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SPECIAL SECTION: How federal funds boost Wisconsin's sport fisheries

WISCONSIN NATURAL RESOURCES

March/April 1988

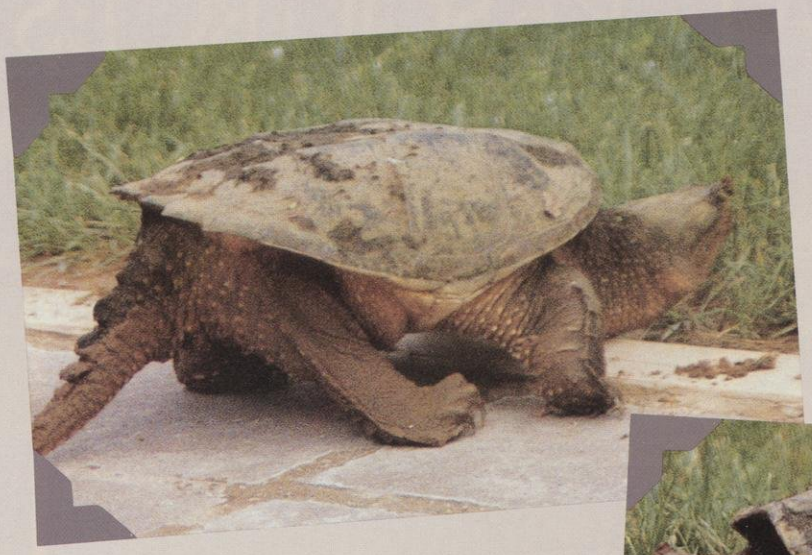
$3.00 Volume 12, Number 2

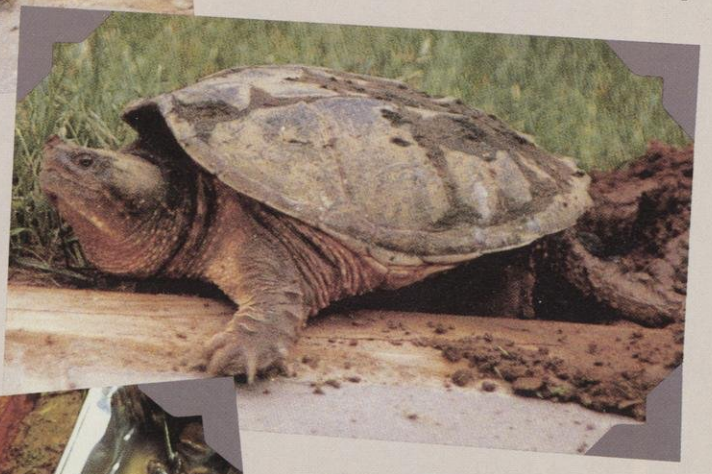
Beloved statesman: the American robin

Maples and air pollution

Lucky Lake Onalaska

Turtle surprise





Sounds like something to eat, doesn't it? Well, I guess turtles are delicious, but our surprise was a snapping turtle digging up our lawn at eight o'clock on a Sunday morning. Backyard watchable wildlife! I snuck out to snap a few photos.

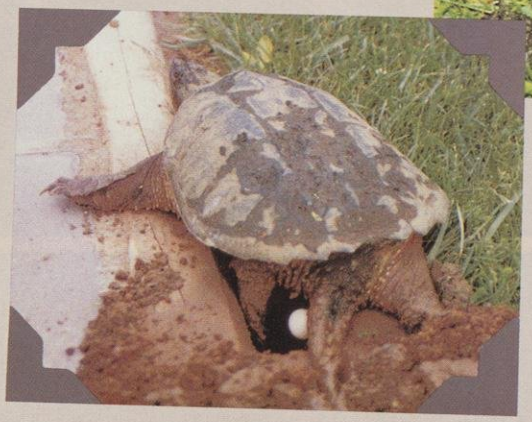
As it turned out, I didn't have to sneak because she was busy laying eggs and nothing was going to bother her. It was just as if we weren't there. After laying the eggs, she packed dirt around them and slowly crawled back to the lake. We never saw her again.

Now, we didn't really believe those little turtles could hatch, crawl out of the ground from eight inches down and find their way to water — all by themselves. So, we built a playpen for them, complete with water and a protective screen cover, and placed it directly over the area where the eggs were laid.

Then, we waited and watched — 76 days we waited and watched. Our next surprise came again on a Sunday morning; baby turtles started appearing. First one, then seven, 12, 17 — would they never end? After 12 hours, it seemed they were all finally hatched — 28 muddy, lively and eager to get to the lake little turtles.

But we had to have our fun first. We played with them, took their pictures and had the whole neighborhood over to see nature continuing one of the oldest species known to man. When turned loose, they all headed in the same direction, toward the lake.

