebrates the fact that endangered species protection can be part of Wisconsin's cultural as well as its natural heritage.

"It's satisfying to know that you are working on something of lasting significance," Lentz says. "We have a butterfly and an ecosystem that is rare in the world. And we have it right here in Wisconsin."

Natasha Kassulke is a public affairs manager for the Wisconsin Department of Natural Resources.

KARNER BLUE HOT LINE

Call the toll-free Karner Blue Butterfly Hot Line (877) 4KARNER (452-7637):

- to request information or assistance about Karner blues or the habitat conservation plan
- to listen to a "flight status" report (May-August only)
- to report *qualified* observations on wild lupine, Karner blue larva, feeding damage or flying adults.

The Butterflies and Moths of North America at www.butterfliesandmoths.org is a searchable database of verified butterfly and moth records in the United States and Mexico. This site includes dynamic distribution maps, photographs, species accounts, and species checklists for each county in the U.S. and each state in Mexico.

Get the buzz on butterflies at the North American Butterfly Association at www.naba.org.

KARNER BLUE BUTTERFLY FESTIVAL

DATE: Saturday, July 14, 2007
TIME: 8 a.m. - 10:30 p.m.
LOCATION: Main Street in Black River Falls

DESCRIPTION: The Karner Blue Butterfly Festival, through the ongoing efforts of the downtown association and Black River Falls' residents, showcases the Karner blue butterfly. This beautiful creature is threatened by the decline in prairie areas and by its dependence on the wild lupine plant. Festival events include: butterfly princess contest, pancake breakfast, 5K-10K run-race, grand parade, artists and crafters, "turn of the century" trolley rides, brewery tours, historical museum tours, great food, musical entertainment and much more. To learn more about the Karner blue butterfly you can visit the Karner Blue Education Center at the festival and take in a guided old-fashioned trolley tour of the Bauer Brockway Barrens, local home of the Karner blue.

FOR INFORMATION: Visit the Karner Blue HCP webpage: www.dnr.wi.gov/org/land/forestry/karner/index.htm. Or call (715) 284-2503.



JIM ZAHASKY

Karner blues and some look alike

Several little blue flits look similar. Take a closer look at these similar one-inch butterflies inhabiting the same sort of habitat as the Karner blue.



STEVE APPS

- Eastern tailed blue (*Everes comyntas*)



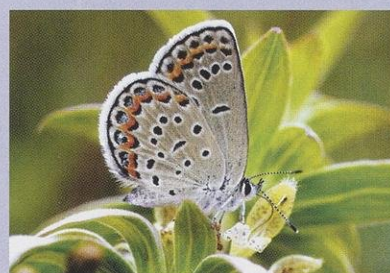
STEVE APPS

- Edwards' hairstreak (*Satyrium edwardsii*)



STEVE APPS

- Spring azure (*Celastrina ladon*)



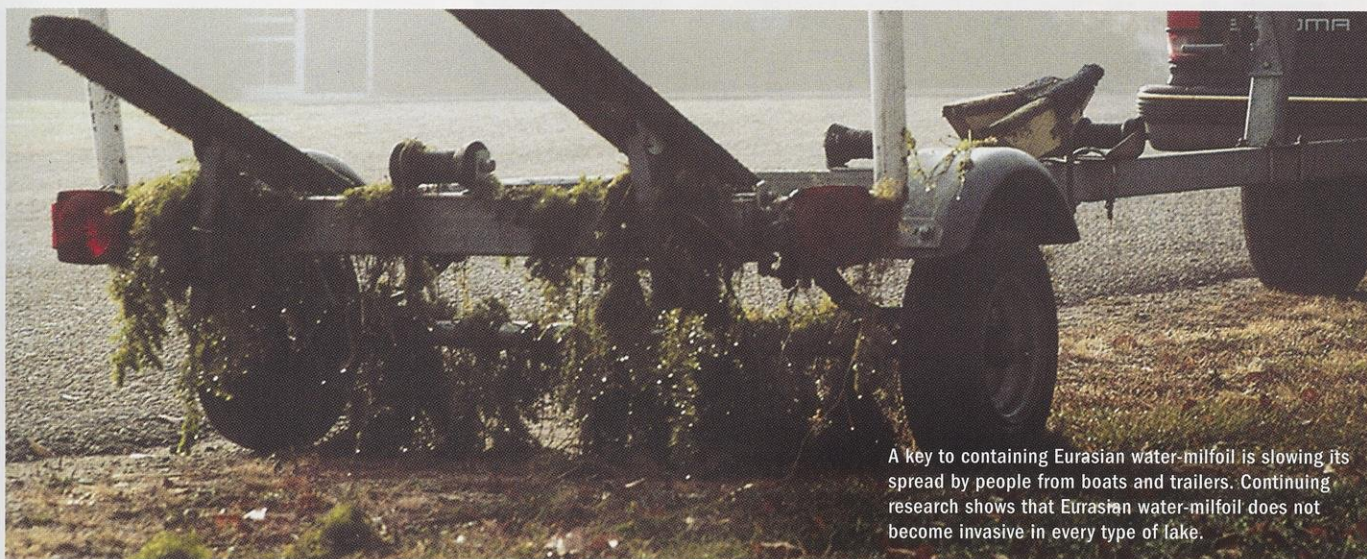
STEVE APPS

- Karner blue (*Lycaides melissa samuelis Nabakov*)



A tangled

**DNR scientists
begin to unravel the
secrets of Eurasian
water-milfoil and
its effect on
Wisconsin lakes.**



A key to containing Eurasian water-milfoil is slowing its spread by people from boats and trailers. Continuing research shows that Eurasian water-milfoil does not become invasive in every type of lake.

