



## Wisconsin natural resources. Vol. 16, No. 2

### April 1992

Madison, Wisconsin: Wisconsin Department of Natural Resources,  
April 1992

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# WISCONSIN NATURAL RESOURCES

April 1992 \$3.00 Volume 16, Number 2



## Fishing in the '90s • Saving songbirds • A concrete problem



Brook trout (*Salvelinus fontinalis*).

DON BLEGEN

# TROUT

Justin Isherwood

## Editor's Note:

Lots of us dearly love to fish for trout. It has been a couple of years since many of us have felt good about slipping on waders or romping a streambank for trout we knew were stressed by drought. This essay kind of tickled me because it captures so much of the trout fishing experience and the spirit of volunteers who help rebuild streams and protect habitat. To those in the trout congregation who prefer to wet a dry line and roll their casts, keep your sense of humor. We know many of you are our partners. We also know you can handle good-natured kidding that comes with any good fish tale.

**M**y friends will not look at me when the conversation turns to trout. Make that when passions, better yet, ideologies turn to trout. In their eyes I am a dishonest trout-killer. My friends have a code. Actually more of an oath than a code, and more of a holy grail than an oath: Their allegiance is to the fly. The same insect abhorred by millions, punished and gassed and swatted. The fishing hat is their mark and signal of their method. Theirs are not just any noisome swarm of bugs, but are flies with names, pedigrees and inheritances. Well and fancy-named flies like Brown Cahill, Royal Coachman, Pagan Dancer, the Nancy Drew and the Anabaptist.

I fish with worms. Worms have no names.

Of trout then, there is high church and low church. I have friends who own numbered and signed fishing poles, the value of these weapons equal to a good second-hand pickup truck.

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*Wisconsin Natural Resources* magazine (USPS #34625000) is published bimonthly in February, April, June, August, October and December by the Wisconsin Department of Natural Resources, 101 S. Webster St., Madison, WI 53702. The magazine is sustained through paid subscriptions. No tax money or license fees are used. **Subscription rates are:** \$6.97 for one year, \$11.97 for two years, \$15.97 for three years. Second class postage paid at Madison, WI. POSTMASTER and readers: **subscription questions and address changes** should be sent to *Wisconsin Natural Resources* magazine, P.O. Box 7191, Madison, WI 53707. Toll-free subscription inquiries will be answered at 1-800-678-9472.

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# WISCONSIN NATURAL RESOURCES

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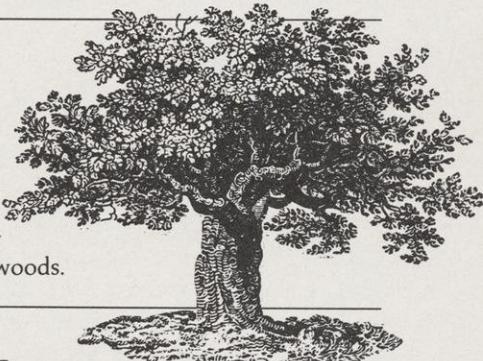
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Traditional bird quilt design hand crafted by Sylvia Druckenmiller of Littleton, Colorado for her grandson.

DAN ZENKER SUTTER PHOTOGRAPHERS

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Acadian flycatcher (*Empidonax virescens*). One of at least 143 songbird species stressed by changing habitat on their breeding grounds in North America and their wintering grounds in Central and South America. See p. 10.

STEPHEN J. LANG, Madison, Wis.

# Casting Ahead

Our fisheries chief provides an outlook for fishing in the nineties

Lee T. Kernen

The last years of the 1980s brought many challenges for our fisheries. Some were technical problems we've now resolved. Others challenged us to rethink attitudes about fishing, and those will take longer to sort out. Nevertheless, I believe the future looks bright for fishing in Wisconsin and recent changes are part of the solution.

New, more restrictive rules on Lake Superior that took effect last year will reduce the amount of gill netting commercial fishers can set by two million feet a year. Fish managers estimate this reduction has already saved 30,000 lake trout. Last November, the State of Wisconsin entered into a new fishing agreement with both the Red Cliff and Bad River Chippewa tribes which provides more protection for lake trout. The planned comeback for this native predator fish in the biggest lake in the world is truly great news for our greatest lake.

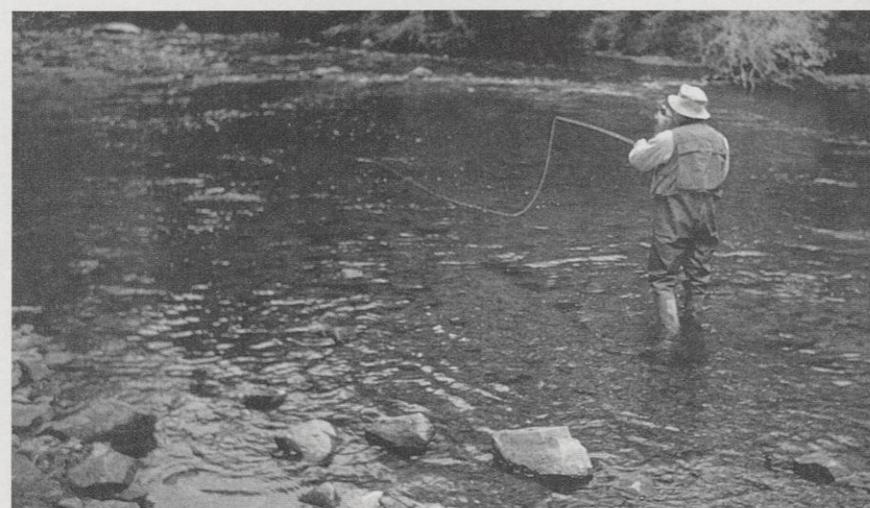
The life-giving rains of 1990 and '91 have rejuvenated our water tables and refilled our streams. We can finally start using special trout regulations that we designed to give anglers the wide variety of fishing experiences they asked for — plenty of small keepers in some areas, trophy fish in other streams and exceptional action in catch-and-release waters. Small trout that hatched during the last two springs have been observed in most waters. Trout anglers can look forward to a normal season of fishing on most streams starting on

the May 2 opener.

Some streams truly hold pleasant surprises. Many of these waters haven't been fished for two years and contain some of the biggest trout you'll ever see. Until the streams fully recover, I'm asking you to show some restraint this spring and voluntarily put some fish back for future fishing.

The 1991 tribal spring spearing season had some people uptight

Forecasting good action on trout streams. Trout populations are rebounding from drought conditions in 1988 and 1989. Streams and rivers are managed to provide anglers a wide variety of fishing opportunities. Anglers can choose to fish streams managed to produce fewer, larger fish or plentiful numbers of medium and smaller fish.



MARGARET KNIOTEK



JANET KERNEN

again but it was relatively uneventful. Life is returning to normal in northern Wisconsin and I hope spring spearing will be even quieter than last year. Spearers harvested 23,018 walleyes from 147 lakes. Most anglers across Wisconsin are beginning to understand that we can accommodate both tribal and sport fishing on our lakes. More than 700 lakes in the Ceded Territory are not speared for wall-

eyes. Moreover, walleye populations will continue to grow. We're convinced that the 15-inch minimum size limit will give anglers the opportunity to catch more fish, even if they keep fewer fish. We're banking that anglers will handle under-sized fish carefully, will continue to enjoy fishing and will help us improve walleye fishing in the Ceded Territory.

Chinook salmon on Lake Michigan made a modest recovery last year. We improved disease control techniques at our spawn-taking stations to produce stronger populations of young fish. It's too early to say much more. Let me assure you, all four states bordering Lake Michigan states have never worked better as a team to solve a fishery problem and we're hoping chinook fishing will respond.

Alewife were more abundant this past year. We have removed alewife as a target for commercial fishers and set a quota of 2.34 million pounds for smelt. Since the forage fish harvest is dropping from over 20 million pounds a year to less than three million pounds, that should leave more "groceries" in the Great Lakes and spell good news for the trout and salmon. I believe the worst is over, but this issue continues. Our legal people are still trying to interpret the impact of a last-minute amendment to the budget bill that allows commercial trawlers to bring in incidental catches of alewife.

Wisconsin fishing license sales in 1990 were relatively stable. Last year's figures are not yet available. Some 948,475 residents and 519,394 out-of-state visitors bought fishing licenses in 1990. More visitors continue to come to Wisconsin to enjoy fishing than any other state.



Taking the slack out of salmon fishing. Disease controls when salmon eggs are collected and better protection of natural fish foods are two strategies to bolster Great Lakes salmon populations that have sagged for a few years.

Understandably, inland trout stamp sales dropped when we closed some streams for two years to protect trout from drought. Sales of Great Lakes salmon and trout stamps dipped as chinook salmon fishing became more difficult and contaminant scares led anglers to try their luck for other fish.

When you tally senior anglers and junior anglers with Wisconsin's 1.5 million licensed anglers, the grand total is over two million anglers. I think our impressive number of anglers will swell this year because I firmly believe we keep offering anglers a better product.

Let me tell you why and where. I'll start on the mighty Mississippi River, one of Wisconsin's fishing gems. Excellent walleye reproduction

on the ol' Miss since the mid 1980s is producing some of the state's finest opportunities to catch a trophy walleye. But, let's not forget the unsung hero of the Mississippi, the bluegill. The upper Mississippi produces some of the finest bluegill fishing in the Midwest, and I see no reason why this won't continue.

The number of muskellunge in our waters is as high as it's been in years. Anglers are seeing and catching a lot of fish in the 30-40 inch size range. Their willingness to catch and release muskies is having a big influence here. And our hatcheries are pumping out 150,000 fingerlings a year in the hefty 10-12 inch range. The chance to catch a trophy musky is also improving as nearly 50 lakes will have 40-inch minimum size limits and two will have



BUREAU OF FISHERIES MANAGEMENT

License fees funded eight new boat ramps and improvements at 17 public ramps last year. Boating is more popular every year. New skippers can take inexpensive courses to learn how to handle their powerful rigs safely and courteously.

45-inch size limits beginning May 2. We hope to raise the statewide minimum to 36 inches in the future to help musky populations in all waters.

The Green Bay perch fishery is almost unbelievably good. Can you imagine that thousands of ice fishers can go out on one body of water and catch an average of 145,000 perch each weekend? We had to reduce the daily bag limit to 25 fish per day to protect the stocks. Up off Oconto and Marinette, the trolling for big brown trout was good for much of the summer. These are big fish, 7-15½ pounds on average, and anglers are catching a lot of them.

Formerly polluted waters that were almost devoid of fish are now providing not just good, but great fishing. Two big rivers, the Wisconsin and the Fox are prime examples. The Wisconsin now has excellent smallmouth, walleye and musky populations from Rhinelander to Mosinee. The Fox from Winnebago to Green Bay is home to a rebounding walleye run. Are all these fish good to eat? No. In fact some are listed on the health advisory, but boy do they provide action where there was none before.

