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Center Section: The forest where we live

WISCONSIN NATURAL RESOURCES

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Keeping
the fight
in the king
of fishes

Fire up! Your favorite recipes
from the campfire and cabin

Curious creatures on the Big River

Is your land a wetland?



Bottle gentians are easy wildflowers to grow in moist to wet soils.

A late blue bloomer

One last sign of summer floats in on a blue bottle.

Beth Gollan Capettini

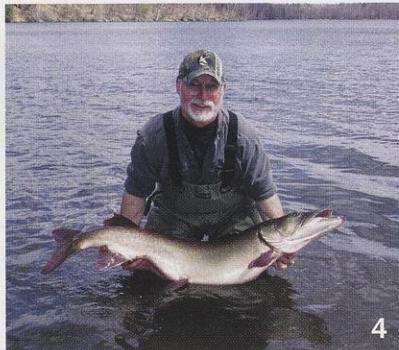
When the flowers of summer pass and the somber browns of early fall begin to creep in, the brilliant blue bottle gentians (*Gentiana andrewsii*) are at their peak. Few other wildflowers boast the same intense blue, and none so late in the season as this perennial.

Bottle gentian is the agreeable cousin in a family of wildflowers that is notoriously difficult to grow. Other gentians require precise growing conditions, good luck and are fussy to cultivate; they are best enjoyed in their native habitats. Bottle gentian, however, is quite happy in most garden situations and even grows well in boggy soils.

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FRONT COVER: Fisheries Biologist Scott Toshner, DNR Brule, handles a big musky that was measured, aged and clipped as part of annual survey work to track musky growth and abundance. See our p.4 story on strengthening the vigor of stocked muskies.

CORDELL MANZ, DNR Brule

BACK COVER: Bear Caves State Natural Area in Langlade County features huge boulders transported by glaciers. 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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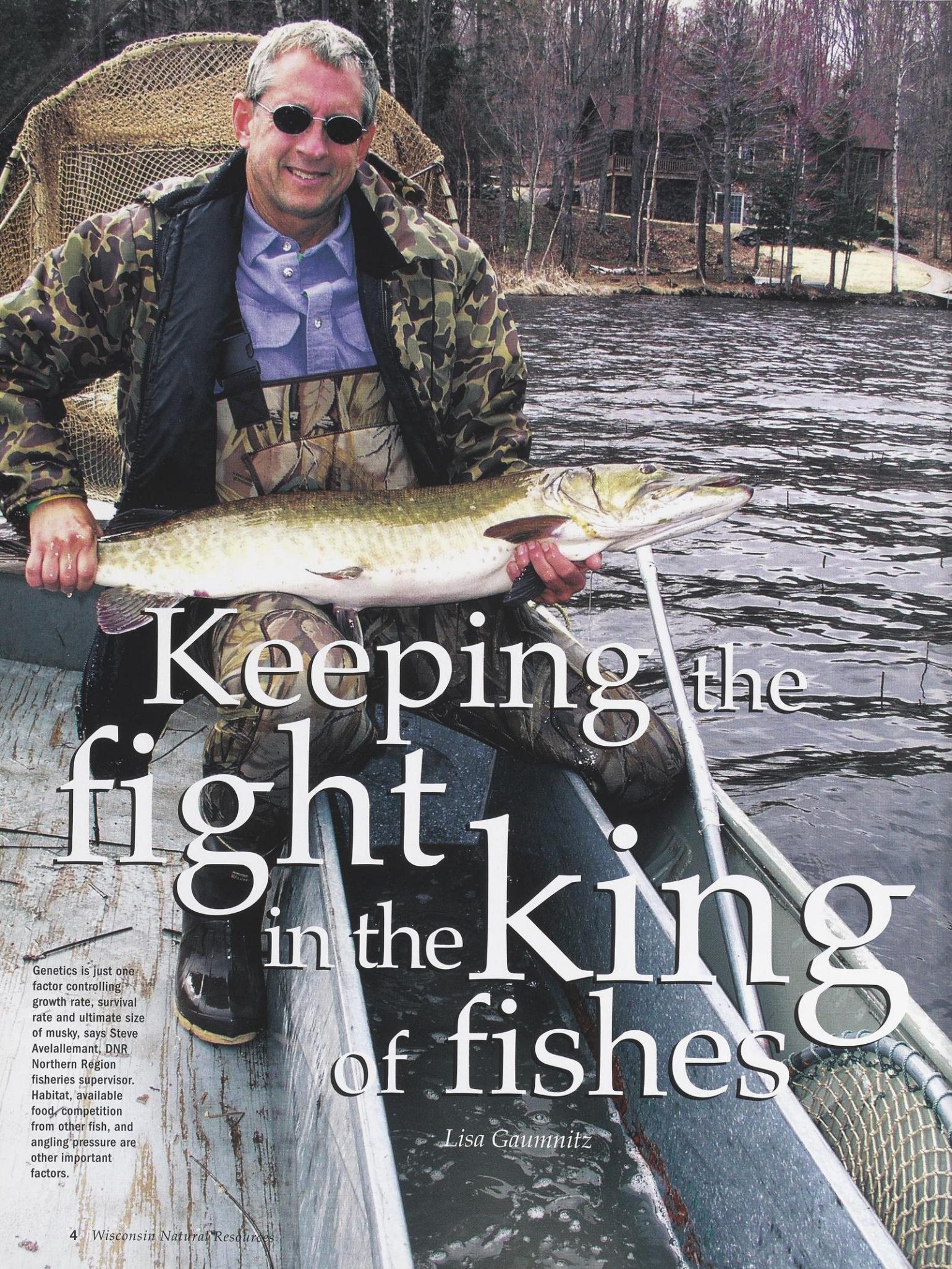
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Keeping the fight in the King of fishes

Genetics is just one factor controlling growth rate, survival rate and ultimate size of musky, says Steve Avelallemant, DNR Northern Region fisheries supervisor. Habitat, available food, competition from other fish, and angling pressure are other important factors.

Lisa Gaumnitz

Natural strains and careful matchmaking invigorate the genetic lineage of stocked muskellunge.

Call it CSI: *Hayward*. Using the same kind of cutting-edge technology common on the current crop of TV forensics shows, Wisconsin fish managers, hatchery staff and geneticists are unraveling the musky's genetic lineage and launching a comprehensive examination of the state's musky propagation practices.

They hope to determine if Wisconsin harbors distinct musky strains in different waters or if a century of fish stocking has erased genetic boundaries and turned Wisconsin fish into slow-growing "mutts" as some anglers contend.

Fisheries crews now follow precise genetic guidelines when collecting eggs and sperm from parent fish (or "brood stock") to foster a strong, vigorous, diverse bloodline in ensuing generations of stocked musky and to conserve the genetic makeup of muskies that naturally evolved in our lakes and rivers.

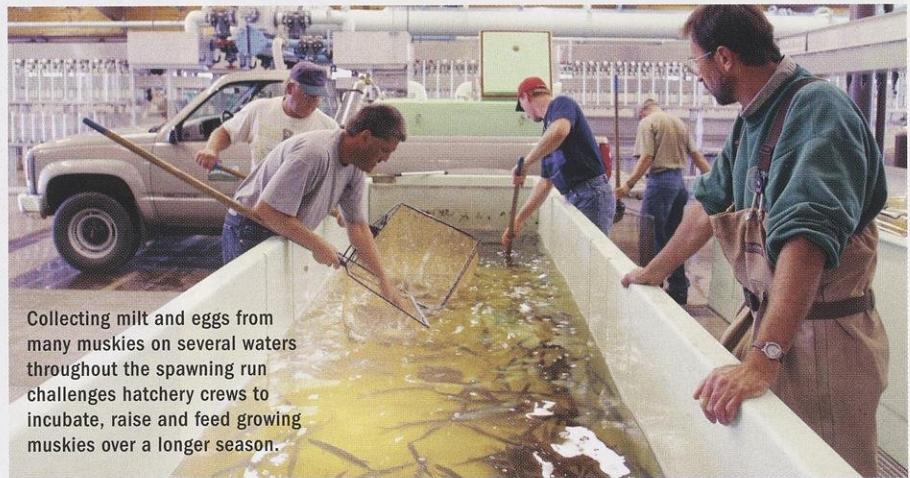
As a component of that review, biologists set up side-by-side tests to compare how musky strains produced in Wisconsin hatcheries stack up against a Minnesota strain. The fish are raised under identical conditions and stocked in the same waters at the same time.

"This is a very exciting time for our fisheries program," says Mike Staggs, director of DNR fisheries management. "We're marrying the latest science and forensic techniques in our day-in and day-out hatchery programs to improve the way we manage our brood stocks, and to answer some important questions raised by anglers."

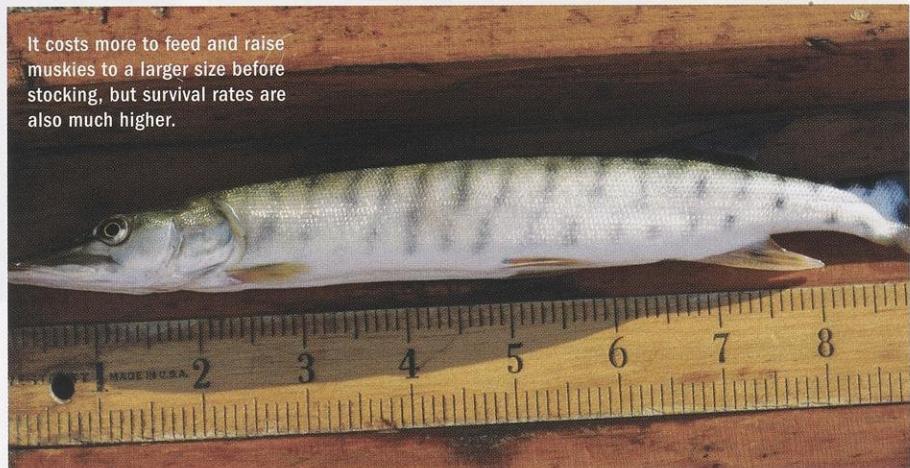
The results, Staggs says, will benefit fish, anglers and the public wallet, given that stocking musky is a pricey proposition.

Muskies fight long odds to reach adult size. Nearly 600,000 musky fry are stocked for every musky that survives to 18 months at a cost of about \$800 per fish, according to a 1986 Wisconsin study. The tab drops to about \$70 per survivor if fish are stocked as fall fingerlings, or to \$27 per survivor when stocked as spring yearlings — the two sizes DNR focuses on.

"We want to be assured that the fish we put in a lake have the best chance



MICHAEL KIENTZ



MICHAEL KIENTZ

to survive and naturally reproduce," Staggs says. "Our aim is to have more lakes where muskies reproduce on their own, providing anglers the best fishing at the best price — free. In those waters where musky aren't native and the fishery must be maintained by stocking, we want to make sure we are putting in the right strains of fish to provide the performance anglers want — steady growth and large size — if the forage base, angler harvest, and other factors are right."

The fish

At the beginning of the 20th century, muskies only inhabited lakes and streams fed from the headwaters of the Chippewa, Flambeau, Black and Wisconsin rivers, with a range covering about 20 counties. In the 1940s, fish managers switched from primarily stocking days-old fry to stocking older, larger

fish. By 1970, the musky's range had expanded to include 33 counties.

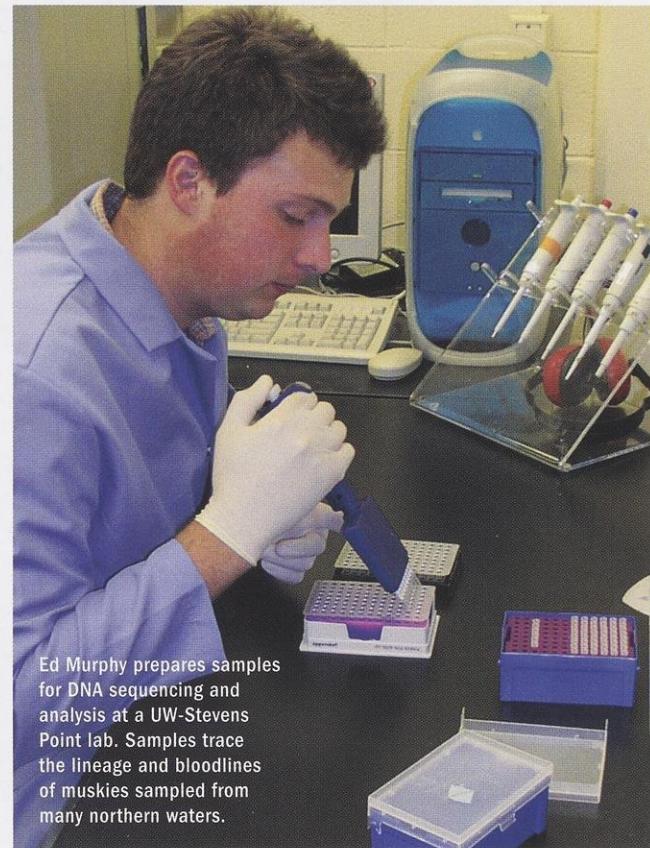
Today, nearly 90 percent of the state's 794 musky waters are found in northern Wisconsin, reports Steve Avelallemant, a fish biologist stationed in northern Wisconsin for 24 years who is now the region's fisheries supervisor and a member of DNR's musky team.

About three-quarters of these waters currently have self-sustaining musky populations with good, natural reproduction. Most musky waters have been stocked at least periodically over time, mainly with fish spawned from northern waters and raised in state hatcheries in Woodruff and Spooner. Green Bay and the Lake Winnebago system receive a Great Lakes strain of musky raised at the Wild Rose State Fish Hatchery. A total of 180 waters are now being stocked regularly.

DNR's stocking program, combined with a phenomenal catch-and-release



To mimic natural reproduction, eggs and milt from many different muskies are mixed, fertilized and raised at state hatcheries.



Ed Murphy prepares samples for DNA sequencing and analysis at a UW-Stevens Point lab. Samples trace the lineage and bloodlines of muskies sampled from many northern waters.

COURTESY OF ED MURPHY

ethic by anglers and higher minimum size limits, have helped musky populations recover from the low levels in the 1970s following a musky fishing frenzy in the late '50s and '60s; the "musky mania" was sparked by world-record catches in Wisconsin in the 1940s. Now, more than a generation later, anglers in Wisconsin are enjoying some of the highest musky densities and best catch rates anywhere, Avelallemant says. The so-called "fish of 10,000 casts" is now caught in an average of 3,000 casts.

However, some fish managers were concerned that the stocked fish were not surviving as well as expected in some waters, and were not building self-sustaining populations as hoped. In other waters, managers saw growth rates decline as musky numbers increased, causing concern that the fish are outstripping the forage base.

One group of anglers believes one lot of muskies stocked into Lac Courte Oreilles in 1956 has resulted in interbreeding that is reducing musky growth. The anglers question the growth potential of the Bone Lake musky strain, origi-

nally derived from Lac Courte Oreilles fish, used as brood stock at the Spooner hatchery, and stocked widely throughout the state. The group has called on DNR to stock a musky strain from Leech Lake, Minn. that recently yielded a large number of 50-inch fish when stocked in some Minnesota waters.

"The current controversy asks, 'Do we have fewer big fish than we used to?'" Avelallemant says. "We don't have any problem producing enough muskies. If you want to catch a musky, you should come to Wisconsin because nobody is going to beat our fish densities and catch rates." And he notes that by other measures, Wisconsin isn't producing fewer big fish. Voluntary reporting by Muskies, Inc. members shows the number of 50-inch fish has reached an all-time high.

"Most of the evidence shows it isn't the fish, it's where it is put," he says. Genetics is only one factor deter-

mining growth rate and size, and it's rarely the controlling factor. "It's not that simple."

The availability of food, amount of habitat, populations of competing species, mortality from angler and tribal harvest, and mortality from poor handling practices or hooking injuries when fish are released, all affect the growth rate, survival and ultimate size muskies attain.

Still, Avelallemant, Staggs and other members of the department's musky team think the group has raised some important questions at a time when tech-

Annual catch of muskies larger than 48 inches

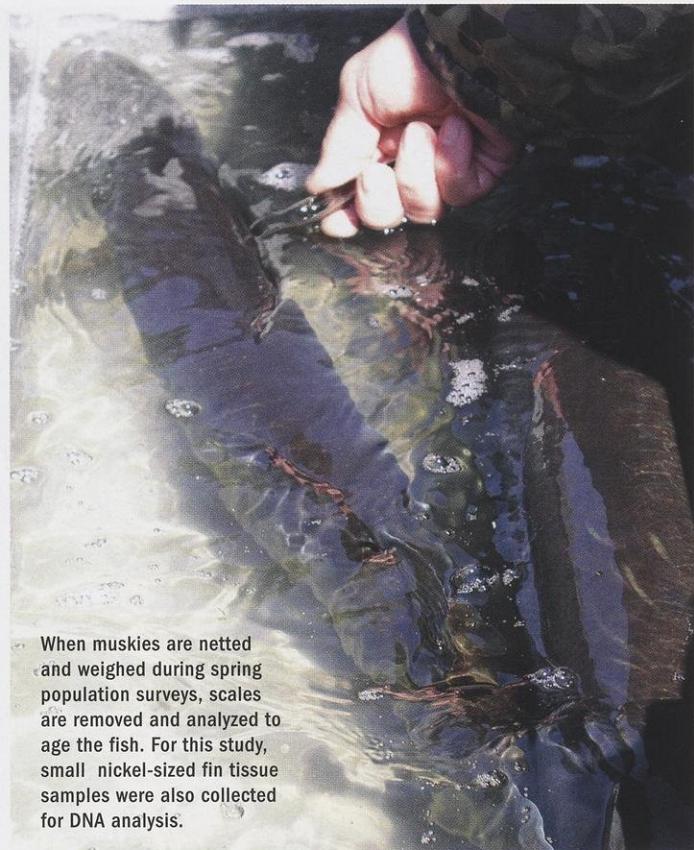


WALDBILLIG & BESTEMAN BASED ON DNR DATA



Brian Sloss, UW-SP geneticist, reviewed DNR plans to suggest methods so the genetic makeup of stocked muskies can mimic the natural variation.

ED MURPHY



When muskies are netted and weighed during spring population surveys, scales are removed and analyzed to age the fish. For this study, small nickel-sized fin tissue samples were also collected for DNA analysis.

ED MURPHY

nological advances can help provide answers. So the DNR team has contracted with Brian Sloss, a University of Wisconsin-Stevens Point geneticist, to do some detective work while DNR continues studies of its own to uncover answers.

The agency already has made some adjustments. Beginning in 2001, muskies have been stocked at one of several fixed levels lower than in the past, and stocking has been stopped entirely on other waters. Holding to this stocking strategy for at least a decade will show patterns in the resulting musky populations which will help to better match the amount of stocking to available food, levels of natural reproduction and competition among species. Biologists are also identifying musky habitat and educating people why certain lakeshores should not be developed. A recent study showed muskies reproduce best on waters where less than 20 percent of the shoreline is developed, and that musky reproduction starts to drop off significantly once 40 percent of the shoreline is developed.

"I consider [addressing all these factors to be] the next step in the long evolution of our musky management

program," Staggs says. "It's time to take the next steps to keep us at the head of the pack."

The detective

Since joining the UW-Stevens Point's Cooperative Fishery Research Unit in 2002, Brian Sloss has helped establish and build its Molecular Conservation Genetics Laboratory in the College of Natural Resources. The facility now has three DNA sequencing machines capable of running genetic tests on more than 500 individuals a day. Ninety-five percent of the lab's work involves fish, but Sloss recently helped DNR untangle the genetic heritage of prairie chickens. (See our February 2006 story, "The drummer of love.")

In 2004, DNR hired Sloss to review its stocking strategies and practices. Those strategies assumed musky strains taken for stocking would be best suited to waters within the same river drainages where they naturally evolved.

"I was pleasantly surprised at how well the program was set up," Sloss says. He also appreciated the openness of DNR propagation staff to his review

and their willingness to embrace suggested changes.

As a geneticist, Sloss wants to see stocked populations that mimic the diversity found in nature, not in the barnyard, where it's common to mate the biggest bull and the biggest cow to get even bigger calves.

"From a genetic health standpoint, I want a population that has enough genetic diversity to adapt as their environment changes. For example, as waters warm through global climate change or are invaded by exotic species," Sloss says. "Without genetic diversity, they have a higher probability of becoming extinct."

Although DNR's hatchery operations already were very close to what he would recommend, Sloss felt that with a few changes the stocking programs could be made even stronger. He was concerned DNR wasn't collecting eggs and sperm from enough different fish, and that the fish selected as brood stock came from waters that were stocked year after year rather than from waters with naturally reproducing populations. "There was no evidence that any harm had been done," Sloss was quick to say.



During the next few years, fisheries crews will collect samples for DNA testing from muskies on 20-30 waters to learn if muskies on different waters descend from distinct fish stocks.

the Art Oehmcke Hatchery in Woodruff also followed Sloss' plan, collecting and fertilizing eggs from the naturally reproducing water of North Twin Lake. They fell just short of their goal, demonstrating some of the challenges in propagating fish.

Spawning seasons start at different times on different lakes, so staff need to learn the spawning sites and dates of each lake. The need to collect eggs from throughout a spawning run, instead of just collecting eggs from "peak" spawning times, means more staff collecting more fish and eggs over a longer period of time — all while juggling other duties including incubating the eggs and collecting walleye and sucker eggs.

Changes to the brood stock policy will similarly ripple throughout the production cycle, Lindenberger says. Eggs collected at different times will be incubated so that they hatch at the same time. Transferring fry of the same size into DNR rearing ponds helps cut down on cannibalism and poor survival.

"The brood stock policy is good, and it's necessary to ensure that the genetic diversity we want in our state's musky population will be found in the thousands of fish that our facility stocks each year," Lindenberger says. "With these new changes, it's quite possible, however, that we'll have to modify and adjust our operation once again so that our musky production is consistently successful from year to year."

Revealing the code

While conducting annual fish population estimates this spring, hatchery staff and fish biologists also snipped nickel-

"But using those populations every year could slowly erode genetic diversity."

So Sloss developed a precise plan by which the two hatcheries would each need to spawn milt and eggs from 70 to 100 fish each year so that within five to seven years, there would be a 95 percent chance of mimicking the genetic strength found in natural populations. Fish would be collected only from naturally reproducing populations, throughout the spawning run, not just at the beginning, and each population would be put on a five-year rotation to avoid harming its reproductive potential. Eggs from each female were to be fertilized by three males.

The men and women in the middle

Starting this spring, Gary Lindenberger and his staff at the Gov. Tommy G. Thompson State Fish Hatchery in Spooner started putting the genetics plan into

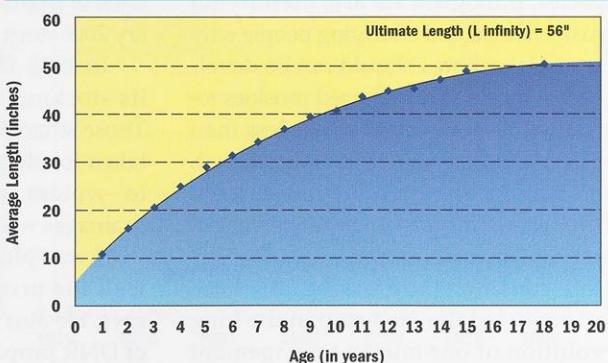
practice.

Instead of collecting eggs and milt from fish in Bone Lake (a stocked lake), Spooner hatchery staff and fish biologists from the Department of Natural Resources and Lac Courte Oreilles' Conservation Department collected eggs and milt from fish in the Chippewa Flowage (a lake that historically had good natural reproduction).

They exceeded their goal — collecting 30 female fish and successfully mixing their eggs with milt from two to three different males each, ensuring a high degree of genetic diversity among young fish to be reared at Spooner this year.

Hatchery crews from

How quickly do muskies grow?



sized pieces of fin tissue from muskies sampled in Lac Courte Oreilles, North Twin Lake and 20 other waters across Wisconsin.

Those tissue samples are destined for Sloss' lab, where he and his graduate student, Ed Murphy, will map the fishes' genetic sequences and look for patterns that could indicate if the fish descended from distinct stocks.

Over the next couple years, fisheries crews will collect tissue samples from muskies in about 20-30 other waters for similar genetic testing. Sloss and his students will test tissue from DNR's archive of fish samples collected over the past decades on Escanaba Lake and Lac Courte Oreilles to help determine if past stocking has changed musky lineage over the years.

"We're hoping to more or less genetically categorize what's out there," Sloss says. "I hope to give the agency a stock map of the state. The advances in technology should allow us to draw the lines pretty clearly."