DNR FILE PHOTO

question

Julia Solomon

At first glance Eurasian water-milfoil looks like a typical aquatic plant. Its long, slender branches are covered with tiny green leaflets. It anchors to lake bottoms and grows toward the surface, sometimes reaching heights of 10 feet. A casual observer would not pick out this innocent-looking plant as a contender for Public Enemy Number One.

Lake users in Wisconsin could tell you otherwise. Eurasian water-milfoil is not native to Wisconsin's waters, and in the four decades since it arrived in the state it has spread to more than 400 of Wisconsin's 15,000 lakes. Eurasian water-milfoil is a tough, aggressive plant that can alter lake ecosystems and crowd out native plants. In certain situations it can become so thick that recreational activities like boating, fishing and swimming become difficult. Agencies and citizens across the state are working hard to slow the spread of this invader and minimize the problems it causes.

In recent years Eurasian water-milfoil has achieved a certain amount of notoriety. The worst-case-scenarios — green, choked, unusable lakes — have captured headlines and imaginations. But does Eurasian water-milfoil take over every lake that it invades? Or does it behave differently in different locations, or in different types of lakes? Is it possible to predict where it will become a nuisance? And what can citizens do to keep lakes healthy — with or without invasive plants? These are the questions that motivate Department of Natural Resources researcher Dr. Jennifer Hauxwell and her team of scientists. In the summers of 2005 and 2006 they set out to get to know the enemy.

The research

Researchers Alison Mikulyuk and Kelly Wagner laugh when asked to describe how they spend their summers. “We practically live out of our boat,” says Wagner. “We spend so much time on the water that sometimes in the evening — after hours on dry land — you can still feel the rocking of the boat.” Over the past two summers, Mikulyuk and Wagner have spent over 500 hours taking plant samples in 100 lakes with known populations of Eurasian water-milfoil. Armed with lake maps, a standardized sampling protocol, a GPS unit, a couple of big rakes, and a 14-foot jon boat, they set out across the state to document the places where this nasty invader is and isn’t. In each lake they sampled an average of 200 separate points — more in big lakes, fewer in small ones.

Floating around on lakes all summer sounds like a pretty nice job, until you realize that sampling means scraping the lake bottom with the rakes and hauling dripping loads of aquatic plants out of the water. Each rakeful is sorted out and every plant is identified. “Pulling in over 19,500 rakefuls of plants is tiring work,” says Mikulyuk. “I certainly love working outdoors, but by the end of the summer, you really can’t stand to look at another bottle of sunscreen or dig through another rakeful of plants.”

Their goal was to collect enough

data to be able to map where and how much Eurasian water-milfoil occurs in each lake. With this information, they can compare conditions in different lakes.

Dr. Susan Knight, a project partner and aquatic plant specialist with the DNR and the University of Wisconsin, explains some of the reasons why it is important to collect this type of information. “Good data are the foundation of strategic lake management,” she says. “The information we are collecting now provides a baseline for the future. Knowing where Eurasian water-milfoil is in a lake and how much there is helps people choose the most appropriate management options.”

The results

After their summers on the water, Mikulyuk and Wagner traded their rakes for computers and dug into the task of analyzing the data. What they found was surprising.

“A lot of people assume that Eurasian water-milfoil becomes very abundant in every lake and always dominates the aquatic plant community,” says Mikulyuk. “But that’s not what we found at all.”

In fact, in most of the lakes they sampled, Eurasian water-milfoil showed up on their rakes in less than 10 percent of sites shallow enough to support plant growth. For deep lakes, this meant Eurasian water-milfoil was found in even fewer than 10 percent of the sites they sampled, because deep lakes have many areas where plants are unable to grow. While these measurements don’t translate to an exact acreage of Eurasian water-milfoil in a lake, they provide a good estimate of its distribution and abundance for each waterbody. And they tell researchers that the story is a lot more complicated than they first



Researcher Kelly Wagner was part of a research team that collected and analyzed aquatic plant samples from more than 100 lakes during the last two summers. On each lake, the team collected an average of 200 samples to determine the frequency, density and spread of Eurasian water-milfoil in lakes where it occurs.

might have thought.

“It turns out that lakes with sparse or patchy Eurasian water-milfoil are actually a lot more common than lakes where it takes over the vegetation,” says Hauxwell. “In most of the lakes we sampled, the amount of Eurasian water-milfoil we found was well below the level where most people would consider it a nuisance.”

Which is not to say that they didn’t find any Eurasian water-milfoil nightmares: In a few lakes, they pulled up Eurasian water-milfoil nearly every time they stuck a rake in the water. But this scenario was a lot less common than expected, and a lot less common than people are led to believe.