The sturgeon stronghold of the eastern United States continues in Lake Winnebago. The population has

grown much stronger through careful harvest regulations and tough enforcement. Future winter spearing seasons look to be as good as ever. Like the season just concluded, the spearing harvest is determined mainly by the weather and water clarity. The important thing is, we know the fish are there.



DAVID GUNN UW-MADISON SEA GRANT INSTITUTE

University and DNR researchers have been studying the spawning behavior of sturgeon. This female was fitted with a radio transmitter in on-water surgery.

Access to our waters is better each year. We built eight new ramps in the past year, and 17 addi-

tional ramps have been upgraded into really first-class facilities. We know we can't keep up with the exploding demand for better boating access, but we're investing fishing and boating license and permit fees wisely. We've built 11 fishing piers which are available to everyone, including anglers and boaters with disabilities.

In the past 10 years we've seen growing evidence that the number of larger fish in most waters was deteriorating. We may not have a lot more anglers, but I think anglers were getting much more effective each year. The constant barrage of new technology is having an impact — note the recent "discovery" of walleyes in the shallow reed beds on lakes Poygan and Butte des Morts.

Our fish were taking a pounding across the state, and we had to do something to better protect them. Minimum size limits were established for bass and walleye in 1989 and 1990. Very tight regulations on the famous Brule River have brought immediate improvements in the steelhead run. Preliminary data already show conditions are getting better, but we know we have to do even more to protect these marvelous fish. Inland lakes with a 15" walleye size limit are already building up with fish after only one year. Anglers should

notice the difference as the lag between bites shortens.

A key to making size limits effective is teaching anglers how to release undersized fish. We must educate anglers to take greater care when playing, landing, handling and releasing fish. Teach youngsters and old salts alike to support fish when they lift them out of the water. Clip the fishing line close to the mouth. Avoid pulling on the line if the fish is deeply hooked and return fish to the water gently, yet quickly.

Some anglers have bemoaned that new regulations seem too complicated. We hope a look at our new, simplified fishery regulation pamphlet will dispel fears. County-by-county listings make it easier to interpret the regulations. If you know what lake or stream you are going to fish, it's easy to determine special limits or restrictions ahead of time. We'll do our best in coming years to make the regulations even easier to understand.

We've got a great new facility



Spring bluegill action will stay hot on the Mississippi River

where even those who don't have much luck catching fish can watch some real lunkers. Our salmon and trout spawning station in Dana Farms County Park just west of Kewaunee is going to be the number one fish watching spot in the state. So many of you have enjoyed watching fisheries crews collect fish and stripping eggs and milt for our hatcheries that we designed a work station with you in mind. Two huge glass windows give you a front row seat as salmon and steelhead make their way up a



Chinook remain the king salmon of the inland seas. More anglers expect to hear the call "Fish on!" as sophisticated gear and knowledgeable captains coax big fish from big waters. Wisconsin, Illinois, Indiana, Michigan and Canadian fisheries crews take a team approach to improving fishing on the Great Lakes.

fish ladder. It's open all day and accessible to visitors with disabilities. It's similar to the Brule lamprey barrier in design, but not so remote. I expect so many biology classes at the Kewaunee site this year that we made a parking lot big enough for 20 buses. Soon, a similar facility on the Root River in Racine will rival the Kewaunee station.

There is good news for our fish hatcheries in Wisconsin, too. We've been promised \$11 million by our governor to refurbish cool-water hatcheries at Lake Mills, Woodruff and Spooner. Modernization and enlargement will allow hatchery staff to raise approximately 6.4 million walleye fingerlings and 269,000 muskies by 1995.

Finally, let me say a few words about the future. What are you telling me you want and do I think we can we deliver it?

There is no question that trend setters among the fishing public are ahead of most resource management agencies. As managers, we strive to meet the increasing demand for quality fishing without neglecting the beginner, the lakeshore bullhead angler

or the rural youth who bikes down to the nearest bridge to fish near home.

I believe we can meet all anglers' needs, but not on the same body of water. We need to manage some waters for those who primarily want to eat fish. We must encourage eating panfish while viewing game fish in a different light. We have to convince some people to invest in their fishing



Improved exhibits make state fish hatcheries "fish schools" where visitors can learn how fish are raised for stocking in lakes and rivers.



MICHAEL WEIMER

Soak up nature while you soak your bait. These anglers near Ashland watched swans drift by.

future. Anglers can still enjoy a fishing experience while carefully putting back some of the fish they catch. I know the leaders in the sport fishing community buy into that philosophy. Heck, they're already ahead of us. Let me share some of the encouraging signs:

Muskies, Inc., an avid organization of dedicated musky fishers, convinces its members to release most of their catch. The organization also keeps good records of their fishing success. Five years ago, one in 100 muskies caught by members measured over 50 inches long. Three years ago, one in 87 muskies caught was over 50 inches. Two years ago, one in 65 measured over 50 inches long. In fact, of 5,497 muskies caught two years ago, only 85 fish were kept. Musky anglers win the prize for catch and release, and guess who the beneficiaries are? Everybody who fishes.

I mentioned the Fox River earlier. In 1988, anglers fished the Fox 75,000 hours and killed 8,000 walleyes out of 10,500 caught. We were concerned.

To protect the walleyes during their spring run, we established a 28" minimum size limit on the Fox from March 1 - May 4. Did that tough regulation drive anglers away? Judge for yourself. In 1990, despite a 28" minimum, anglers spent 40,000 hours catching 39,716 walleyes. They only kept 175 fish. Yes, total fishing hours dropped 48 percent, but those who fished caught a walleye per hour. That's almost nine times faster than the average in Wisconsin!

Pallette Lake, a 176-acre lake in our northern research area in Vilas County, is home to smallmouth bass. From 1946-1988, no size limits and no bag limits on this lake meant few bass lived to grow bigger than 10 inches long. People came to Pallette Lake to harvest smallmouth for food as if they were fishing perch. Three years ago, a 16-inch size was established on Pallette. Did anglers stay away once they knew the lake contained only a few legal fish? No. In 1990, fishing pressure was up 35 percent. Although only 26 legal fish



STEPHEN J. LANG

Panfish are fun to catch. Small hands can easily handle and unhook these hearty fish. Teaching catch-and-release techniques on panfish prepares young anglers to more deftly handle and return delicate game fish.

were kept, 820 were released. People came to Pallette Lake because strict regulations meant fishing would remain good. Anglers weren't concerned that they would not be taking home many fish. Do I think the same crowd is fishing Pallette Lake? I doubt it, but I trust that crowd found new spots to catch fish for the table. We've got hundreds of such waters.

Am I against eating a game fish? Absolute not! I like a fillet off a 16-inch walleye just as I always did. All I'm saying to anglers is, if you really want better fishing in Wisconsin with more strikes and bigger fish, then we have to cut back somewhat on the number of fish we kill and take home. I think midwestern anglers are ready to do that if we get them the facts.

What else can you expect from the 1990s? A rejuvenated Delavan Lake will be opened to fishing this spring and, although most of the young fish are small, this place should provide excellent fishing for many years. At the request of the Natural Resources Board, Fisheries Management will be studying fishing tournaments during the 1992 season. We'll provide you an update on this in the next issue of the magazine.



DAVID KUNELIUS

Counting wet noses. Fisheries crews interview anglers, measure and weigh fish caught throughout the fishing season to monitor fish populations and learn how we're doing with the fishing public.

Overall, I'm confident that fishing will get better by the year 2000. Anglers are more aware of conditions fish need and the angling public appreciates what it has. More and more fish are being released, which means the chances for catching fish are

steadily improving. A greater appreciation for clean water and anti-pollution programs will bring back fish to our most polluted waters. More and more people are contributing to the protection of wetlands and other important fish habitats — nearly \$95,000 was donated to fisheries programs by fishing clubs and individuals last fiscal year.

Some people may long for the "good ol' days," but I honestly believe the best years are still ahead of us. Please be sure to take advantage of it. Take a kid fishing and share the pleasures of learning about Wisconsin's great outdoors. We live in a great place, and it will be as full of good fishing memories in the future as it was in the past! □



SCOTT STEWART

Banking and stocking for the future. Fishing clubs work with DNR fisheries crews to restore breeding habitat and stock young fish to improve future fishing. Donations topped \$95,000 last year and clubs volunteered thousands of hours restoring creeks, streams and lakeshore breeding grounds.

*As Director of DNR's Bureau of Fisheries Management, Lee T. Kernen leads the 270 professional managers and field technicians who work to improve fish stocks, habitat and fishing opportunities in Wisconsin.*



# SAVING OUR SONGBIRDS

How we manage forests and grasslands determines if songbirds will sink or soar.

*Craig D. Thompson*

From above, the forest resembles a rich, organic quilt: continuous, undulating, textured shades of green. Occasionally, a small flock of birds emerge from the verdant cloak and rapidly disappear into the canopy's leafy maze. On the horizon, a smoke plume and a cloud of dust signal impending change. Slowly at first, a sinuous brown scar advances toward the heart of the forest. Like an army of mechanized yellow ants, bulldozers methodically carve roads into the wooded landscape. Around them, slash piles smoulder in scattered heaps.

In this case, the forest is in our backyard, not tropical Brazil. Roads, homes, timber harvests and agricultural practices in our forests and fields are having as dramatic an impact on migrating songbirds as the destruction of the tropical forests of Central and South America.

To better understand this situation, let us turn back the history pages.

For thousands of years after the glaciers retreated, Wisconsin's landscape evolved into continuous forests

of sugar maple, hemlock, white pine and red pine in the north. Tracts of oak, hickory, sugar maple and basswood prevailed in southern Wisconsin, occasionally interrupted by oak savannah and prairie. With settlement, prairies were plowed and planted, vast expanses of forest fell to provide the building blocks for a growing society. While the loss of the great northern pinery is legendary, habitat was altered even more significantly in Wisconsin's southern forests.

By the 1940s, when UW-Madison professor John Curtis began studies for his seminal work *The Vegetation of Wisconsin*, southern Wisconsin forests had been clear cut or dramatically changed by logging, farming and grazing. In fact, Curtis couldn't find pristine examples of many forest types, so he reconstructed a picture of Wisconsin's pre-settlement landscape by interpreting original land survey notes. The changing landscape made Curtis's research more difficult and it created even greater problems for woodland birds.

In the late 1970s, a cadre of ornithologists sounded an avian S.O.S. Data from breeding bird surveys across the eastern United States indicated populations of many species that live in deciduous forests were declining precipitously. Wisconsin data tells a similar story. From 1966 to the present, northern water thrush populations have declined 30 percent, veeries dropped 55 percent and black-billed cuckoos plummeted 68 percent. Formerly widespread species, such as wood thrushes and Acadian flycatchers, disappeared completely from small woods. They were solely found in large tracts of undisturbed forest that provided quality habitat. Ornithologists termed these birds "area sensitive."