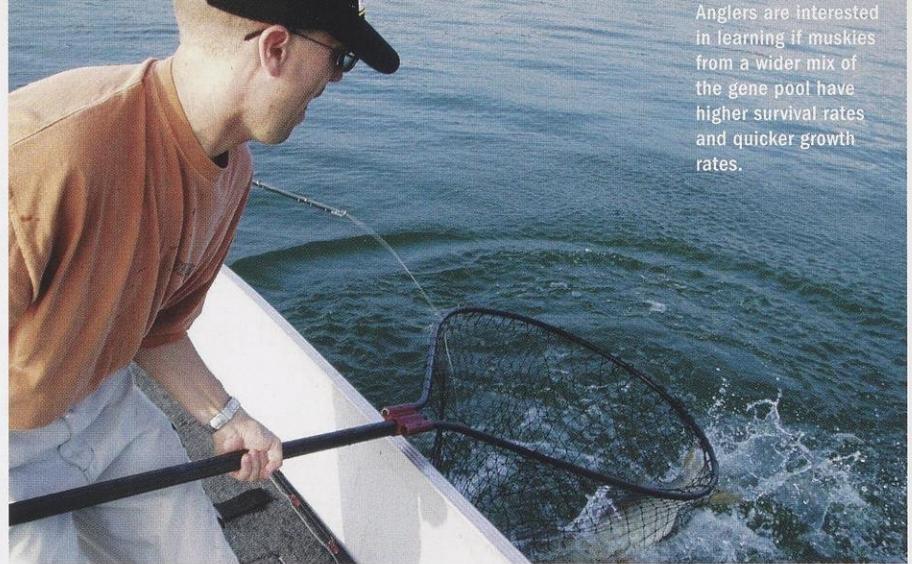
In addition, he hopes to answer a question the angler group posed: Has stocking over the last 100 years eliminated natural stock boundaries and turned Wisconsin muskies into "mutts" — meaning there's no need to protect pure-bred strains and no concern in introducing a new strain of fish that some anglers find more desirable?

Head-to-head competition

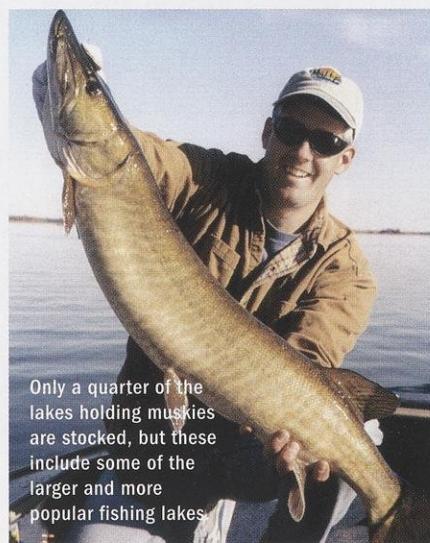
Minnesota's switch from stocking a proven slow-growing musky strain from Shoepack Lake to the Leech Lake strain seems a good decision for that state and has Wisconsin anglers talking. In this case, genetics was a controlling factor. The Shoepack strain was slower growing and reached a smaller maximum size than the Leech Lake strain.

Anglers report catching higher numbers of 50-inch and longer fish from some waters stocked with the Leech Lake strain. A Minnesota study suggests the Leech Lake fish grew at faster rates in the first five years than Wisconsin hatchery strains.

Wisconsin researchers have developed a controlled experiment to compare performance standards of the two



SCOT STEWART



SCOT STEWART

strains head-to-head. "Past comparisons have been anecdotal, or lacked side-by-side measurements in relevant waters," says Martin Jennings, a longtime DNR fisheries researcher.

Starting this spring, Jennings began a long-term study to see how the two fish strains fare when raised at the same hatchery under the same conditions, and then are stocked at the same time into the same lakes. The research design eliminates differences in lake characteristics, whether the fish were stocked in waters with or without established musky populations, and whether angling pressure might contribute to differences in fish growth rates and ultimate size.

Wisconsin waters differ considerably from Minnesota in some of these factors. Leech Lake, for instance, has the same surface acreage as all of Wisconsin's trophy musky waters combined. The Leech Lake strain was introduced into many Minnesota lakes that lacked established musky populations, so the stocked fish

were able to exploit the forage base and thrive. Many of Wisconsin's popular musky lakes have considerably higher angling pressure per acre than Minnesota waters.

The Wisconsin study will include seven lakes in the St. Croix River basin, which was not part of the musky's original range but now has musky fisheries established and maintained by stocking. The study will run a minimum of 10 years; in six years' time, Jennings and fellow researchers will start setting nets to sample fish numbers and estimate survival and growth rates.

If the Leech Lake fish or any particular strain of fish discovered through research have much better survival and growth, DNR managers would stock the strain in lakes with no native populations. "If it turns out that some strain really can produce superior fish, why wouldn't we use it in nonreproducing, nonnative waters?" asks Staggs.

But he also cautions the fish may be "super fish" because they are voracious predators, eating and growing at the expense of other fish in the lake. "It's never as simple as it appears to be," he says.

"In the end, I think we'll find that there is no silver bullet, no supersize fish," Staggs says. "I think this is more about making sure Wisconsin lakes can produce musky on their own, that our stocking program is introducing fish that will survive and grow the best with the lakes we have, and that we will have evaluated this issue systematically in a scientific fashion so we aren't arguing about this in 10 to 15 years."

Lisa Gaumnitz is public affairs manager for DNR's water programs.

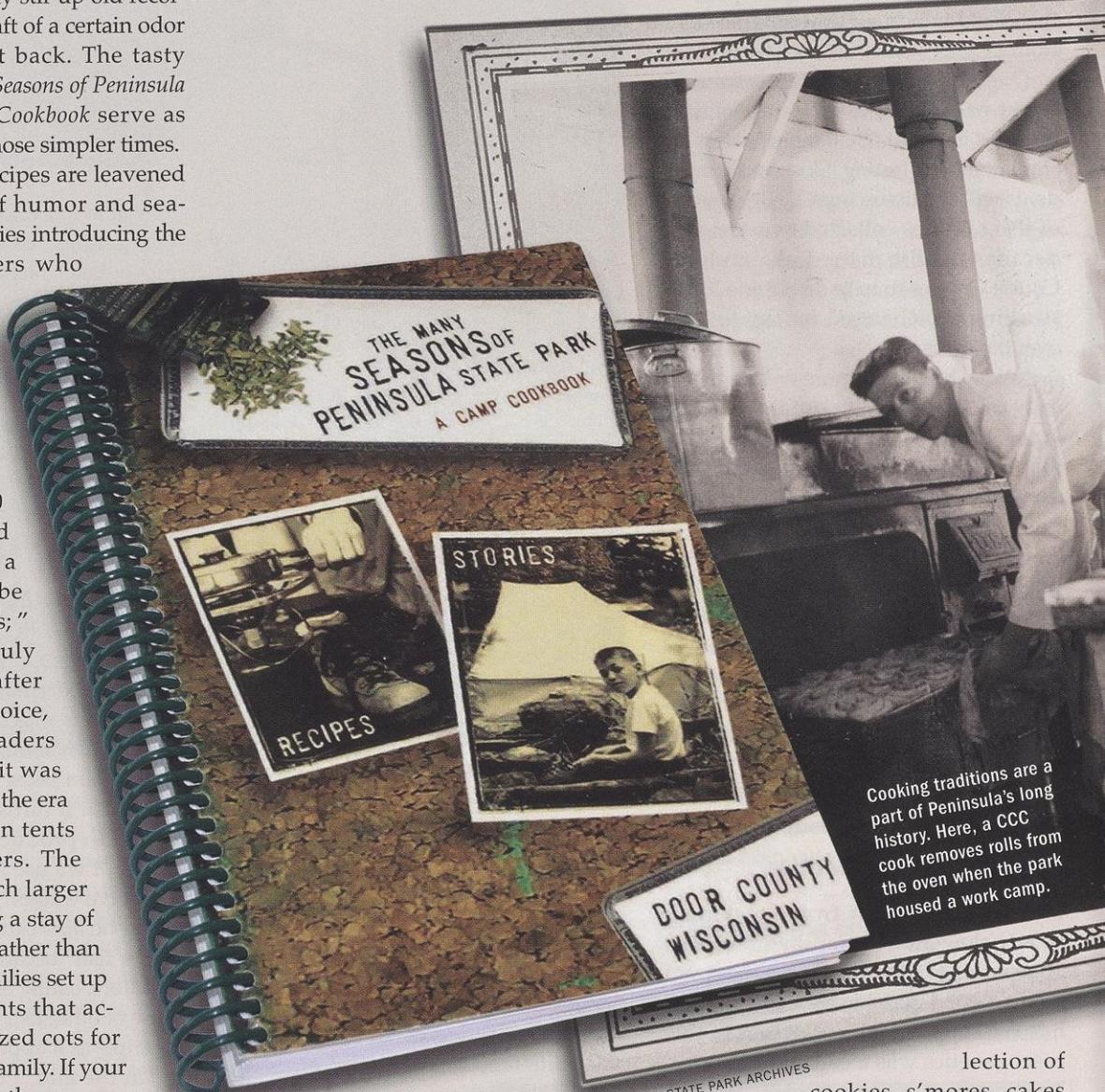
David L. Sperling

Our memories are a montage and mélange of the sights and sounds of our past, blended together to recall a friend, a face, a time or place. Surely underrated among those memory triggers, smell and taste quickly stir up old recollections, and just a waft of a certain odor can bring you right back. The tasty recipes in *The Many Seasons of Peninsula State Park: A Camp Cookbook* serve as guides for enjoying those simpler times.

Most of the 359 recipes are leavened with a good dash of humor and seasoned with short stories introducing the families and workers who inhabited the park from the early 1900s through the present. I say "inhabited" because people who camped at the park year after year for 30 to 50 years, or who stayed there for months at a time, could hardly be described as "visitors;" these folks were truly encamped. Page after page and voice by voice, today's younger readers get a sense of what it was like to go camping in the era before ripstop nylon tents and pop-up campers. The equipment was much larger and heavier, befitting a stay of two weeks or more rather than a long weekend. Families set up big, high canvas tents that accommodated full-sized cots for each member of the family. If your clan planned to stay the summer (for a fee of \$18 for the whole summer season!), it wasn't especially uncommon to outfit THREE tents — one for adults, one for children and a separate cook tent where mom set up a pantry. If the menu called for something more elaborate, several families could share oven space in the big cook stove in the park's cookhouse. In those days as now, local Door County merchants catered to the summer tourists, driving through the campgrounds to take orders

Well-seasoned

Treasured recipes from a new cookbook stir up though



and offering campers weekly grocery delivery, ice delivery and laundry services.

The cookbook provides interesting tidbits about each of the park's six superintendents in its 97-year history. One story is so eye-opening it will be retold here, at the end of the article.

The recipes, grouped into sections on snacks, breads and pastries, soup and salads, side dishes, breakfasts, main dishes, wild game and fish, and a big se-

PENINSULA STATE PARK ARCHIVES

Cooking traditions are a part of Peninsula's long history. Here, a CCC cook removes rolls from the oven when the park housed a work camp.

lection of cookies, s'mores, cakes and pies, are hardly all campfire fare; I suspect most were perfected in the communal cook stove. But some quick snacks and dishes you'd only try around a campfire — like *Mud Apples*, apples slathered with an inch-thick coating of mud, buried into glowing coals, and baked until the mud hardens. When cool, crack off the mud and scoop the warm filling out of the skins.

Readers will pick up interesting tips for living off the land. A simple recipe

memories

of good times around the campfire and stove.



potatoes, veggies and spices wrapped in a sheet of foil, then tossed on the coals or grilled until the foil is charred and the contents steaming hot. Skillet hot dishes tempt the palate with lasagna, enchilada, stroganoff, walnut chicken with cherry glaze, campside pizzas, pork chop and barbecue options. And there are burger ideas galore, including *Lone Ranger Burgers* (a mask of black olives disguises the ground chuck). As times have changed, there's also a healthy mix of vegetarian offerings like *Chipotle-Glazed Veggie Kebabs*, *Veggie Couscous with Feta*, and *Grilled Zucchini Lasagna*.

Authentic recipes from some of the old CCC (Civilian Conservation Corps) camps and standards from the heart of the Great Depression show how people made a dollar stretch. Like this recipe:

Rinktum Ditty

1 can condensed cream of tomato soup
2 cups cheddar cheese, grated
1/2 teaspoon dry mustard
1 egg, slightly beaten
6 pieces of toast

Heat soup over low heat. Add cheese, stir until melted. Add mustard and egg. Heat thoroughly and serve on toast. Yield: six servings

Often served with pickles, olives and raw carrots on the side, Rinktum Ditty was an easy, affordable dish. It had several variations, all served over toast:

Pink Poodle: Follow recipe for Rinktum Ditty, but add a little red wine.

Blushing Bunny: Melt two tablespoons of butter in a saucepan, blend with two tablespoons of flour, add soup, cheese, salt and pepper.

English Monkey: Melt two tablespoons of butter in a saucepan. Blend in a like amount of flour. Add a cup of grated cheddar cheese and two beaten eggs to soup. Cook thoroughly.

Pink Monkey: Melt two tablespoons of butter in a saucepan. Blend in two tablespoons of flour. Add two cups grated cheese, chopped green onions and one can condensed tomato soup.

for *Dandelion Fritters* tells how to batter up and fry those profuse flower buds. For *Sumac Lemonade*, gather the red berries from staghorn sumac trees. Soak a cup of the fuzzy berries in one quart of warm water. Let it cool overnight, strain through cheesecloth. Sweeten the pink liquid with sugar or low-cal sweetener and enjoy a refreshing drink.

A whole group of recipes give kids a chance to make some fun foods that can double as scary Halloween treats. These confections include the colorful *Been Camping Too Long Armpit Hairs*, *Edible Campfire Coyote Droppings*, *Apple Ladybug Treats*, *No-Bake Snakes* and the ever-popular *Pit Toilet Jell-O*, a recipe submit-

ted by the park maintenance crew. You can wash it all down with a mix of lemonade, limeade and rainbow sherbet dubbed *Day-Old Bathwater*.

If you lean toward the wild side, try the recipes for venison, squirrel, turtle, pheasant, wild turkey, a slow-cooker version of raccoon in apple cider, and a Dutch oven paprikash recipe for *Smoothed Muskrat and Onions*. The dressed muskrat meat is soaked in salted cold water overnight, drained, patted dry, seasoned with flour and paprika, browned in oil or butter and then slowly simmered in an onion and sour cream sauce for an hour until tender.

Reacquaint yourself with recipes for those tinfoil dinners from scouting or summer camp — ground meats,

KATHLEEN HARRIS

Lenox Rarebit: Combine one can condensed tomato soup, two beaten eggs and four ounces of cream cheese. Heat thoroughly.

Welsh Rarebit: Combine one can condensed tomato soup, two cups grated cheddar cheese, a dash of Worcestershire sauce and a dash of cayenne pepper.

Try these recipes over your own Hobo Stove (a coffee can and some melted paraffin in a small tin can; the book shows you how to make one) and you'll appreciate how people made do in tough times.

The cookbook features ample recollections of simple pleasures and also includes a few tales that go

Road Kill Delight

When I was a child, my parents always spent their annual vacation at Peninsula State Park. We lived in Racine and in those days there were no expressways, so the route to Peninsula went through the heart of Milwaukee. To minimize traffic, my parents usually left at 1 a.m. My sister and I retired early the night before, but never slept much because we were too excited. Once we were clear of Milwaukee, our job was to keep our eyes peeled for road kill. It didn't matter much what animal, except we learned the hard way

rack to keep it cool on the trip north. Despite the noise of the carcass flapping in the wind, we eventually fell asleep.

When we arrived at the campsite, mom woke us up so we could gather "beater" rocks to tenderize the carcass. Sometimes we were lucky as tire tracks had done the job for us. If not, we beat it to a bloody pulp and then seasoned it with mom's Louisiana "red hot." Finally we rubbed campfire ashes over the entire carcass to give it a nice smoky flavor.

My sister skewered a willow stick through the carcass butt to front so we could "spit" it over the campfire. We traded off turning the spit, but usually tired after about 30 minutes, so we called mom and dad to "Come and get it," even if it was on the rare side. Dad always washed down his portion with three to four beers, as he said it "slid down better."

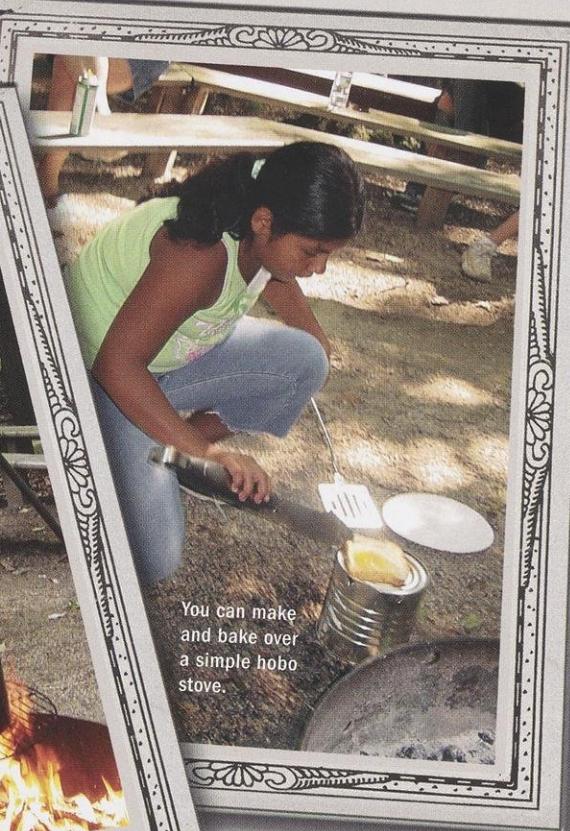
If we were lucky, we could feed off the carcass two to three days as long as we didn't have too many rangers to share it with. Usually the smell kept them away, as some of those rangers would eat just about anything as long as it was free! We were always glad to oblige, as we were eager to build up "points" to offset the inevitable trouble that always seemed to find us.

Our two weeks of vacation seemed to fly by. And soon we were packing up and dreaming about the unknown road kill treasures that waited us on the way home.

The Many Seasons of Peninsula State Park: A Camp Cookbook is available for \$12.50 (\$10 plus \$2.50 shipping) from Peninsula State Park, 9462 Shore Road, P.O. Box 218, Fish Creek, WI 54202. Make checks payable to Wisconsin DNR. Proceeds help fund the Peninsula Park education programs. **W**



KATHLEEN HARRIS



beyond simple to the downright elemental. Check out this reminiscence from Gary Patzke, who was Park Superintendent from 1974-84. His family camped at Peninsula for two weeks every summer for nearly 50 years. Even if this account is a bit of a stretch or even if some of it happened once, it is seasoned with enough humor to make a good yarn.

skunk wasn't at the top of the list. Once we even found a nearly intact deer, but when dad kicked it to see if it was still alive, it exploded! Perhaps its bloated size should have tipped him off.

After we found the "kill," it was my sister's and my job to pluck it, skin it and gut it in the back seat. The first few years it was kind of messy, but with a little practice, we managed to do the job quite nicely without the dog and cat going too crazy. Once we had it prepared, dad tied the carcass to the luggage

David L. Sperling edits Wisconsin Natural Resources magazine.

come and get it!

Time-tested favorites from your campfire and kitchen.

Last winter we invited you to share favorite recipes that you whip up at a campsite, for shore lunch, on a hike, or at the cabin when friends gather to remember old times or launch new adventures. You didn't let us down. Each entry was seasoned with a short story or sprinkled with a little advice that shows how good food is part of the glue that holds together a get-together. Enjoy!

Standard abbreviations are used throughout: cup (C.), teaspoon (t.), tablespoon (T.), pound (lb.), ounce (oz.).

Bean Bags

canned pork and beans
wieners, cut into pieces
chunk pineapple
chopped onions
cubed cheese (like processed cheese that melts easily)
cut-up fresh tomatoes (optional)

Lay out 15" squares of aluminum foil on a solid surface like a sturdy paper plate. Set out each item on a buffet line and let each person assemble their own mix of ingredients. Seal and mark each foil dinner. Heat on an outdoor grill or in a moderate oven (350-375°) about 20 minutes. Open and serve on the paper plates, no mess and no clean-up!

Our families have been campers since 1950 from our parents down to great grandchildren. When we get together, there's invariably a campfire and this is an easy to fix favorite. If baked in an oven, place packets on a cookie sheet to prevent spilling or breakage. Our rule is if you break the foil while eating these, you have to do clean-up.

Wanda J. Nelson
Woodruff



Lightweight Walleye

potatoes
onion
garlic
scallions
1 lb. butter

About 30 years ago, three friends and I used to take a four-day fishing trip up north. Fishing started on Friday as soon as the tents went up and the food was secured against bears. Slow would have been way too fast an adjective to describe the fishing action, but by Sunday evening, we finally put together a stringer of six 20- to 21-inch walleyes and looped them to the pier. I melted an entire pound of butter in a big fry pan, cooking the vegetables. Ted was sent to retrieve and fillet the fish. Even though the fish had only been tied up for an hour, all that was left of them was two jawbones! The vegetables with some bread made a decent meal, but the mystery of the disappearance of our fish has made wonderful fodder for our stories over the past three decades!

Kieran J. Sawyer, Sr.
Oak Creek

Crusty Corn Trout

4 cleaned and boned rainbow or brook trout
1/2 C. all-purpose flour
1 egg
1 T. water
1 C. yellow cornmeal
1/2 C. ground nuts (peanuts, pine nuts, walnuts or pecans)
1 t. salt
1/4 t. cracked pepper
1/4 t. paprika
1/4 t. ground cumin
vegetable oil for frying

Put flour in one plastic bag. Mix cornmeal, nuts and spices in a second plastic bag. Shake cleaned trout in flour. Beat egg and water together and dip trout in that mix, then in the cornmeal mix. Heat an inch of oil in a fry pan over coals or medium heat. If the oil is hot enough, a tiny pinch of the breading mix should sizzle and bubble in the oil. Cook trout about five minutes per side, turning once. Drain on absorbent paper toweling. Makes four servings.

I use this both for shore lunches and at home. I've played around with different ingredients, but prefer this original recipe we found in an old cookbook.

Bruce Buelow
Amherst

Basting Sauce for Roast Goose or Duck

10 oz. jar currant jelly	1/4 C. orange juice
1/2 t. dry mustard	1 T. lemon juice
1 T. grated orange rind	1/8 t. dried ground ginger
1 T. grated lemon rind	

Combine all ingredients in a small saucepan. Heat and cook until smooth. Turn off heat. Brush on goose or duck several times after the skin has browned in the oven.



This wonderful basting sauce recipe was given to me by Dick Nelson in the early 80s. Dick has since passed away, but he was an avid waterfowler and a real chef. I was his granddaughter's second-grade teacher. Dick and I shared many hunting stories over the years.

Bev Engstrom
Rhineland

Chicken-fried Deer Steak

2-3 lbs. tenderloin or back straps cut $1\frac{1}{2}$ - $3\frac{1}{4}$ inch thick
1 C. milk
1 egg
One sleeve crackers, crushed
1 T. garlic powder (optional)
Cooking oil, just enough to cover the bottom of your pan.

Cut or butterfly the steaks to indicated thickness while half-frozen. Tenderize by pounding slightly with a meat mallet. Beat egg and add milk to a dish. In a separate dish, blend cracker crumbs and garlic.

Heat oil in pan to 300-350°. Dip steaks in the egg-milk mixture. Drain, then dip and cover with cracker crumb mixture. Place one at a time into hot oil then cook three to four minutes per side until medium rare. Serve with fried potatoes.

This recipe is equally good with bear and elk. I got the recipe by watching a Wyoming rancher's wife who cooked for our hunting party nearly 30 years ago.

Vernon A. Denzer
Holcombe

Chokecherry Liqueur

3/4 C. sugar
1 3/4 C. vodka or light rum
2 C. chokecherries

Wash and drain chokecherries. Put sugar and vodka or rum in a clean, quart glass canning jar. Add chokecherries to fill. Close the jar tightly. Invert the jar briefly once a day until the sugar is dissolved. Allow the liqueur to age several weeks to a few months. Decant and seal the liqueur in a smaller bottle. Enjoy in moderation.

When I was a child, we enjoyed eating chokecherries, but an astringent chemical in the fruit would ultimately limit our intake. When my mother heated the chokecherries while making syrup, we enjoyed the flavor without the choking sensation. Heating or time broke down the astringency. Similarly, after picking chokecherries in early autumn and allowing several weeks to a few months for this mixture to infuse its flavor and mellow, the astringency from the chokecherries disappears.

Richard LeClair
Wausau

Ron's Rabbit Patties

2 rabbits, boned and ground (approximately 1 pound)
1 small, finely chopped onion
1 egg
1/2 t. pepper
1 t. ground sage
1 C. crushed crackers (approx. 25 crackers)

Place ground rabbit meat in a large mixing bowl. Add remaining ingredients. Mix thoroughly. Form into 4-6 patties. Heat 2-3 tablespoons of oil in a fry pan. Cook 4-5 minutes per side until golden brown.