We hope they will survive and perhaps later in their lives give other nature lovers a fun-filled surprise.



Donald and Mary Vosen, Merrimac

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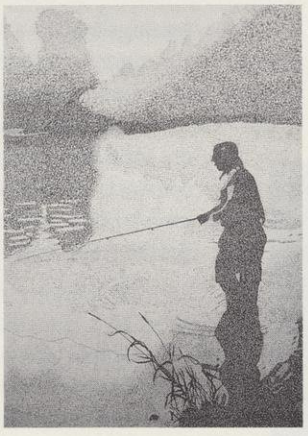

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. . . and then there were trout

What makes trout anglers tick? A team of university and DNR researchers set out to scientifically measure the fervor of those who fish trout streams.

Robert Jackson

"Each morning I go out from the cabin and look at the trout stream. And each morning I am filled with wonder and awe."

Spoken by a female angler, these words capture the emotion, intensity and almost transcendental feelings of many who fish for trout in Wisconsin waters.

A team of University of Wisconsin-La Crosse researchers using a survey designed with DNR Cold Water Fish Specialist Larry Claggett and Natural Resources Sociologist Ed Nelson measured the attitudes, motivations and feelings of trout anglers during the 1986-87 fishing seasons.

Researchers mailed surveys, questioned individual anglers and conducted group interviews to: collect angler reactions to proposed trout regulation changes, discuss new management strategies and study the behavior and attitudes of trout anglers.

Why would fish managers spend two years studying the psychology of trout anglers? Because understanding what anglers want and expect is an important part of managing streams and fish to provide the best possible fishing experience.

Women, men and kids all fish for trout and they all have different expectations. DNR photo

Robert Jackson is a Professor of Psychology at the University of Wisconsin-La Crosse.

TROUT FISHING IS MORE THAN CATCHING

Trout management is especially complex because researchers have shown that trout anglers have the widest range of expectations of any anglers who fish for one particular species. Fishing experiences pleasing to one angler may be repugnant to another.

How do anglers describe a "successful" day of fishing? Well, it's much more than just catching fish. In fact, surveys have shown that taking home fish is not an important motivation for many trout anglers.

Trout anglers have intense, even emotional feelings about the nature of their fishing experiences. Some key in on certain trout species, some only stalk "trophy" fish, some concentrate on fishing methods, some have only limited tolerance for other anglers on the same stream segment, some are looking for a pristine stream.

Two Wisconsin fish managers recognized this many years ago. In one of the most popular DNR technical bulletins ever published (#39), White and Brynildson de-

scribed trout stream management in this way: "Within each stream also, the fish manager must respect qualities of 'stream personality' cherished by anglers who have fished it for years, for much besides abundance of trout and skill of angler enter into trout fishing's quality and meaning: Unique scenic setting, the sounds of nature, the overall character or mood be it sylvan, pastoral or swampy. For the fish manager to serve his clients well, he must keep these aspects of the trout stream prominently in mind, as well as seeing to it that the stream maintains a substantial stock of trout."