The big question, of course, is why. What makes one lake develop a carpet of Eurasian water-milfoil while in another it is present but hardly noticeable? The complete answer has yet to be found, but here are some things researchers now know:

- Southern lakes have higher levels of

Small floaters



PHOTO COURTESY OF JENNIFER HAUXWELL



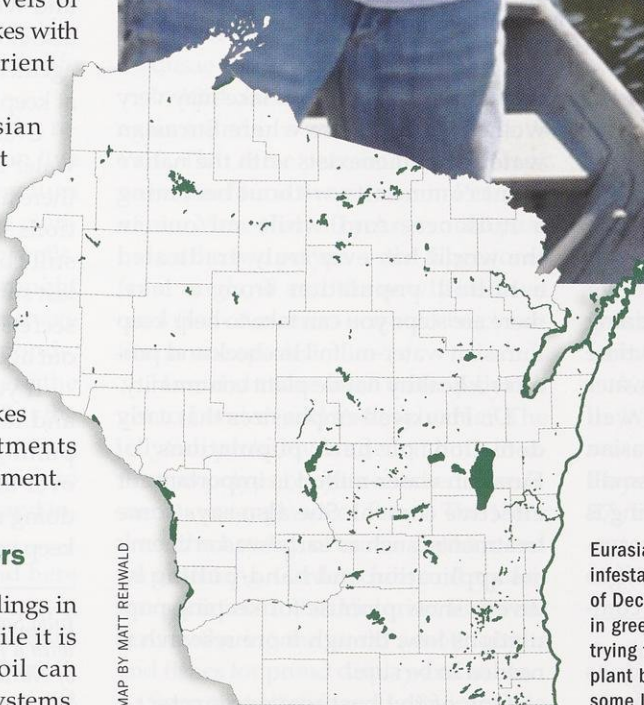
PHOTO COURTESY OF JENNIFER HAUXWELL

Eurasian water-milfoil than northern lakes.

- Lakes with moderate-to-high amounts of nutrients have higher levels of Eurasian water-milfoil than lakes with very low or very high nutrient loads.
- The length of time Eurasian water-milfoil has been present in a lake may explain some of the variation in abundance, but it doesn't explain all of it.
- Some lakes that have had Eurasian water-milfoil for decades still have very low levels. This is true both for lakes with annual chemical treatments and for lakes with no management.

What it means for lake-lovers

Dr. Hauxwell sums up their findings in two words: "Don't panic." While it is true that Eurasian water-milfoil can cause major havoc in lake ecosystems,



MAP BY MATT REHWALD

People assume that Eurasian water-milfoil becomes abundant and dominates the aquatic plant community in every lake where it is found. But that is not what we found at all, notes researcher Alison Mikulyuk.

Eurasian water-milfoil infestations documented as of December 2006 are shown in green. Researchers are trying to unravel why the plant becomes invasive in some lakes but not in others.



FRANK J. KOSHERE

In some lakes, Eurasian water-milfoil just interspersed in small clusters among a host of other lake plants.



FRANK J. KOSHERE

In other places, Eurasian water-milfoil takes over and fills the lake bottom in dense mats of vegetation that are difficult for boats and fish to penetrate. Researchers want to understand why.

don't assume that finding a few Eurasian water-milfoil plants automatically means a lake is destined to be overrun.

"Prevention is always the best option," says Hauxwell. "It's vital for lake users to do everything they can to keep Eurasian water-milfoil out of a lake."

This means taking steps like cleaning plants and mud off of boats every time you leave the water and draining water from your bilge, motor and live well before you leave the landing. Eurasian water-milfoil can spread from small stem fragments, so thorough cleaning is critical. Promoting healthy lake ecosystems by reducing nutrient runoff to lakes and preserving native plant communities in lakes is also important.

But if Eurasian water-milfoil does make its way into a lake you care about,

don't give up hope. Your lake may very well be one of those where Eurasian water-milfoil coexists with the native plant community without becoming a nuisance. And while no one in the world has ever truly eradicated a milfoil population from a lake, there are steps you can take to help keep Eurasian water-milfoil in check and promote a healthy native plant community.

Dr. Hauxwell emphasizes that early detection of new populations of Eurasian water-milfoil is important for effective control. She also says some treatments, such as early-season chemical application and hand-pulling by divers, show promise for keeping populations low, though more research is needed to be sure.

One of the best ways to protect a

lake is to develop a long-term management plan. If you're thinking about developing a plan for your lake, getting access to good baseline data — like that collected by Hauxwell's team — is a great place to start. Knowing how much Eurasian water-milfoil is in a lake, when it got there, and what other types of plants are present helps scientists develop a strategic plan for control.

"It is important to tailor the lake plan based on how much Eurasian water-milfoil is in a lake and where the populations are located," says Hauxwell. "It is also important to set reasonable expectations about what various management options can accomplish. For newer populations of milfoil, the goal may be to reduce the abundance of Eurasian water-milfoil over time, not just to offer single-year relief. For more established populations, the goal may be to run an efficient nuisance relief program through harvesting. It really all depends on the data."