In winter, I hunt rabbits with a couple of friends and our two dogs, Max and Ticker. We get a lot of rabbits, I mean a lot! A few years back, my wife, Janet, told me if she ate another rabbit she was going to start hopping around the kitchen. That meant stopping hunting (Ha! Like that would ever happen!) or finding another way to eat all those rabbits. That wasn't easy given that I like to go rabbit hunting 2-3 times a week or more. I finally realized that every time I went hunting, I needed a sandwich or two. Though these patties are really good served hot with a white sauce with mixed vegetables for dinner, I eat them cold on a bun with mayonnaise. I just freeze a bunch of cooked patties, then pop them in the microwave for a few minutes just long enough to thaw them out before packing my lunch.

Ronald L. Cornwell
Town of Hull, Portage County

Greatest Granola

2 1/2 C. regular rolled oats	1/4 C. wheat germ
1/2 C. sliced almonds	3 T. brown sugar (or more to taste)
1/2 C. shredded/flaked coconut	1 T. cinnamon (or more to taste)
1/2 C. sesame seeds	1/2 C. cooking oil
1/2 C. sunflower seeds	1/2 C. honey
1/4 C. whole wheat flour	1/2 t. salt
1/4 C. powdered milk	1 C. raisins

Preheat the oven to 300°, then combine ingredients in order: Add the first 10 dry ingredients in a large bowl and mix. In a smaller separate bowl, combine the oil, honey and salt. Gradually mix these wet ingredients to the dry ingredients and mix well. Grease a 13x9x2 inch pan and spread the mixture into the pan. Bake at 300° for 30 minutes stirring well every 10 minutes. Stir in raisins and bake another eight minutes. Allow granola to cool in pan, but stir it several times. Store in an airtight container. Makes 8-9 cups.

In camp or on the trail, eat it by the handful. If milk is available, serve it as a cereal. If milk is not going to be available, you can prepackage single servings in double plastic bags and add a tablespoon or so of powdered milk. When you want to eat, simply add a little water, shake the bag and spoon it down. Delicious!

Dave Engleson
Sun Prairie

Papa's Homemade Chili

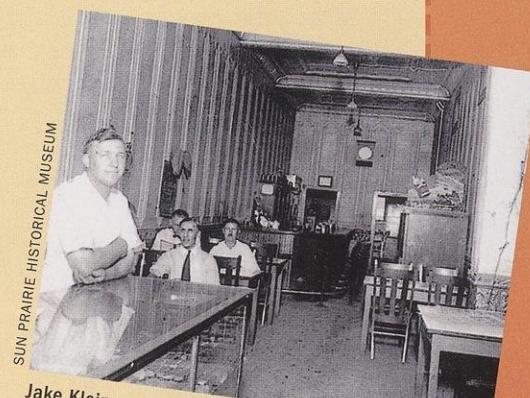
3 lbs. hamburger, chopped beef or coarse chopped venison
4-5 lbs. of home-grown cooked tomatoes (about two quarts)
3 medium onions, diced
5 stalks celery, chopped
46 oz. can tomato juice
50 oz. can tomato soup
40 oz. can chili beans
Two 15.5 oz. cans kidney beans, drained
1 T. pepper, ground
2 T. salt
3 T. chili powder

Brown meat in a kettle. Drain and add chopped celery, onion and seasonings. Cover and cook until the celery and onions are soft.

While the meat is browning, mix and cook the beans, tomato juice, tomatoes and soup concentrate over medium heat in a 12-quart kettle. Stir ingredients in both kettles often to avoid sticking. Add the meat mixture to the larger kettle. Bring to a boil slowly, then reduce heat to a simmer. Stir occasionally but then let mixture simmer on low heat for a few hours until you are ready to eat. Consider serving with crackers, corn chips and sour cream. Makes 10 quarts of chili.

This is the recipe my grandfather, Jake E. Kleiner, served in his diner (Kleiner's Diner in Sun Prairie) in 1914 when he was only 16 years old. The recipe remains a favorite with our hunting groups, neighbors and family. Try it. It's delicious!

Kirk Meicher
Baraboo



SUN PRAIRIE HISTORICAL MUSEUM
Jake Kleiner at his Sun Prairie diner in the early 1920s.

Grilled Shish Kebabs

1 1/2 lbs. fresh chicken breasts, cut into about 3/4-inch chunks
1 each red pepper and green pepper, cut into chunks
firm cherry tomatoes, slightly under ripe
1 sweet red onion, chunked

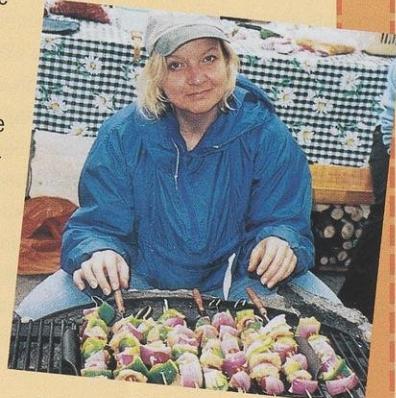
Marinade:

1 pkg. commercial marinade mix, teriyaki or another flavor that goes with chicken
3/4 C. pineapple juice
3 T. soy sauce
1 T. brown sugar

Mix marinade and pour into a sealable large freezer bag. Cut the chicken into chunks and freeze in the marinade. Cut up other vegetables, place in another sealable plastic bag and refrigerate. When leaving for your trip, place both bags in a cooler. By the time the chicken thaws, it has marinated long enough. Assemble the kebabs for grilling alternating vegetables and a mix of chicken pieces on the skewers. Once the fire is hot, place the kebabs on the grill, turning on all four sides until the chicken is cooked throughout.

We take these on our camping trip each summer. My children (11, 14 and 16) assemble the kebabs while we get the fire ready. The recipe makes six kebabs.

Carla St. Aubin
Black Creek



Poached Walleye

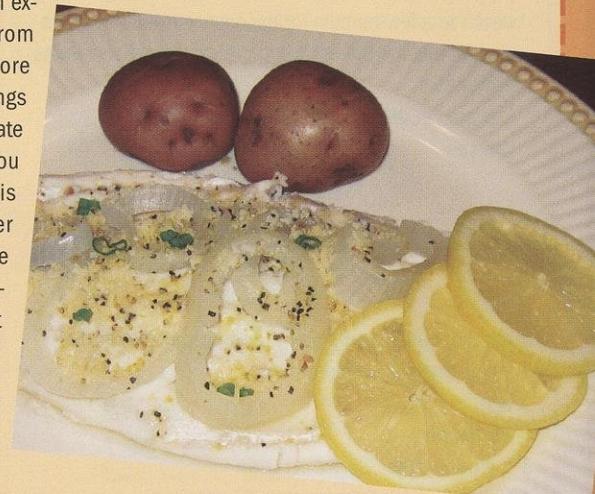
walleye fillets, boneless, skin off
1 Vidalia onion, in 1/4-inch slices
a few whole peppercorns
1 bay leaf

grated parmesan cheese
lemon pepper seasoning
a few fresh lemons, sliced

If whole fillets will fit in the fry pan, keep them whole. Fill a large skillet half full of water. Add a few peppercorns and a bay leaf. Place on a camp stove over medium heat. Place sliced onions in the water, cover the pan, and let them cook down until soft. Place walleye fillets on top of the onions and poach. This really does not take very long, so don't take your eyes off the skillet or go back to the card game. The difference between sushi, poached fish and mush walleye is measured in seconds. You will see the fillets change color to opaque quickly. When the fish flakes, use a wide spatula to gently lift and drain the walleye. Place on a warmed platter. Place a few slices of cooked onion on top of the fillets with a little grated cheese. Garnish with lemon slices, season with lemon pepper and serve with some boiled potatoes.

A friend, Barry Lindsay, showed me this dish on a fly-in trip 30 years ago. It is an excellent break from fried walleye shore lunches and brings out the true delicate walleye flavor. You can also try this with other colder water fish like perch and crappie, but don't bother with softer fish like bass and bluegill.

Dean Hoffman
Brookfield



Bohemian Surprise

6-7 medium potatoes, scrubbed, sliced skin-on into 1/4-inch rounds
1 medium onion, sliced thin
1 lb. ring Bohemian smoked sausage, sliced into 1/4 -inch rounds
2 C. fresh asparagus, cut into 1 1/2-inch lengths
1/4 C. olive oil
parmesan cheese (optional)

Heat olive oil in a large skillet and fry potatoes, turning occasionally, until almost tender. Add onion, sausage and asparagus. Cook until the onion is clear and the asparagus is tender. Add salt and pepper to taste. Sprinkle with parmesan or another cheese of choice (optional). Serve with garlic toast. Serves 4-6

Raymond P. Hach
La Crosse

Squaw Corn

1/2 lb. seasoned bulk sausage
1 15-oz. can cream style corn
6 large eggs, beaten

fresh chives
Seasoned salt
ground pepper

Brown the sausage in a skillet. Pour off fat and add the creamed corn, mixing over medium heat. Turn down the heat. Beat the eggs in a separate bowl and add to the corn-sausage mixture stirring frequently and folding in the same manner as making scrambled eggs cooking until eggs are set. Place in a warm serving platter. Season with salt and pepper. Garnish with chive and serve as a side dish with walleye shore lunch.

My friend John Kracht introduced me to this dish. It was one of his mother's depression era favorites that kept her family well fed during those lean times. The original recipe called for bacon instead of sausage, but our group prefers sausage. Try it both ways and decide what works best for your group.

Dean Hoffman
Brookfield



The forest where we live
Growing a legacy.





Leave a

Tim Berndt (right), a member of the Stoughton Tree Commission, plants a legacy. The tree commission determines the city's tree planting, protection and maintenance needs.

RICK WOJCIK

"The best friend on earth of man is the tree. When we use the tree respectfully and economically, we have one of the greatest resources on earth." — Frank Lloyd Wright



lasting impression

Plant trees to grow a legacy.

Maple Bluff. Elm Grove. Cedarburg. Hickory Corners. Elmwood. Oakfield. Ashland. Wisconsin derives personality from trees. Community trees often define the look, the name and the character of streets, neighborhoods, cities, subdivisions and shopping areas.

When supplemented by good municipal services and schools, the urban forest forms the positive impression that residents and visitors alike have of a community.

"It is often trees and other mature vegetation that give residents and visi-



"I could never imagine a Superior without its urban trees or municipal forest. Trees are extremely beloved here."

— Mary Morgan, Superior parks and recreation director and city forester

tors the impression that an area is safe or inviting," says State Urban Forester Dick Rideout. "Trees add to the social and economic well-being of the community, and provide environmental services such as stormwater management and air cleansing."

Many communities, large and small, urban and rural, have municipal tree programs. Their investment in trees means a safer and healthier future for their community. By planting and nurturing trees, local governments and citizens can leave a mark on the community that they can point to with pride — a legacy.

This legacy is a vibrant, thriving community — a desirable place to visit, work, do business and live.

The City of Superior (pop. 27,368) is one of Wisconsin's best examples of a community with a strong urban forest legacy. Besides having an urban forestry program with about 11,000 public trees, the city houses the third largest municipal forest in the United States. This largest remaining boreal forest in Wisconsin and a wetland that is home to rare and endangered plant and animal species have been permanently protected as Wisconsin's 300th State Natural Area.

Superior officials worked with local citizens to develop a protection strategy for this property, says Mary Morgan, Superior parks and recreation director and city forester.

"I could never imagine a Superior without its urban trees or municipal forest," Morgan says. "Trees are extremely beloved here."

Payback

An investment in trees also can build business as the City of Neenah has discovered. Today, you can enjoy a cup of coffee or shop along shaded sidewalks in downtown Neenah.

"A community's trees make an impression on its visitors and are an extension of the community's pride and spirit," says Karen Harkness, executive director of Future Neenah, a nonprofit dedicated to improving Neenah's economic and cultural vitality.

Neenah is one of several communities across Wisconsin revitalizing its business district with healthy and well-maintained trees. The community has come to know what other business owners across the country are realizing — trees are good for business.

A study by University of Washington social scientist Kathleen Wolf on the role of trees in revitalizing business districts across the country shows that trees attract business and tourists. People linger and shop longer along tree-lined streets. She also found that people believed that merchants in a heavily treed district would be more knowledgeable and helpful than those in an area without trees. They felt product quality was higher in areas surrounded by trees and were willing to pay more for those products.

According to Wolf, people claim that they are willing to spend nine percent more on products in small towns and 12 percent more in large cities for identical products in places that have trees versus those that don't.

American Forests, a nonprofit conservation organization, suggests that business districts maintain 15 percent tree canopy cover. Most retail environ-



Trees create a more inviting downtown Neenah, which store owners hope will cause people to shop longer.

Communities all over Wisconsin have come to realize that trees provide far-reaching and ever growing returns. We're not talking about intangible, aesthetic returns — we're talking about the quantifiable, cold hard cash variety. According to U.S. Forest Service researchers, properly cared for trees in the upper Midwest can be worth three times their investment. Studies have shown:

- The presence of trees increases a property's value three percent to seven percent.
- Strategically placed trees can cut summer air conditioning costs by as much as 50 percent.
- Trees can intercept between seven percent to 22 percent of storm water runoff from impermeable surfaces.
- Shoppers are willing to pay up to 12 percent more for products purchased in shops along tree-lined streets than they would pay for the same items in a barren setting.
- Employers report greater employee productivity, satisfaction and retention at properties enriched with trees and other vegetation.

ments in the United States, however, have five percent cover or less.

Future Neenah received a DNR Urban Forestry Grant to replace trees that had been damaged by reflected heat from nearby buildings. The city planted 42 trees selected to tolerate



"I could not imagine the downtown anymore without the trees and flowers."

— Karen Harkness, executive director of Future Neenah

harsh conditions. Flower beds also were planted.

"People were concerned when the original trees were cut down," Harkness recalls. "I got lots of phone calls. But now people love the results."

The trees and flowers have beautified the downtown, shaded the sidewalks, attracted people to sit outside in the summer, built a sense of community and softened the storefronts.

"I could not imagine the downtown anymore without the trees and flowers," Harkness says.

Property values

Healthy, attractive trees improve the "curb appeal" of real estate. Research by L.M. Anderson and H.K. Cordell of USDA Forest Service on some 800

single-family houses sold over a two-year period in Athens, Georgia found that people are willing to pay three to seven percent more for property with well-maintained trees versus properties with few or no trees. A comprehensive study conducted by Dan Neely, Univer-

sity of Illinois, utilizing actual sales prices found each large front-yard tree was associated with one percent increase in sales price. A large specimen tree could result in a 10 percent increase in property value.

The value of this benefit, depending on the average home sales price, can contribute significantly to a community's property tax revenues.

The USDA Forest Service has found that the amount of taxes contributed to communities throughout the United States due to the added value of privately owned trees on residential property is conservatively estimated at over \$1.5 billion per year.

Steve Ziegler, a licensed landscape architect who has been practicing in Wisconsin since 1983, says he has many

clients who are interested in installing rain gardens and planting a diversity of native trees and shrubs.

"More and more people are getting the idea that trees are a good investment," Ziegler says. "Trees add value — they give us short-term enjoyment in their beauty and environmental benefits, and long-term satisfaction in what they add to a property's real estate value."

A green workforce

Trees also support the state's economy by creating jobs. A recent Wisconsin green industry survey showed that trees attract business and people to an area, in turn, increasing the tax base.

The "green industry" describes businesses that produce, install and maintain flowers, shrubs and trees as well as items related to their maintenance. The Wisconsin Green Industry Economic Impact Survey, completed in 2004, indicates that the green industry has a \$2.7 billion impact on the state's economy annually. Total retail sales of lawn and garden supplies increased 49 percent from 1997 to 2003.

The Wisconsin green industry includes over 4,700 businesses employing over 43,000 workers. The Wisconsin Green Industry Federation contracted with the Wisconsin Agricultural Statistics Service to develop and perform the survey.

"What we found is that gardening is growing as a hobby and people are more and more valuing green space," says Brian Swingle, executive director of the Wisconsin Green Industry Federation. "People are landscaping, adding water features and they like the tranquility that plants and trees add to their homes."

Swingle says there is a consistent eight percent growth in the green industry. "It's evidence that people are paying more attention to the environment," he says.

Healthy trees for healthy cities

Trees are important working components of community infrastructure, just like streets, sewers, public buildings and recreational facilities. A healthy tree canopy functions as "green infra-



JEFF ROE

Employees at the Teton Wood office building in Madison can connect with nature with a lush view of trees from their windows.

structure" reducing the need and expense to manage air quality and waste. The major difference is that trees increase in value over time. Trees need care to survive, but the longer they live, the more benefits they provide. Trees are utilities that pay us back for this care by:

- conserving energy by shading buildings and paved surfaces;
- extending the useful life of asphalt pavement;
- reducing and filtering airborne pollutants;
- removing atmospheric carbon dioxide, the major "greenhouse" gas;
- reducing stormwater runoff and noise pollution;
- filtering and reducing surface and groundwater pollution;
- providing wildlife habitat.

A study of Chicago's urban forest found that increasing tree cover by 10 percent (three additional trees per building) would reduce total heating and cooling energy use by up to 10 percent. At a national level, researchers estimate that planting three additional trees per building could cut more than

\$2 billion in energy costs.

A reduction in energy demand reduces fossil fuel consumption by power plants to generate energy, resulting in additional energy savings and improved air quality. Trees further improve air quality as leaves filter and remove dust and other particulates. Leaves also absorb carbon dioxide, the major greenhouse gas, and give off oxygen. A single tree stores on average 13 pounds of carbon annually. One acre of trees generates enough oxygen each day for 18 people.

According to research by Rachel Kaplan, University of Michigan, workers who had a view of nature from their desks were less frustrated, more enthusiastic and reported higher life satisfaction when compared to workers who couldn't see a view of nature from their desks.

Other studies have shown that trees help workers focus and stay focused. A view of trees can boost worker wellness. Kaplan found that workers without a view of nature from their desks reported 23 percent more instances of illness.

Edible urban forests

Troy Gardens on Madison's North Side, is not only feeding a community's need for trees, but is putting something on the table.

Steve Ziegler, a Madison landscape architect, was the lead designer for the 31-acre urban agricultural center and natural area, which was once an overgrown state-owned vacant lot. Ziegler believes interaction with the landscape is an important way for people to connect to their environment. That's why Troy Gardens today provides family garden plots, a maple forest, tallgrass prairie, an interpretive trail, and fruit and nut trees.

"There are the obvious environmental benefits, but trees also bring stability to an environment and growth as they are living and thriving," Ziegler says.

In this case, Troy Gardens and the surrounding woodland are providing people with apples, pears, plums — 18 kinds of fruit trees. Add to that berry patches, nuts and currant bushes. There are also edible foods for wildlife — an urban buffet with lots of environmental benefit.

Parking lots

Parking lots occupy about 20 to 30 percent of the land surface in most downtowns. But they don't have to be eyesores or steaming masses of asphalt under the summer sun. Incorporating trees and other vegetation into parking lot design provides shade, cools the air, lessens runoff, muffles noise, controls speed and directs traffic, provides reference points for entrances and exits and helps people locate their cars. According to the Journal of Arboriculture, trees reduce asphalt temperatures by as much as 36 degrees and car interior cabin temperatures by over 47 degrees. By shading parked cars, trees reduce emissions caused by the evaporation of fuel from gas tanks and smog-producing compounds from hosing and vinyl car parts.

Trees soften the glare and hard lines of built-up city streets and they screen buildings, making houses both more attractive and private. The shade from street trees can also help offset pavement costs by protecting asphalt from UV radiation. Streets with little or no shade need to be repaved twice as often as those with tree cover.

Trees also reduce noise pollution. Concrete and asphalt echo noise, while trees absorb and reduce it. Trees can act as sound barriers and create gentle and natural noise amidst the often harsh city sounds.

Healthy community trees intercept, slow and store water, helping to control erosion and flooding, and limiting water runoff that can lead to sewer overflows. Leaf and branch surfaces intercept and store rainfall, reducing runoff volume. Roots increase the rate at which rainfall infiltrates soil and tree canopies reduce soil erosion by softening the impact of raindrops on the soil surface.

A U.S. Forest Service study of Midwestern trees found that a typical 20-year-old hackberry intercepts 1,394 gallons of rainfall per year. After 40 years, this figure increases to 5,387 gallons per year, nearly enough to fill a

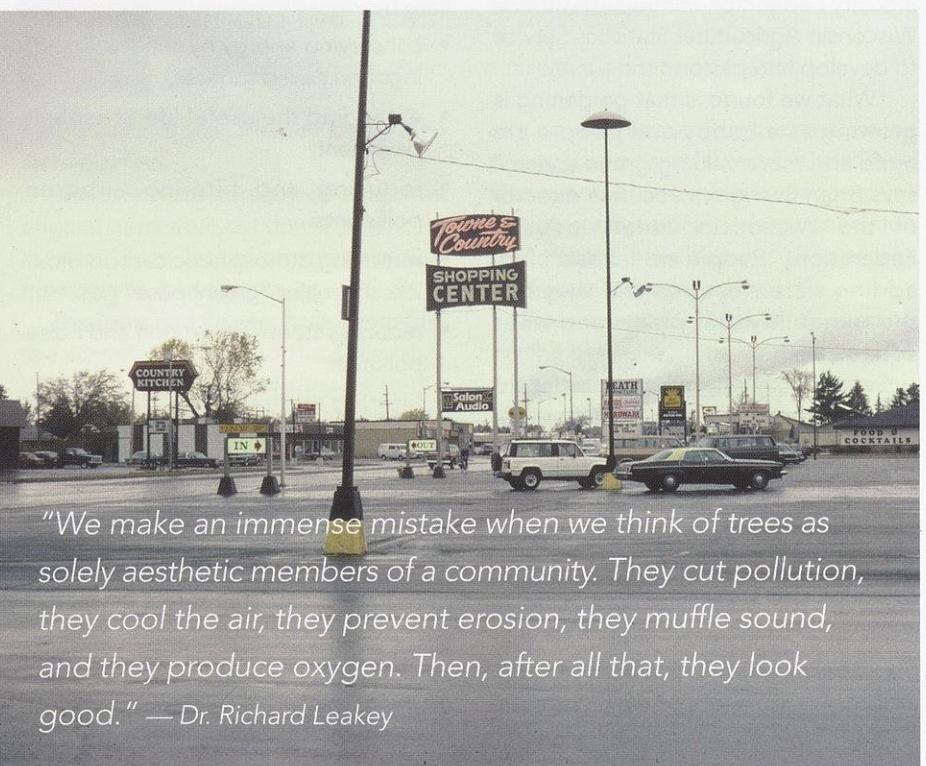
milk tanker.

Rain gardens and vegetated swales bring native plants into the landscape. Rather than using curb and gutter to channel runoff into storm sewers, where there is no chance to mitigate its quality or quantity, runoff is filtered through swales planted with native vegetation. Vegetated swales remove sediment, nutrients and other contaminants, increase infiltration and add beauty.

Leaves in fall are often viewed as an environmental problem, but can provide an opportunity to mulch trees and shrub beds for free, eliminating leaf pickup costs and the nutrient flush from piled leaves on the street. The easiest way to dispose of leaves is to simply mow them into the turf.

"Trees don't take a break," says State Urban Forester Dick Rideout. "They are on the job every day and all day improving the environment and quality of life."

Strategic tree planting can be incorporated into state implementation plans to help meet air quality standards set by the Environmental Protection Agency. Due to new ozone standards, many urban sites are designated as non-attainment areas for ozone clean air standards and are required to reach



"We make an immense mistake when we think of trees as solely aesthetic members of a community. They cut pollution, they cool the air, they prevent erosion, they muffle sound, and they produce oxygen. Then, after all that, they look good." — Dr. Richard Leakey

attainment typically by 2007-2010.

Trees attract wildlife to the area. Certain trees provide food, shelter and resting areas to migrating and wintering birds. Urban forests are especially important stopovers for migratory birds such as Tennessee warblers and red-eyed vireos, says Owen Boyle, DNR ecologist in the Bureau of Endangered Resources. Tree height is likely the first characteristic that migrants use to choose stopover sites. Insects in the urban forest canopy are a primary food

plan to help meet environmental and quality-of-life goals, including federal and local clean air and water standards.

Once a specific goal is determined, the local government can pursue that goal using policies, procedures and budget.

Social benefits

So, when was the last time you were bird watching? Climbed a tree? Spent the night in a tree house? Jumped into a giant crunchy colorful pile of leaves?

"Trees don't take a break. They are on the job every day and all day improving the environment and quality of life." — State Urban Forester Dick Rideout

source for most long-distance migrants.

American Forests, a nonprofit conservation organization, advocates that every community set a tree canopy goal to ensure that their valuable green infrastructure is maintained at working thresholds, even as the community continues to develop. American Forests offers some general goal guidelines based on climate conditions and zone categories.

After identifying what their tree canopy cover is, a community can then set its goals to include an annual work

when a neighbor cuts down a wonderful tree. Some search longer than necessary just to find a parking spot in the shade. Others savor the lazy Sunday afternoons in the hammock under a tree.

"The simple act of planting trees provides opportunities to connect residents with nature and each other," says Dr. Greg McPherson, director of the USDA Center for Urban Forest Research. "Neighborhood tree plantings and stewardship projects stimulate investment by local citizens, business and government in the betterment of their communities."