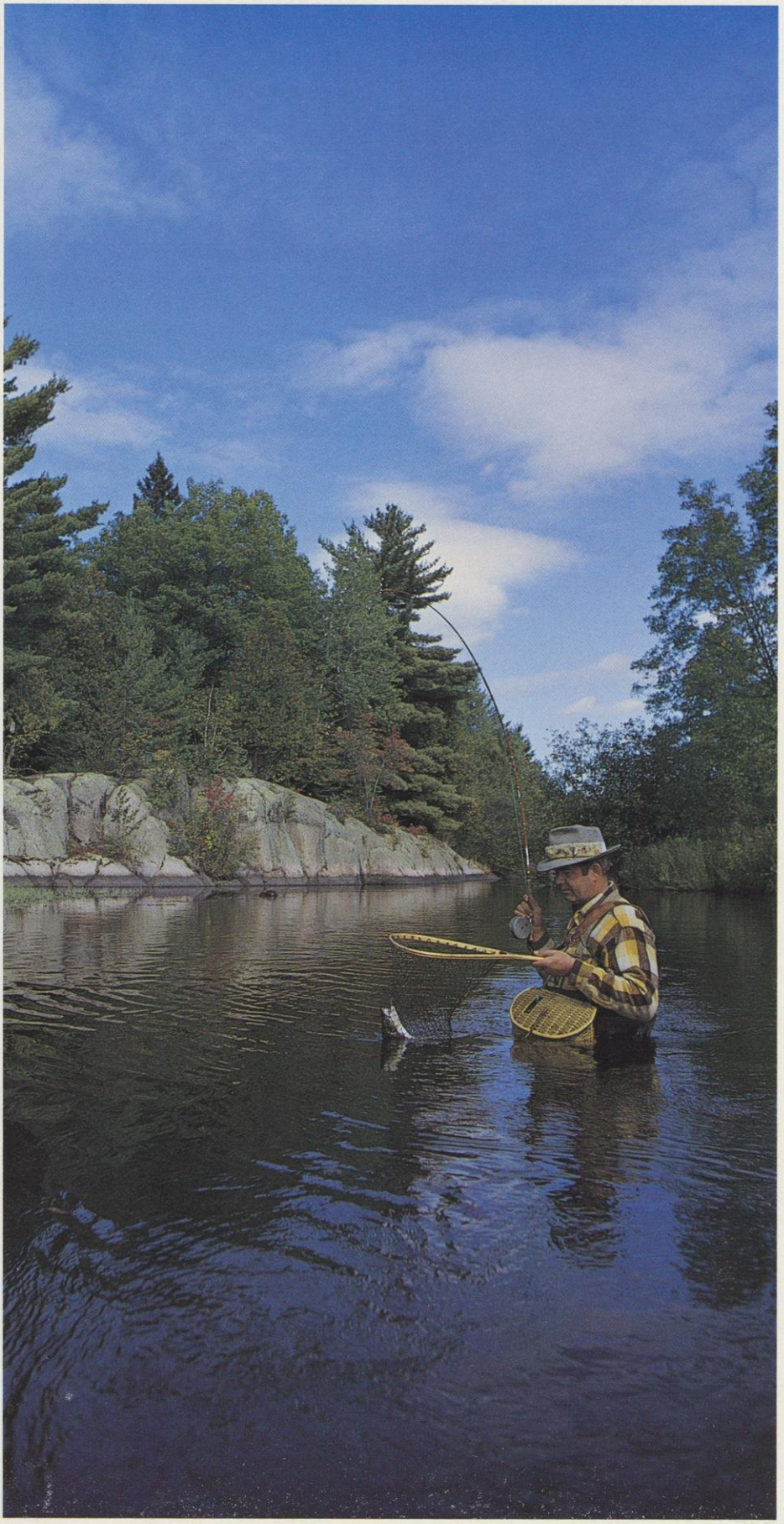
A TALLY OF WISCONSIN TROUT FACTS

Historically, stream trout have been important to Wisconsin anglers. Trout are currently maintained in 9,650 miles of streams, 443 spring ponds and 180 lakes. Approximately 179,000 trout stamps were sold to licensed anglers in 1986.

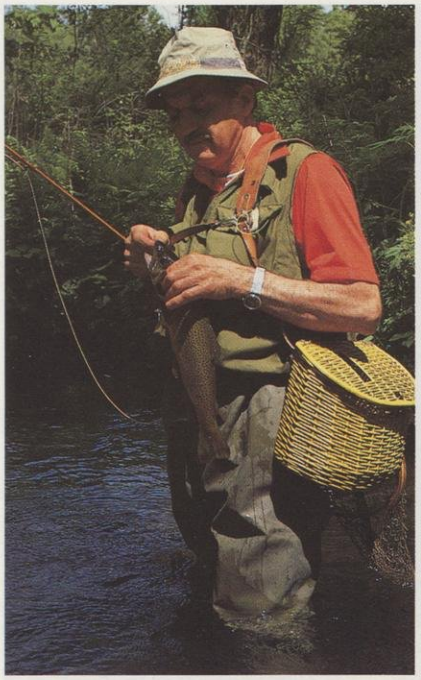
Brook trout are native to Wisconsin, but as trout anglers hungered for a more varied fishing experience, German brown trout were introduced from Europe 100 years ago and rainbow trout were transplanted from the West Coast at the turn of the century.

GETTING ANGLERS TO TALK TURKEY

To study a wide array of trout anglers, fish managers and technicians contacted anglers while they were fishing some of Wisconsin's most popular trout waters. In 1986, 256 anglers fishing Rowan Creek in Columbia County and Timber Coulee Creek in Vernon County were willing to fill out a 21-page questionnaire about their sport. In 1987, trout anglers on the Namekagon River in Sawyer



"When I'm belly high in the stream, I forget everything else." DNR photo by Staber Reese



(above) Some trouters mainly "want to be alone" in a quiet place. DNR photo by Staber Reese

County, the Prairie River in Lincoln County and the North Branch of the Pem Bon Won River in Marinette County were surveyed. Fish managers also questioned anglers who made at least 20 trips a year to fish brook trout on small streams. Almost 500 anglers responded to the 1987 survey. In the final phase of the study, 162 members of seven Trout Unlimited (TU) chapters were interviewed.