However, not all bird species followed that pattern. Permanent forest residents, such as chickadees and cardinals, and short-distance migrants that winter in the southern United States, such as grey catbirds and robins, were maintaining healthy populations.

Why were certain species declin-



(top) Common yellowthroat (*Geothlypis trichas*).  
(middle) Gray catbird (*Dumetella carolinensis*).  
(bottom) Eastern kingbird (*Tyrannus tyrannus*).

Populations of many songbirds have dropped considerably during the last two decades. As forests, grasslands and wetlands are fragmented, plowed and drained, these birds have fewer places to breed. They face similar threats on their wintering grounds in Mexico, Central and South America. Yellowthroats live in thickets, wetlands and second-growth forests. Catbirds inhabit parks, suburban neighborhoods and gardens. Kingbirds thrive in pastures and grasslands.



The willow flycatcher (*Empidonax traillii*) prefers swampy thickets, pastures and orchards. This neotropical migrant breeds in Wisconsin and as far northwest as British Columbia. It winters in South America skillfully feeding on a variety of bugs, especially gnats.



Some birds need the protection of large, undisturbed forests to breed and fend off predators. When forests get fragmented (left) like this portion of southwestern Juneau County, woodland birds like the wood thrush (*Hylocichla mustelina*) move elsewhere or don't reproduce. Environmentalists are working to preserve the largest remaining blocks of the southern Wisconsin forest. The Baraboo Hills near Devil's Lake State Park in Sauk County (right) still contain outstanding tracts of 13 distinct habitats important to songbirds.

ing? Researchers discovered a common thread. Songbirds declining the fastest bred in large, undisturbed forests of North America and migrated in winter to tropical climes. Researchers refer to these songbirds that breed in North America but winter in the Caribbean, Central and South America as "neotropical" migrants.

After more than a decade of ornithological sleuthing, clues to the mystery of the missing songbirds are identifying likely culprits.

Habitat loss in both North America and the tropics is decimating bird populations. Many species simply can't find suitable habitat here or on their tropical wintering grounds. Birds forced to use second-rate habitat face additional problems.

Forest fragmentation — the subdivision of large, continuous forests into smaller rural and suburban woodlots — changes the ecological complexion of the forest. For instance, southern Wisconsin forests have become patchy wooded islands surrounded by seas of agriculture and urbanization. It's not just that tree cover is reduced. Roads, fields and openings increase the amount of woodland edge. Birds which breed in

these remnant woodlots often must fend off predators that thrive in these conditions. The smaller the woodlot, the easier it becomes for foxes, raccoons, opossums, blue jays, grackles and crows to find nests, eggs and young birds.

David Wilcove, a senior ecologist for the Wilderness Society, studied nest predation rates in forests of various sizes. Wilcove mimicked natural songbird nests by stocking artificial

nests with quail eggs. Results were both astonishing and disturbing. In the largest forest studied, the half-million acre Great Smokey Mountains National Park, only two percent of all nests were preyed upon after one week. In rural woods ranging from 10 to 30 acres in size, 48 percent of all nests were disturbed. In suburban woodlots of similar size, predation rates were as high as 70 percent. Clearly, woodlot size and predator density are critical factors that can keep songbirds from breeding successfully.

But these factors form only half of the equation. Another songbird menace has winged its way into the woods.

### Problems from a nest parasite

The brown-headed cowbird is a small, unpretentious member of the blackbird family. Cowbirds are infamous for their unique breeding strategy known as nest parasitism. They lay eggs in other birds' nests, leaving the host species to raise young cowbirds. Supremely adapted to this free-loading lifestyle, young cowbirds hatch earlier and grow faster than



The indigo bunting (*Passerina cyanea*) needs uncut grasslands, pasture and brushy slopes to find insects and tall plants like mullein.



STEPHEN J. LANG

Brown-headed cowbirds (*Molothrus ater*) are pernicious brood parasites of more than 200 songbird species. They roam the edges of woodlots, forests and grasslands laying eggs in nests that other "hosts" will raise. Young cowbirds grow quickly and try to eat most of the food brought to the nest for other birds.

their unrelated nest mates. Consequently, little cowbirds eat the majority of food coming into the nest.

Brown-headed cowbirds originally traveled the Great Plains and lived on insects associated with buffalo. Their nesting strategy allowed the adult birds to keep up with roaming herds that meandered the vast prairies. As forests were cleared and cattle freely roamed into wooded areas, the cowbirds followed, spreading throughout eastern North America and extending their range to four times its pre-settlement size. Cowbirds that formerly affected 50 grassland species now parasitize 200 species. Woodland songbirds became unsuspecting victims.

One study of 15 wood thrush nests in central Illinois found nests containing 15 thrush eggs and 48 cowbird eggs. By the end of the breeding season, eight cowbirds fledged while only one wood thrush survived.

For some species, the situation is even more critical. The Kirtland's warbler and the black-capped vireo have been pushed to the brink of ex-

inction by extensive nest parasitism. Only aggressive cowbird trapping and removal gives warblers and vireos a tenuous toehold on survival.

Cowbird populations have increased explosively as grain cash cropping has become more profitable on their wintering grounds in southern states. Mechanized farming practices on large acreage leaves plenty of winter food for cowbirds.

### Why tropical migrants face special risks

All birds nesting in fragmented woodlots suffer predation and nest parasitism, but neotropical migrants are especially vulnerable. Many only raise one brood a year. They arrive on their breeding grounds later and depart earlier than resident birds and those migrating shorter distances. Tropical migrants don't have the luxury of producing a second or even third brood, as do cardinals and robins. Nest failure well into the summer may doom their only opportunity to breed in a given year. Second, many neotropical migrants such as whip-

poor-wills, black-and-white warblers and ovenbirds are ground nesters, making them extremely vulnerable to predation. By contrast, none of our common suburban resident or short-distance migrants nest on the ground. Third, most neotropical migrants are small birds, ill-equipped to drive marauding predators such as cats, raccoons or even blue jays from their nests.

As if problems on the breeding grounds aren't enough, many woodland songbirds find less and less suitable habitat on their tropical wintering grounds. More than half of the 650 bird species found in the United States call the tropics home for up to seven months of the year. Many return to the same location year after year. Others defend winter territories against their own kind. As thousands of square miles of forests in Central and South America are destroyed annually, it's no wonder migrating songbirds are stressed.

### Grassland birds in peril, too

Woodland songbirds would find little comfort in the sad truth that their grassland cousins are no better off.

On almost any morning in early June, you can find David Sample waist deep in tall grass. An ornithologist with the Department's Bureau of Research, Sample has been studying



DNR BUREAU OF RESEARCH

Dave Sample and colleague collect prairie plants in Jefferson County as they study grassland birds' needs.

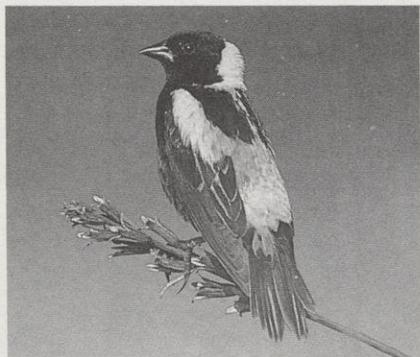
Wisconsin's grassland birds for several years. Like woodland species, populations of many grassland birds have dropped precipitously statewide. Since 1968, dickcissels have declined 96 percent, grasshopper sparrows fell 94 percent and western meadowlarks dropped 84 percent. Other grassland birds losing ground throughout the Midwest include the bobolink; field, vesper and savannah sparrows; eastern meadowlark and loggerhead shrike. Since 1950, Illinois grassland bird populations have declined 80 percent to 90 percent.

According to Sample, reduced habitat is a key factor. "Despite the loss of 99 percent of Wisconsin's native prairie, most grassland species maintained their populations by breeding in hayfields and pastures that serve as surrogates for natural grasslands," Sample said. "However, since 1950, the amount of pasture in Wisconsin has declined from 4½ million acres to approximately two million acres." Intensive agricultural practices have rendered remaining acreage less suitable for birds.

The right kinds of pastures could provide terrific habitat for grassland songbirds, Sample determined. Pastures can hold large numbers of species and relatively abundant bird populations, provided they are not overgrazed, he said. Unfortunately for songbirds, changing farming technology means fewer acres are left as grassy pastures. For 40 years, grassy pastures have been converted to faster growing varieties of alfalfa that can be cut early, often and close to the ground. Since these new cultivars were introduced, the average first cut in hayfields has moved from July 1 to June 1 — right in the middle of the bird nesting season. Enough bird eggs and young are mown down that biologists consider these alfalfa fields "population sinks" that contribute to the overall decline of many bird species.

Further compounding these problems, Wisconsin's remaining grasslands are highly fragmented, exposing birds to the same predation and parasitism problems as woodland

birds. As with neotropical migrants, grassland songbirds are also stressed by changing land use on their wintering grounds in the southern United States.



GREGORY K. SCOTT

The prairie and meadow-loving bobolink (*Dolichonyx oryzivorus*) is a true long-distance traveler breeding in the northern United States and Canada and migrating to southern South America. Southerners call them "Ricebirds" because they rest and feed in the rice fields during migrations.

Loggerhead shrikes, for instance, have steadily declined in the upper Midwest despite ample acreage of quality habitat and breeding success. Why? Wildlife researchers attribute the drop to the fact that thousands of grassland and scrub land acres have been converted to row crops or pine plantations. Many of the remaining grasslands are infested with exotic fire ants which kill or drive off insects and small mammals that shrikes eat. Row crops and resulting waste grain have displaced shrikes with growing populations of blackbirds and brown-headed cowbirds.

### Some encouraging signs

Despite this litany of avian woes, the S.O.S. for songbirds has been heard and the outlook is getting rosier.

Resource managers are concerned about the loss of songbird habitat. They will increasingly protect songbirds as a side benefit of managing resources for other purposes. Public properties are being managed to protect birds, but forestry, wildlife, fisheries and recreational funds should not have to bear all the management costs.

The call to protect songbirds is banding concerned people together.

The Department of Natural Resources works with partners to preserve our avian heritage by identifying, acquiring and protecting critical habitat statewide. Particularly noteworthy is the Glacial Habitat Restoration Area, a cooperative program between DNR managers and private landowners to protect, restore and manage 35,000 wetland and grassland acres in east central Wisconsin for both game birds and songbirds.

Biologists also appreciate the importance of maintaining large blocks of forest and grassland to ensure long-term survival of many species. The buzzword among biologists is "biodiversity." Surprisingly, it follows the old Texas rancher philosophy that sometimes "Bigger is better." Maintaining large, undisturbed tracts of land can reduce the edge effect that opens forests and fields to nest predation and parasitism.