DNR Southeast Region Urban Forestry Coordinator Kim Sebastian says, "People don't always make the connection about why they were drawn to live close to the park or why they feel comfortable in their neighborhood, but maybe it is because of the trees."

An Illinois study documented the calming effect of trees and their value

"A people without children would face a hopeless future; a country without trees is almost as hopeless; forests which are so used that they cannot renew themselves will soon vanish, and with them, all their benefits." — Theodore Roosevelt

Trees pay us back

Look at what 100 large public trees give over 40 years.

Benefits = \$379,000

Energy savings

Air quality

Runoff management

Real estate values

Cost = \$148,000

Planting and pruning

Removal and disposal

Irrigation

Sidewalk repair

Litter

Legal and administrative costs

Net benefits = \$231,000

US Forest Service 2005



Friends enjoy playtime on the shaded swings of Joannes Park in Green Bay.

NO PRICE TAG ON PRESERVATION

It's tough to put a price tag on trees treasured for what they mean to the heart. How do you put a price on a tree planted by a parent for a child? Or a tree that stood at a crossroads where Civil War soldiers marched? Preserving some trees may be as important to communities as preserving historic buildings. Here are two stories: the Forest Home Cemetery and the Dunbar Oak.

In the late 1800s the Forest Home Cemetery was considered Milwaukee's first park. Today, the South Side cemetery has over 148 types of trees with new trees planted each year to shade Milwaukee mayors and Wisconsin governors laid to rest there.

Some people visit the cemetery to see the famous "Beer Baron" corner where the Blatz, Schlitz and Pabst families have plots overlooking each other, but Paul Haubrich, president of the Forest Home Preservation Association, says many people also seek serenity under the towering trees. Of the more than 2,500 trees in the cemetery, some are more than 100 years old. The cemetery offers a self-guided tour to see trees in their early stages of development.

"I'm often telling people to save themselves some money and instead of driving north to see the trees in the fall, to come to Forest Home and see our trees," Haubrich says.

David Liska, Waukesha's city forester, says no other tree in the city is more loved than the legendary Dunbar Oak.

Suffering from diabetes, Civil War veteran Col. Richard Dunbar stopped to rest against a large white oak while traveling in Waukesha County in 1868. During that visit he drank water from a nearby spring and he came to believe the spring water had healing properties and declared himself cured. As news of Dunbar's "miracle" spread, Waukesha's tourist and resort industries flourished. Dunbar called the spring "Bethesda" which signifies mercy.

In 1991, the mighty Dunbar Oak fell during a windstorm. Several shoots were carefully cut and nurtured at a Menomonee Falls tree nursery. In May 2004, in celebration of Waukesha's 25th anniversary as a Tree City USA and Wisconsin's forestry centennial year, a clone was planted at the site where the Dunbar Oak had grown.

for stability and neighborhood crime reduction in the inner city. The study by University of Illinois researchers Frances E. Kuo and William C. Sullivan explored how well residents of the Chicago Robert Taylor Housing Project were doing in their daily lives based upon the amount of contact they had with trees.

ties and decrease the incidence of child abuse. Buildings with high levels of greenery had 52 percent fewer total crimes than apartment buildings with little or no greenery. Residents of buildings with more vegetation knew their neighbors better because they were more apt to come outside. Based on

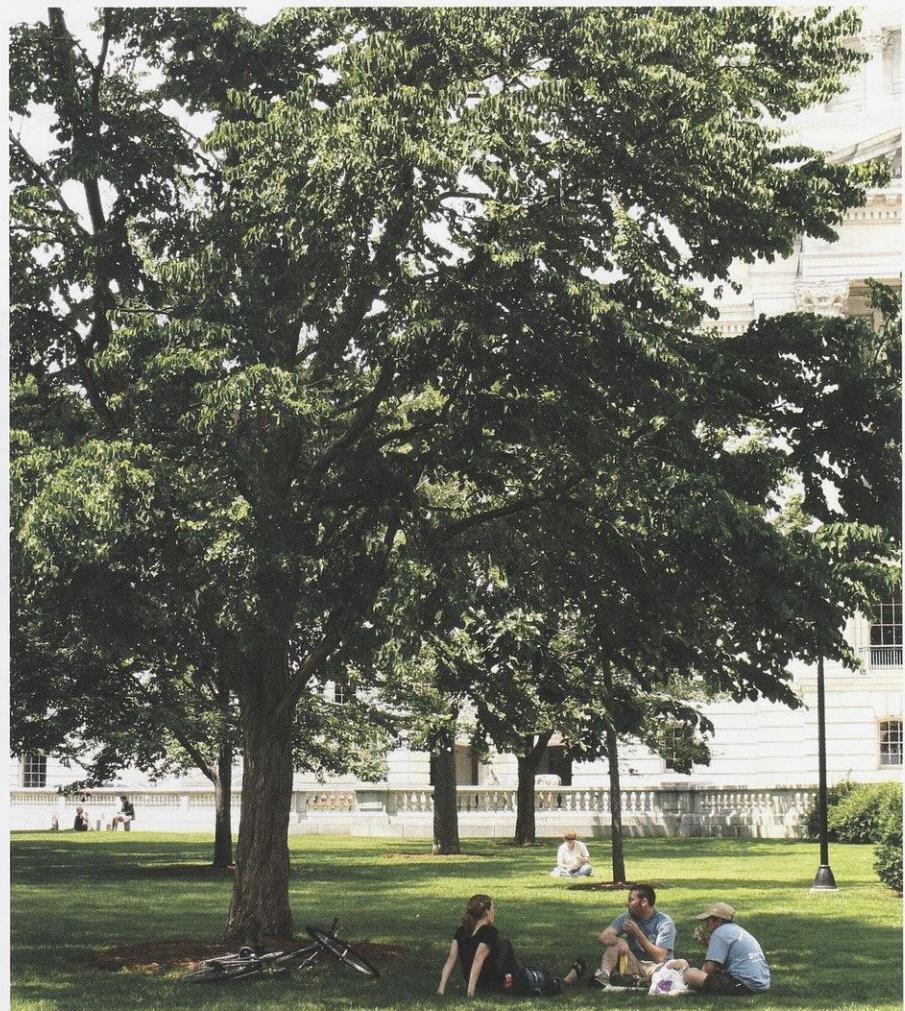
"People don't always make the connection about why they were drawn to live close to the park or why they feel comfortable in their neighborhood but maybe it is because of the trees."

—DNR Southeast Region Urban Forestry Coordinator Kim Sebastian

Kuo and Sullivan found that trees are a canopy against crime. Trees have the potential to reduce social service budgets, decrease police calls for domestic violence, strengthen urban communi-

study findings, the city of Chicago spent \$10 million to plant 20,000 trees as a means of social change.

In another study, University of Illinois researchers Andrea Faber Taylor,



JEFF ROE

Trees on the State Capitol lawn invite people to take time out of their busy lives to talk, walk and picnic.

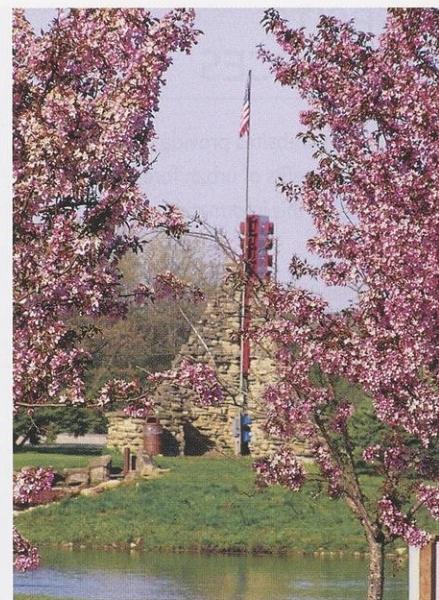
Frances Kuo and William Sullivan found that when children with attention deficit disorder played outside in a green environment they were better able to concentrate and complete simple tasks. Another study showed that girls with a view of nature at home scored higher on tests of self-discipline compared to girls with views of man-made settings.

Scientists at the USDA Forest Service in Chicago believe that people make a psychological tie to trees because trees help us reflect on life changes as we observe the changing seasons, tree growth and death.

Research also has provided evidence that the overall hospital environment has an important impact on recovery time. Roger Ulrich, Texas A&M University,

found that patients with vibrant surroundings such as flowers and an outside view, recovered three-quarters of a day faster, and needed fewer painkillers than those with dull surroundings. Patients also responded by having slower heartbeats, lower blood pressure and more relaxed brain wave patterns than people who view urban scenes without vegetation.

An article in the February/March 2005 issue of National Wildlife ("Take two hikes and call me in the morning") cites a study that found a group of breast cancer patients who spent 30 minutes watching birds or strolling in a park three times a week had increased attention span and significant gains in quality of life ratings, compared to those who did not take these actions.



SUE MOEN

Montesian Gardens and Park, Village of Monticello.

Wisconsin Champion Trees

Everybody likes a huge, old tree. The largest specimen of a particular tree species is called a "champion." There is a national registry, a state registry and even some communities who keep local registries of champion trees. The Wisconsin Champion Tree Program identifies and recognizes these large trees and is a great way to encourage appreciation of your community's urban forest. A local champion tree contest puts people in touch with the community's oldest "residents" and is always good for media coverage. You might even find a new state or national champion!

The official registry of Wisconsin's largest trees is maintained by the Department of Natural Resources. Information on the location, dimensions and rank of these champions, representing over 270 tree species and cultivars, totals over 2,200 records. The registry is available on the DNR website at dnr.wi.gov/org/land/forestry/uf/champion/. How to measure and nominate new champions and links to other useful information are there as well.



PAUL PINGREY

Richard Rideout, DNR urban forestry program coordinator, measures a walnut tree in Wyalusing State Park.

"It's about the right tree for the right place at the right time for the right person. Picking a tree is like picking a pet. You need to know its personality and how it will mesh with yours."

— Joe Wilson, executive director of Keep Greater Milwaukee

Beautiful/Greening Milwaukee

WEBSITE RESOURCES

The following websites provide research behind the benefits of urban forestry and ideas for using this information.

USDA Forest Service Center for Urban Forest Research, wcu.fre.ucdavis.edu/

USDA Forest Service Northeastern Research Station, www.fs.fed.us/ne/syracuse/

USDA Forest Service North Central Research Station, www.ncrs.fs.fed.us/4902/

Center for Urban Horticulture, College of Forest Resources at the University of Washington, www.cfr.washington.edu/research.envmind/

Human-Environment Research Laboratory of the University of Illinois at Urbana-Champaign, www.herl.uiuc.edu

Center for Watershed Protection
Urban Watershed Forestry Manual,
www.cwp.org/forestry/index.htm

USDA Forest Service Trees
Pay Us Back research results,
www.na.fs.fed.us/urban/treespayusback/

USDA Forest Service Northeastern Area
Urban & Community Forestry Program
www.na.fs.fed.us/urban/

The Local Government Environmental Assistance Network (LGEAN) with American Forests hosted a webcast in 2004 called "Seeing Green with Trees: The Economic and Environmental Benefits of Urban Forests." The webcast demonstrated how trees have been used by local government to meet environmental regulations, save money and improve the quality of life. A multimedia CD-ROM recording of the webcast is available for free. To order a copy, call (877) TO-LGEAN or e-mail to lgean@icma.org.



Quality of life

Less crime. More shopping. Healthier and happier workplaces. A clean and more comfortable environment. A place to play hide-and-seek. Trees are key.

A drive through Stevens Point (pop. 25,000) has earned the city comparisons from other convention and visitors bureaus to driving through a gigantic park.

"Every mayor talks about quality of life for his or her community," says Stevens Point Mayor Gary Wescott. "In Stevens Point, urban forestry is very important to our quality of life."

ing gypsy moth, emerald ash borer, home construction and trees, proper pruning, the city's tree ordinance, general services of the forestry department and a picture of the forestry crew for residents to recognize when they see them working with community trees.

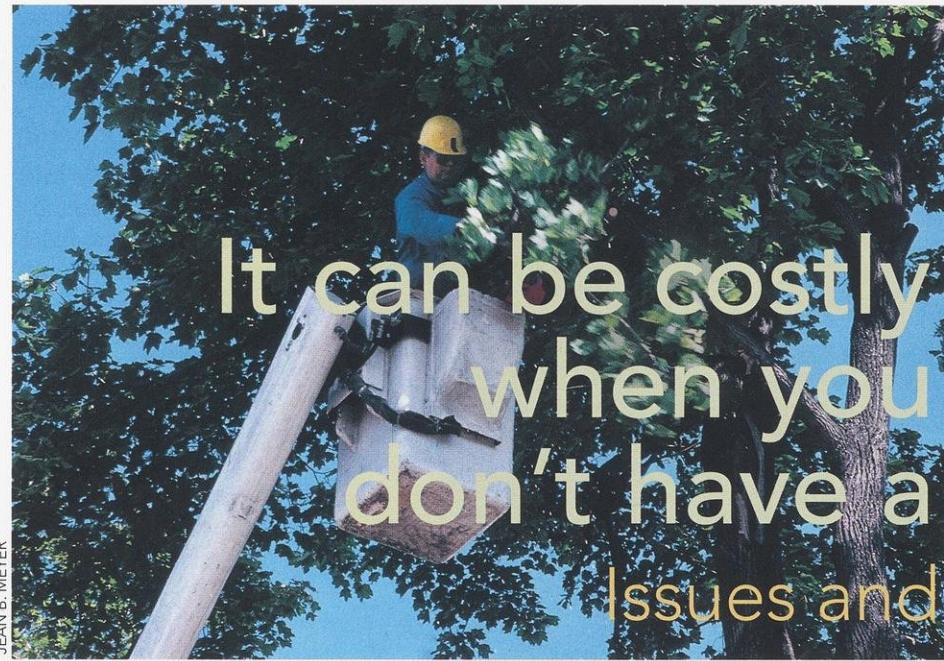
The newest addition to the website is the "Right Tree, Right Place," which gives examples of small trees appropriate for planting under overhead utility lines and explains where these plants can be viewed. This project was carried out in cooperation with UW-Stevens Point and Wisconsin Public Service.



"Every mayor talks about quality of life for his or her community. In Stevens Point, urban forestry is very important to our quality of life." — Stevens Point Mayor Gary Wescott

In fact, after the onslaught of Dutch elm disease, the community launched an urban forestry program and has built on it ever since. Stevens Point has a full-time forester, Todd Ernster, and embraces the forestry department's use of the city's website (www.StevensPoint.com/forestry) to provide information to citizens regard-

"Having UW-Stevens Point, an undergraduate natural resource college, in our community helps in the overall appreciation of the environment," Wescott says. "I don't think it takes as much convincing [here] as maybe in some communities of the benefits of trees."



JEAN B. MEYER

It can be costly when you don't have a program

Issues and challenges.

U.S. Forest Service researchers conclude that properly cared for municipal trees can be worth three times their investment. Neglected, these trees can become liabilities.

Yet, urban forestry is not a priority for many communities, and their green infrastructure is typically in disrepair as a result. Without programs or policies to protect and replenish trees, canopy declines and tree benefits are sacrificed. Life is tough on trees in people-dominated settings. The American Forests reports that the average life expectancy for an urban tree is only 32 years compared to the 150 years or more that same tree could expect to live in its native habitat.

"The issue should not be about choosing between police and trees. It should be about how to achieve both."

— Cindy Casey, DNR's West Central Region urban forestry coordinator

Tree management budgets are rarely sufficient and many municipal tree workers do not have adequate training. This training is important because it helps staff properly plant, protect and maintain trees, leading to longer tree life and greater benefits to the community.

A study of urban forestry by James Kielbaso and Vincent Cotrone of Michigan State University concluded that only 23 percent of the cities surveyed

had a city forester and cities typically devoted less than half of one percent of their budgets to tree care.

"Urban forestry is often seen as a luxury, rather than infrastructure development and maintenance," says Cindy Casey, DNR's West Central Region urban forestry coordinator. "The issue should not be about choosing between police and trees. It should be about how to achieve both."

The onslaught of Dutch elm disease in the 1930s was a wake up call to some communities to the need for a municipal tree care program. Nearly all Midwest communities were ravaged by the disease and lost many elms that arched

over the streets and yards. Milwaukee lost 128,000 elms from 1956 to 1988 due to the disease. There was little shade and fewer places to play hide-and-seek.

Even today, our urban forests continue to be threatened by the introduction of exotic insects and diseases. Asian long horned beetle, sudden oak death and the emerald ash borer are examples of newly introduced pests which lack the natural controls found in their native

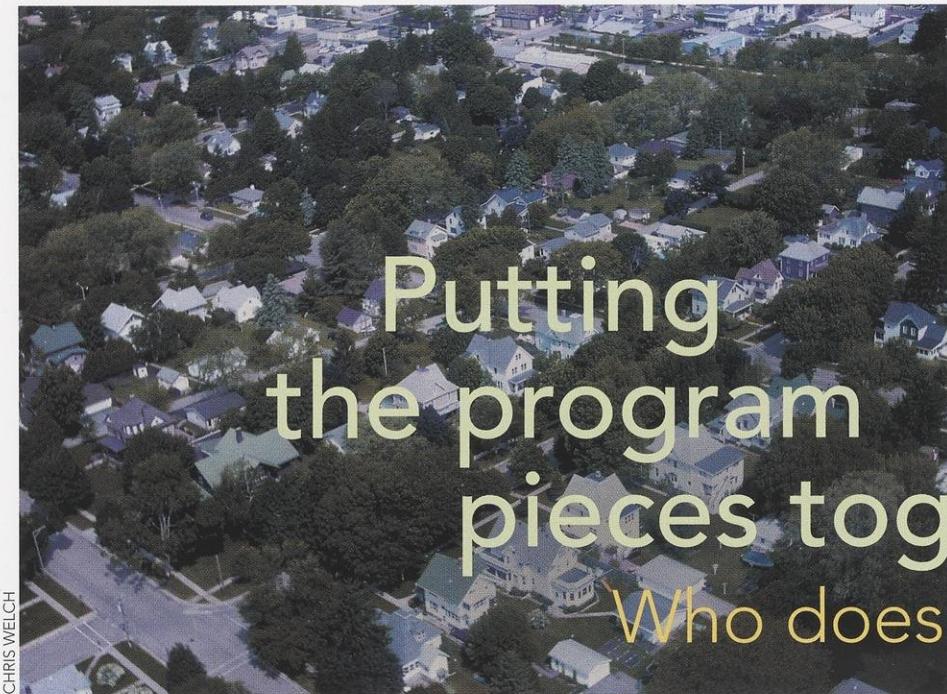
habitat, which would assist in keeping these pests in check in their new environment.

Competition for space causes the demise of many urban trees. According to the National Arbor Day Foundation, the utility industry spends \$1.5 billion a year trying to keep tree limbs and power lines apart. Road widening, construction and redevelopment projects, and similar public improvements take more trees. Many street trees are doomed to early destruction because they were poorly chosen for the amount of space available, eventually leading to sidewalk damage, obstructed views, clearance problems, poor tree health, excessive maintenance and similar concerns.

Development takes a large toll on trees, according to American Forests. An estimated 630 million trees are currently missing from metropolitan areas across the United States as the result of urban and suburban development.

Hazardous trees can kill and injure people, and damage property. When damage, injury or death occurs because of a defective tree, the law usually holds the tree's owner responsible. In a public place, responsibility shifts to tree managers. The best defense against litigation is a sound and comprehensive community forestry program.





CHRIS WELCH

Putting the program pieces together

Who does what?

An overview of the Village of Mount Horeb, a Tree City USA community, shows its commitment to trees.

So, maybe you've been sold on the benefits of an urban forest. But how do you turn that conviction into a program of ongoing tree planting, pruning, protection, removal and replacement? What does it take to pull it off? Where do you start? Who does what? Where does the funding come from? Large and small, Wisconsin communities are finding ways to plant and nurture urban forest programs from the ground up.

Some tree programs start at the grassroots level with a small group of citizens concerned about one or more tree issues. Dutch elm disease was just such an issue and citizen reaction spawned local tree programs across the country.

Menomonie's modest tree program underwent major expansion in the early 1990s over citizen concerns about preserving the city's tree canopy amid growth and development pressure. Sanctioned as an advisory board, the group was instrumental in shaping an ordinance that protects existing trees during development and requires tree and shrub planting with new commercial construction.

Menomonie (pop. 16,000) has been recognized by the National Arbor Day

Foundation as a Tree City USA since 1990, and has an ongoing tree-planting and care program to ensure that its wooded areas continue to thrive. Menomonie Mayor Dennis Kropp is a strong supporter of the city's urban forestry program. Before he retired as an elementary schoolteacher, Kropp involved his students in planting trees on the school ground and at the fairgrounds.

"Now some of those pines we planted are 25 to 30 feet tall," Kropp says. "It always brings back memories of my teaching days when I drive by those trees."

Like Menomonie, advisory tree boards in many communities raise public awareness and advocate for community trees. Tree boards can also develop and facilitate long-range, strategic program plans and spearhead various other forestry projects.

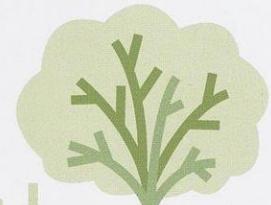
A decision to make early on, is who will have authority and responsibility for the tree program. Municipal governments generally have responsibility for managing the forest in their parks, along streets and on other public properties, so the job of forester is typically delegated to someone on staff, such as public works director, parks and recreation director, or administrator.

City forester

A city forester is the person responsible for administering tree-related programs and activities and the human and material resources to carry these out. While specific duties vary with each community, a city forester can be responsible for planning and overseeing tree planting, pruning, other tree maintenance and removals; maintaining a tree inventory; developing a tree management plan; assessing and responding to tree health conditions; providing input in community development projects; working with volunteers and urban forest education and advocacy.

The City of De Pere south of Green Bay (pop. 22,000) has a city forester, Don Melichar, who oversees maintenance and a pruning cycle for the large old trees as well as planting new trees. Melichar also monitors for and educates about invasive species as well as reviews landscaping plans with developers and architects. The city forester program came out of a step to advance the city's urban forest program in 2000.

"Before we had the city forester position, the director of parks and recreation was responsible for all city forestry issues, but the community came



to realize that more time was needed for urban forestry than that position could give," Melichar says.

Sharing staff

Not every community has staff devoted to urban forestry issues. Tracy Salisbury, DNR urban forestry coordinator in the Northeast Region, says that sometimes it isn't until a huge storm hits a community that urban forestry gets attention and cities start to work together.

Networking groups of municipal tree managers now exist in each region of Wisconsin to get communities talking about urban forest issues and even sharing funding, staffing and equipment.

"The urban forestry program took hold here because of a greater awareness of the importance of trees," says Tim Bauknecht, Ashwaubenon city forester.

That awareness came in the 1980s, as trees in the village created potentially hazardous situations with low-hanging limbs and weak, dead trees. In the early 1990s Ashwaubenon set out to correct those hazards and the village was revitalized under the guidance of a new director of parks, recreation and forestry. A tree board was created and the villages of Ashwaubenon and Howard jointly contracted for an urban forester to better manage their respective programs.

"Start small," Bauknecht says. "Share staff and equipment with other communities if you need to, like we did at first." — Tim Bauknecht, Ashwaubenon city forester

As a result of the project's success, both communities budgeted for and hired full-time urban foresters beginning in 1998. Today, Ashwaubenon not only has a full-time forester but six seasonal part-time staff to help with tree maintenance. Not bad for a community with a population of about 18,000.

Bauknecht's advice to other communities that think they can't afford an urban forest program or forester is to find innovative ways to initiate a program.

"Start small," Bauknecht says. "Share staff and equipment with other communities if you need to, like we did at first."



A tree board meeting brings concerned citizens together to advocate for community trees and develop strategic urban forestry plans.

Other options

Contracting for forestry services can be another option, particularly for communities whose forestry needs may not warrant a full-time position. Some communities have been fortunate enough to find a volunteer forester in their midst. Regardless of who wears

ed management not only enhanced the forestry program's credibility, but expanded tree awareness and program support, heightened effectiveness of the tree board and increased the skill level of the city's parks and streets workforce.

Community partnerships

Partnerships are a key way to manage community forests, particularly in communities with minimal resources. In some communities, garden groups, Master Gardeners, and neighborhood groups lead tree planting and protection efforts. Banks have become involved in forestry efforts through donations and low or no-interest project loans. The Wisconsin Environmental Education Board (WEEB) program has many grants to further the education and understanding of the environment for adults and children alike. Many businesses from local to multinational now have "green" programs or provide grants or products to local organizations to build their tree programs. Most utility companies have programs for tree replacement under power lines and tree planting for energy conservation.

Many service organizations do tree planting including Kiwanis, Rotary and 4-H. Nonprofits also provide grants and support. Two national examples are the National Arbor Day Foundation and the Main Street Program. Two Wisconsin examples are Greening Milwaukee and the Urban Open Space Foundation.

Schools can be another source of help. Mid-State Technical College has received grants to develop an education center on the college's Wisconsin Rapids campus. Two demonstration areas specific to the utility industry include low-growing trees under or near power lines and installation of a non-energized power line. A \$25,000 DNR Urban Forestry Grant, and \$5,000 grants each from Alliant Energy and Madison Gas and Electric fund the project. Over 150 trees and 50 shrubs have been planted on the Wisconsin Rapids campus with help from area high school students. The education center is used for training students, the general public and forestry professionals.