Strategic lake management with the help of data is something that Dr. Hauxwell discusses a lot. She hopes her research will help the Department of Natural Resources, lake associations and others make better management decisions as they work to keep lakes healthy. Eventually, they hope to be able to predict in which lakes Eurasian water-milfoil will and won't become problematic. They also hope to learn more about the management strategies that are most effective at keeping it under control.

Untangling the mysteries of Eurasian water-milfoil is a long-term project, and there are still a lot of unanswered questions. Dr. Hauxwell and her team are still combing through their data from last summer in hopes of teasing out new secrets, and they're gearing up to head out again this year.

If you're out on a lake this summer and happen to spot a crew of people pulling up rakefuls of plants, head on over to say hello. The research they are doing now may provide the answers to keep your lake healthy in the future. ■

Julia Solomon is an aquatic invasives educator with a joint appointment at the Department of Natural Resources and the University of Wisconsin-Extension.

Small floaters

continued from page 2

So far, our life cycle involves asexual reproduction: polyps forming buds that either attach or float before settling down to form new polyps. In some years, especially during hot summers in Wisconsin, the polyp colony produces medusa buds. Each of these top buds becomes either a male or female **medusa**.

OK. Put down the biology book and pick up that dusty old mythology text. You may recall the mythical Greek maiden Gorgon Medusa whose long hairs became writhing serpents and who petrified anyone foolish enough to glance at her. (How's that for a "perm!") When polyps develop into medusae they develop a mass of really tiny wriggling hairlike tubes on top.

After a week or two, and still quite small, the medusa leaves home to become free swimming. In another five weeks, the medusa matures into a nearly transparent body, called a **bell**, that dangles with long, hairlike tentacles we all associate with jellyfish.

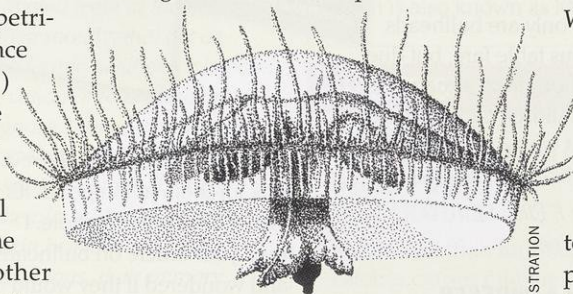
Sometimes just female medusae form, sometimes just males form. Only rarely in North America and Europe do both male and female medusae appear together. Why jellyfish produce swarms of same-sex medusae, a seeming waste of energy, still remains a mystery. If female medusae produce eggs that are fertilized by a male, they hatch into planula larvae and the whole jellyfish life cycle starts over again.

The medusae live but a few weeks, release eggs and die. The polyps can live from spring until fall, when they turn into **cysts** that are covered with a chitinous "skin" enclosing fairly dry cells. The cysts are able to survive drought and cold. In Wisconsin, the cysts survive on the bottoms of ice-covered ponds, lakes, and quiet river pools where the water is slightly above freezing. But the cysts are more than a winter resting stage. They are a vehicle for jellyfish to spread north of their home range and invade new waters.

The freshwater jellyfish found here is one of two species of *Craspedacusta* believed to be native to China. Both species (*C. sowerbii* and *C. sinensis*) live in the Yangtze River, the world's third

longest river that is so vast it makes the Wisconsin River seem like a trout stream! Here, male and female medusae form from spring until fall and congregate in quiet reaches of the river.

Freshwater jellyfish were unknown outside of China until June 1880 when William Sowerby (1827-1906) found jellyfish medusae swimming in a large water-lily tank at the Royal Botanic Gardens in Regent's Park just outside London, England. Sowerby was the director of these private botanical gardens and in charge of their indoor and outdoor exhibits. He found the medusae, all males, among sediment and pickerelweeds



Freshwater jellyfish have only been documented on a spotty, periodic basis in 40 Wisconsin waters. These inch-long jellyfish often go unnoticed and unreported.

only three weeks after filling the water tank. What a surprise to find the first freshwater jellyfish known to science! Thinking they came in from South America on the plants, he dubbed them "Amazon jellyfish." The discovery came with much publicity and fanfare. Then, six weeks later, the curator's worst nightmare struck: all the jellyfish medusae vanished!

In 1884, mature jellyfish polyps were again found in a water tank at Regent's Park. That same year, immature polyps were also found in a stream in Pennsylvania. More than 40 years would pass before the two polyps — the bigger ones from England and the newly budded ones from America — would be classified as one species.

How did these freshwater jellyfish get to London and Pennsylvania? The jellyfish probably landed at both locations as polyps or cysts attached to sediments, water plants or fishes. The 1880s were the heyday of water gardens and carp stocking. Garden clubs and aquarium societies in this Victorian Era were busy gathering the world's exotic plants and fishes for proud display and study.

Soon the jellyfish made their way to

other botanical societies, as well as to public and private aquariums in England, Europe, North America, South America and Australia. Once again, plants and fishes likely provided a vehicle to move these polyps and cysts. Other jellyfish were flushed into lakes and rivers when aquariums were emptied, perhaps for cleaning or restocking with fish. Polyps and cysts, attached to river sediments, were swept downstream to new waters. Others may have arrived on the backs of turtles or the feet of water birds. Perhaps they even stuck to boats and boat motors.