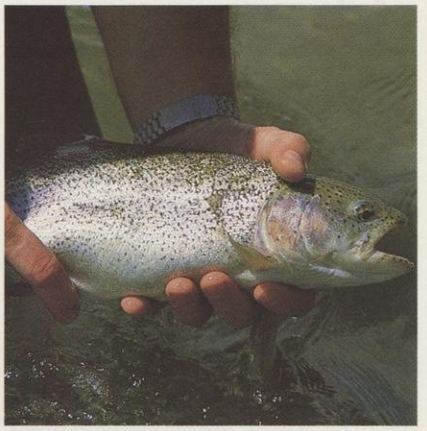
How Anglers Judged Current Fishing Policies

About half of the anglers on southern Wisconsin streams and 27-35 percent of the northern Wisconsin anglers believed DNR fish managers do an excellent or very good job of stream trout management. All anglers believed that during the last 10 years opportunities to go trout fishing, stream access and DNR regulations have improved.

There are concerns, too. Common complaints among anglers were that trout are overharvested, streams are increasingly crowded and some anglers are unethical.

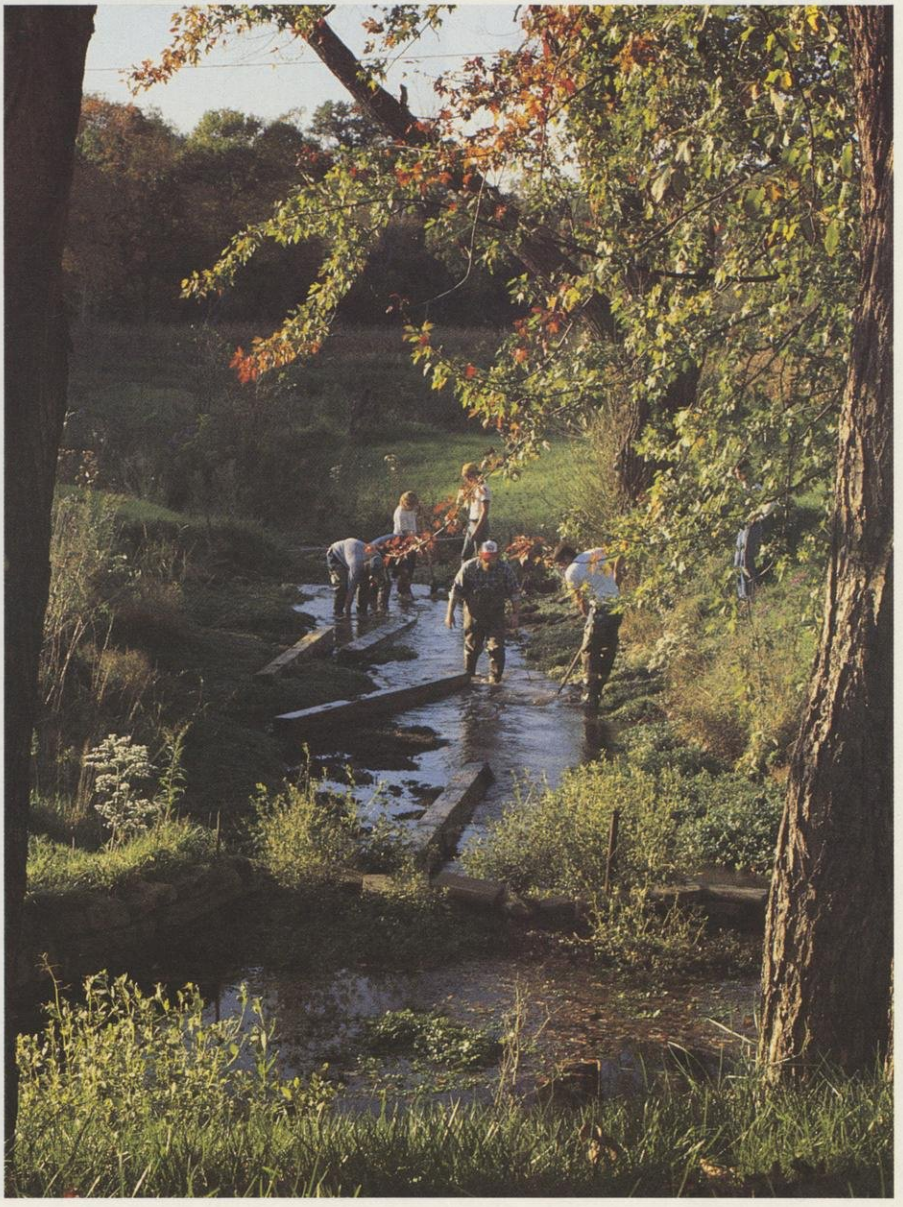
Southern anglers supported new size and bag limits (in place since 1986) designed to ensure more and bigger trout for more anglers. Anglers were equally divided on the benefits and drawbacks of winter trout fishing in portions of southern Wisconsin.