In Rosendale, the grade school is actively planting trees. A local artisan made a plaque and etched into it the names of the students involved.

"The students will take ownership of those trees until they graduate," says Olivia Witthun, DNR urban forestry assistant for the Northeast Region.

Board approval

Some communities rely on tree boards to develop and facilitate a plan for urban forest care. Residents with an interest in trees and related resources may work in cooperation with a city forester and advise the mayor, city council and other departments on matters concerning trees.

The town of Greenville (pop. 7,200), located west of Appleton, has accomplished most of its projects through the Greenville Urban Forestry Board. This talented group of people has accomplished a lot in a short time.

Steve Nagy, a founding member of the Urban Forestry Board, describes Greenville as a fast-growing community where many farm fields have been converted to lawns. Nagy says the town's urban forest program has been

successful because it has direction and a long-term plan.

Since its formation in 1999, the Greenville Urban Forestry Board published operating guidelines that outlined the board's role and established responsibilities. With help from volunteers and town staff, they have

planted over 1,000 trees. Seed-to-shade nurseries at Greenville's elementary schools educate and involve children in nurturing trees that can eventually be transplanted to the Greenville landscape.

Essential to its success is an urban forestry preservation ordinance. Greenville



Boy Scouts lend a hand at the Greenville Crabapple Tree Demonstration Project.



The street tree replacement program in downtown Black River Falls won the Wisconsin Urban Forestry Council's 2004 Project Partnership Award.

GREENVILLE URBAN FORESTRY BOARD

CINDY CASEY

adopted its ordinance in 2001 and the town board began collecting a \$300 fee on each new lot to cover street tree planting. The Urban Forestry Board worked with town staff to develop appropriate tree planting plans for new subdivisions.

Tree plantings also are being incorporated into the community's recreational trail. The Yellowstone Trail was the first coast-to-coast cross-country roadway in the United States,

extending from Plymouth Rock to Puget Sound. The original roadbed traversed the Town of Greenville. Today, the community is rallying around the historical significance of the trail and has been planting trees along it to help restore the trail to its former glory.

Tony Nowak, director of parks and forestry for the Town of Greenville, was hired in 2003. "Before I came here there was one department that did everything from water to sewers to roads. The town

of Greenville is growing rapidly and there is an increasing workload," he says.

They hired out the pruning work with assistance from a DNR urban forestry grant. Nowak says the key to securing funding is to keep projects unique and varied.

"The key to success is to have a group of citizens such as our tree board, that is passionate about what it does," Nowak says. "Their drive and determination are important."

Growing Amherst's legacy

The Village of Amherst (pop. 1,039) has had a concerted urban forestry program since 1996. Prior to that, it had a village forester who worked for a small annual salary to survey for Dutch elm disease and work with homeowners to remove diseased and hazardous trees.

The village tree board was formed out of a tree crisis. Many in the community were upset when some maples were removed to make room for storm sewer installation. LaVerne Peterson, one of those concerned, approached the village board.

"I thought it was a good time to propose that we have a tree board to oversee these situations," Peterson recalls. The village board agreed and the first tree board was formed.

budget, applied for grants and solicited bids for tree purchases and removal. Tree board members are paid a small sum for attending monthly meetings. The stipend makes members feel valued and stresses the importance of the tree board's work.

In addition to backing the program with funding, Peterson suggests involving your DNR regional urban forester early on as you form an urban forest program. Training is also key. Village Forester Mike Hinrichs attends workshops and the annual state urban forestry conference.

Much of the tree board's time is spent maintaining the village's tree nursery. After the village was awarded its first Tree City USA recognition, tree board member Mark Boll learned about the National Tree Trust's Community Tree Planting Program. The tree board asked the village board for property for a tree nursery and was given a one-acre parcel.

The initial phase of planning, site preparation, tree installation and irrigation hookup involved seven youth, seven adults and over 140 hours of work. The nursery continues to grow and houses about 900 trees today.

The tree board also received the 2001 Landscape Beautification Award from the International Society of Arboriculture (ISA). The ISA recognizes individuals, organizations and communities for outstanding Arbor Day programs or community landscape beautification projects that have significant impact upon a community or region.

Another success story has been a restoration effort on the Tomorrow

River, which winds through the village. Trees had fallen into the river, the banks were eroding and the view was cluttered with brush. The river, once a popular place to go tubing and hunt for crayfish, was nearly impassable. The DNR and the Department of Transportation granted the village permission to stabilize the bank with about 15 truckloads of rock. Community service workers helped move the rock into place. Boxelders and willows were extricated from the riverway and nuisance trees were removed from the riverbank. The two-year project involved many volunteers and was completed in February 2006.

"Having so many people in the community involved takes some of the pressure off the village employees to do all the work with limited staff resources," Hinrichs says.

Linda Sook, tree board president, says one of the greatest challenges facing the community today is growth. As contractors develop subdivisions and the business park, she says the tree board is hoping to work with them to preserve the trees and even add plantings. The board is gathering construction information to include in its ordinance.

While all of these projects point to a strong urban forestry program, Peterson considers the tree board budget as one of the most telling signs of the village's tree program success. Their first budget was \$2,000 in 1997 but has since grown to \$9,250. The village has also received six growth awards along with about \$15,000 in urban forestry grants.



AMHERST VOLUNTEER FIRE DEPARTMENT

Students from Amherst help DNR Urban Forestry Coordinator Don Kissinger plant a serviceberry tree on Arbor Day 2006.

In the last 10 years, the tree board has developed a tree ordinance, completed a management plan which they continuously update and use, worked with the Portage County Master Gardeners and other volunteers on special projects, submitted an annual

This year, Greenville's Arbor Day celebration garnered widespread media attention for wide community involvement in planting 23 varieties of crabapple trees.

"The little town of Greenville was on the local news for Arbor Day and that's pretty big," Nowak says.

People power

Individuals can play an important role in their community's urban forest, says Jeff Roe, DNR's urban forestry coordinator in South Central Region. Individuals can

help establish long-term goals for the community forest, fund programs for maintenance and care, support volunteer organizations and champion community trees.

Roe suggests that individuals can volunteer to serve on a community tree board, help with work days and plantings, write articles about urban forestry issues for their local newspapers and newsletters, volunteer with schools and neighborhood groups to increase public awareness, adopt-a-park or tree and effectively manage their own back-

yards by forming a property plan to plant trees.

If you don't know where to begin, Roe suggests contacting your city forester or parks and recreation staff. They can direct you to the right source. Or, try your county extension office or the DNR's urban forestry coordinator for your area if you don't have a forester.

"Talk to your elected officials and let them know that urban forestry is important to you," Roe says.

Though public interest in community trees is generally strong, this support doesn't automatically translate into support for an ongoing program of tree care. Forestry programs are well supported when residents more fully understand how they reap the benefits of the trees they help pay for.

For many years, La Crosse has required homeowners receiving terrace trees to attend a brief training session where they learn about caring for new trees. The sessions have built awareness and support for the forestry program, improved tree care in general, reduced planting mortality and cut back on staff time for maintenance.

Kristina Skowronski, a former DNR Southeast Region urban forestry assistant, cites Mequon as a good example of a community that supports its urban forestry program by engaging the public. The city hosts an Arbor Day fair with free trees for residents.

"Recognizing the importance of educating residents, the Mequon tree board is proactive and provides the community with information on how to care for their trees," Skowronski says.

When the city crew planted 15 Northwood maple Tribute Trees, the Superior Urban Forest Tree Board had cause to celebrate. In the four years since the program started, 33 new trees have become a part of the city landscape. Superior's Tribute Tree Program was established in 2001 as a way for citizens as well as civic and business organizations to honor individuals and recognize special occasions.

After reviewing several municipal tree donation and memorial programs, the tree board went back to its strategic plan and decided to structure the Tribute

Growing Phillips' legacy

The City of Phillips' (pop. 1,700) forestry program can be traced back to 1977 when a windstorm caused about \$12 million in damage. After the storm, the county forest administrator was joined by citizen groups, 4-H and Scout groups and others to replant about 1,000 trees.



DON KISSINGER

Phillips Tree Committee Chair Linda Windmoeller (right).

About 30 years later, Phillips' community forestry program thrives thanks to continued citizen input and the hard work of a city tree committee. For a small community, the city is lucky to have several citizen tree committee members who are degreed foresters or botanists. Among them, is tree committee chair Linda Windmoeller who has a degree in forestry administration from University of Wisconsin-Stevens Point.

In 2001, the committee led an effort to complete an inventory and management plan and then used the plan to leverage DNR grant funding. The grant helped their small staff rent an aerial lift

truck to perform the work that the management plans called for including tree removal. The community hired an arborist from a neighboring community to evaluate its trees for risk. The arborist used a rating system developed by the U.S. Forest Service and found that about a dozen trees were at high risk to community safety and needed to be removed.

"It is important for communities to get good information and data to base their decisions," Windmoeller says.

Most recently the committee took on the task of creating a stand-alone tree ordinance for the city. The committee went through several drafts and reviews with DNR Urban Forestry Coordinator Don Kissinger to complete the ordinance, which was the missing piece to become a Tree City USA community. Phillips achieved this goal in 2005.

The tree committee now stresses public education. High school students write a "Tree Tips" column for the local newspaper. Tips include avoiding insect infestation, mulching, and Arbor Day. The committee hosted a pruning class that was well attended.

"The key to getting people interested in a tree program is to find those who are civic minded and to catch them at the right time in their lives to get involved," Windmoeller says. "It's just fun to do something for which you can see the results."

Tree Program to increase tree populations on the city's boulevards.

Corporations, individuals and families are donating trees for memories that they have of being in a park. The Superior program is an excellent example of how people can get involved in city improvement. The Tribute Tree Program encourages good stewardship and provides lasting benefits for donors and the city.

Have a plan

Imagine building a house without a plan. Few would try! Building and managing a community forest are equally difficult and wasteful without a plan. With 134 trees per mile lining the streets of an average American city, a street tree inventory is the way many communities begin developing a plan for their trees.

In fact, the best management decisions are based on facts. An inventory can provide the facts. What species and sizes are present? Where and how many empty planting sites exist? Are there hazardous trees? What maintenance is



COREY GEORGE

Healthy and colorful street trees help define the character of Shorewood Hills.

Growing Appleton's legacy

Appleton's forestry program earns an "A." In fact, since the mid-1950s Appleton (pop. 72,000) has had one of the top urban forestry programs in the



OLIVIA WITTHUN

state combining citizen and staff involvement and backing its urban forestry program with the resources it needs.

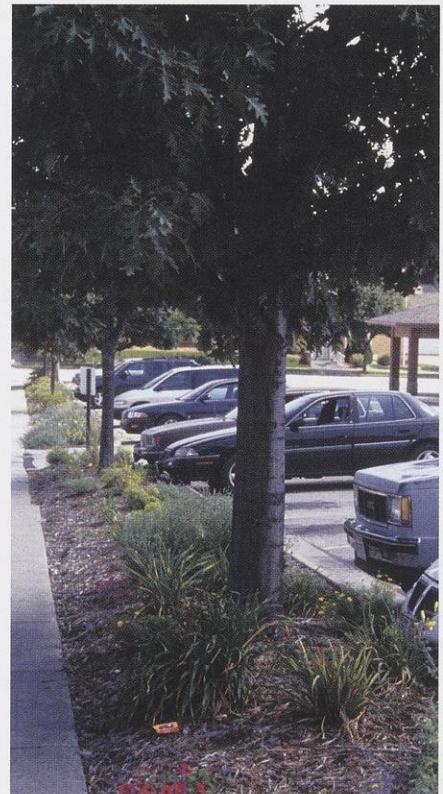
"Citizens are very involved and we have a proactive tree pruning program, street design and construction pro-

gram," says Mike Michlig, city forester. "The original design for Drew Street was to clear-cut it and the public process saved all of the trees."

Bill Lecker, city parks and recreation director, attributes much of the program's success to community involvement and a budget that supports the staff and the equipment necessary to do the job.

"When we remove and plant trees, we communicate with property owners and send them a letter," he says. "People ask to participate in the process because we are visible in the community and people understand the benefits of planting street trees."

On June 11, 2001, a strong wind storm toppled many trees. One park lost 55 large trees. The city of Green Bay pitched in to help Appleton remove the fallen trees and replant the park. The storm brought the communities together and the park has rebounded with a diversity of trees.

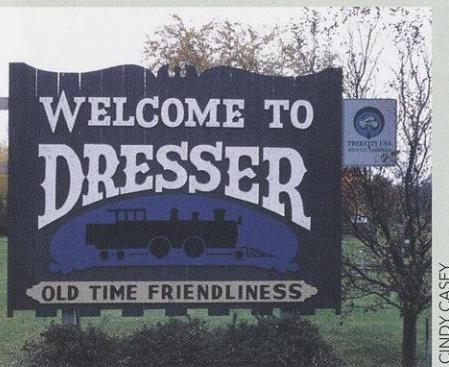


CINDY CASEY

Oak trees next to a Black River Falls parking lot shade pavement and cars, and control stormwater.

Growing Dresser's legacy

The welcome sign to the village of Dresser tells a story. Small communities can have tree programs. In fact, this village of 750 people has been a Tree City USA since 1998 and, as a very small community, is one of the greatly under-represented in the mix of Wisconsin communities with tree programs.



Urban forestry's impact and appeal extends to small communities like this where the village clerk and public works department partnered with a local utility (Northern States Power, now Xcel Energy), volunteers, and a DNR urban forestry coordinator to form a tree board, conduct a tree inventory, develop and adopt a tree ordinance and management plan, replace trees, develop a tree care brochure and annually celebrate Arbor Day. Urban forestry is now a distinguishing characteristic of this small rural village.

Dan Nord, of the village's public works department, says that because it is so small, the village relies on residents to help. Residents are trained in proper tree maintenance and the village hosts spring and fall clean ups. Brush is regularly chipped on site and made available for free as mulch at the public works building.

"We received a grant from the DNR and from Xcel Energy to remove high trees out of the power lines and then replant low-growth trees," Nord says. Residents helped choose trees to replant on their property.

needed? Are there heritage trees that should be given special care? What's best for the community?

Based on a detailed tree inventory, a management plan identifies and prioritizes site-specific tree planting, maintenance and removal activities within a multi-year timeframe.

A good tree management plan can make the difference between cost-effective, proactive management and costly crisis management. Plans establish focus and direction. They provide the framework for program implementation and a basis for consistent decision making. They are tools for determining budgets and other support needs.

Merrill made tough choices

After a tree inventory and management plan were completed and later presented to the Merrill (pop. 10,146) City Council in 1999, the council members were flabbergasted and dismayed to learn

that a significant number of their boulevard trees presented high risks.

Some council members went as far as touring the designated boulevards only to agree that there were some serious problems that needed to be addressed.

"This case is similar to other historic communities," says current City Parks and Recreation Director and City Forester Dan Wendorf. "The trees were older and becoming hazards. People asked who should do something because Merrill didn't have an urban forest program and only had a parks and recreation program."

The city council, public works, and parks and recreation department got together and sought funding to start with a tree inventory and management plan. The parks and recreation department applied for a DNR Urban Forestry Grant to pay for a street tree inventory. Wendorf says they first needed to

Growing Algoma's legacy

The City of Algoma (pop. 3,357), located east of Green Bay, is a great example of how a community can go from little interest in urban forestry to one of the most successful programs in the region. This is due to a dedicated group of people including public works superintendent Gary Paape.

Paape joined Algoma's staff in 1998 and noticed that there was a lot of tree topping and many trees that needed maintenance were not getting attention. Paape went to the public works department and asked the community to tackle the problem.

The city organized the Algoma Tree Committee, applied for a DNR urban forestry grant in 2001 and hired a consultant to conduct a tree inventory and develop a management plan. They have built on that plan and gone on to accomplish much over the past five years including implementing a memorial tree program, offering educational programs for residents and city employees, producing a tree

maintenance video that was shown on cable television, planting trees and setting up a pruning and removal cycle with their municipal utility company.

Algoma's Tree Line program is an initiative to replace large trees under power lines with smaller, more suitable species. Tree maintenance under power lines can be time consuming and costly. Paape used dollar figures to show that maintaining large trees over time was more expensive than removing them and replacing them with smaller species. He estimates that the cost savings in labor and equipment through the Tree Line program could be as much as \$400 per tree. He says the best way to sell a community on a tree program is to show its value.

"When you have a tree program you are not just paying a tax bill, you are getting something of value in return that you can actually see makes a difference," Paape says. "Each community is different, but I can now go through a community and tell you from looking around which one has a tree program and which one doesn't."

identify how many trees the city has, tree health, pruning and removal needs, and diversity.

Wendorf worked with a consultant to catalogue the tree species and over

Along with the management plan and street tree inventory, Merrill now has a set of urban forestry ordinances that empowers the city forester.

"The goal of the street tree inventory

"You are never too small to have a management plan."

— Merrill City Parks and Recreation Director and City Forester Dan Wendorf

several months they mapped out what the city had. When they found that Merrill had 40 percent maple on its boulevards they realized the need to diversify. They also found out that of 6,000 trees, about 580 needed to be removed, including 300 that were immediately removed because they posed high risk to public safety. They also found that there were about 800 sites that could potentially be planted. By working with local media and distributing neon-green door hangers to homes they were able to keep the community informed.

is to get to the point where we can plant more trees than we remove," Wendorf says. "The key is to use the resources that we have: volunteers, DNR grant funding and work with other organizations."

"You are never too small to have a management plan," he says.

Tree ordinance

Why have tree ordinances? Tree ordinances are tools to help communities achieve goals. Matters pertaining to tree damage, health and safety, and general welfare are often best codified

in an ordinance. Tree ordinances are not new. The first is believed to have been enacted in 1807 when a Detroit ordinance specified tree planting along the city's streets.

Tree ordinances provide authorization and standards for management activities.

The effectiveness of a tree ordinance is influenced by many factors. The key is to write an ordinance simply, clearly and tailored to the community's needs. An ordinance that works well in one community may be unworkable in another. Do the residents support or oppose various ordinance provisions, or are they even aware of them? Is there sufficient capacity to enforce the ordinance? Does the ordinance account for environmental limitations that affect tree health, growth and survival? Does the local government have the financial resources to fulfill ordinance requirements? Since the answers to these



USDA FOREST SERVICE

Defective trees can cause personal injury and property damage. Identifying high-risk trees and taking proper corrective actions can protect property and save lives.

DNR'S URBAN FORESTRY ASSISTANCE PROGRAM

Many Wisconsin communities cite the DNR's urban forestry program for assisting their community officials, green industry professionals, businesses, schools, nonprofits and the public in working together to expand, improve and manage the urban forest.

This assistance takes four forms:

Technical — help communities develop management plans, inventories, ordinances, plant health care and training plans.

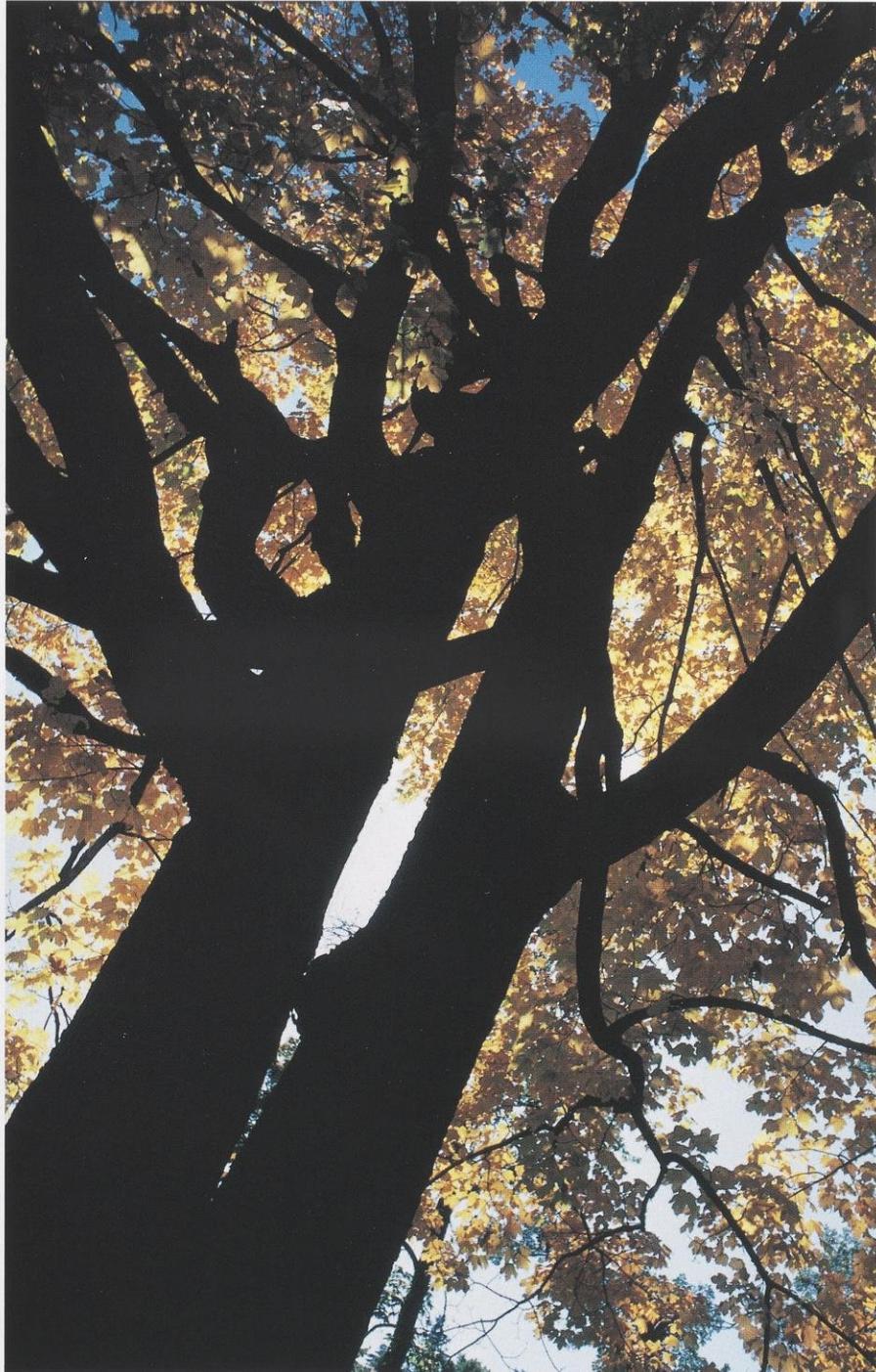
Education and training — develop and coordinate programs and materials for forestry professionals, elected officials, planners, developers, school children and volunteers.

Funding — administer state and federal cost-sharing grants and suggest alternate sources of funding, staff and support for community programs.

Public awareness — develop awareness and support for the value of urban forests and their need for management through the media, recognition programs, celebrations and events.

The program is advised by the Wisconsin Urban Forestry Council, a 23-member committee of citizens and professionals that represents everyone from community officials to businesses and neighborhood activists. The Council also presents awards to communities, groups and individuals for exceptional urban forestry efforts and advocates for the urban forest and urban forestry.

For more information on the program visit dnr.wi.gov/org/land/forestry/UF/



DON BLEGEN

questions will vary from place to place, even very similar ordinances can have quite different outcomes in different communities. Visit www.isa-arbor.com/publications/ordinance.aspx

If money grows on trees mine are in recession

Tree care costs money but it's an investment that pays back over time. Community trees are a local responsi-

bility, but federal and state assistance is available to help plant trees and establish community forestry programs.

American Forests suggests that 20 percent of an urban forestry budget should be directed at planting and early care. A program of pruning young trees is a wise long-term investment. It is estimated that municipalities with forestry programs spend between \$8 and \$11 per tree each year. However,

the total value of the nation's street trees is estimated at \$30 billion. Communities must find ways to balance income with the cost of tree care.