How big is big? According to Mike Mossman, nongame biologist with the Department's Bureau of Research, a 500-acre tract of forest is probably the minimum tract size needed to protect area-sensitive forest birds like the wood thrush or cerulean warbler.

But birds need quality as well as quantity. Forest habitat needs to provide trees of diverse ages and species. Researchers like Mossman are conducting field research to determine the proper mix. The aim is to recommend guidelines for foresters, wildlife managers, farmers and recreational land managers to sustain northern forests that are more "songbird-friendly."

In southern Wisconsin, songbird habitat protection will focus on four areas containing the largest remaining blocks of deciduous forest: the northern and southern units of the Kettle Moraine State Forest, the Lower Wisconsin Riverway, the Mississippi River corridor including forested areas along the Chippewa and Black rivers, and the Baraboo Hills. Of the four, the Baraboo Hills is considered a mecca for breeding songbirds.

Covering approximately 20,000

acres in central Sauk County and adjacent Columbia County, the Baraboo Hills are a ring of ancient quartzite bluffs containing 13 distinct habitat types. From jack pine barrens to large hardwood forests, 135 bird species have been seen here and at least 91 species breed here. Land purchases and management plans developed by landowners, the Department of Natural Resources and the Wisconsin Chapter of The Nature Conservancy have protected a significant amount of habitat within the hills.



On the international front, the National Fish and Wildlife Foundation is sponsoring a second year of *Aves de las Americas - Partners in Flight*, a program to conserve migrating songbirds and their habitat. Conferences and clearinghouses bring together experts from federal, state and local agencies, nongovernmental organizations, conservation groups, industry and the academic community in both North and South America. Through practical research, participants monitor bird populations and habitat trends, manage important habitats, and establish educational programs to conserve neotropical migrants.

In a world where an estimated 1,000 species become extinct each year, declining songbird populations send a very serious signal. Natural resources are linked and interdependent. Like losing rivets from an airplane wing, we can't afford to learn which species or which biological communities represent the critical rivets. And bird songs, or the lack of them, sound a shrill clarion we cannot afford to ignore. □

*Craig D. Thompson is assistant environmental impact coordinator for DNR's Western District. He works in La Crosse.*

## The new "Good Book" for Wisconsin birders

Where in Wisconsin are you most likely to spot a cardinal? Did those "early" robins you saw last spring really go south for the winter? How many eggs will you likely find in a veery nest? Where has the Kirtland's warbler been sighted in Wisconsin? Is the eastern meadowlark's call note a *dzeep* and the western meadowlark's a *chupp*, or is it the other way around? Where can

Samuel D. Robbins, Jr.

you find out about the "area sensitive" cerulean warbler whose song sounds like a bird "giving off a sneeze after several introductory gasps: *ah, ch-ch-ch-ch-cheez?*"

It's all in an encyclopedic, new birding reference, *Wisconsin Birdlife: Population and Distribution/Past and Present*, by Samuel D. Robbins, Jr. The book will soon be touted as the factual and physical heavyweight for amateur and professional ornithologists alike. The 702-page volume contains authenticated records and notes from the state's leading ornithologists about every one of the 394 bird species reliably recorded in Wisconsin.

The book began as the germ of an idea from the late artist Owen Gromme, then curator of birds at the Milwaukee Public Museum. Robbins got involved in the project in the late 1960s. Others added their expertise. A chapter on habitat preferences by James Hall Zimmerman, UW-Madison naturalist, details 29 kinds of bird habitat in the Wisconsin landscape. Three easy-to-use tables matches species to the habitats used by resident, wintering and migrating birds.

An enlightening chapter explores the history of Wisconsin ornithology. It documents how pesticide use, logging and agricultural clearing of forests and wetlands caused habitat loss and consequent declines in bird populations. Efforts to combat bird losses through protective laws, restocking and public education are also detailed.

The heart of the book is its nearly 400 detailed species accounts — past and present population and distribution, habitat needs, migration patterns, breeding habits and wintering traits are described for each species. A glance at handy range maps shows when and where to find a particular species in the state. For example, the account of the brown-headed cowbird concretely describes why the bird so threatens other species.

An added attraction is Robbins' folksy commentary. Once he whistled to attract migrating warblers and instead was surprised to hear "the whinnied response from a screech owl." He shares his feelings for the pied-billed grebe this way: "I have often wondered, while standing on the road adjacent to the Twin Lakes in St. Croix County, what it would sound like if every pied-bill on these lakes sounded off at the same time. I have heard five or six going at once and laughed at the ludicrous tomfoolery .... On a larger marsh like Horicon, where grebes must number in the hundreds, the sound would be fantastic if all decided to 'whup it up' simultaneously."

*Wisconsin Birdlife* is available from the University of Wisconsin Press, 114 North Murray Street, Madison, WI 53715-1199, by phoning (608) 262-8782 or through bookstores.

— *Backyard birder Charles G. Evenson lives in Madison, Wis. He grew up in Baraboo and spent many days watching birds in the Baraboo Hills.*





ROBERT QUEEN

Mary R. Sagal

A spherical stone, a birch leaf and a little tobacco once helped Chippewa Indians ward off rainstorms.

While techniques have changed, state residents are still trying to find ways to deal with unwanted side effects of precipitation. Although it replenishes groundwater supplies and waters crops, rain is not always welcome.

That's especially true in urban areas covered by concrete and other impermeable surfaces. In cities, rain and melting snow — known collectively as stormwater — are quickly channeled, drained and whisked away from paved areas to prevent flash flooding.

Where does all that water go? Street gutters drain into storm sewers which carry water into nearby lakes, rivers and streams as quickly as it hits the pavement. Picture an expansive river beneath the street, or a watery subway.

Rain  
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pollutants  
into  
lakes.  
We  
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it.

The system is quite an engineering feat, but it's a convenience that comes at a price. On its way to the gutter stormwater will flow across roads, parking lots, construction sites, rooftops and lawns. Along the way it will pick up pollutants like oil, loose dirt, metals, fertilizers, pesticides and bacteria.

Such pollution is called *nonpoint source pollution* because it can't be traced to just one point of origin. It accounts for half of the nation's water pollution. Since storm sewers empty directly into nearby lakes and streams, that mix of untreated pollutants regularly drains where you fish, boat and swim.

#### How stormwater gets polluted

Stormwater dissolves and scours pollutants from many sources.

Every time you drive your car, you leave a little of it behind. Zinc from

# A CONCRETE PROBLEM



Ironically, fresh cleansing rains carry metals, nutrients, oils, sediment and as much bacteria as in raw sewage into lakes.

tires clings to concrete. Oil from the crankcase can drip onto roads and parking lots. Hydrocarbons from exhaust pipes float back to earth.

There are a host of other sources, too. Storms wash bird feces from rooftops and pet wastes from lawns that can spread bacterial diseases like campylobacteriosis, which causes diarrhea. Lawn care products often contain pesticides that can poison fish and other aquatic organisms. Dirt from construction sites can clog waterways.

"I think most of us have memories of floating toy sailboats down the gutter after a rain," said Roger Bannerman, a Department of Natural Resources environmental specialist who is studying the constituents of city stormwater. "Surprisingly, bacteria counts in that water can be as high as in raw sewage."

After three months of sampling rain in Madison and Milwaukee during the summer of 1990, Bannerman found that stormwater often includes these pollutants by the time it reaches city lakes and streams:

- metals such as lead, zinc and copper at levels toxic to fish and other aquatic organisms.

- bacterial concentrations that are 2.5 to 250 times the level considered safe for human exposure.

- PAH or polycyclic aromatic hydrocarbons that can cause cancer. PAH are by-products of several types of combustion from car engines, home furnaces, industrial processes and even forest fires.

- phosphorus, a nutrient that can stimulate aquatic plant growth.

- sediment or soil particles from construction sites which can smother fish eggs and larvae, cloud water, impair sight-feeding fish and clog fish gills.

"No one accepts the blame for stormwater pollution because it's so difficult to pinpoint sources," Bannerman said. "The fact is, almost every pollutant in stormwater was put there by people, and only we can take it away."

### Solid solutions to liquid problems

Putting the brakes on stormwater requires reducing the volume, speed and concentrations of pollutants that funnel from the cityscape into lakes and streams. Slowing water down on its inevitable path to the sea takes a balancing act — keeping water levels

high enough to support fish populations and low enough to prevent flooding during peak runoff.

Keeping pollutants out of stormwater is a more effective, economical and environmentally sound way to keep it out of waterways. Several common-sense precautions can prevent problems:

- Storage and manufacturing areas should be covered as much as possible to divert the forceful flow of stormwater away from goods that might dissolve, leak or spill on the ground.

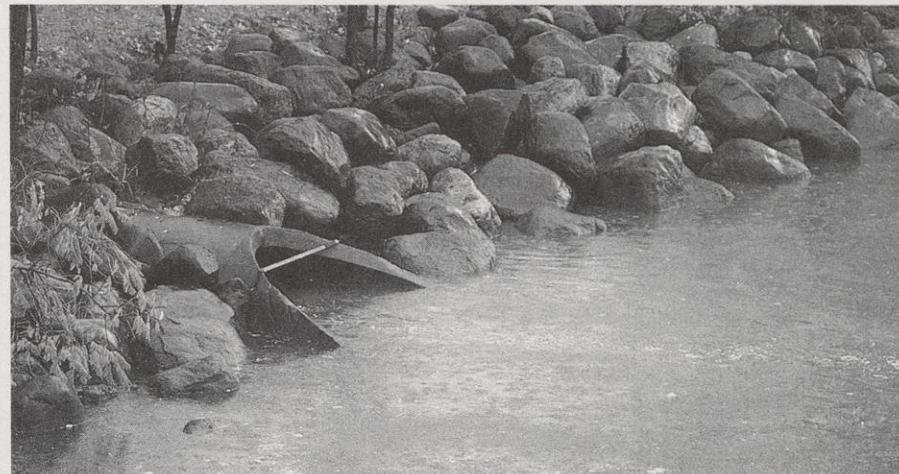
- Builders can control erosion at construction sites by covering dirt piles and placing filter fences or other erosion barriers between the site and nearby pavement.

- The landscape can be reshaped and engineered to trap pollutants before they run far.

Detention ponds are shallow reservoirs that are underlain with plastic or compacted soil. The pond is shaped and pitched to collect raging stormwater and retain it like a wetland would — reducing flooding, storing runoff and providing a place for contaminants to settle out before they reach a nearby lake, river or stream. Collected pollutants are dredged from the pond periodically and taken to a sanitary landfill.

A well-designed detention pond is more than a pollution trap. It can be a neighborhood attraction, providing a pretty locale for an evening stroll, a

Storm sewers were designed to efficiently drain streets and prevent flooding. The raw pollution mix from roads and rooftops drains directly through storm drains like this into streams.