Northern and small stream anglers pushed for more restrictive size and bag limits for brook trout compared to brown trout. They also liked the idea of strict size limits on some streams, which would allow trout to grow to trophy size — 20 inches for browns and 15 inches for brookies.



(above) Keeping fish isn't important to many. A rainbow trout is released to brighten up someone's tomorrow. Photo by John Beth

These Trout Unlimited members are highly dedicated to their sport, generously donating time to restore and improve trout streams like Rocky Run Creek in Columbia County.
Photo by Lowell Gennrich



Northern anglers split right down the middle on a proposal to set up three bag limit and size zones in Wisconsin.

WHEN DO ANGLERS DEVELOP THEIR LOVE OF TROUT FISHING?

When asked why they fish trout, anglers wax poetic. "The hardest thing is leaving at the end of the day." Another said, "When I'm belly high in the stream, I forget everything else." Almost every other person in the group interview nodded in agreement.

Eighty to 85 percent of the small stream anglers, and 70-75 percent of trout anglers statewide said they would miss trout fishing more than most or all other outdoor experiences if they were denied their sport. That compares to 53 percent of the muskie anglers, 61 percent of the gun deer hunters and 81 percent of the bow deer hunters.

Interestingly, many anglers develop their love for fishing as adults. The TU members surveyed averaged 42 years of age and 20 years of trout fishing experience. Anglers are typically 30 before they start hurling crankbaits for muskies.

Pleasure in being near streams plays a large part in the trout angling experience. One angler stated that "trout fishing is just an excuse to be near moving water." Another contended he waded streams to develop "an intimacy" with the trout's environment. Anglers also enjoy the lifelong challenges of reading moving water and "where you have trout, you almost always have a beautiful setting." Other important factors include "being out-of-doors," "nature appreciation," "solitude," "using fishing skills" and "escaping the routine." At the bottom of the list were "trophy displays" and "competitive activities."

It's interesting to note that all groups felt it was more important to simply catch a fish than to take home the catch for dinner. All groups except small stream anglers rated releasing the catch as more important than catching fish to eat.

When searching for the ideal fishing spot, trout anglers uniformly sought places with fewer anglers, places where they'd previously caught fish, places with large trout, places with wild trout and places with beautiful surroundings.

The "fly versus garden hackle" wars will not be refought here, but angler fishing techniques were also sampled. Fly anglers generally fished more days and released more fish than bait or spinner anglers. Studies clearly show high survival rate for released trout caught with flies and artificial lures. It's not a selfless act. Catch-and-release allows anglers to catch more than a bag limit and usually means the same trout can be caught several times.

It helps to have a sense of humor when trout fishing. This time "the big one" was a sucker.
Photo by Larry Claggett

PROTECTING THE STREAMS THEY REBUILT

Apparently, anglers who get involved in stream improvement projects get very attached to the stream segments they rebuild. Common feelings include: "I just won't harvest trout from that stream. I hunt my fish, but I don't have to kill them when I catch them."

Fish managers note that anglers who have worked on habitat projects often object when they see other anglers keeping fish raised in improved areas. One angler told us, "I love them so much I just can't kill them. My son and I use barbless hooks. He called me the other day and asked, 'I hear you caught Oscar?' I swear he has a personal relationship with every trout in that stream." ■

THE FIVE STAGES OF TROUT FISHING

One hundred years ago, Dr. James Henshall, physician and angling author, suggested anglers mature through three stages of development — catching fish, catching trophy fish and, finally, reaching a stage where *how* fish are caught is more important than *how many* are caught.

We hypothesized two additional stages — one at each end of the Henshall scale. The earlier phase is the "How does it work?" stage when anglers master rod, reel and basics. The most advanced stage we call the "sportsperson" stage when anglers relish the role of mentor — introducing and coaching others in the sport. The angler in this last stage gets as much enjoyment from watching trout rise and studying moving water as fishing — an almost transcendental experience soaking in every detail of the trouting experience.

Bringin' back the bay

Two years of sampling, investigating and hashing over tough questions in long meetings have forged a cleanup plan for Green Bay.