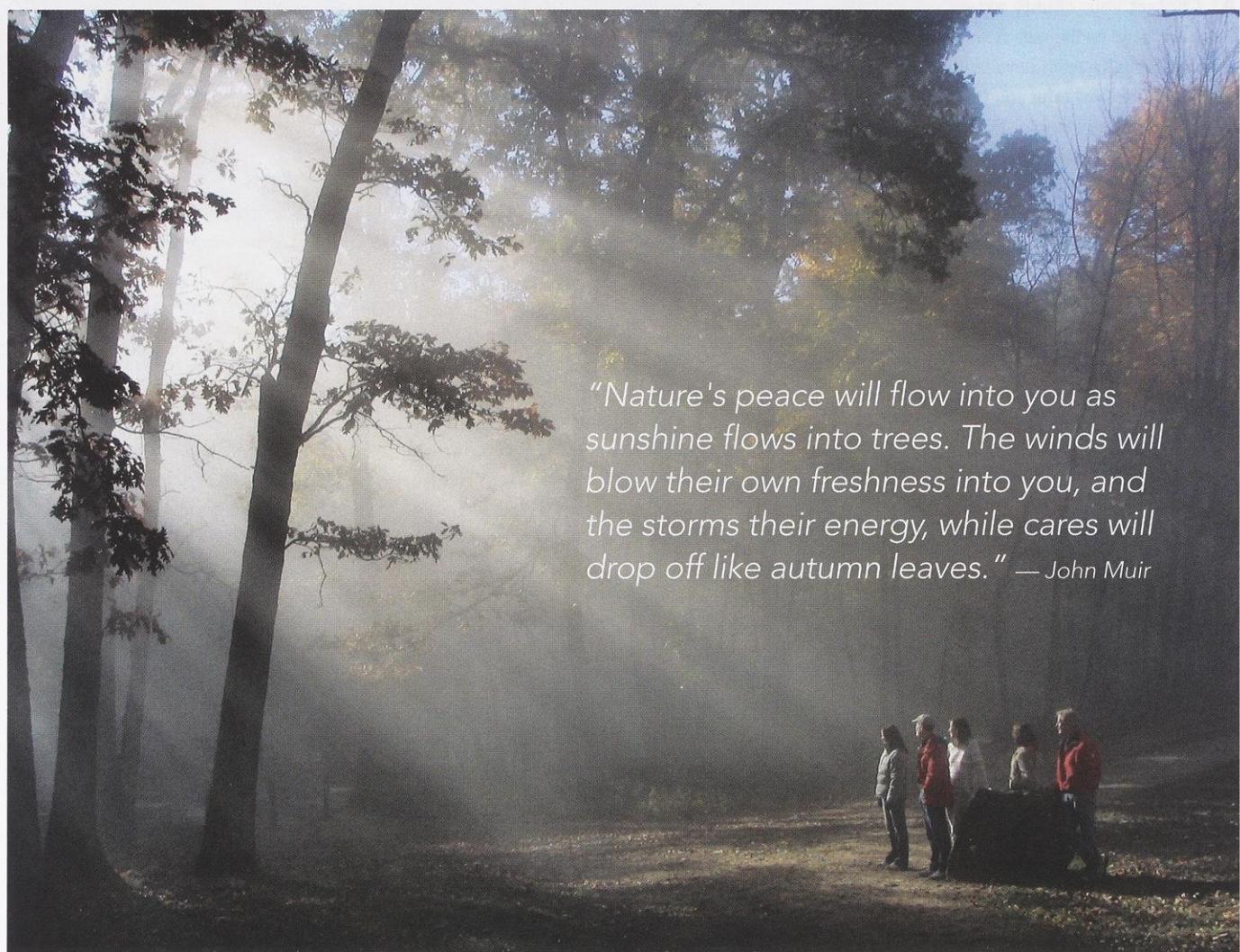
From local donations to state and federal grants, money is available to fund community forestry. Federal Emergency Management Agency (FEMA) helps victims of natural disasters. The key to collecting from FEMA to replace lost trees, is to prove that your community regularly maintained its trees and replaced them under normal circumstances.

State government can help. The obvious candidate here is the DNR with its urban forestry grants but the departments of Transportation and Corrections (inmates or those sentenced to community service), and local fire and police departments are sources of labor or grants. Check with your county extension office for additional grants and volunteer sources.



DNR FILE PHOTO

The DNR Urban Forestry Grant Program helps communities plant trees that will pay back over time.



PAUL HINGRAY

"Nature's peace will flow into you as sunshine flows into trees. The winds will blow their own freshness into you, and the storms their energy, while cares will drop off like autumn leaves." — John Muir

WHO TO CALL?

Q: My community doesn't have a tree program. How can I help start one?

A: Contact your DNR regional urban forestry coordinator. Visit dnr.wi.gov/org/land/forestry/uf/.

Q: I'm responsible for the trees in my community. Where can I go to get technical training?

A: There are a variety of training, education and networking opportunities available in Wisconsin, as well as private consultants that provide customized instruction. Contact your DNR regional urban forestry coordinator to find out more. Visit dnr.wi.gov/org/land/forestry/uf/.

Q: There is something wrong with my tree. Who should I call?

A: Contact your county extension office. These are listed on the web at www.uwex.edu/ces/cty/. Some counties have horticulturists on staff and others will refer you to the University of Wisconsin Insect Diagnostic lab, www.entomology.wisc.edu/entodiag.html or the University of Wisconsin Plant Disease Diagnostics Clinic, www.plantpath.wisc.edu/pddc/. A list of certified arborists in Wisconsin also is found at www.waa-isa.org/arborists/search.asp. Local nurseries, garden centers and botanical gardens may be able to help.

Q: What do I do about trees in power lines?

A: Contact your local utility company. You can find their name and address on your monthly utility bill. You may also contact your community forestry, parks or public works department.

Q: What other resources are there?

A: There are numerous websites that provide information or links to other sites. Check out:

TreeLink, www.treelink.org; International Society of Arboriculture, www.treesaregood.com; National Arbor Day Foundation, www.arborday.org. Others can be found at the DNR urban forestry resources web page at <http://dnr.wi.gov/org/land/forestry/UF/resources/>

Local funding might come from taxes, local tree trusts, municipal utility bill donations, memorials and cost-sharing. Consider including tree planting as part of infrastructure improvement projects such as street and road improvement. In some areas, money from recycling programs is used to purchase trees.

Appleton has become creative when it comes to funding. For Arbor Day, it hosted a tree planting at the local sports complex. A \$5 surcharge per player was put on the Babe Ruth teams and they were able to raise enough

money to plant 20 trees.

Greening Milwaukee is a nonprofit that shows people how easy it can be to plant trees and shares information on the positive effect of trees in the urban environment. Greening Milwaukee has received innovative funding that includes an Adopt-A-Tree Initiative, Mayor's Landscape Awards, Tree Gift Program, Greening Milwaukee Schools program and volunteer opportunities. Greening Milwaukee also hosts an informative website at www.greeningmilwaukee.org.



Students from New Glarus High School helped the city become a Tree City USA.

Tree City USA

Since 1976, Tree City USA has been a catalyst for community tree care and a powerful force for promoting urban forestry. This program, sponsored by the National Arbor Day Foundation and administered in Wisconsin by the DNR, provides communities with a tangible goal and national recognition for their community forestry efforts. Today, over 3,000 communities fly Tree City USA flags over areas that house over 93 million Americans. Wisconsin has over 160 Tree City USAs, ranking it third in the nation!

At the heart of the Tree City USA program are four basic requirements. The community must have: a tree board or department, an annual community forestry program backed by an expenditure of at least \$2 per capita for trees and tree care, an annual

Arbor Day proclamation and observance, and a tree care ordinance. In addition, communities that have achieved Tree City USA certification can strive for a growth award that recognizes effort over and above the four standards. Typically around 25 Wisconsin communities achieve this commendation each year.

On May 10, 1990, Waukesha experienced a late-season snow storm that damaged 60 percent of the city street trees. The city's finance committee used emergency funds to restore and repair the trees. City Forester David Liska says that the fact that Waukesha is a Tree City USA was a tremendous influence in securing the support for the necessary repairs and the continuation of Waukesha's urban forestry programs.



JEFF ROE

Bruce Slagoski, terrace operations supervisor for the City of Beloit, celebrates Arbor Day 2006 with the planting of a star magnolia dedicated to Slidell, Louisiana.

On August 29, 2005, Hurricane Katrina ripped through the Gulf States. The National Weather Service reported that Slidell, Louisiana, located on the north shore of Lake Pontchartrain, sustained winds of more than 176 mph and gusts of over 190 mph, and was hit by a 23- to 26-foot storm surge. The deadly storm damaged over 90 percent of the community and left 40 percent of its citizens homeless.

Though it was dubbed "The Forgotten City" because it had been hit by the eye of the storm but received less press coverage than the flashier New Orleans, Slidell has not been forgotten in Wisconsin and has received support from the city of Beloit to bring back part of what Hurricane Katrina swept away.

In fact, this year, citizens of Beloit (pop. 35,000, which is similar to the size of Slidell) raised about \$2,500 and

donated it on Arbor Day 2006 for tree plantings in John Slidell Park in Slidell. Like Beloit, Slidell valued its urban forest in the pre-hurricane days, for the sense of beauty it gave the community. As people in Beloit discussed the

woman Tammy Baldwin visited Beloit as it celebrated its 18th year as a Tree City USA by planting a star magnolia dedicated to Slidell.

"Beloit reached out to help Slidell and people here have said that if they

"None of us can really imagine going through what the people of Slidell did. We can't imagine a Beloit without its trees." — Bruce Slagoski

project, some came to learn that they had relatives in Slidell.

Bruce Slagoski, terrace operations supervisor for the City of Beloit is proud of how the community has come together to support plantings for trees most of them will never see. One couple, he recalls, donated \$200 toward the project to mark their wedding anniversary. On Arbor Day, Congress-

needed help someday – if a storm devastated their community – they hoped some other community would do the same for them and help them replant their trees," Slagoski says. "None of us can really imagine going through what the people of Slidell did. We can't imagine a Beloit without its trees."

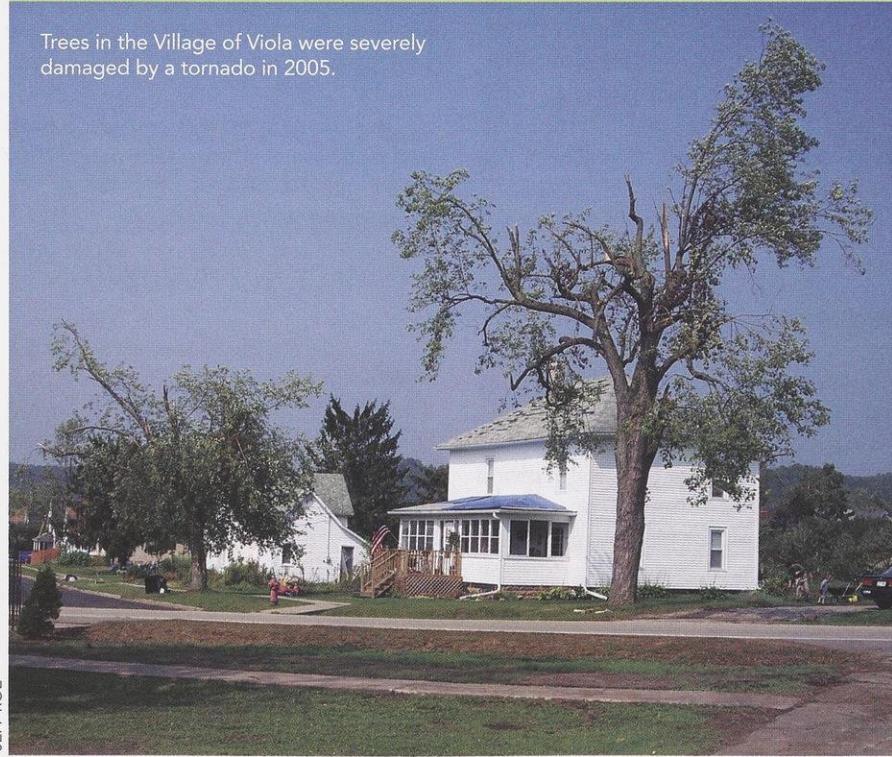
Viola

On August 18, 2005, a strong storm roared through Viola. The storm eventually spawned a tornado that devastated the small village, destroying nine homes, one business, and damaging more than 100 other buildings. Additionally, about 1,000 of the community's trees were damaged or destroyed. Total damage was estimated at \$2.4 million.

Immediately, volunteers began to arrive to assist with the cleanup effort and the replanting of Viola began. The group that formed to put Viola's urban forest back together was named "Trees for Viola."

Because FEMA funding was overextended due to multiple disasters, the Wisconsin Department of Commerce contributed a \$600,000 reconstruction grant and another \$821,000 came from a block grant. Trees for Viola raised over \$29,000 for replanting and other restoration projects and an additional nonprofit organization, the Vernon-Richland Recovery Project, raised over \$85,000 in private donations.

Trees in the Village of Viola were severely damaged by a tornado in 2005.



JEFF ROE

On the weekend of April 29, 2006, about 390 volunteers from over 30 volunteer organizations chipped in to help restore Viola's tree-lined streets and yards. About 300 trees were planted that weekend and a celebration dance was held at Viola's community building.

"The elderly of Viola feel the loss of their tree canopy more deeply than the newer residents," says Harley McMillen, director of the Vernon-Richland Recovery Project Inc. and treasurer of Trees for Viola. They lived under the canopy of trees that was destroyed so quickly, and although they are happy that we are now planting new trees, they are saddened that they will not live long enough to see these new trees grow into the beautiful canopy that they treasured so much as residents of Viola."

Trees for Viola plans to build on the replanting efforts over the next two years with the goal of planting its 1,000th tree in April 2008.

— This story excerpted from articles by Dan Simmons that appeared in the La Crosse Tribune.

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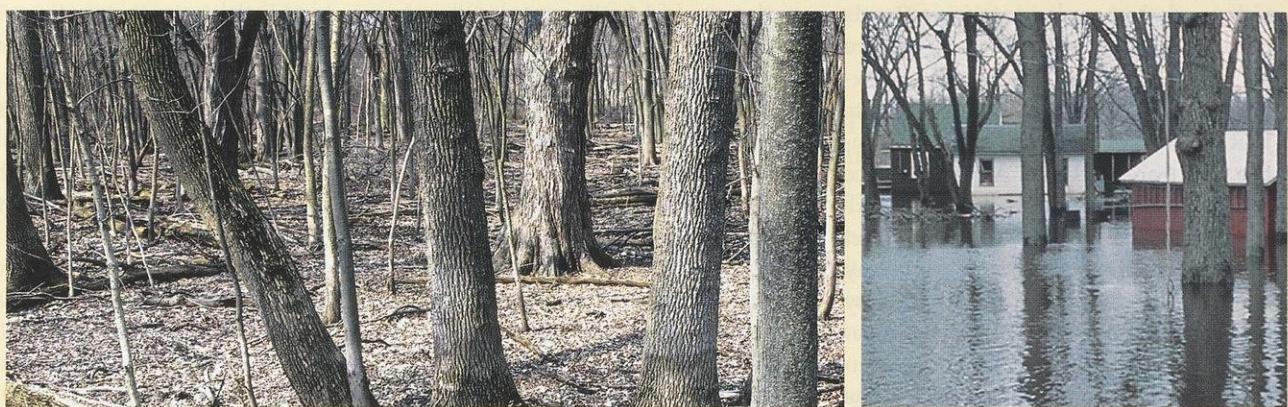
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Wetter – or not?

Determining if a property is a wetland isn't always a cut-and-dried affair. Sometimes you have to get your feet wet to find the answer.



DNR PHOTOS

Patricia A. Trochell

Dappled sunlight filtered through the maple leaves. The new landowners walked their forested parcel in the August heat, grateful for the maples' cool shade. The property, near the city of Sheboygan, seemed isolated and natural; it looked like an ideal place to build a home. But when the couple returned the following April, they were shocked to find the excavation for their basement filled to the top with water! The beautiful maple trees were silver maples — a tree species common to floodplains. Every spring the lot was under water. The couple had bought a wetland.

Do your homework before buying land or developing parcels. Maps, soil reports, vegetation types, professional inspections and conversations with neighbors can all provide clues if the land contains wetland. ABOVE LEFT: A floodplain/woodland wetland looks like a dry parcel, but it is near a river and subject to periodic flooding. BACKGROUND: Prairie wetlands also contain distinct mixes of plants that only grow in wet soils. Clusters of those plants are signs that the soil is not suitable as a building site.



PATRICIA A. TROCHIELL

Another wetland type that can be hard to recognize is a wet meadow. It often has saturated soils rather than standing water. Sedges, grasses and reeds dominate here, but look also for blue flag iris, marsh milkweed, mint and several species of goldenrod or aster.

Even though maps and many other aids can help people identify wetlands before subdivisions are plotted, lots are purchased, or existing homes are expanded, many people discover too late that portions of their property or the entire parcel are wetlands. Advance notice would help, because homeowners never win when they fight nature. Wet parcels need more engineering and may need to be drained continually to stay dry. Building on wetlands is costly, requires special permits, and often, zoning variances. On the other hand, some people intentionally buy wetlands because they want to preserve the natural values and enjoy the diverse wildlife wetlands attract.

Wetlands used to be considered wastelands, good only to drain for agriculture or to fill in for development. Over time, we've learned that wetlands are important for many reasons — valuable as habitat for dragonflies and great blue herons, ducks and geese, muskrats and mink. Wetlands are nurseries where northern pike, frogs and salamanders spawn. Forty-three percent of all endangered and threatened species rely on wetlands for part of their life cycles. Wetlands soak up storm and flood water, protecting homes and businesses from flooding and slowly releasing water once storms subside. Plants in shoreland wetlands hold the soil and protect lakefront shorelines from waves and erosion; the vegetation also filters

the water, providing time for harmful sediments and fertilizers to settle out or be taken up to keep downstream waters more pristine. Wetlands can be areas where groundwater is recharged or discharged, helping maintain summer stream flow.

As we've lost almost half of our state's original 10 million acres of wetlands, we've discovered we can't live without them. Wetlands are places to hunt, fish, harvest wild rice and cranberries, watch sandhill cranes and wood ducks, hear chorus frogs singing and enjoy the solitude of nature. The wetlands that remain are all the more precious for their scarcity.

As more wetlands were developed, laws were adopted to protect them. Wetlands may be regulated at the local, state and federal level. Laws generally require an individual to avoid harming wetlands, but if impacts are unavoidable, permits in some cases grant development rights.

When you buy property or decide to build a home or driveway, it's important to know whether wetlands are present. There are many sources of information to help you locate and pinpoint wetlands on your property or on parcels you are considering purchasing.

How liquid is your land?

What defines a wetland? It is an area where water is at, near or above the

land surface long enough to be capable of supporting aquatic or hydrophytic (water-loving) vegetation. It must also have soils indicative of wet conditions. In layman's terms, this means the land has water, wet soils and plants adapted to water. Examples of wetland types include cedar swamps, sedge meadows, shallow marshes, bogs and fens. As we'll see, other types of wetlands are less obvious and harder to identify.

Begin your wetland investigation by consulting maps and soil data. The Wisconsin Wetland Inventory has mapped wetlands across the entire state. You can find these maps at DNR service centers and county zoning offices, or you can order a copy through the DNR website (see box at end of story). The website also offers access to digital maps for your area, and the site's "Wetland Delineation" page describes how wetland boundaries are located and determined.

The Natural Resources Conservation Service maintains maps that identify wetlands in farmed areas at the NRCS service centers and in each county office.

Another good source of information is the County Soil Survey, available at your local zoning office or the NRCS office. You can find soil maps and read the description for each soil type on your property on these survey maps. Poorly drained soils are likely wetland soils.

Don't overlook good sources of information in your immediate neighborhood and community. Ask locals about your property's history. Former landowners, neighbors and county zoning officials may have knowledge about how the land was used, whether it was ever drained, and whether it is subject to flooding.

Maps and people will provide good information, but they are not foolproof. The only way to know for sure where wetlands are located is to look for clues on the property itself.

Walk your land, then consider a professional inspection

Walking your land at different times of the year is a great way to get a sense of



DNR PHOTO

Scrub/shrub wetlands are thickets of woody shrubs and small trees such as tag alder, bog birch, willow and red osier dogwood.

whether certain portions are wetlands. The best time to look for wetlands is in early spring.

Some clues will be obvious. If you see springs, standing water that remains ponded throughout the year, or if you have a healthy stand of cattails, you probably have a wetland. Usually the signs aren't so obvious. Land that is farmed or was formerly farmed often has drainage ditches or tile lines signaling the land was too wet to farm in its natural condition. Make sure to cruise your entire parcel in each season.

You can also dig a hole in the ground and watch to see if it fills with water. Keep in mind that local weather conditions, such as droughts or recent heavy rains, can affect this test. The hole will serve another purpose — to check the soil. If you've already looked at the county soil survey, you should have an idea of what types of soil are on your property. If the soil is very dark and relatively lightweight, it may be an organic soil, typical of wetlands. Mineral wetland soils also have distinctive characteristics, such as dull, grayish colors with bright colored mottles. You should see these soil characteristics close to the surface of the land, indicating a high water table.

The plants growing on your land will also give you clues. Most people recognize cattails and bulrushes as wetland plants, but many species of grasses, sedges, shrubs, trees and flowering

plants grow almost exclusively in wetlands. Spend a little time reviewing the wetlands pages of the DNR website so you can recognize the range of trees, shrubs, grasses and wildflowers that typify some common wetlands. While we wouldn't expect to find a bur oak growing in a wetland, a swamp white oak is a species adapted to flooded conditions. A summer field ablaze with asters and goldenrods will not appear to be a wetland, especially considering that water rarely stands on the surface of the land, but it is likely to be a type of wetland known as a wet meadow.

In a wetland, water saturates plant root zones most years in the spring. Common plants of shrubby wetlands include red-osier dogwood, willows or tag alder. Forested wetland types can be quite diverse with balsam fir, white cedar, black spruce and black ash in northern regions of the state, or silver maple, black willow, eastern cottonwood and green ash in southern regions.

Being able to distinguish among 150 or so species of sedges is a skill best left to trained wetland scientists. Professionally trained wetland consultants can determine the boundaries of wetland areas. In the Yellow Pages or on the Internet, look for the headings "environmental consultants" or "ecological services." To get a sense of whether the consultant is skilled and experienced in delineating wetlands, ask some questions: Are the firm's employees certified professional wetland scientists? Have they completed DNR's 40-hour wetland course? How many years of experience does the firm have delineating wetlands? Costs for wetlands evaluations will vary depending on property size, but you can anticipate a thorough analysis might cost about \$1,500 and up, depending on the size of the property. The results may need to be verified by DNR, local or federal representatives.

What to do with wetlands

If you suspect wetlands are present on your property, what do you do then? It all depends on what you want to do with your land. If you wish to build a house, road or other development that may affect wetlands, contact your local

DNR water management specialist. Prepare ahead of time by compiling any information you have — maps, aerial photographs, site characteristics (soils, water conditions and plants), historical information and a rough plan of what you wish to do.

If your project will affect a wetland, you likely will need permits from the Department of Natural Resources. The average time for DNR review of a complete application is under 50 days and costs \$300 for a standard review or \$2,000 for expedited service. You may also need to apply for local and federal permits. Contact your local government office and the U.S. Army Corps of Engineers. Remember, there are laws in place to protect these valued parcels; it's unlikely you will win approval to develop wetland areas unless there are no practicable alternatives to your project and the effect to the wetland is minor.

Three who go with the wetlands flow

The young couple who bought the Sheboygan lot eventually did get relief, but it came as a very expensive flood control project. Fortunately, this scenario need not occur again. There are plenty of resources available to help people learn where wetlands are located and to take appropriate action to protect those areas. The three people you'll meet below have each in their own way made protecting wetlands a priority.

Diane Schauer lives in Brillion and owns a 4.2-acre marsh surrounded on three sides by houses and the fourth side by a farm. She had always been interested in native plants and habitats and was thrilled to have her own little wetland. In the five years she has lived here, Diane has seen many species of birds, including sandhill cranes which have nested for two years and produced three young in that time. A pair of Canada geese nests in her wetland, and it serves as a refuge to a dozen or more wood ducks every fall. Diane has learned frog songs and can now identify six different species singing on summer nights.

"This is such a glorious little marsh with so much life," she says. The previ-



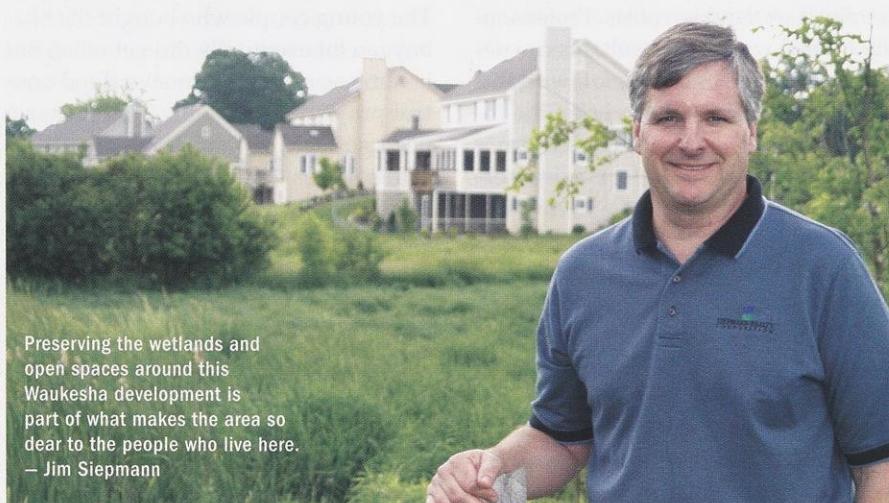
This is the place in Nekoosa to visit if you want a quiet natural getaway. — Tim Radtke

PATRICIA A. TROCHLELL



The wetland Diane Schauer preserves in Brillion draws in sandhill cranes, geese, ducks and a chorus of frogs.