JAMES BACHHUBER

Oily slicks and decaying leaves are two urban pollutants that residents can control. Collect and recycle motor oil. Compost or mulch leaves away from the sidewalks. Wash cars on grassy areas that soak up suds. Drain downspouts to grassy areas or gravel rather than concrete.

place to watch birds, a reflecting pond where a toy armada can set sail and a skating pond in winter.

Other landscaping techniques also act as stormwater controls. Infiltration basins look like detention ponds but the bottom is lined with permeable soil. Collected stormwater slowly soaks through a deep soil layer into groundwater. Filter strips are swaths of grass or other close-growing vegetation that trap stormwater pollutants as water flows across the land.

So-called "conveyance systems" use storm sewer technology to cleanse stormwater more naturally. A mixture of porous pipes and grassy swales allow water to soak into the ground as stormwater flows toward a nearby waterway.

### Federal controls

This year, stormwater controls become more fact than theory. By federal law, cities with more than 100,000 residents — Milwaukee and Madison in Wisconsin — will start measuring pollution loadings as rain and melting snow travel through their storm sewers. Eventually, these discharges will be restricted similarly to the way industrial pipelines are

now regulated. Effluents will be monitored and state permits will limit the amount of pollution permissible from storm sewers. The monitoring/permit program will ultimately keep stormwater cleaner in smaller communities as well.

Several kinds of businesses will also have to monitor, measure and reduce stormwater pollution from their property. Stormwater restrictions will first apply to railroad and trucking

Such a deal! Fill dirt needed to construct a shopping center in DePere was removed and built into a detention pond to trap parking lot pollutants.



MARY R. SAGAL

firms, most manufacturing industries, solid waste landfills, mining operations, sewage treatment plants, electricity generators and hazardous waste treatment, storage and disposal facilities.

"We're redefining nonpoint source pollution," said Anne Mael, who coordinates the stormwater permit program for the Department of Natural Resources. "Even though we've been regulating pollution discharges from industry for years, we found that streams and rivers aren't getting as clean as we anticipated. When we started looking around for the reasons, we discovered how much pollution stormwater runoff adds."

### Putting stormwater controls into practice

One community taking progressive steps to tame stormwater is DePere, a city of 16,500 along the Fox River at the southern fringe of the Green Bay metropolitan area.

Tucked among the offices, manufacturing shops and warehouses in DePere's westside business park are 12 attractive detention ponds. All look like they were built to attract wildlife.

"Proper design gives you more than one benefit," said Carl Weber, DePere city engineer and director of public works. "The ponds look great, and we're controlling the volume of

water that washes through, stemming runoff and attracting birds."

Weber said 25 percent of the 600 acres that make up DePere's new industrial complex will remain as green-space interspersed between buildings. Large, grassy right-of-ways will stretch between ponds, filtering contaminants even before stormwater reaches the detention ponds. Wetland vegetation along the banks provides shelter for birds and animals.

"We even saved \$80,000 to \$100,000 constructing one detention pond through a unique agreement with one tenant," Weber said. "When the discount store Shopko moved into the park, builders needed fill and we needed to dig another detention pond. We told them we'd give them the dirt if they'd build the pond. It worked great."

DePere is meeting with environmental success on other fronts, too. In a booming residential area on the east side of town, a similar stormwater management strategy has united developers, new homeowners and city officials. Funded in part by a demonstration grant from the Department of Natural Resources, this new neighborhood site includes 6,600 feet of grassy drainage ditches and two detention ponds.

Rain that falls on this neighborhood flows into a detention pond and then slowly trickles into a grassy ditch that empties into the East River.

"Installing cement gutters and

Wet detention basins enhance this DePere housing project and prevent runoff into the East River.



MARY R. SAGAL



NONPOINT SOURCE AND LAND MANAGEMENT SECTION

Landscapers can sculpt grassy swales that are as effective as concrete in draining water away from buildings to areas where rains can slowly soak into the ground.

storm sewers would have cost \$1.74 million in that development," Weber said.

The detention pond-grassy ditch system cost \$945,000 with the DNR grant. Even without the grant, this system would have cost 30 percent less than conventional curb-and-gutter techniques.

"Developers and residents supported our idea because of cost savings," Weber said, "but it didn't hurt that this solution also helps the environment." □

*Mary R. Sagal writes about environmental issues for DNR's Bureau of Information and Education.*

## What you can do

**Prevent pollution.** Remember, everything that goes down a storm sewer ends up in a waterway. Don't use storm sewers as trash bins.

**Be a green car owner.** Cars are a major source of pollutants picked up by stormwater. They also cause most of our air pollution problems. Limit car use by walking, riding your bike, joining a carpool or using mass transit. Clean your car at a car wash where used water flows to a sanitary sewer, not a storm sewer. If you wash your car at home, use a gentle, biodegradable soap. Hose the suds onto the grass, not the driveway or street. If you change your own oil, take the used oil to a recycling center.

**Maintain a healthy lawn.** Make your lawn a sponge! Grass, ground cover, shrubs and trees all catch water, giving it time to soak into the soil instead of creating runoff. Reduce pesticide and fertilizer use. Do not allow leaves, grass clippings or soil to accumulate on your driveway, sidewalk or in the street. Keep them on your lawn.

**Clean up after pets.** Use a "pooper scooper" to collect feces when you walk your dog. Flush the waste down the toilet or bury it in your backyard when you get home.

**Limit paved surfaces.** When building or renovating walkways and driveways, consider using porous materials such as gravel, bricks, lattice blocks set in sand, stepping stones or wood chips instead of concrete or blacktop.

**Redirect stormwater.** Drain house gutters onto flat and relatively grassy or well-vegetated areas, not onto pavement.

**Prevent erosion.** Cover slopes with vegetation, mulch or rock gardens.



# WISCONSIN'S MOULD BUILDERS

Many types of mounds were built for many reasons.

European colonists would find it unsettling to discover some mounds were built by settlers more than 2,000 years ago.

*Cynthia M. Stiles*

## HISTORIC MOUNDS

*"We had the occasion to be highly gratified with a survey of curiosities that have baffled the ingenuity & penetration of the wisest to account for them. The curiosities alluded to are the remains of ancient works... which we found more numerous and of greater extent up on the high lands just above the Ouisconsin than any of which a description has been made public that have yet been discovered in the Western Country...."*

Steven H. Long, 1817

These words, penned in Long's journal while he was employed by the United States War Department to map the American middle west, describe mounds he located on the heights of the Wisconsin River. This spot is now part of Wyalusing State Park, which you can visit in Grant County. Similar words were echoed by other explorers, fur traders and settlers, as European and Yankee settlement extended into the Upper Mississippi River region. They knew little about the mound builders yet, ironically, a great deal of the information we have been able to piece together today about the location of these ancient sites depends on ac-

counts from the first European immigrants.

Today, we are more sensitive about saving mounds and other cultural remnants, but we destroyed many of them before we gained such sensitivity.

Who were the moundbuilders?

Given their self-image as explorers and takers of an unsettled wilderness, 18th- and 19th-century settlers did not credit these magnificent earthworks to the people then inhabiting the land. So little was known about America's ancient past that Europeans believed all mounds were built by one extinct race of people. Some settlers believed that this race descended from the earliest Old World explorers of the seas: the Phoenicians, Egyptians and Scandinavians.

Through long and careful study of the mounds and surrounding villages, we now know that mounds were built for nearly 3,000 years by people from several different cultures who shaped earthworks for a variety of purposes.

People have lived in the Upper Midwest region for more than 12,000 years. However, the earliest remains of earthworks, like mounds, appear to date from 600 B.C. Very little is known about these first mound builders.

Between 100 B.C. and AD 100 archaeologists noted increases in native populations and changes in lifestyle. Nomadic ways of life were replaced by the beginnings of seasonal village life which was tied to warm-weather horticulture. This era marked the beginning of an extensive trade network which grew to include exotic goods and raw materials exchanged among traders in the eastern half of the continent. Trade centers flour-

Many of our state parks and forests contain mound sites. Several have signs and are managed for public viewing. Check with each park office as you enter for directions and accessibility. Remember, these sites are considered sacred places for many Native American tribes. Always treat them with respect. Some of the finest specimens are preserved at:

Aztalan State Park

Nelson Dewey State Park

Wyalusing State Park

Perrot State Park

Copper Culture State Park

Lake Kegonsa State Park

Governor Nelson State Park

High Cliff State Park

Devil's Lake State Park

State parks, like Perrot, preserve remnants of the mound-building cultures that built an estimated 15,000 mounds in Wisconsin 600 to 2,600 years before white settlement.



ROBERT QUEEN

ished, patterned after those of the Hopewell in Ohio and Illinois. Trading brought different social and political ideas to local populations.

Throughout the first 1,200 years of mound construction, earthworks were built to house the dead. After 100 B.C., ceremonies accompanied the careful preparation of burial grounds. The tomb and ceremonial area was then covered with dirt. The same burial mounds were often used repeatedly over a long period of time, creating a succession of tombs within a single earthwork. The resulting shape was round and tall. Some of these conical mounds reached a height of 20 feet or more.

Around AD 600, lifestyles again changed throughout the region. Horticulture becomes important, first using local plants, then corn. The introduction of the bow and arrow made hunting more efficient and individual. Settlements began to dot the landscape, especially where land was easy to till, water was plentiful and a wide variety of wild food and raw materials for tools were readily available. The vast intercontinental trade network disappeared. In its place, regional customs and material goods developed.

Mound building also changed. Although conical mounds were still built, they were smaller. New shapes started dominating the landscape. People crafted earthworks in the form of large birds such as eagles or hawks; animals such as deer, bears, buffalo and panthers; as well as long, straight mounds we call "linears." Large groups of mounds with a variety of linears or a mixture of linear and animal shapes appeared. Some groupings contained as many as 300 mounds built over a period of several hundred years.

Archaeologists call these "effigy mounds" to distinguish them from previous moundbuilding traditions. Effigy mounds and the traditions of the people who built them are unique to an area that now encompasses southern Wisconsin, and small portions of northern Illinois, eastern Iowa and southeastern Minnesota.

Aside from their distinctive shape, effigy mounds are distinguished by their size. Although all are less than three feet high, many linear and animal shapes range from 50 to 200 feet long. Effigy moundbuilders sometimes incorporated earlier conical mounds into their group designs. However unlike these earlier mounds, not all effigies contain burial sites.

Their function is hotly debated: boundary markers, clan totems, ancestral monuments, and/or astronomical markers for key ceremonies, to name a few. However, all researchers, native and non-native alike, agree the mounds represented an important focus for the social, religious and political lives of the people who built them.