By the time they were first sighted in Wisconsin, jellyfish had already been reported from 33 states, Hawaii (then a U.S. territory) and Washington, DC.

In Wisconsin, jellyfish were first reported from a farm pond near Baraboo in Sauk County. Wood ducks rather than fish or plants were thought to have carried the polyps or cysts to the pond. By October 2006, jellyfish had been reported from 40 water basins: 37 natural lakes, two dugout ponds and one creek. These "jellyfish waters" vary in size from tiny ponds to lakes 9,842 acres in size (Lake Mendota) and 236 feet deep (Big Green Lake).

Unlike a list of Eurasian water-milfoil lakes, these 40 Wisconsin water bodies may no longer have jellyfish! Almost all of the sightings have been of medusae, which are sporadic and soon disappear, sometimes never to be seen again. On the other hand, polyps tend to be more widespread than medusae, so Wisconsin could have more "jellyfish waters" than we know of now.

For those of you active in sampling lakes and rivers, in examining sediments and water plants, or just curious about the natural world, I urge you to keep an eye out (if not a handy sample jar) for jellyfish medusae, as well as their polyps, larvae and cysts.

You can report new jellyfish sightings in Wisconsin to Craig Roesler, DNR water quality biologist at the DNR's Hayward office, 10220 N. State Highway 27, Hayward, WI 54843; by e-mail to craig.roesler@wisconsin.gov or by calling (715) 634-9658 extension 3522. ■

Sandy Engel is a retired DNR water quality biologist and researcher now living in Arbor Vitae.

Readers Write

COMMENT ON A STORY?

Send your letters to: Readers Write, WNR magazine, P.O. Box 7921, Madison, WI 53707 or e-mail letters to david.sperling@wisconsin.gov

BULLISH ON CATFISH

I was happy to see your article on the catfish and bullhead family in the February 2007 issue ("Felines with fins"). This fish group deserves far more respect and your well-written article went a long way to gain some for them.

Bullheads were not only one of the "depression buster" foods in southern Wisconsin in the 1930s, but almost certainly the main ingredient of the Friday night fish fry that originated there! My oldest brother sold gunny sacks full of bullheads to local tavern owners until the Conservation Department, as it was known then, changed the rules about selling wild fish and game.

Depression, prohibition and a large Catholic population in southern Wisconsin led the taverns and small restaurants to blur the lines between themselves by serving food. Friday night featured the fish fry — typically, bullheads, cole slaw and rye bread — for twenty-five cents! Catholics were looking for another choice on meatless Fridays. Tavern owners were looking for a good cover to sell a little of whatever alcohol they could. A depression weary population needed a cheap night out! All three benefited!

An article on how to handle and clean bullheads would encourage people when they find them to catch a "good mess" of bullheads. The prime cleaning tool is a proper pliers.

There were several machine shops in southern Wisconsin small towns that turned out an excellent pliers. An experienced bullhead cleaner could clean 25 bullheads in 25 minutes, rarely getting "spiked."

Not only are bullheads delicious table fare, but due to their primeval structure even small children can eat them without worrying about bones — just like corn on the cob!

George F. Ellis, Sr.
Eagle River

OFF BY A WHISKER

After reading your article "Felines with fins," it brought back memories of an incident that happened to me. When I was a preteen, my parents and I were catfishing one evening at the family cottage. They decided to go to town to the local tavern for a short time. I said I would watch Dad's pole along with mine. Suddenly he had a good-sized flathead catfish on the line. I managed to net it and get it to shore, but Dad had always been there to take it off the hook. I knew it had spines, so with a pliers and fillet knife I carefully removed them. A short time later my parents came home and I proudly showed him his catfish. As he approached, he exclaimed, "What happened to my catfish?" Not knowing for sure which were the spines, I had cut off every whisker along with the spines. It didn't look much like a catfish anymore!

Diane Eisermann
Montello

POND ECOLOGY 101

I have a pond in my woods that is about eight feet deep. It's not a big pond but wood

ducks use it because I have a box for them in the pond. It's also a deer watering hole. I read your article on bullheads and wondered if they would live in the pond as it freezes over from November to April? I would like to see something alive in the pond and thought that bullheads would survive. If not, would turtles?

Glen Bawek
Arcadia

Author and fisheries biologist Joe Hennessy says, "Eight feet of depth is probably too shallow for fish to survive, even bullheads. However, there are a number of animals that would be glad to live in your pond and especially thankful to not have to share it with fish. Some are probably already there. Wisconsin has 12 frog species, for example, five of them endangered, threatened, of special concern or declining. Bullheads would prey on frogs or tadpoles in the pond. You're right about turtles — the pond could be habitat for a number of Wisconsin's 11 turtle species. Aquatic insects like dragonflies, damselflies and a host of others provide food for songbirds and bats. My guess is that your pond is already teeming with life, and that bullheads would probably not be a welcome addition!"



PAST ISSUES AVAILABLE

The Eau Claire Area Master Gardeners recently held its winter seminar and your contribution of past issues was extremely well received. On behalf of our organization, I sincerely thank you for your generous contribution. I hope that distributing these magazines along with the subscription envelopes you provided will increase your subscriptions. The content of your magazine covers many issues that good gardeners throughout the state can benefit from, besides being just good reading. Thanks again!