DIANE SCHAUER



Preserving the wetlands and open spaces around this Waukesha development is part of what makes the area so dear to the people who live here.

— Jim Siepmann

JOHN SIEPMANN

ous landowner had wanted to dredge the wetland, which would have destroyed the natural habitat. Diane regularly communicates with Mike Hanaway, a water regulations and zoning specialist in DNR's Northeast Region, to remind him of the wetland he helped preserve.

Tim Radtke, a Nekoosa alderman, helped convince the city council there was a better use for a seven-acre wetland in the middle of town slated to become a fast-food restaurant with a road

passing through it. Radtke felt the wetland could be maintained as a natural place people would want to visit, and helped shift community thinking toward that end.

On Arbor Day, Radtke, teachers and other city residents joined high school students who enthusiastically worked to plant trees, remove trash and invasive plants around the wetland, and install signs. Officially dedicated as the Grassy Waters Preserve, the wetland teeming with birdsong and wildlife

now supports a variety of native plants and animals and is seen as an oasis in the city. "It's the place in town you'll want to visit if you want a quiet, natural getaway," Radtke says.

Real estate developer Jim Siepmann deals with wetlands all the time. His grandfather started the family business Siepmann now runs with his sister and brother. His dad employed conservation practices in his subdivisions in the 1960s, decades before the concept was known as "conservation design." Jim looks at the land first — the wetlands, woods, steep slopes and environmental corridors — and then decides where the buildings will go. Large areas of wetlands and other open space are preserved. Siepmann Realty's The Preserve at Hunters Lake, a development located in the Town of Ottawa in Waukesha County, has 65 acres of wetland on the property.

"Most developers would have tried to run lots through the wetlands to Hunters Lake for access," Siepmann says. "We limited the access with a narrow boardwalk and a small pier, but people really love it." Preserving the wetlands and open space areas is part of what makes these areas so dear to the people who live there. The next phase is encouraging residents to take care of the land. Deed restrictions require landowners to take an active role in maintaining the quality of the open space. The residents have ownership in their special areas and help preserve the quality of the wetlands and maintain them for the future. "That's what it's all about, isn't it?" says Siepmann.

Wetland Ecologist Patricia A. Trochlell develops wetland policies, training and restoration for DNR's Watershed Management Bureau.

Wetland resources online

DNR website: dnr.wi.gov (click "Natural Resources," then "Wetlands")

Locating wetlands: dnr.wi.gov/org/water/fhp/wetlands/locating.shtml

Information about wetland permits and a list of local DNR wetland contacts: dnr.wi.gov/org/water/fhp/waterway/wetlands.shtml

Curious creatures on the Big River

Ruth Nissen

Sponges, shrimp and meat-eating plants dwell in the Mississippi.

Here, the habitat varies from quiet backwaters with lush vegetation to busy channels with constantly rushing currents. Natural conditions mix with manmade changes that created locks and dams dividing the Upper Mississippi River into a series of navigation pools. River reaches just below the dams are tangles of sloughs and side channels bordered by wooded islands, while the sections just above the dams tend to be wide-open shallow lakes. ■ This rich mix makes the Mississippi home to an incredible variety of plants and animals. Some are well known — like the migrating eagles in spring and tundra swans in fall. Others, like healthy populations of walleyes, catfish, bass and bluegills, attract their own followers. Still other interesting creatures and plants live quiet lives in peaceful oblivion far from the crowds of anglers, birders and summer tourists. These river residents range from the very small to the very large, but all are unexpected finds just waiting to be explored and discovered anew.

ROBERT QUEEN

Freshwater sponges



MARK ENDRIS

Sponges not only mop up fresh water, they live in it! On the Mississippi, the most common sponges look like brown growths or fibrous algae on submerged objects. Other white ones with finger-like projections resemble coral on the river bottom. They vary in size from one- to four-inch irregular shapes and are tough enough to be picked up without falling apart. Sponges are colonial animals, masses of cells embedded in a gelatin-like goo that is bound together by tiny, spiny structures of calcium, silica and organic fibers. Sponges filter large volumes of water through their pores, capturing tiny particles for food.

Glass shrimp



MIKE ENDRIS

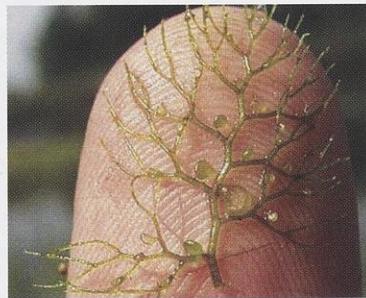
Hidden among lush vegetation in slow moving backwaters are small, delicate crustaceans that closely resemble marine shrimp. They grow to almost two inches long, but are easy to overlook because they stay hidden and their bodies are transparent except for the eyes. These glass shrimp, mainly found in the central and southern U.S., also inhabit the Mississippi, St. Croix and Wolf rivers at their northernmost range. Glass shrimp prefer the slowly moving parts of river where they can hide in dense vegetation to avoid becoming desirable morsels for small fish. Just like marine shrimp, these fresh-

water prawns have a large spiny protrusion that sticks in front of the head and their bodies are flattened sideways. Glass shrimp can have a tinge of color in hues of pink, yellow or tan, which can give them an opalescent appearance. At times, their abdomens may appear green after eating plants. Freshwater shrimp walk on their first five sets of legs and use five sets of swimmerets for swimming and tightly tucking green eggs under their tails. They spawn from late May until August. Eggs are carried by the female for 12 to 16 days. After hatching, the young grow rapidly for about three months. They are active during winter and growth resumes in April. The adult shrimp population may die-off as year-old males are scarce by late June and few females are found by August.

Meat-eating plants



Common bladderwort flowers above water with a yellow, snapdragon-like blossom.

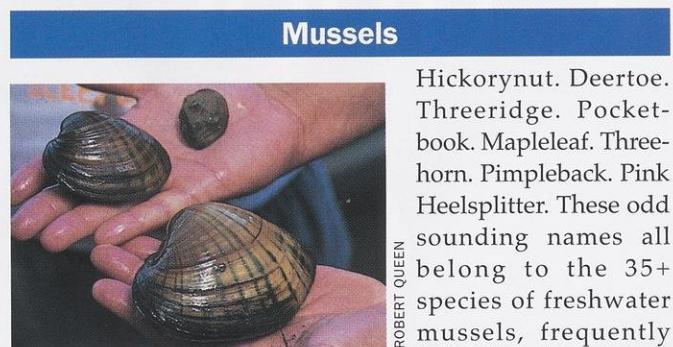


A fine network of underwater stems contain the tiny bladders that trap prey.

bling snapdragons that rise above the water surface on slender stalks during the summer. Branching underwater stems have many finely-divided leaves and small buoyant sacs (bladders) with a unique adaptation for capturing prey. Each bladder has a trapdoor with special trigger hairs near the lower edge. When an aquatic bug brushes one of the trigger hairs, the plant pumps out creating a vacuum and the trapdoor swings open. Water rushes in pulling the bug with it. The trapdoor slams shut in less than half a second. The trapped insect is digested, then water is again pumped from the bladder and the trap is reset in as little as 15 minutes.

Bladderwort prey include water fleas, mosquito larvae, glass shrimp, scuds and tiny insect larvae. Common bladderwort can feed on fish fry or newborn tadpoles. A common bladderwort may have thousands of active bladders on a single plant and can thrive in nutrient-poor waters as long as there is insect life.

River shrimp are wary of another hungry floater in the water column — the carnivorous, rootless bladderwort. More than 200 species of terrestrial and aquatic bladderworts are found across every continent except Antarctica. They frequent marshy areas and calm waters with little current. Eight species of bladderwort are found in Wisconsin; three are species of special concern. The most widespread species on the Mississippi is, appropriately, the common bladderwort. Its most noticeable features are bright yellow flowers resembling



Mussels

Hickorynut. Deertoe. Threeridge. Pocketbook. Mapleleaf. Threehorn. Pimpleback. Pink Heelsplitter. These odd sounding names all belong to the 35+ species of freshwater mussels, frequently called "clams," found in the Upper Mississippi River. The names describe the outer appearance of the shells, which range from smooth to bumpy and rippled with ridges. The pearly inside of the shells can range from pink to purple to white. This pearly covering, called nacre, played a major role in a long, rich history.

Records show that Native Americans ate mussels and used the shells for tools, utensils, tempering pottery and trade. European settlers "clammed" for freshwater pearls and cut the shells for pearl buttons. It took a phenomenal number of shells to supply the country with buttons. With the advent of plastic buttons, mussel populations started to recover until people discovered that small plugs of mussel shells were a perfect medium for seed pearls for the Japanese cultured pearl industry. In 1995, more than one million pounds of shells were removed from Wisconsin waters along the Mississippi River and shipped to Japan.

Mussels are equally woven into the web of river life. Freshwater mussels continuously pump water through their bodies to obtain food and oxygen. In the process, they filter and clean the water. Small mussels provide food for fish; older ones are a food source for mink, muskrats, otters, raccoons and turtles. Groups of mussels gather in mussel beds and can form a hard "cobble" on the bottom of the river that supports fish, aquatic insects, benthic algae and worms.

Fish and mussels have a relationship that extends beyond the food web. Mussel larvae or "glochidia" released into the water attach to fishes' gills and remain implanted for a few weeks or a month before dropping off to colonize a new area. Certain mussel species have raised this hitchhiking to an art form. The pocketbook family of mussels, which includes the endangered Higgins eye, has developed body parts to look like a minnow complete with an eyespot. The mussel "fishes" this structure with an undulating motion that mimics a small struggling fish. When a bigger fish grabs for it, the female mussel expels her larvae into the face and gill area of the fish. Many mussel larvae only attach to specific fish species, others will hook up with a widespread variety of fish. Where host species are rare, mussel species in the river are jeopardized. Mussel populations are also threatened by overharvest, declining water quality and effects from converting the free flowing river into an impounded system of locks and dams.

At one time, mussels were so common in the upper Mississippi River that an 1867 report to Congress stated, "In places protected from moving sands, the mussels grew so

abundantly as to accumulate beds of their shells at least two or three feet thick." These beds were quite extensive. In 1896, nearly 500 tons of shells were taken for the button trade from a bed two miles long and a quarter-mile wide. More recently, one remarkable site, the East Channel mussel bed near Prairie du Chien, was described as the mother lode of mussels on the Mississippi River. It extended bank to bank over an entire 3.5 mile length and contained as many as 30 different species of freshwater mussels until it was decimated by zebra mussels.

Most people don't realize the United States is a heavy-weight of mussel diversity. All of Africa contains 56 species and most countries can claim only 20. The U.S. weighs in with about 300 different kinds of mussels. Sadly, they are also the most threatened order of animals in this country.

Monsters of the deep

Big waters breed big whoppers about the lunkers that lurk below, but sometimes the tall tales are true! Just ask Kyle Schauf of Onalaska. While fishing in mid-March for walleye below Lock and Dam 7 near La Crosse, one very big fish hit his minnow.

"We were in a 13-foot boat and that fish pulled us wherever it wanted to go," Schauf said. He was pretty sure he'd hooked into a big catfish, but after battling 30-40 minutes to beach the behemoth, Schauf discovered he had latched into a five-foot lake sturgeon. Heidi Kuehler, a U.S. Fish and Wildlife Service fisheries resources biologist at Onalaska aged the fish at 35-40 years old. As happy as Schauf was to land it, he was just as glad to see the big fish swim off upon release.

Lake sturgeon is but one ancient fish species that cruised the Mississippi unchanged for more than ten million years. Other members of this elite club of odd looking fish include shovelnose sturgeon, paddlefish, bowfin, and the long- and short-nosed gar.

Sturgeon populations have not recovered on the Mississippi River from overharvest in the early 1900s. Pollution, habitat loss, accumulated silt on gravel spawning bars and the construction of dams that block seasonal movements have taken their toll. There are many unknowns about the Mississippi River population including details of their abundance, movement, spawning areas and whether the population is self-sustaining.

Shovelnose sturgeon, the smaller cousin of the lake sturgeon, are doing much better surviving the changing river conditions. Named for their long, spade-shaped snout, the shovelnose reach a maximum length of 38 inches. Their other common name, "hackleback," refer to a dorsal ridge of bony plates. Though found throughout the drainage basin, this species is most common south of Pool 7. Their population is large enough to support an open fishing season and a commercial fishery. "There is a demand for delicious smoked sturgeon, but the prize is their roe that is sold as hackleback caviar, selling for \$15 an ounce," said Patrick Short, DNR Mississippi River Fisheries Manager at Prairie du Chien. The jet black eggs of medium size have a superb sweet, buttery, nut-like flavor. Prices in the last few years have risen rapidly as the supply of Caspian Sea caviar has diminished.

Paddlefish



MARK STEINGRAEBER

Paddlefish, aka spoonbill catfish, duckbill catfish, and spadefish, all refer to the unique paddle-like rostrum that extends from the fish's head like a nose. It's used to sense food, which for the paddlefish is zooplankton, a microscopic meal. The rostrum and sides of the paddlefish's head have electro-receptors that can sense living organisms in dark murky water. To feed, the paddlefish merely swims with its mouth open and filters or strains zooplankton through comb-like gill rakers. The paddle helps the fish keep its balance while swimming with an open maw through river current. These docile, toothless giants grow to more than five feet and weigh more than 60 pounds. Paddlefish don't begin reproducing until they are at least seven years old and the females only spawn every two to three years. Paddlefish require a gravel or rubble bottom in six to 40 feet of flowing water with temperatures between 50 and 68 degrees to begin spawning.

Populations have drastically dropped since the early

CALE SEVERSON



1900s, due to habitat changes and harvest for their prized caviar. Paddlefish are still found in the tributaries and channels of the Mississippi and the Missouri rivers. The largest populations in Wisconsin live in the Wisconsin River below the Prairie du Sac dam and in the lower Chippewa River. They also inhabit the Mississippi, Black, St. Croix, and Minnesota rivers. In both Wisconsin and Minnesota the paddlefish is listed as a threatened species.

An extensive study in the 1990s examined the movements and range of this declining species. Spawning locations, wintering waters, age studies, mating patterns and seasonal migrations were plotted. "Both the Wisconsin and Chippewa river fish move downstream from wintering areas to suitable spawning sites," said Ann Runstrom, fisheries biologist with the U.S. Fish and Wildlife Service. "After spawning, the Wisconsin River paddlefish return upstream to just below the dam at Prairie du Sac." The Chippewa River fish, however, keep moving down to Lake Pepin in Pool 4 of the Mississippi River, which has an ample food supply. In late June, they begin to move back up the Chippewa River.

American eels



JOHN LYONS

These eels are the Mississippi River's true long-distance travelers, moving thousands of miles to get here. These fish, which look like a snake with ribbon-like fins, are catadromous, meaning they spend most of their lives

in freshwater but return to the ocean as adults to spawn — just the opposite pattern of salmon.

Eels hatch in the Sargasso Sea between Bermuda and the Bahamas. Eel larvae are tiny, transparent and look more like willow leaves than fish. They gradually drift to the edges of the Sargasso Sea and are caught up in the currents. After drifting for a bit more than a year, the larva, called glass eels, arrive off our coastal waters of the Eastern Seaboard and Gulf of Mexico. As "elvers," they rarely grow more than 3.5 inches long. Only the females journey up the Mississippi River. Males remain near the mouth of the Mississippi south of New Orleans where it empties into the Gulf of Mexico. There is no evidence that elvers imprint to any particular stream.

To reach our part of the river, the small eels have to get past at least 20 locks and dams that limit the movement of other migratory fish like skipper jack herring and small-mouth bass. The eels migrate upstream at night, climbing and crawling up the sides of the dam. Young eels get around fast currents by leaving the water and crawling over wet grass until they have passed the swift sections, sometimes traveling over flooded or dewy fields, and turn up eventually in a pond or lake with no apparent access. This upstream movement may take years. This "yellow eel" phase can last 5-20 years. Adults can grow to three feet long and weigh three to

four pounds. As eels sexually mature, they undergo internal changes to survive the salty ocean environment. Their yellow-green colors change to a metallic sheen with purplish black backs. Called "silver eels" at this stage, they are better camouflaged from oceanic predators.

The females migrate back down the Mississippi River to the Gulf of Mexico, generally in late summer to November, joining the males at the Gulf. Together, they begin a final three-month journey back to the Sargasso Sea. American eels spawn in the western part of the Sargasso Sea, peaking between February and April. Soon afterward, the silver eels die where they were hatched. Their offspring then begin this cycle anew.

While many Americans view them as "trash" fish, eels are highly prized food in many parts of the world. Once abundant in the Mississippi River and the Great Lakes Basin, this fish is now considered uncommon.

Native lamprey



DON BLEGEN

Lamprey are generally viewed as repulsive or loathsome. The adults, resembling snakes, are coated with slime and their sucking discs rasp into the sides of fish. They are not true eels, which have jaws, a mouth and scales. Lamprey are scaleless, have cartilaginous bones and their sucking discs are armed with horny teeth.

Lamprey species are distinguished by their teeth patterns. Five species occur in Wisconsin, of which three are parasitic. The most notorious, the sea lamprey, is an exotic species that invaded the Great Lakes in the 1930s. Fortunately, they are not found in the Mississippi River, but the parasitic silver and chestnut lamprey do occur here.

Adult lamprey deposit eggs in stream riffles, then die. Larvae burrow into silt and sand in quiet water, filter-feed, and grow for three or more years. Parasitic lamprey migrate downstream to prey on large fish. They are not viewed as a threat to Mississippi River fish survival due to their small size and small populations. Some of the river fish will jump out of the water, falling with a crash to try and dislodge the irritating lamprey.

The fascinating adaptations of these little known species only make them more distinctive members of the Mississippi River community. Changes people have made during the last 150 years for navigation and flood control have not been kind to species that were better adapted to a free flowing river, and some species face threats from exotic species. We hope through river restoration that we can conserve more of these vulnerable species and they will continue to be a part of the Mississippi's future.

Ruth Nissen is stationed at DNR's La Crosse office on the Mississippi River.



Caring for the “orphans”

Years of effort and millions of dollars help restore abandoned contaminated properties.

Marie Stewart, Dick Kalnicky, Robert Strous, Jr. and Andrew Savagian

Chemicals are widely used for a range of everyday activities from curing disease to providing fuels and easing household chores. Common sense and a host of regulations provide guidelines for safely using and disposing of these compounds, but it wasn't that long ago that common practice for handling dangerous chemical residues was much different — out of sight, out of mind. “Down the drain” backyard dumping led to national catastrophes like Love Canal in New York, which in turn led to cleanup funds like the national Superfund and state Clean Sweeps.



DNR REMEDIATION AND REDEVELOPMENT BUREAU

TOP: Abandoned and burned by arsonists, the old QuicFrez manufacturing site in Fond du Lac was an eyesore. **ABOVE:** State funds razed the building, removed rubble and stabilized the shore. This summer treatment will start to remove river contaminants. Plans call to redevelop the site by 2009 for residential use, open green space and a riverfront recreational trail.

Although a lot of the dumping was done in ignorance, it left a legacy of contaminated sites. Unfortunately, it's not always clear who is accountable today for yesterday's actions. In many cases, the owners of polluted properties have died, gone bankrupt or are unwilling or unable to accept responsibility for soil and water contamination. "Orphan" sites lie vacant for years, languishing while local governments struggle to find enterprising people who see enough opportunity to risk the costs of cleaning up such eyesores.

The DNR's State-Funded Response Program in the Remediation and Redevelopment Bureau provides staff and money to help turn blighted properties around. "State-led projects don't often create headlines," said Robert Strous, Jr., the bureau's fiscal and information technology section chief. "The state steps in at orphaned sites when no one else will. We expect the cleanup benefits to last for generations."

State-funded response cleanups

State-led cleanups of contaminated properties are partially or fully funded using money from the State Environmental Fund. Since these funds were first offered 20 years ago, more than 200 orphaned sites across Wisconsin have been addressed. "We don't just help the environment," said Strous. "We help communities get their contaminated wells back online, provide clean drinking water, and help get properties back into productive use, which benefits local economies."

During the last 12 years, the Department of Natural Resources has spent nearly \$60 million on state-led cleanup projects. Some projects require millions of dollars and many years to clean up. Other efforts are simpler and cheaper: A few thousand dollars can fund an investigation to find the "responsible parties" (or "RPs") to pay for all or a portion of the cleanup costs. Since 1992, the program has recovered more than \$16 million from RPs, or nearly one-fourth of the total costs incurred.

Communities are often willing to form partnerships with the state and individuals to aid cleanups. "We're in it for the long haul," Strous said. "We're com-

mitted to helping communities turn these sites around."

A quick response and a long-term community investment

The first state Environmental Repair Fund, established in 1984, went a long way toward cleaning up contaminated orphan properties.

One of those sites popped up in the tourism-friendly city of Minocqua in northern Wisconsin. Routine sampling of drinking water in 1984 found a municipal well was contaminated with perchloroethylene, a chemical often used by the drycleaning industry. In those days, drycleaners often sprayed used "perc" on gravel parking lots to reduce dust, or they simply dumped the residue, eventually contaminating area soil and groundwater.

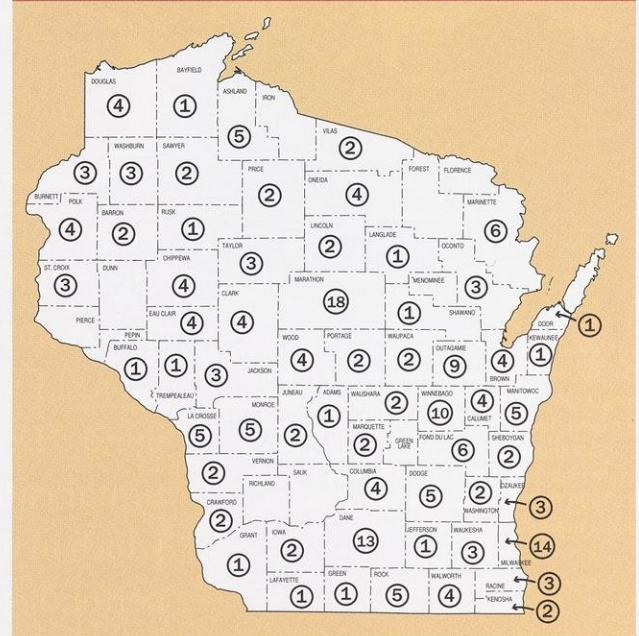
The contaminated city well was the community's only operating source of drinking water. DNR responders quickly arranged to install an extraction well to intercept and treat the contaminated plume while further investigations determined the source of the perch.

Cleaning up the sources of contamination

tion was a bigger problem. Perc can persist in soil for a long time. Excavating soil was not a good option because the area where contamination was highest was located on the shoreline of Lake Minocqua. The owner could not afford the high cleanup cost. DNR investigators conducted field studies and pilot tests, eventually installing a vapor extraction system to draw the perc out of the soil and trap it in carbon filters.

Similar to cleanups at many other sites, there was no overnight cure for Minocqua's perc problem. More than 20 years later, treatment continues with support from the State Environmental

Sites by county where state cleanup funds were spent 1994-2005



Fund, which covers long-term operating and maintenance costs to protect the community's drinking water.

Working together

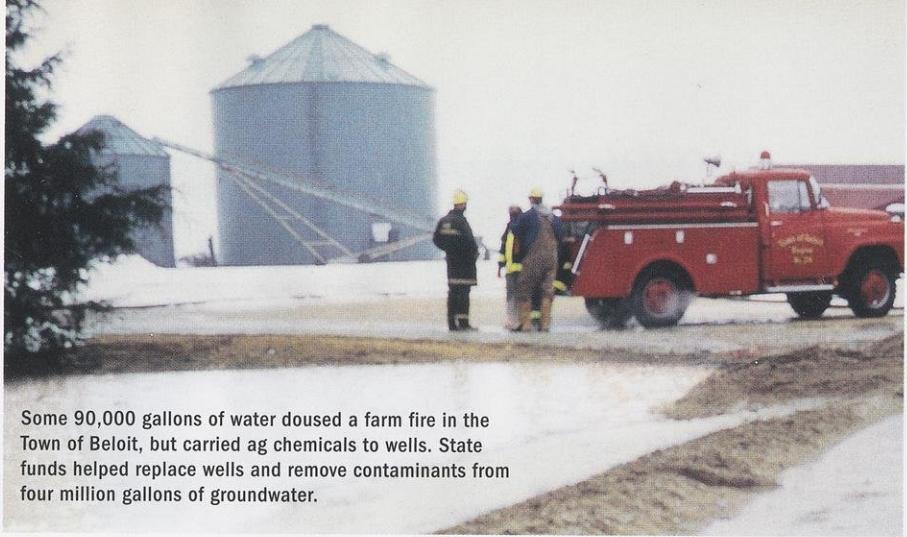
Relationships between responsible parties and the Department of Natural Resources can be very contentious on large cleanups. They become even more complex, costly and lengthy if the sites become part of the national Superfund process. Active partnerships between RP's and DNR staff offer a more productive model for restoring contaminated land.