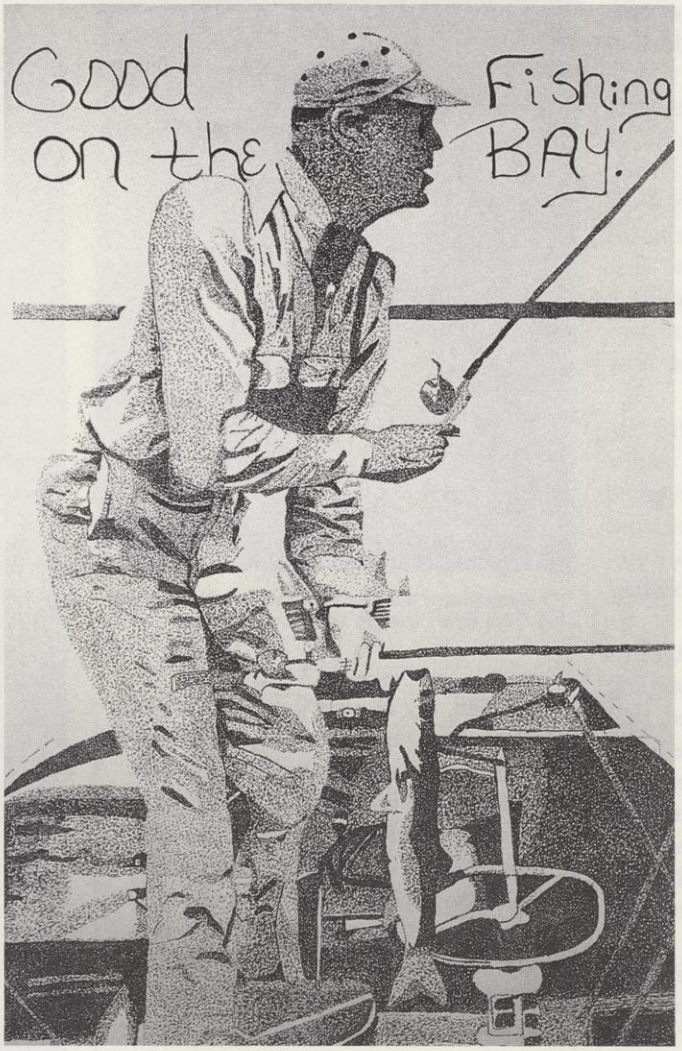
Lynn Persson and Richard C. Mulhern

Restoring quality water where the lower Fox River empties into the southern end of Green Bay is no simple task.

The area drains a 6,642 square mile basin that includes a highly industrialized region as well as large cities and rich farmland. The greatest concentration of pulp and paper mills in the world is located along a 39-mile stretch of the river here.

Cleanup efforts during the past 10 to 15 years have reduced loads of traditional pollutants, namely biochemical oxygen demand (which measures the strength of organic wastes) and suspended solids. To a large extent, this has restored dissolved oxygen levels vital to a healthy fishery. Investigators are now concentrating on reducing other environmental pollutants — sediments, toxic substances and excess nutrients that enter the water system.

Today, we're facing the challenges of identifying solutions for these new threats and entering another phase of water cleanup activities in the Fox River and Green Bay.



"Good Fishing on the Bay," by Liane Lentz, Grade 11, Oconto Falls. A prize winner in the 1987 Fox River and Green Bay poster contest.

Recently, DNR Secretary Buzz Besadny approved a plan that builds on local and state cleanup efforts of the past decade and names 16 key actions needed to restore the beneficial uses of the bay and river.

It's dubbed the Lower Green Bay Remedial Action Plan and has been formally approved as part of the state's water quality management strategy. The plan culminates two years of work by concerned local citizens, elected officials, DNR personnel and the scientific community.

The plan lays out an ambitious mixture of environmental controls to improve water quality, land use controls to maintain shorelands, social goals to entice more people to play in restored waters and economic strategies to rediscover the business opportunities that a clean Green Bay could offer.

The technical and scientific challenges in themselves are formidable.

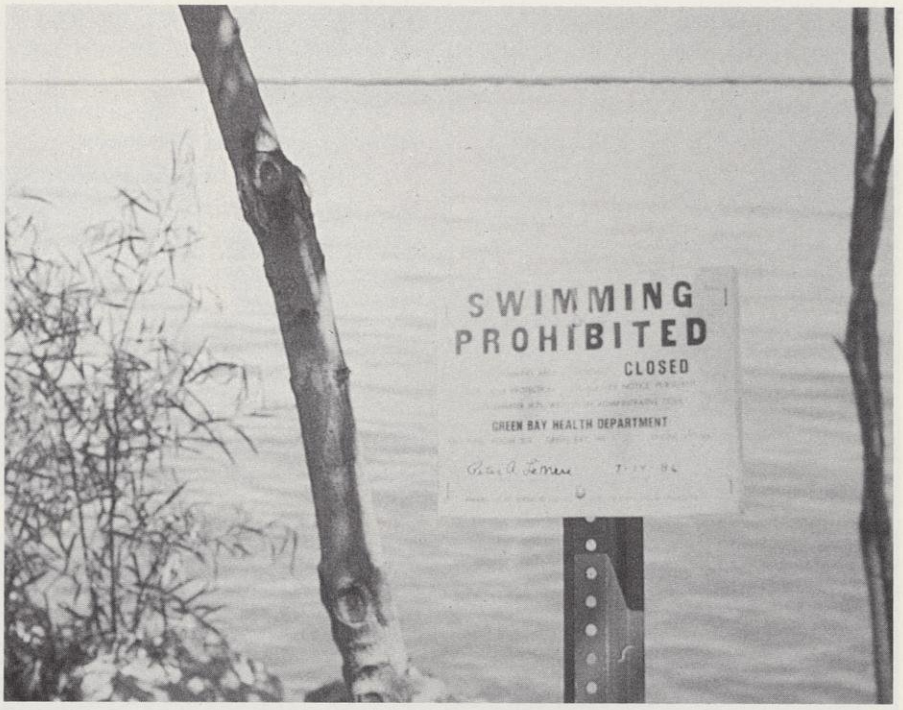
GREEN BAY WAS LABELED A "HOT SPOT"