Around AD 900, a new group of people entered the region from the south. These people brought a different type of moundbuilding tradition patterned after that found in the great cultural center of Cahokia near present-day St. Louis. Their mounds, called platform or house mounds, can be seen in only a few places in Wisconsin. The most well-known site is Aztalan State Park in Jefferson County.

The people of Aztalan were settled farmers who grew corn, beans and squash, hunted large and small game, and collected plants for food and medicine. They lived in the area from approximately AD 900 to AD 1300. There is evidence that the Aztalan settlers made contact with surrounding cultures, perhaps to exchange food and raw materials.

At one time, the Aztalan site contained three platform mounds and a natural knoll that encompassed four corners of a large plaza. The mounds, plaza and several houses were surrounded by a stockade. Unlike their surrounding neighbors, the Aztalan people had a highly stratified society. An elite group organized the village political and ceremonial life. The platform mounds were used to elevate temples, charnel houses (like crematoria) as well as the living quarters of the most important members of the society.

## A recent push to preserve mounds

Prior to European and Yankee settlement of the Midwest, thousands of mounds could be found where there were natural vistas on bluff tops, along lakeshores and following river terraces. Many were leveled by white settlers during the first 100 years of agricultural practices. As cities were established, many more mounds disappeared. Most of our information about mound shape and groupings was gathered in the middle to late 19th century by surveyors employed to locate and map them. An estimated 15,000 mounds were constructed in Wisconsin and about 40 percent of these were destroyed through development — urbanization, road building, agriculture, lumbering, mining and dam impoundment — during the last 130 years.

Public concern over the disappearance of our nation's past prompted state and federal governments to pass laws preserving cultural resources. In 1985, the State Legislature passed the Burial Sites Preservation Act, which protects all human burials whether historic or prehistoric, marked or unmarked, on private or public land. State approval is required before any disturbance can occur. Mound sites are considered burial sites under state law and are afforded protection. Federal and state laws enacted since the 1960s aim to preserve our history on state or federal land, and on properties that receive state or federal permits, licenses or assistance. Many private land owners share this sensitivity. They work with historical societies and archaeologists to learn about the people who used the land before them. And they appreciate that the richness, the value of their land includes saving our cultural heritage. □

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*Cynthia M. Stiles is the historic property planner for DNR's Bureau of Property Management in Madison.*



RICHARD RIDEOUT

# BRINGING THE FOREST TO TOWN

Many Wisconsin communities are proudly wearing the green.

David L. Sperling

**T**alk to most people about greenery in the city and they think landscaping — a few shrubs, a few carefully placed shade trees, a little garden, and the annual turf battle between mower and lawn. Yet, if you raise your sights even a hundred feet above your town or city, your perspective changes dramatically. From here, the land is sheltered by a leafy canopy dotted with homes, streets, ball parks and businesses. Trees are, by far, the city's most populous residents. Like other parts of a community, they need care and attention.

People have a lot invested in their community's trees. Trees beautify any neighborhood and make living space more livable. Developers plant trees to define the character and spirit of new homes, apartments and offices. Some plant trees to tame hot summers and winter storms by providing windbreaks, shade and natural air conditioning. Trees make parks, walks and public places more relaxing and comfortable. The daily hassles of traffic and congested streets are much less stressful in areas surrounded by trees.

Trees do more than make us feel good. They attract birds and other wildlife. They enhance property value and conserve soil. They stimulate business and tourism. People feel more welcome, linger longer and spend more money in business areas with mature trees. Moreover, trees are a source of civic pride and community protection. You don't find as much litter, graffiti and crime in areas surrounded by trees and flower gardens.

Trees have the capacity to live long lives compared to human life-spans. Yet, according to the journal *Urban Forests*, the average lifespan of a downtown tree bounded by concrete is less than 10 years.

City life can be tough on trees exposed to car exhaust, compacted soil, parched paved areas, disease, development, pollutants, and vandalism. Yet with proper care, city trees could easily live six to ten times longer.

Typically, more than half of every

community's trees are on public property — street trees, parks and playgrounds, along recreational trails, around businesses, near office parks and open spaces. Planning, planting and maintaining these trees is too important and too valuable to do haphazardly.

## Tree City plants the seed to nurture city trees

One approach to encourage communities to invest and care for urban trees is the Tree City USA program, sponsored by the National Arbor Day Foundation and state foresters. Towns and cities that meet simple requirements get visible symbols to display their sustained commitment to trees. Official Tree Cities receive a plaque, a beautiful flag of a green tree on a white field, and special Tree City signs that hang like a welcome mat at the city limits. This publicity is an important tool to build community pride and support for tree programs.

The Tree City program provides an incentive and a tool for organizing community action to view urban forests as community assets that need a budget. Followup Tree City Growth Awards recognize communities that keep improving their basic programs. Each community applying for Tree City recognition must have a Tree Board or commission that accepts legal responsibility for the community's public trees. City tree ordinances bind the board to form long-term plans to remove dead and diseased trees, replace old trees with disease-resistant varieties, plant trees safely and maintain trees. Tree Cities must also have community forestry budgets of at least \$2 per capita and hold officially-proclaimed Arbor Day observances.

In truth, the Wisconsin towns and cities distinguished as Tree Cities are doing much more to share the value of trees as honored citizens in their communities. From the town of Gilman, population 470, to Milwaukee's 184 full-time forestry staff with a budget exceeding \$10 million this year, each Tree City has a story to tell. Here are a handful.

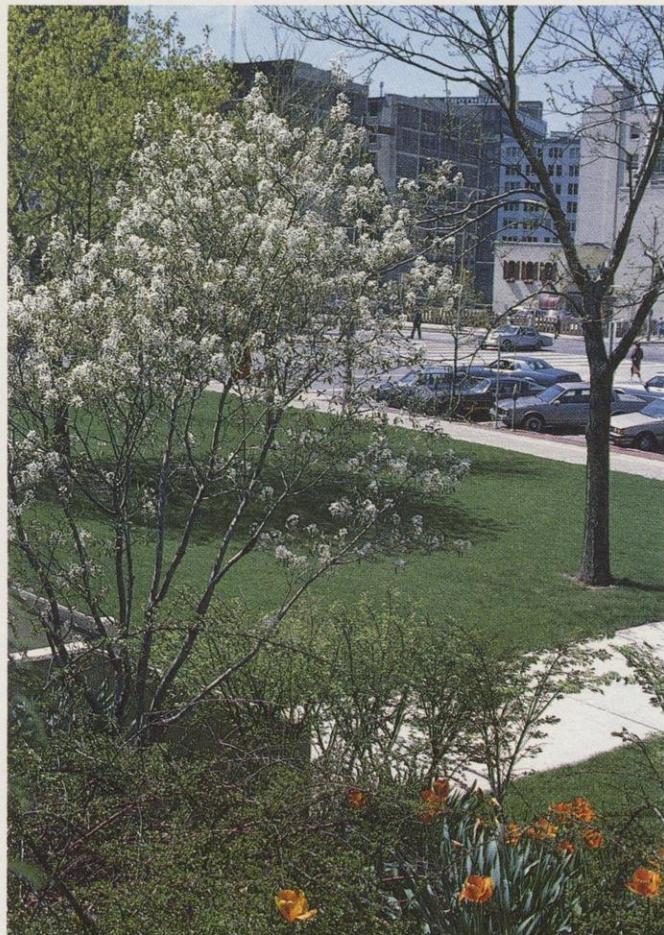
## Seeding ideas of environmental education in Neenah and Menasha

The Neenah-Menasha Arbor Day Committee started as the brainchild, or perhaps the seed, of a local papermill mechanic, Leo Nickasch. In the early 1970s, Nickasch believed students needed to become more aware of environmental challenges in the Fox Valley.

"When Leo saw trees, he saw a way to interest students, to get them involved in local environmental is-

Through the nonprofit Arbor Day Committee Nickasch founded, local businesses, trade unions, and industries joined forces with the school systems to sponsor environmental field days for children. The Neenah and Menasha schools have set up field trips that match students with experts at environmental learning centers like Trees for Tomorrow, the Rat River Wildlife Area, and the Central Wisconsin Environmental Station at Amherst Junction.

Students who completed environmental projects were selected by teachers for these special three-day programs. "This year the committee plans to raise \$10,000 so we can give every fifth-grader in Neenah and Menasha public and private schools a special day to learn about the environment," Day said.



RICHARD RIDEOUT

Trees are a community's calling card that make town more livable, share community pride and encourage future investment. Both professional and volunteer groups manage tree programs in Wisconsin's Tree Cities.

sues," said Nancy Day, committee member. Nickasch envisioned tree planting and maintenance as a Johnny Appleseed type of activity. He wanted children's education to include environmental experiences for at least the first six years of their schooling, Day related.

ing every child in every school the hands-on experience of planting a tree and nurturing nature. He and Representative (now State Senator) Mike Ellis successfully lobbied the Wisconsin Legislature to offer free tree seedlings to every fourth-grade student in the state. The popular pro-

gram lays the foundation for Arbor Day celebrations in schools statewide.

Leo Nickasch passed away in December 1989, but his vision continues in the environmental and Arbor Day programs.

In the last 20 years, thousands of students in Neenah and Menasha have completed environmental projects and planted trees that led to honors for both communities as Tree Cities. The parks and recreation departments run the Tree City programs. The Committee sponsors Arbor Day celebrations. Each year, Menasha first graders hold special programs in Smith Park. Neenah sixth graders plant trees and honor a local citizen who has been active in the schools or spearheaded a local environmental issue.

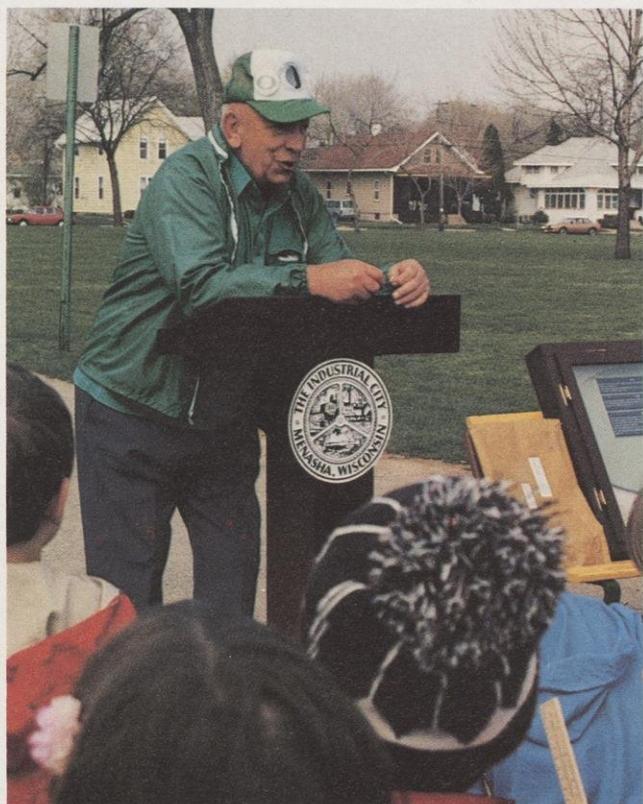
Leo wove a golden thread by involving both communities in youth education, tree planting and environmental care, Day said. That same golden thread keeps the Neenah-Menasha Arbor Day Committee working in these communities today.