Susan R. Kaul
Eau Claire Area Master Gardeners

When supplies warrant, we are happy to make small quantities of past issues — two or more years old — available for hand-outs at meetings or conferences. Most topics we feature remain timely for several years and we appreciate the opportunity to acquaint potential readers with our magazine whenever we can.

PUFF ADDER BLUFF

I read your article on the hog-nose snake ("Hog-nosed ham," August 1996), or as I know them, the puff adder. I have a problem with this article, because unless there are two types of puff adder, they DO have

fangs and venom. Just a few summers ago I saw many snakes caught in netting along a bridge, some dead and some alive. One was a puff adder about one and a half feet long. It had the same raised flattened head and was hissing, just as described in your article. Since it was caught, I took a stick and opened its mouth to investigate further. On the roof of its mouth two fangs were laid back and in the back of its throat was a very visible full venom sack. Since the only known venomous snake in Michigan is the massasauga rattler, it has eaten at my curiosity for a few years. Your article says the hognose, or puff adder, snake does not have fangs or venom, but there was no mistaking what I saw.

Nichole Sauve
Roscommon County, Mich.

Josh Kapfer, a conservation biologist with DNR's Bureau of Endangered Resources, thinks using the common name "puff adder" to describe the hognose snake is unfortunate. "True puff adders are very venomous snakes found in Africa," he explains. "The hognose (Heterodon platyrhinos) got this nickname because of its

tendency to hiss loudly when threatened. I've also heard it referred to as a 'puffer snake' and a 'blower snake.' Regarding its toxicity, most snakes in the upper Midwest have jaws lined with teeth of uniform size and shape. Rattlesnakes — one of the exceptions — have elongated teeth in the front of their mouths that act as hypodermic needles for injecting venom into prey animals. Hognose snakes are also an exception. They have a set of elongated teeth in the back of their jaws that can secrete a toxin believed to affect amphibians, their primary food source. In rare cases I've heard of eastern hognose snake bites causing a severe allergic reaction in people, but not severe tissue trauma or death. This, coupled with the fact that they rarely bite, means they aren't usually considered a venomous species dangerous to humans."

USE CAUTION CLEANING FEEDERS

I enjoyed the article "Keep neater feeders" (February 2007), but noted in step three about disinfecting feeders that you recommend using a

bleach solution. I would caution your readers to check the bleach they are using because all bleach is not the same. Make sure to read the label. Some bleach is labeled "sodium hypochlorite 5.25%," which is fine to use. The other bleach is labeled "sodium hydroxide" which is also known as lye.

Lye can leave a residue and possibly harm the animals. I found this out while doing wild animal transporting for the Colorado Division of Wildlife and the local wildlife rehabilitators for the Wild Forever Foundation.

Ken Maxey
Colorado Springs, Col.

UPDATES

EFFECTS OF FISH CULLING DEPEND ON WATER TEMPERATURE

Sorting fish from tournament catches causes minimal mortality when the weather is cold but can harm fish when the weather warms up, especially if live wells or receiving waters are warmer than 80 degrees. Tournaments that allow culling do not draw more spectators or more money to an area than tournaments that forbid the practice. Further, a majority of anglers oppose culling regardless of special live well requirements designed to keep fish alive longer.

Studies conducted in 2005 and 2006 by UW-Stevens Point and UW-Madison, and funded by the Department of Natural Resources, evaluated the impact of fish tournaments on fish and the state's economy. DNR research staff surveyed attitudes of anglers, boaters, property owners and tournament anglers about tournament fishing. Results were reported to the Natural Resources Board at its April meeting. Lawmakers required the studies in response to criticism by some anglers and tournament sponsors that the state's culling rules made big-time bass tournaments look elsewhere for sites.

MANURE RULES EFFECTIVE THIS SPRING

Manure rules affecting the state's 160 largest farms went into effect this spring. Though these farms comprise less than half a percent of our farms, they contribute 11 percent of the state's manure loading. Each operation spreads manure equivalent to the daily organic loading of a city of 18,000 residents.

The rules incorporate most of the proposed requirements the legislature put on hold in May 2006. Where concessions could be built into the rules without compromising water quality, those measures were revised.

These large farms must have the capacity to store liquid manure for six months if necessary, and 90 percent of them already do. Liquid manure from these large operations cannot be spread on snow-covered or frozen ground unless it is immediately incorporated into the soil.

It's important to note that these rules apply to only the largest farms. More than 99 percent of the state's smaller farms — that can also contribute to winter manure and runoff problems if waste from their operations isn't properly managed — won't be affected.

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You can check how long your subscription runs by taking a look at your mailing label on the back cover. Your subscription runs through the issue shown at the end of the second line. In this example, the last issue is April 2008.

Dog days of summer

For pets, summer can be the best and worst time of the year. To assure a safe summer for your pet:

DON'T ...

- Let your dog ride in the back of an open pick-up truck. Death and injury can occur.
- Put your pet at risk of heat stroke. Provide adequate water at home and in the field. If your pet does overheat, hose it down with cool water and offer water.

DO ...