A good example of such a partnership occurred on the Holtz Krause Landfill project in Wausau in the late 1980s and early 1990s. "Our success in cleaning up that landfill is directly related to the willingness of the DNR folks to partner with the responsible parties in investigating and addressing community concerns," said John Robinson, former Wausau mayor and chair of the Holtz Krause Steering Committee. "By assisting with funding the remedial investigation, and by being flexible about how we approached the project, the 57-acre landfill was capped, soccer fields were incorporated into the final design, and more than 1,300 different parties helped pay for the cleanup."

Even the right action can cause big problems

Sometimes doing the right thing causes environmental contamination, too. In 1990, local fire departments responded to a large shed fire at the Dennis Dwyer farm in the town of Beloit in Rock County. Approximately 90,000 gallons of water were used to put out the fire. The building contained commercial quantities of pesticides, foam insulation and other chemicals. Within days after the fire was extinguished, several local homeowners with private wells contacted DNR offices when they noticed a strange taste in their drinking water.

Testing showed the wells were contaminated with high levels of pesticides, including 19 different agricultural chemicals and volatile organic compounds likely carried to wells in the water used



Some 90,000 gallons of water doused a farm fire in the Town of Beloit, but carried ag chemicals to wells. State funds helped replace wells and remove contaminants from four million gallons of groundwater.

DNR FILE PHOTO

to put out the fire. Chemical levels exceeded safe drinking water standards, and homeowners were advised not to use their wells; emergency water supplies were provided. After the wells were abandoned, homeowners were connected to a new, uncontaminated community well paid for by Dwyer.

Though Dwyer was technically the responsible party, he couldn't cover costs for remedial actions in such a large area of contaminated groundwater and soil. State-funded response staff stepped in to assist. A remedial system was designed to pump and treat the contaminated groundwater with ultraviolet (UV) oxidation technology, which uses hydrogen peroxide and ultraviolet light to break down the chemicals. The system proved highly effective, treating more than four million gallons of groundwater to below chemical detection limits and removing virtually all chemical contamination before the water was injected back into the water table.

A Superior cleanup

Materials spilled or dumped on the ground can run off or be washed "away" by rain or snow — which means the materials have moved elsewhere. Runoff from drainpipes contaminates rivers and lakes, especially the sediment that lies beneath the water. Contaminated sediment can remain in place for years, degrading aquatic life and water quality, and curtailing swimming and boating activities.

This murky threat troubled Newton Creek, a stream located in the city limits of Superior and flowing approximately 1.5 miles to Hog Island Inlet. The inlet is a 17-acre shallow waterway that empties

into the St. Louis River and eventually into Lake Superior. Both waterways provide recreational space and fishing opportunities for local residents.

DNR studies in the early 1990s showed sediments and floodplain soils in the creek and inlet contained petroleum by-products (polynuclear aromatic hydrocarbons or PAHs) and lead. The Douglas County Health Department closed Hog Island Inlet to swimming due to health concerns over the elevated levels of contaminants.

Cleanup at Newton Creek started with reducing wastewater discharges from Murphy Oil USA, Inc., a refinery located near the headwaters of the creek. The company agreed to make improvements and reduce contaminants in the upstream part of Newton Creek, as well as contribute \$200,000 toward cleaning up Hog Island Inlet. Under a broad public-private partnership, state funded response contributed approximately a third of the \$6.2 million needed to remove contaminated sediments from the inlet. Federal funds came from the Environmental Protection Agency (EPA) and the Great Lakes National Program Office. Partners included the city of Superior, Douglas County, Department of Natural Resources, EPA, Murphy Oil, Burlington Northern Santa Fe Railroad, and Enbridge Energy. The massive project removed 60,000 tons of contaminated sediment from Hog Island Inlet and another 940 tons from the lower part of Newton Creek. More than 3,200 truck-loads of contaminated sediment were hauled to a local landfill and buried in a lined cell. The "No Swimming" signs along the waterways were taken down in November 2005.



DNR REMEDIATION AND REDEVELOPMENT BUREAU



DNR REMEDIATION AND REDEVELOPMENT BUREAU

Within three years the dilapidated Mobile Blasting site in west Milwaukee was restored and transformed into the Stadium Business Center.

Protecting rivers and wildlife

Located just 400 feet east of the confluence of the Black and Mississippi rivers and adjacent to the Upper Mississippi River Wildlife and Fish Refuge, the Town of Onalaska Landfill accepted municipal and industrial wastes from the late 1960s until 1980. Liquids and decomposing wastes leached from the aging site, contaminating soil and groundwater with industrial solvents and a floating layer of petroleum hydrocarbons.

A private well nearby was polluted, and several other private wells were in the path of the contaminated groundwater plume. The threat to neighboring rivers and a wildlife refuge also warranted action. The orphaned site was placed on the Superfund National Priorities List (NPL) in 1984, which gave the state access to federal staff and funds to address contamination. The residential well was replaced and EPA capped the landfill. Federal and state contracts paid to install a groundwater extraction and treatment system. Thanks to the partnership, Wisconsin's Environmental Fund needed to cover only about 50 percent of the construction costs.

Soil for the landfill cap was taken from a nearby "borrow pit." Then the Environmental Fund solved two local problems at once: The borrow pit was refilled with sediments dredged from the nearby Dodge Chute of the Black River, which opened up a navigable waterway.

In 2004, the Department of Natural Resources assumed full responsibility to maintain the site for several years. Total cleanup costs stand at \$10 million to date.

From refrigerators to riverfront recreation

The QuicFrez site is a four-acre property hugging the east branch of the Fond du Lac River near that city's downtown. For years the site was used to manufacture furniture and refrigerators, and for storage.

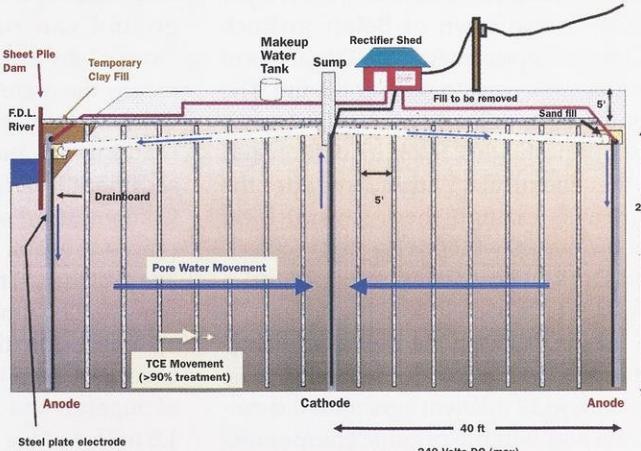
The city acquired the property in August 2001 and plan-

ned to raze the aging buildings, but not before arsonists burned part of the structures and a section of a retaining wall collapsed into the river, contaminating the water with petroleum products, chlorinated solvents, and other wastes. DNR spill responders were called in to contain petroleum wastes while staff from EPA's Removals Program helped remove a 200-foot section of the failed retaining wall.

The state-funded response program entered the picture to start the cleanup process. By January 2006, the first phase of preparing the site for cleanup included installing a river wall, dredging soft sediments and placing big rocks referred to as "rock armor" on the bottom to prevent scouring as the river flow increased once sediments were removed. The second phase, scheduled for this summer, will install layers of treatment equipment (dubbed a "lasagna" design) that will operate for two years. In the "lasagna" process, electrodes will put an electrical charge through layers of iron filings between zones saturated with polluted groundwater. The electrodes will force contaminated groundwater through the treatment walls to degrade the contamination.

According to DNR's project manager, Jennie Easterly, Fond du Lac officials have formed an excellent partnership with the state and are using a variety of redevelopment tools to return the former QuicFrez site to economic use. In addition to its own resources, the city

The "lasagna" design for groundwater cleanup



received a \$130,000 Sustainable Urban Development Zone grant; a \$50,000 Greenspace grant from the Department of Natural Resources and a \$318,000 Brownfields grant from the Department of Commerce. The DNR also provided an estimated \$1.9 million in Environmental Fund money to build and operate the "lasagna" remedy. The city qualified for a local government exemption to limit its liability for site cleanup.

Local residents, the business community and the Department of Natural Resources look forward to redeveloping the site in 2009 for residential use, open green space and a riverfront recreation trail.

A diamond in the rough

Right across the street from new housing and only a few blocks away from I-94 and Miller Park, the former Mobile Blasting site in West Milwaukee certainly had "location, location, location" written all over it, but the site's nasty contamination history and dilapidated buildings discouraged restoration. Fortunately, the city of West Milwaukee and developers Real Estate Recycling saw potential. They went to work securing funds to investigate and clean up the contamination in cooperation with the State-Funded Response Program, the state Department of Commerce and the Brownfields Grant Program.

The Environmental Fund provided \$1.8 million to assist with investigation and cleanup. The city kicked in more than \$300,000, developers added additional funds, and the partnership also netted a \$390,000 Commerce Brownfields grant.

Walking past the site now, no one would guess what it looked like prior to 2002. The new Stadium Business Center — a 44,000 square-foot office building and warehouse — now houses six businesses and employs about 130 people. The property value has jumped from about \$300,000 to approximately \$2.5 million. To the delight of the community, the cleanup and redevelopment of Mobile Blasting has fueled more restoration in the immediate area and spawned new businesses and restaurants.

"We are still discovering orphaned sites every year," said Robert Strous. "Communities willing to pick up the phone and contact DNR's Remediation & Redevelopment program staff can begin to turn those serious problems into community assets."

All four authors work for DNR's Remediation and Redevelopment Program. Marie Stewart is the program's contracting coordinator. Dick Kalnicky is a grant and budget specialist. Robert Strous, Jr. is the fiscal and information technology section chief. Andrew Savagian is the outreach education specialist.

For more information

DNR State-Funded Response

www.dnr.state.wi.us/org/aw/rr/cleanup/statefunded.htm

DNR Remediation and Redevelopment Program

www.dnr.state.wi.us/org/aw/rr/

A late blue bloomer

continued from page 2

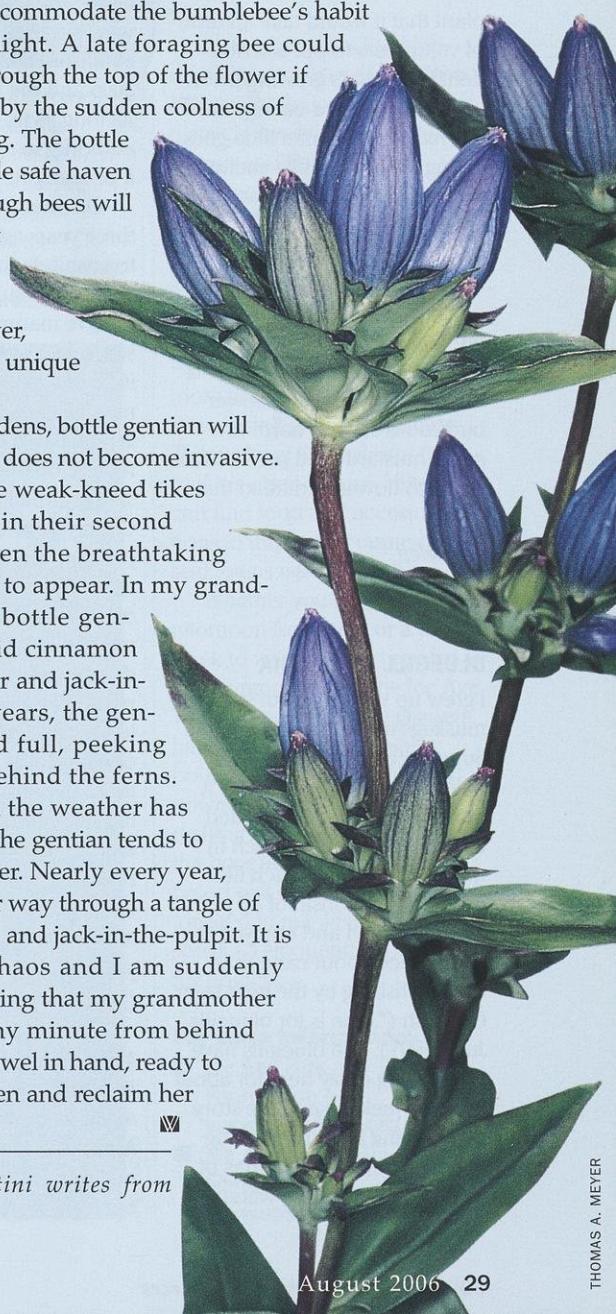
I first came to know it in my grandmother's Sawyer County garden where it has grown for 40 years or more. My grandmother loved its ethereal blue flowers that formed sturdy, long-lived clumps. It prefers full sun but will flower well in partial shade. This gentian is native to northeastern Canada and New England; west to Missouri and Nebraska; and south to North Carolina.

Bottle gentian grows up to 24 inches tall. Pairs of medium sized leaves grow opposite each other attached directly to the stem. The foliage turns mahogany in late fall and remains untroubled by insects or disease. The 1 1/2-inch flask-shaped flowers appear from late August into September, clustered atop the stem and upper leaf axils. The flowers fade with age to a dull purple without opening fully.

This adaptation is a matter of speculation that may have evolved to ensure self-pollination, or as an efficient way to keep the pollen grains dry. Botanist Ross Clark has wryly observed that the flower might accommodate the bumblebee's habit of staying out all night. A late foraging bee could wrest its way in through the top of the flower if rendered flightless by the sudden coolness of an early fall evening. The bottle shape would provide safe haven until morning. Though bees will also spend the night on other flowers, such as goldenrod and coneflower, none offer the same unique protection.

In moist cool gardens, bottle gentian will self-sow readily but does not become invasive. First year plants are weak-kneed tikes that gain strength in their second and third year when the breathtaking blue flowers begin to appear. In my grandmother's garden, bottle gentians scramble amid cinnamon fern, thimble flower and jack-in-the-pulpit. Some years, the gentians are large and full, peeking from below and behind the ferns. Other years, when the weather has been lean and dry, the gentian tends to be leaner and smaller. Nearly every year, seedlings push their way through a tangle of periwinkle, trillium and jack-in-the-pulpit. It is an eye-pleasing chaos and I am suddenly struck with the feeling that my grandmother might appear at any minute from behind the garden shed, trowel in hand, ready to tame the wild garden and reclaim her bottle gentian.

Beth Gollan Capettini writes from Batavia, Illinois.



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@dnr.state.wi.us

APPETITE FOR INVASIVE CONTROL

My regular walking path includes parts of the Glacial Drumlin Bike Trail. Every time I walk it, I feel guilty about not doing anything about the garlic mustard growing along the trail, but it is so overgrown with this plant that it would take an army of volunteers to put a serious dent into what's growing there.

I recently tried eating some. It is rather tasty, but a little goes a long way, much like eating radishes or green onions. I can't imagine how the pioneers who originally brought garlic mustard to this country used it.

Now I stop to pick and eat the flower buds. They taste as good as the tender leaves, and I know that eating the flower buds does serious harm to garlic mustard seed production for each flower bud head that I pick!

Al Corlett
Delavan

BLUEGILL NOSTALGIA

I grew up way up north in the muskegs near Oulu, Wis. [Lake Superior area near the Bayfield/Douglas County line]. A number of years ago I ended up in West Virginia, which in many ways, is still much like northern Wisconsin of 50 years ago. I just read and enjoyed the short piece about cane pole bluegill fishing by the gent from Oshkosh ("June is for bluegills," June 1997). The bluegills have been going crazy here for about the last week. Like in the story, the redwing blackbirds bring back 50-year-old memories of fishing the cold clear waters of

Bayfield County.

Knute Maki
Cacapon, West Virginia

GROUNDWATER QUESTIONS

I enjoyed your groundwater articles ("Groundwater: Wisconsin's buried treasure," April 2006) and the message to protect and conserve our valuable resource. In 2000, I called the DNR to report an open abandoned well with just a rock placed on top of it. DNR staff informed the landowner, but said the agency was powerless to force him to abandon it properly. It's now 2006 and the well is still open. As long as no one has the authority to make him abandon it properly, he won't.

On another issue, about three years ago a doctor in our township received permission to pump groundwater to fill a 25-acre manmade lake so his son could water ski. This lake is 25 feet at its deepest and is replenished each spring. That is a lot of water for a single recreational user. Your article said groundwater levels in Dane County have dropped 60 feet, yet a private 25-acre lake is still approved. I'm a little confused on how our groundwater is managed. Who makes the decisions to approve or deny permits? Who has the authority to sanction or penalize? Someone has to be responsible and there seem to be too many inconsistencies and too little enforcement of conflicting rules. Our groundwater is much too precious to be treated with such disrespect.

Phil Speth
Oregon, WI

Mark Putra, chief of DNR's Private Water Supply Section responded: The Department of Natural Resources does have authority and regularly inspects old wells so that they are

properly sealed up and protected before they are abandoned. Owners or their contractors must also file a report that verifies what steps were taken to seal the well. We want those old wells sealed so they do not provide a conduit to carry contamination to groundwater. We recommend this work be completed by licensed well drillers and pump installers. The key is learning where these old wells are located. As many as 200,000 unused wells statewide may still need to be properly abandoned. [We provided Mr. Speth with a contact for follow-up investigation on this case.]

On the second question, those proposing to construct ponds, enlarge ponds or connect to natural waterways must first secure DNR permits that examine water flow, usage and runoff, among other factors. Depending on the site location and zoning, proposed ponds may also need local and federal permits before projects can proceed. Before planning such projects, talk with the DNR Water Management Specialist serving the area where the pond work is contemplated.

The new Groundwater Quantity Law doesn't directly address pond construction. It provides additional protections for two other situations. Ground

water Protection Areas (GPAs) protect trout streams and waters designated as Outstanding or Exceptional Resource Waters by requiring that high capacity wells remain at least 1,200 feet away from such waters.

The other provisions allow designating Groundwater Management Areas where drawdowns could reduce the amount of groundwater available to other users. Currently only two such areas — one around Green Bay and the other in Waukesha County — have been established. At some point private lake construction like the one Mr. Speth mentions might be a concern in a GMA, but that's not the case now.

FISHING FOR AN ANSWER

I would like to know more about trout lakes in Wisconsin and the quantity of trout that are stocked in them. Is there someplace on your website that has that information?

Ken Sellenheim
Plover

Fish stocking summaries by county and species are available from the fisheries management portion of DNR's website. Here's the address: http://infotrek.er.usgs.gov/doc/wdnr_biology/Public_Stocking/StateMapHotspotsAllYears.htm

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Ice is nice

As Manny the woolly mammoth and his pals Diego, Sid, and Sprat trudge through the harsh chill (of criticism) descending upon *Ice Age 2*, don't forget you have the option to experience a similar drama outside the movie theatre, minus the popcorn and Junior Mints.

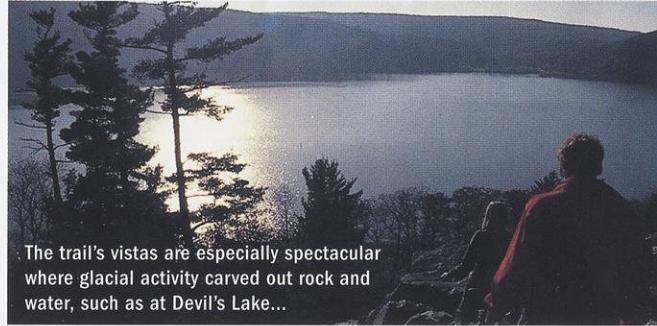


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Wisconsin's fabulous **Ice Age Trail** will take you back more than 10,000 years, to a time when the immense glaciers that periodically covered parts of North America began once again to melt and recede. The trail generally follows the last stopping point, or terminal edge, of the most recent glacial advance.

Previous glaciers had extended further south into the Midwest, and of course many other glaciers made their marks elsewhere in the world — but few glaciers left behind as much conspicuous evidence of their presence as the last one did in Wisconsin. Here the great shifting ice sheets reshaped the landscape into specific, recognizable forms like *moraines* — ridges of sand, silt, rocks and boulders released when ice melted at the edges of the glaciers — and *kettles*, or lakes formed when blocks of ice detached from the glacier were buried in debris, and later melted. The flowing ice gouged and scraped the bedrock, leaving striations in the stone, and depositing elongated hills of glacial debris called *drumlins*. (FYI: Wisconsin's State Capitol is perched on one of these.) Bedrock striations and the drumlins' long axis indicate the direction the ice flowed.

Here's an abbreviated glimpse of the route. The trail's eastern head lies within **Potawatomi State Park** on Green Bay. It follows the crests of *eskers* (long, narrow ridges of coarse gravel deposited by streams flowing in melting glaciers), heads south through the lovely hills and valleys of



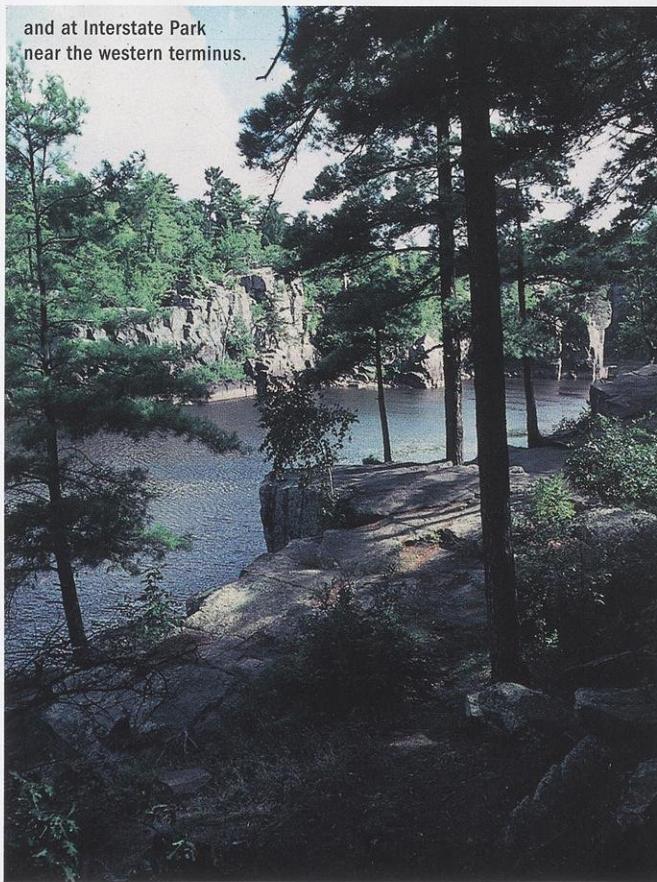
DNR PHOTO

The trail's vistas are especially spectacular where glacial activity carved out rock and water, such as at Devil's Lake...

Kettle Moraine State Forest, and tracks the terminal moraine in Dane County.

The trail divides just north of **Devil's Lake State Park** in Baraboo. The western branch passes the Dells of the Wisconsin River, formed by

glacial meltwater, and crosses the flat bed of glacial Lake Wisconsin. The eastern branch follows the moraines through Columbia and Marquette counties, and rejoins the western branch in the **Chaffee Creek Fishery Area**.



DNR PHOTO

and at Interstate Park near the western terminus.

The trail continues north to Langlade County, an area rich in glacial lakes and bogs. In Lincoln County, you'll hit the high point of the trail — 1,875 feet — on Lookout Mountain, followed by a rugged segment in the **Chequamegon National Forest** in Taylor County.

The trail crosses the high quartzite shoulder of the **Blue Hills** in Rusk County, winds through the dairy country of Barron and Polk counties, and reaches its western end in the **Interstate State Park Ice Age Reserve Unit** and the spectacular gorges at the Dalles of the St. Croix River.

When it is complete, the Ice Age Trail will meander across more than a thousand miles of Wisconsin's glacial landscape. Today about 640 miles of the trail are open for use. Hikers can find food and accommodations in the small communities and towns near the trail.

Whether you have a spare afternoon for a stroll or a full week to wander, take time for a late-summer trek on the Ice Age Trail. Experiencing the glaciers' handiwork at close range is bound to keep you cool. And nowhere else in the world do rushing streams and quiet lakes, the bogs and marshes, the broad oak openings, the hills forested in maple and birch speak so eloquently of their icy origins.

For more information:

- Ice Age Park and Trail Foundation — www.iceagetrail.org
- Ice Age National Scenic Trail — www.nps.gov/iatr/



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OR VISIT OUR WEBSITE WWW.WNRMAG.COM

Wisconsin, naturally

BEAR CAVES
STATE NATURAL AREA



Notable: Bear Caves is among Wisconsin's most intriguing geological sites. Granitic gneiss boulders of immense proportions — many up to six feet in diameter — lie in jumbled piles within a maze of forested ridges. Glacial action and fierce meltwater runoff concentrated the large rocks at this site, located between the former glacier's Chippewa and Green Bay lobes. A diversity of mosses, lichens and ferns cover the boulders.

How to get there: From the intersection of State Highways 64 and 55 in Langlade, go north on 55 for 3.5 miles. Park, then walk west on an unimproved access lane 0.1 mile. The site lies north and south of the lane. Visit dnr.wi.gov/org/land/er/sna/sna286.htm for a map and more information. The site is owned by Langlade County.