The most recent push to restore this waterway began in 1972 when the lower Green Bay and Fox River region was one of 42 Great Lakes hot spots, an "area of concern," identified

Lynn Persson is a planning analyst in DNR's Bureau of Water Resources Management. Richard Mulhern is an editorial assistant with Wisconsin Natural Resources magazine.

by the U.S. and Canada, due to continuing water quality problems often associated with toxic substances. Wisconsin, along with other states and provinces, agreed to prepare a remedial action plan to guide future cleanup and protection in each area of concern. The goal is to restore some important uses of the area — for example, as a place to swim safely and a place to catch edible fish.

Our early investments in pollution controls are paying dividends. Scientists can show better water quality and improved fisheries in the region. But cleaner water isn't necessarily clean enough for animals and people who would use the bay. Serious problems still affect not only water quality, but the area's fish, wildlife, wetlands and public use.



Getting kids back into the water is an important plan goal. Some public beaches in Green Bay have been closed for decades. Photo from Fox Valley Regional Planning Commission

TOXIC CONTAMINATION IS A MAJOR CONCERN

Preliminary studies indicate that some wastes piped or flowing into the Fox River and Green Bay may be acutely toxic to fish and other aquatic life. Sediments are contaminated with PCBs and other toxic substances from past discharges. We know that PCBs enter the food chain and accumulate in fish and wildlife. Recent state fish consumption advisories recommend that no one eat walleyes caught below the De Pere dam. There is also a consumption advisory for waterfowl that feed extensively on vegetation and aquatic organisms from these waters.

Another big concern is phosphorus, a common component of cleansers, fertilizers and other consumer products, which is carried to the bay by sediment. Phosphorus stimulates algae growth. This heavy plant growth at the water's surface in turn makes the water cloudy, cuts sunlight penetration in water and lowers the amount of dissolved oxygen available to fish and other aquatic animals.

The sediment that carries phosphorus also muddies the water, making the bay less suitable for swimming and slowing the growth of aquatic plants favored by ducks and other wildlife. As the sediments fill a riverbed or harbor, they must be dredged from navigation channels.

Clean water renews interests in downtown development and a peaceful place for a stroll. Photo by Lynn Persson

TO INTEREST PEOPLE IN TAKING A STAKE IN THE BAY

The social challenges are even more formidable than the scientific ones. It's one thing to understand the ecological ailments that threaten the Lower Fox/Green Bay region. It's another matter to get people interested in saving the "patient."

During the past two years, the department has worked with other agencies, researchers and the citizens of northeast Wisconsin to build consensus for restoring Green Bay and

ensure that remedial actions reflect local desires. The goal was to identify the diverse ways people wanted to use the bay and river in the year 2000, and develop the strategies for reaching those expectations. A citizen committee representing local government, business, industry, agriculture, environmental groups, and boating and fishing clubs advised the department. Four technical advisory committees also helped.

When Secretary Besadny approved the plan in February, it was one of the first to be formally adopted by a state or province and was hailed by representatives from the City of Green Bay, Brown County, the U.S. Environmental Protection Agency and the International Joint Commission.

Here are the plan's 16 key actions to restore, protect and enhance the ecosystem:

HIGH PRIORITY

1. Reduce phosphorus entering the river and bay from nonpoint and point sources.
2. Reduce sediment and suspended solid loads.
3. Eliminate toxicity of industrial, municipal and other point source discharges.
4. Reduce toxic chemical release from contaminated sediments.
5. Continue current environmental control of oxygen-demanding wastes from industrial and municipal discharges.

MODERATE PRIORITY

6. Protect wetlands, and manage habitat and wildlife.
7. Reduce/control populations of problem fish (including carp and lamprey).
8. Increase populations of predator fish.

LOWER PRIORITY

9. Reduce sediment resuspension.
10. Reduce bacterial pollution from point and nonpoint sources.
11. Virtually eliminate toxicity caused by nonpoint and atmospheric sources.

To improve people's use of the ecosystem

HIGH PRIORITY

12. Create a coordinating council and institutional structure to implement the plan.
13. Increase public awareness of, participation in, and support for river and bay restoration efforts.