- Bring your pet outside with you. Take the dog — and the cat — for a walk. There are harnesses and leashes available for all sizes of pets.
- Check that your window screens are securely in place. Cats are prone to “high-rise syndrome” when they begin to explore, bat at birds or insects, and try to crawl out open windows without screens. Cats can and do fall.
- Schedule your pet for a checkup. Stay on track with the yearly heartworm check, stool check and vaccinations.



Parks where pets are welcome often include special amenities.

MARY KULTGEN

Life's a beach for dogs, too.



MARY KULTGEN

Many communities now offer dog parks and other pet friendly areas. But just as you wouldn't litter at the public beach, remember there is beach etiquette for dogs, too.

- Always keep your dog leashed when there is a leash law.
- Always clean up after your dog using a bag or scooper and dispose of wastes in designated receptacles, not general garbage barrels.
- Do not let your dog visit with other beach-goers or dogs, unless welcomed.
- If using an official off-leash area, your dog needs to be well-behaved and must heed your verbal commands.
- Do not leave your pet unattended and make sure it has water and food.

Several Wisconsin state parks are especially welcoming to dogs and their people (visit www.dnr.wi.gov/org/land/parks/ or call 608-266-2181 for Wisconsin State Park contact information and directions):

Harrington Beach State Park (Belgium) is a day-use park where dogs of all sizes are allowed at the south beach and the Scenic Picnic Area without

additional pet fees. Dogs must be leashed at all times.

Richard Bong State Recreation Area (Kansasville) maintains an area for training dogs to retrieve, point, flush and/or track game for hunting or dog trial competitions. It is in the Special Uses Zone in the southwest area of the park and a license is required if live birds or ammunition are used for training.

Chippewa Moraine State Recreation Area (New Auburn) allows dogs off leash except in the picnic area.

Governor Dodge State Park (Dodgeville) has a pet swim area next to each swimming beach and designated pet picnic areas.

Governor Nelson State Park (Waunakee) has a pet beach swim area. Pets must be

on a leash unless they are in the water. Normally the beach has a pier to teach pets to jump into the water.

High Cliff State Park (Sherwood) features two pet picnic areas. One is in the lower park, near the park office, with a swimming area in the pond. The other is near the pavilion.

Kettle Moraine State Forest Northern Unit (Campbellsport) has designated pet picnic areas and dog training areas. These include pet picnic areas with tables and grills at Mauthe Lake and Long Lake, a wet dog training area where dogs can be trained in water skills and a dry dog training area where dogs can be trained in upland bird skills.

Kohler-Andrae State Park (Sheboygan) has a dog beach for leashed dogs.

Lake Kegonsa State Park (Stoughton) has a pet beach swim area. Pets must be on a leash unless in the water.

Pattison State Park (Superior) allows dogs on the four-mile Logging Camp Trail, Big Falls Trail, small picnic areas at Big Falls and Little Falls, and an area adjacent to the main picnic area. A one-mile dog trail links into the Logging Camp Trail.

Whitefish Dunes State Park (Sturgeon Bay) allows dogs on the beach.

Bird sightings find a home on eBird

Put away the field notebooks. Information on Wisconsin birds is just a mouse click away. Wisconsin eBird (ebird.org/wi/) is a new website devoted to tracking bird sightings and bird activities in the state. The site allows visitors to show off their bird photos, record observations and sort data. Wisconsin eBird is the product of a partnership among the Wisconsin DNR, the Wisconsin Bird Conservation Initiative (www.wisconsinbirds.org) and the Wisconsin Society for Ornithology (www.uwgb.edu/birds/wso/). eBird is free and user-friendly.



Waukesha Diamonds 1874

OLD WORLD WISCONSIN
WISCONSIN HISTORICAL SOCIETY

Traveler

Opposites attract

The adage holds true for recreation and leisure time, just as it does for love. Every summer Wisconsin oscillates between extremes of entertainment, offering countless stops along the route from high-brow to no-brow, fantasy to history, strictly vegetables to meat alone. We've paired some events to anchor the poles; it's up to you to decide where you fall on the spectrum.



See landscaping plants that need less tending.

Biogas Buddy or Carburetor Chum?

All friends of the earth will want to converge on Custer from June 15-17 for the world's largest **Renewable Energy and Sustainable Living Fair**. The 18th annual fair held at the ReNew the Earth Institute features workshops on solar and wind power, biodiesel, energy-efficient construction and more. Speakers include citizen action advocate Dr. Helen Caldicott and journalist Judith Levine, who has written on culture and the marketplace. Visit vendor exhibits, enjoy music, food, and special programs for kids, and view the Clean Energy Car Show. See www.the-mrea.org/energy_fair.php for ticket information and mass transit/ridesharing details. (715) 592-6595.

If you'd rather hark back to the halcyon days of the hydro-carbon, drive on over to Fond du Lac. Every Saturday evening through September 15 the

proud owners of vintage hot rods and classic cars pack the parking lot of Culver's at the junction of highways 23 and 41 for **Car Cruise-In Night**. Ogle the chrome, get under the hood, and reminisce about those Shorty Street Headers for a '64 Mustang. The website www.fdl.com tells more.