## Sprucing up downtown Niagara

In Niagara, Wis. nestled in northeast Marinette County near Iron Mountain, Mich., a community tree program started over a cup of coffee two years ago. Karen Klenke and Pat Butler were taking a break in Karen's studio, and talk turned to the town's trees. You wouldn't think there would be a shortage of trees in a riverside community surrounded by county forests, industrial timberlands and in the shadow of a major papermill.

"We were just concerned that the community was getting older, the trees were getting older too and bit by bit, we were losing many more trees than we were planting," Pat recalls. "Karen and I started talking about the need to protect the local environment, and we got excited about doing something. We felt the main road that curves along the river would look much better with more trees."

"So, we invited a group of women



VERNA NICKASCH

Leo Nickasch believed that tree planting could kindle environmental awareness and stewardship among Neenah and Menasha youngsters. He spearheaded a program to offer free trees on Arbor Day to all fourth grade students in Wisconsin.

over for coffee and we started talking up the idea of planting some trees along the road," Butler continued. "We didn't want to start a big project. It was just a small group of women who didn't really feel up to planting 200 seedlings or more. Besides, we wanted to start with bigger trees that could be planted in visible places right downtown. We thought street trees would enhance the community and would provide much-needed shade. We called ourselves TREA — Trees Restoring Environmental Aesthetics.

"I don't know why we picked such a long name," she chuckled, "but it seemed to capture what we wanted to do."

"First, Karen and I spoke with Steve Zigman, who worked for the town. He was a friend of one of my sons and I knew he had a forestry background. He said he'd help us, and we set out to raise money to plant 15 trees."

"Well, Karen and I didn't know much about trees. As our photo jobs

took us to other places, we started spending extra time driving down streets, looking at trees, getting ideas of what we liked and what would look good in Niagara.

"The nearest large community to ours is Iron Mountain, so we spent some time with their forester, too. We decided to plant Patmore green ash trees because they look good, would do well here and they were medium-sized trees that would start to grow quickly.

"Then we started calling nurseries and sorting out the varieties of green ash.

There was a lot of variation, and we shopped carefully.

"Steve helped us spot areas along the main drag that could use a tree, and we started calling residents. We asked if we could plant trees in front of their house and if they'd care for them once we gave them instructions. All the neighbors were really enthusiastic.

"The local bank helped us out, and we set up an account for TREA. After those first trees went in, a few checks started dribbling in. We developed a mound near one bend near the river and we planted that with trees and flowers. Well, that was a real attention-getter and we started getting more support.

"That summer at the community picnic, we decorated Karen's husband's truck with a big TREA banner and drove through the picnic area advertising the program. That was a good ice-breaker. A lot of people had seen that truck because we had rigged a watering tank on the back and every time we went through the

neighborhood watering trees, that TREA banner was on the side. People had seen our projects and we started getting broader support. The Lions Club agreed to pitch in. The local papermill offered to help us, too.

"Well, of course, this last year, we just HAD to plant even more trees. With the help of the village (now a City) and volunteers, TREA planted 21 more ash and maples. We also moved a big spruce tree into the heart of the village, and that became the focus of our tree celebration. We had completed all the other requirements for the Tree City program, but we hadn't held any kind of formal observance. So we decided to hold a holiday tree-lighting ceremony in winter. It was really lovely! We bought little white lights for each of the young trees we had planted and strings of lights for the big spruce. The school kids sang around the tree and Pete Rudquist, the DNR urban forester for our area who helped us, came up from Green Bay to tell the kids about nurturing and caring for trees. It was really a nice celebration and all those trees lit up for the holidays looked really festive.



KAREN KLENKE

Like trees, Tree Cities start small. A tree beautification project in downtown Niagara started with two local women over a cup of coffee.

"Our spring project will be planting an area at the entrance to town that welcomes people to our community. TREA really has become a community project," Butler concluded, "and a source of pride in our homes, our city and our environment."

### A class project in Bloomer since 1969

"We discovered we had Dutch elm disease here in Bloomer in 1969," said Ray Miller.

"The city asked for my help and I've volunteered as city forester ever since. I was teaching forestry as part of our agriculture program. Our field conservation course for high school juniors and seniors included forestry, wildlife ecology, landscaping and the like. Over the years, our conservation students worked restoring trout streams, building habitat structures with the DNR crews, working forestry projects and even getting trained as fire-fighting crews during the spring fire season.

Our classes located all the elm trees and we plotted them on a city map — green pins for healthy trees, yellow pins for weakened trees that we lost to wind damage or another cause, red pins for trees that had Dutch elm disease and had to be removed. It was a revelation. Once it got going, that Dutch elm disease walked right down the boulevards through root grafts.

"Early on, all the diseased trees were piled and burned at the landfill. The city did a real good job of tree removal and sanitation. A few years later, we realized that a lot of that wood could be salvaged. The city would cut and split the wood into 16-inch lengths. Our conservation students stacked it into cords, in some years as many as 200 cords! They'd cover the cords with thick black

plastic for a year to keep elm bark beetles from spreading. The beetles crawled out of that hot, drying wood and died. So we ended up with good quality, dry firewood. It sold for about \$16 a cord, which was a real good deal for everyone.

"Concurrently, we started a program to save elms and replace the trees that had to be removed. The U.S. Forest Service gave Bloomer a demonstration grant to treat elms because the community had shown a strong interest in saving its trees. We



CURTIS E. HARRISON

In Bloomer, city reforestation became a partnership between the community and Ray Miller's high school conservation classes. They even taught elementary school students how to plant trees.

were a small enough community (3,173 people) that we could effectively treat all 2,000 healthy and diseased elms we could find. We'd attach a five-gallon pail to each tree and run 15-20 feeder tubes into each tree. My sons and I developed the hardware. Each tree was treated with Arbotect for 24 hours once a year. The treatment was preventative maintenance for healthy trees. We had limited success treating diseased trees. Once the disease got into the roots, it was difficult to control.

"Well, we didn't stop Dutch elm disease, but we slowed it down. At

the height of the outbreak, Bloomer was losing 50-75 trees a year. We slowed that down to about 20-30 trees a year and some of our elms lasted 20 years or more. Without a management program, the DNR forester told us those trees would only have lasted five to six years.

"The elms continued to come down and our conservation classes started planning and replanting trees on street boulevards, five parks, and on the school campus. We didn't want another monoculture that could get wiped out. We did our research, determined what would do well here and selected good shade tree varieties for street trees — sugar maples, some of the seedless ashes (Marshall, Summit and Gold Ash), little leaf linden (Green Spire) and hackberry. Later, we rotated in a Norway maple (Emerald Queen) and a native red maple. We have an Oak Street in town that had no oaks along the street, so we put red oak and pin oak there.

"Our plan was to replace elms by framing each house with two 8- to 10-foot trees. We'd plant different species as we worked down the street to match trees with their surroundings and avoid disease problems.

"Our conservation students did a lot of the work. We would mark out where trees should go, taking into account the location of overhead lines, buried utilities, intersections and other traffic safety concerns. The city would dig out the holes with a small backhoe. Students planted all the trees and came back in a few days to shape and prune the trees. Then the city would return to lay down a good four to six inches of mulch.

"Homeowners were thrilled to have the trees the city provided. Owners helped by watering the trees and soaking them really well during drought periods. City crews watered newly planted trees and transplants during severe drought.

"Though we've planted trees for 14 years, we didn't participate in the Tree City program until 1986. That first year, we had a real nice program down in Willis Park. High school conservation students demonstrated

tree-planting techniques for the elementary school kids. Our county forester spoke and presented awards. Bloomer has made quite an investment in trees. We've planted and maintained about 2,800 trees in 14 years. Last year, the city invested \$17,878 in tree planting, pruning and tree removal," Miller said.

Three aspects of the conservation program have been especially rewarding for Miller. "First, we've made a lot of students much more aware of conservation and have developed a love for trees. Some have pursued conservation careers. Others took up farming and are now doing an excellent job of being natural resources stewards. Many are doing forestry work on their own land. We've had a lot of good cooperation from our community, school administration, and our students, and I'm grateful for that. Second, I was real proud that our program found a way to recycle all of that dead wood that was being buried. Finally, I think the reforestation program has been real good for this community. I think about that every summer when we have our parade in town and people can now stand under many of those shade trees we planted."

## Growing with a growing community

Urban forestry has been practiced in Waukesha since the mid-1950s, but a formal program with full-time professional foresters started in the mid-1960s to battle Dutch elm disease. "Waukesha used to have 3,000 - 5,000 American elms, and less than 200 are still standing," said City Forester David P. Liska.

City ordinances designated the Parks and Recreation Board responsible for the community's trees in 1976. The city's organized commitment to tree care led to the "honor and privilege of being recognized as a Tree City since 1978," Liska said.

In Waukesha, a complete forestry program includes planning and designing public landscapes in new areas, replacing plantings in established neighborhoods and maintaining the community investment in trees. The city is county seat to the fastest growing region in Wisconsin.

"We've seen tremendous growth in residential areas, downtown revitalization and community block grants that parallel expansions in our parks system," Liska said. Ten arborists manage nearly 30,000 street

trees, and 7,000-10,000 public trees on nearly 800 acres of parklands, wetlands and other public spaces. They also operate a small, municipal nursery growing lindens, Norway maples, flowering crab trees and flowering pear trees that are in high demand and short supply.

A computer inventory keeps an up-to-date census of tree locations, species planted, size, health, maintenance history and approximate value of the community's trees. "We're managing living resources worth about \$13-15 million that keep appreciating in value," Liska added. "Through careful management, this community's trees live an average of 35-50 years, much longer than the nationwide average.

"In new developments, our planning and plantings follow curb, gutter and sidewalk development after 80 percent of the homes are built in an area," Liska explained. "We select trees that will be hardy in this area, compatible with our alkaline soils (No sugar maples, red maples or red oak here!) and aesthetically pleasing with the neighborhood and the particular property."

"Our arborists consider the leaf, tree shape, tree size, color and the

## Trees as city workers

Seventy to 75 percent of society now lives on 20-25 percent of the land. To compete for space in such areas, trees must provide visual, environmental, economical and psychological benefits.

Every schoolchild learns that trees absorb carbon dioxide and transpire oxygen, but they have other environmental values. Smog is formed when ozone-forming pollutants react with sunlight on hot days. Streets and buildings are heat islands that reflect strong sunlight, but trees provide shade that can lower the temperature, dampen this heat island effect and reduce air conditioning costs.

Tree leaves also directly filter pollutants from the air. Nitrogen

oxides, airborne ammonia, sulfur dioxide and ozone are absorbed as trees transpire, although the pollutants aren't healthy for trees.

Trees slow runoff and soil erosion. Leaves slow down raindrops and give water time to absorb into soil. A city with 30 percent tree cover has a green leaf and branch umbrella that blocks rain with four times the surface area as the city's buildings and concrete.

Trees are social do-gooders too. Tree-planting projects build a sense of community and neighborhood that empower residents to better control litter, vandalism and other crimes.

Trees not only make people feel good, they make cities more livable.

Leaves, twigs and branches absorb and mask high-frequency sounds that most bother people. Hospital patients placed in rooms with windows facing trees heal faster, need shorter hospital stays and require fewer pain killers.

City trees don't cost, they pay! Well-placed trees can increase property values 5-20 percent. Unlike other parts of the community's infrastructure — roads, sewers and sidewalks — trees increase in value and contribute more to the community as they age.

*Compiled from Urban Forests, August/September 1991*



DAVID P. LISKA

Waukesha foresters manage the community's \$13-\$15 million investment in trees with computer inventories, careful plantings, maintenance schedules and close contact with other community planners.

bark," Liska said. "We look for strong-wooded, wide-branched trees that will not be messy, a street nuisance or a traffic hazard.

"We know people are quite fond of street tree giants, like the old American elms," Liska said, "but these majestic trees are often too big for the setting." Though pretty, elms are not a great choice for the space modern construction techniques leave between the sidewalk and the street. These trees were poorly branched and had buttressed root systems that could heave up curbsides, walks and roadways. We also have to consider trees that won't fight for space with sewer, water, electric, gas, telephone and cable lines; overhead wires; street signs; fire hydrants; street lights and a clear view at intersections.

Liska noted that arborists also consider the set-back distance of residences, kinds of architecture in the area, compatible natural plantings in the area and neighboring trees. "We want to encourage species diversity that can stop the spread of disease," he added. Waukesha uses about 20 different species as street trees. They

also communicate proposed choices with property owners.

"We complete a preliminary layout, contact the homeowners and listen to their reactions," Liska said. "The final say on tree choice rests with the Parks and Recreation Board, but they work with residents when planning new development."

Forestation around commercial areas, hospitals and urban renewal projects presents different challenges. Usually, there's a lot more pavement to consider as these areas are surrounded by sidewalks and parking lots, but there are other stresses: The soil and root zone for trees is small. The air is hotter and drier than in the country or residential neighborhoods.

Heat radiates from concrete buildings long after the sun sets. Concrete canyons can create wind tunnel effects. De-icing salts are used more generously around trees bounded by sidewalks.

In such places, arborists look for trees that can handle tough conditions. "We use some of the honey locusts and green ashes as 'trouble shooters,'" Liska noted.

"So you can see that urban forestry in a region like this has to embrace aspects of classical forestry, landscape architecture, urban planning and tree psychology," Liska said.

The Tree City designation is a badge of honor that helps define community character and commitment. "Trees are the community's calling card," Liska said. "They provide the first impression that visitors, potential residents and new businesses get when they come to an area. That pride and investment is important to companies that are considering where they want to grow."

"Let me provide a concrete example," Liska continued. "On May 10, 1990, Waukesha received a 10-inch

snowfall with better than 30 mph winds when all the trees were in full leaf. The damage was devastatingly spectacular. Some 20,000 - 30,000 trees were injured and 1,000 had to be removed. Since the storm was localized, we didn't qualify for federal or state disaster relief. When the forestry department approached the city's finance committee with an estimate of the walloping damage, here's what they said: Waukesha is a Tree City USA. We're proud of that designation and we intend to maintain that title.

"Our collective pride in that title was the single biggest factor in securing the financial commitment to restore this community's trees. No one questioned it." □

## The fab 50 — Wisconsin's Tree City USA communities for 1991

Appleton	Medford
Beaver Dam	Menasha
Beloit	Menomonie
Bloomer	Merrill
Cedarburg	Milwaukee
Chenequa	Monona
Chippewa Falls	Monroe
Clintonville	Neenah
Cudahy	Niagara
Delavan	Oshkosh
Eau Claire	Rice Lake
Elm Grove	Ripon
Fond du Lac	Saukville
Fontana	Seymour
Fort McCoy	Sheboygan
Fox Point	Stevens Point
Gilman	Tomahawk
Green Bay	Two Rivers
Horicon	Watertown
Kenosha	Waukesha
Kimberly	Wausau
La Crosse	Wauwatosa
Madison	West Allis
Manitowoc	West Bend
Marshfield	Wisconsin Rapids

# Readers Write

## RECYCLING MEMORIES

I was surprised and delighted to find a picture of my old high school in the December issue ("The Waste-not war").

The top photo on page 20 is the old Hartford High School. What a flood of memories that image brought forth! Four classes competed to bring in the most metal for the scrap drive.

The smokestack and water tank on the left were part of the old Kraft plant that's now gone.

Thanks for the memories.

*Doris Bautzmann  
Wautoma, Wis.*

A picture in your December issue struck home. It was a photo of a scrap pile on the front lawn of Hartford High School. I also noticed the Kraft Cheese water tower and a fraction of the factory in town. As a student who helped gather that scrap before entering the U.S. Navy, I just had to correct the caption. As you can see on the attached photo, our victory scrap pile contained more than 36 tons of metal.

*James W. Grager  
Slinger, Wis.*

## FOLDING FLOWERS

I was interested in "Join the Fold" and the origami artwork. The figure I wanted to try and fold was the dwarf lake iris — but the instructions weren't shown in the magazine. I was disappointed.

*M.D. Johnson  
Superior, Wis.*

*Sorry we let you down, but due to limited space we were unable to print folding instructions for the iris. Although it looks simple and elegant (just like the real thing!), the origami iris is difficult to fold, requiring several pages of diagrams and*



considerable patience. We chose easier folds so anyone trying origami for the first time could achieve success. Many origami books carry iris instructions, so why not visit your local public library and scan the origami section?

## CCC REMEMBERED

I'm disappointed that the Civilian Conservation Corps was not mentioned in your article about the recovery of Wisconsin's forests. We planted millions of trees that have been harvested and turned into profits for the public. We also saved acre upon acre of forest fighting fires and standing watch in fire towers.

*Matthew M. Walczak  
Milwaukee, Wis.*

*We certainly remember and revere the conservation work the Civilian Conservation Corps and Works Progress Administration completed in Wisconsin. In fact, an upcoming issue will display a retrospective of their handiwork that endures on state properties and buildings. Our December piece high-*

*lighted the contributions of the tree farming program toward meeting the same goal of a greener Wisconsin, better habitat and sustained supplies of timber, pulp logs and other forest products.*

## SETTING IT STRAIGHT

*The cricket frog photo on p. 4 of our December supplement Join the Fold was taken by Richard C. Vogt.*

*The correct number to reach DNR's Southeast District headquarters ("Just Ask," Outdoor Traveler Companion, February issue, p. 5) is (414) 263-8500.*

*The correct number to reach the International Crane Foundation ("More critter counts," Outdoor Traveler Companion, p. 3) is (608) 356-9462.*

## INDEX STILL AVAILABLE

*Readers who save their old issues of Wisconsin Natural Resources may want a copy of our new index. The subject/author index cross-references all of our stories from 1977-90 and is very handy for classroom research, school papers or just rediscovering some fine reading. Copies cost just \$1.60 including tax and postage. Send checks payable to Wisconsin Department of Natural Resources to WNR Magazine Index, P.O. Box 7921, Madison, WI 53707.*

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**NEXT ISSUE:**  
Green lifestyles  
Tournament fishing  
Sea kayaking in Wisconsin

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continued from page 2

The price of a reel is extra. My reel cost \$3.95 in 1957, and the line came with it. I doubt it has appreciated in value. My friends store their rods in felt-lined cases, the same care Aaron Burr gave his dueling pistols. My rod hangs in the entry hall; fiberglass does not suffer the elements like split bamboo. I leave the hook and bobber attached.

In the evenings of late winter when idle talk turns to trout, I fix the fire and tend my pipe. The voices of my friends trail off in ecstatic revelry, of the early season on the Bois Brule or the time they pulled in a 20-inch brown with a wet Izaak Ibsen on Plum Creek; how they caught the trout, had it dead to rights, then let it go. All they had to show for the experience was a flattened piece of metal where the leviathan straightened the hook. Their trophy rooms are lined with honored flies; my friends eat Grapenuts and bran flakes for breakfast.

I do not believe in big trout. Big trout are smart trout. Big trout are like limousines: they burn too much fuel and hog the road. In my faith, a trout that outgrows the diameter of a

frying pan has lived too long. I have the same distrust of hunters who cannot shoot a deer without horns attached. They must have a good recipe for horns.

For trout, I favor garden worms. Nightcrawlers are too big. They won't fit on a hook. A trout fed the steaks and chops of a nightcrawler will not return for seconds. Fly fishers think they are very sporting using hand-tied flies. Such a cruel hoax. With a worm, a trout can die with a good supper on his conscience.

I am not a talented trout stalker. Friends have offered to remedy this. "We'll teach you how to dress flies," they say. Flies are well enough dressed, methinks.

"There's nothing like an evening on the upper Tomorrow, matching the hatch and watching as a trout rises to your imitation," they say. I am lazier than that. It embarrasses me to say how much.

Yet, I will admit trout twilight is a special edge of day. I have been out on the marshmoor in that hour: the sun well gone, the sky luminous and tranquil, the scent of new-mown hay on the air, the neighbor's cows bawling, the blue heron feeding upstream,

swallows knitting over the stream. On such nights, I do not care if I catch trout or not. To do so almost ruins the innocence. I have, I'm ashamed to say, fished often enough without rebaiting the hook. All I really wanted was the pose. Besides, sausages for breakfast will be equally nice and they are already cleaned.

Hiawatha, as legend says, spent his retirement years after his hitch as the Indian savior clearing streams for the canoe. I think a savior of trout is in order. Not so much a fisher of mankind as a fisher for places and yearnings of kinder men. A builder of wingdam and trout hole, of cut bank and rock crib. A tender of gravel, a keeper of fences, a churchman of cold stream; a deacon who invites the vesper by worm . . . or by fly.

Leopold did not invite the trout to tinker with streams, but he meant to. The trout stalker who has a thousand dollar fly rod is only partially equipped. He needs also to mind the stream, heft rock and sandbag, and dream of trout. □

*Farmer and commentator Justin Isherwood writes from his home in Plover, Wis.*



A time for trout and contemplation on the Rush River in Pierce County.

DON BLEGEN