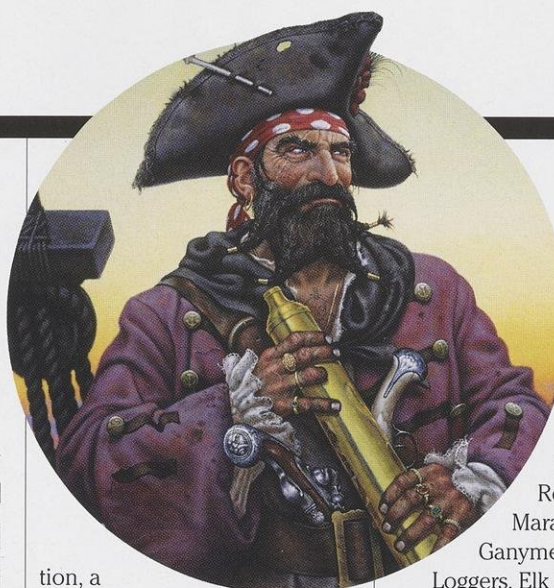
Sweet Dreamer or High-Sea Schemer?

Celebrate the summer solstice a few days early in Green Lake. There, on June 16, the town throws a **Big Pajama Party**, complete with bed races, a "howl at the moon" competi-



The bed races are a good bet at the Big Pajama Party in Green Lake.

MIDWEST RENEWABLE ENERGY ASSOC.



DON MAITZ &
DOOR COUNTY
MARITIME MUSEUM

tion, a "cutest pj's and slippers" contest, and plenty of food and fun. Show up in your pajamas and enjoy some special discounts. See www.visitgreenlake.com or call (920) 294-3231.

Prefer to catch a thief rather than a few zzzzz's? Head to Sturgeon Bay and the Door County Maritime Museum, where **Pirates!** rule the Great Lakes. The exhibit highlights the history of famous buccaneers like Blackbeard, Captain Kidd, and "the fierce hell-cats" Anne Bonney and Mary Read. It also illuminates the less well known but equally nefarious activities of James Jesse Strang and Captain Dan Seavey, who played fast and loose with Prohibition on our inland seas. Visit www.dcm.org for more booty or call (920) 743-5958. The exhibit runs until January 15, 2008.

Base Slider or Bull Rider?

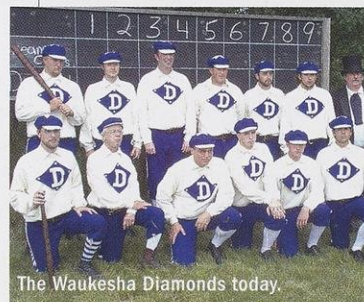
Hope your side comes out swinging during **Base Ball History Day**, June 16 at Old World Wisconsin in Eagle.

The Eagle Diamonds, Old World's vintage 1860s team, takes on the Milwaukee Cream Citys (sic). If you can't make this game, fear not: the doughty

Diamonds play a 12-game season this summer, with the Greenbush Dead Citys, Rockford Midway Marauders, Oregon Ganymedes, Minnesota Loggers, Elk Grove Bucks,

Downers Grove Plowboys and those fishy Chicago Salmon on the schedule. After the game, tour the mid-18th century village and ten ethnic farmsteads on 576 acres in the Southern Unit of Kettle Moraine State Forest. True fans will want to support the team at Old World's **Base Ball Barbecue Friday**, June 8 at 6:30 p.m. Meet players over a brat and bring your glove to play a little catch afterward. See www.wisconsinhistory.org/oww or call (262) 594-6300.

If the national pastime isn't your preference, trade in your baseball cap for a 10-gallon hat. At the **Wisconsin High School Rodeo Finals**, June 15-17 at the Richland County Fairgrounds in Richland Center, participants compete in bareback and saddle bronc riding, bull riding, barrel racing, pole bending, cut-



The Waukesha Diamonds today.

ting, calf roping and breakaway roping, all with one goal: to move on to the nationals. Cheer on your two-legged and four-legged favorites. Visit www.richlandchamber.com for details.

OLD WORLD WISCONSIN
WISCONSIN HISTORICAL SOCIETY



Wisconsin, naturally

ROCKY RUN OAK SAVANNA STATE NATURAL AREA

Notable: Oak savannas — oak openings characterized by widely spaced, open-grown oak trees with prairie grasses and flowers growing beneath them — once covered millions of acres of southern Wisconsin. One of the best remaining examples lies on a south-facing slope above Rocky Run Creek. Rocky Run Oak Savanna contains bur, black and white oaks over a groundlayer of more than 100 plant species, from little bluestem and side-oats grama grass to the rare woolly milkweed and Hill's thistle. Slender glass lizards, dog-face butterflies and vesper sparrows add diversity, sound and color to the landscape.

How to get there: From the intersection of State Highways 16 and 22 south of Wyocena, go south on 22 for 1.9 miles to the Rocky Run Fishery Area parking lot west of the road. Walk west and south on an access lane 0.7 mile into the area. See dnr.wi.gov/org/land/er/sna/sna220.htm for a map and more information.



TO SUBSCRIBE CALL **1-800-678-9472**
OR VISIT OUR WEBSITE **WWW.WNR.MAG.COM**