MODERATE PRIORITY

14. Enhance public and private shoreline uses.

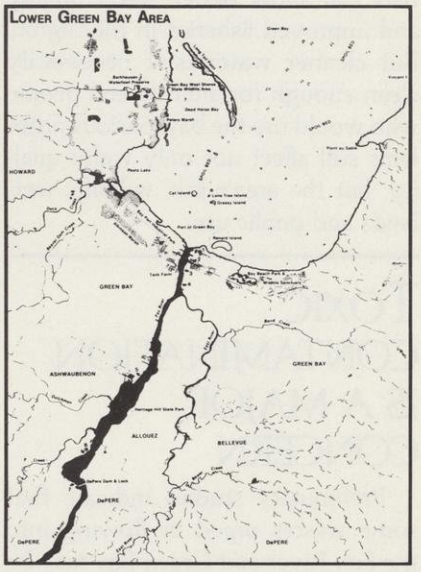
MONITORING AND RESEARCH

15. Monitor to evaluate the effectiveness of remedial actions, track trends, and identify new problems.
16. Conduct research to better understand the ecosystem, its problems and how to remedy them.

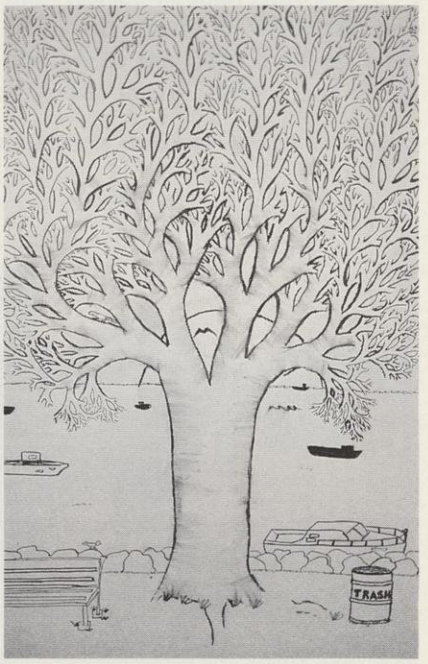
In addition, the plan contains 120 specific recommendations to accomplish these key actions.

MOVING THE PLAN FROM PAPER TO THE WATERWAY

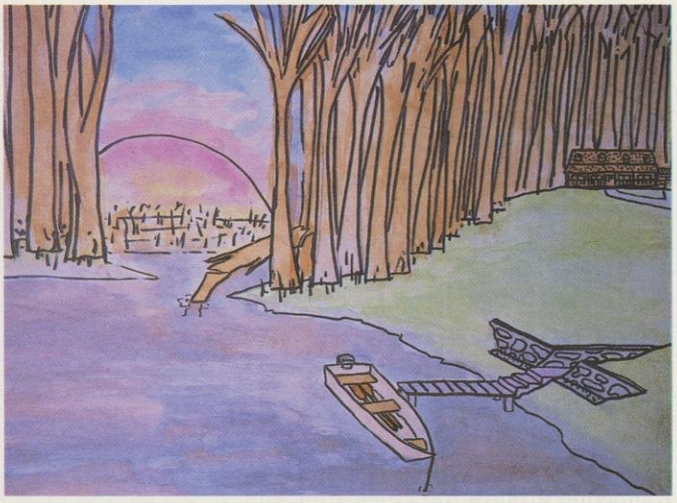
"Brown County, by itself, will not be able to implement the recommendations of this plan," says County Ex-



Overview of the lower Green Bay/Fox River region. Map by Jim McEvoy



"Keep It Clean and Beautiful," by Stacy Tostrop, Grade 8, Green Bay.



(top left) "The Horizon," by Shane Schaetz, Grade 6, Green Bay.
(top right) "Shouldn't Everything Be This Way?" by Matt Hendricks, Grade 8, Green Bay.
(bottom) "Going on a Boat Ride," by Tracy Ackley, Grade 6, Green Bay.

ecutive Thomas Cuene. "The solutions to these problems will be expensive, sometimes controversial and in many cases long-term. But the end result will be worth the money, time and effort needed to achieve it.

"However, for implementation to become a reality, we have to overcome the cost considerations of the plan," Cuene says. "Brown County taxpayers alone cannot bear the tremendous expense associated with the proposal. It's also difficult to expect the total cost to be borne by those within the Fox/Wolf drainage basin.

"I would hope to see some fair and equitable cost-sharing proposals formulated, which would divide these costs among the drainage basin communities, the state and the federal government."

Cuene admits that the plan presents a formidable challenge. The drainage basin is larger in area than the combined land mass of Connecticut and Rhode Island. There are more than 40 identified watersheds containing about 120 industrial dischargers and 60 municipal treatment plants.

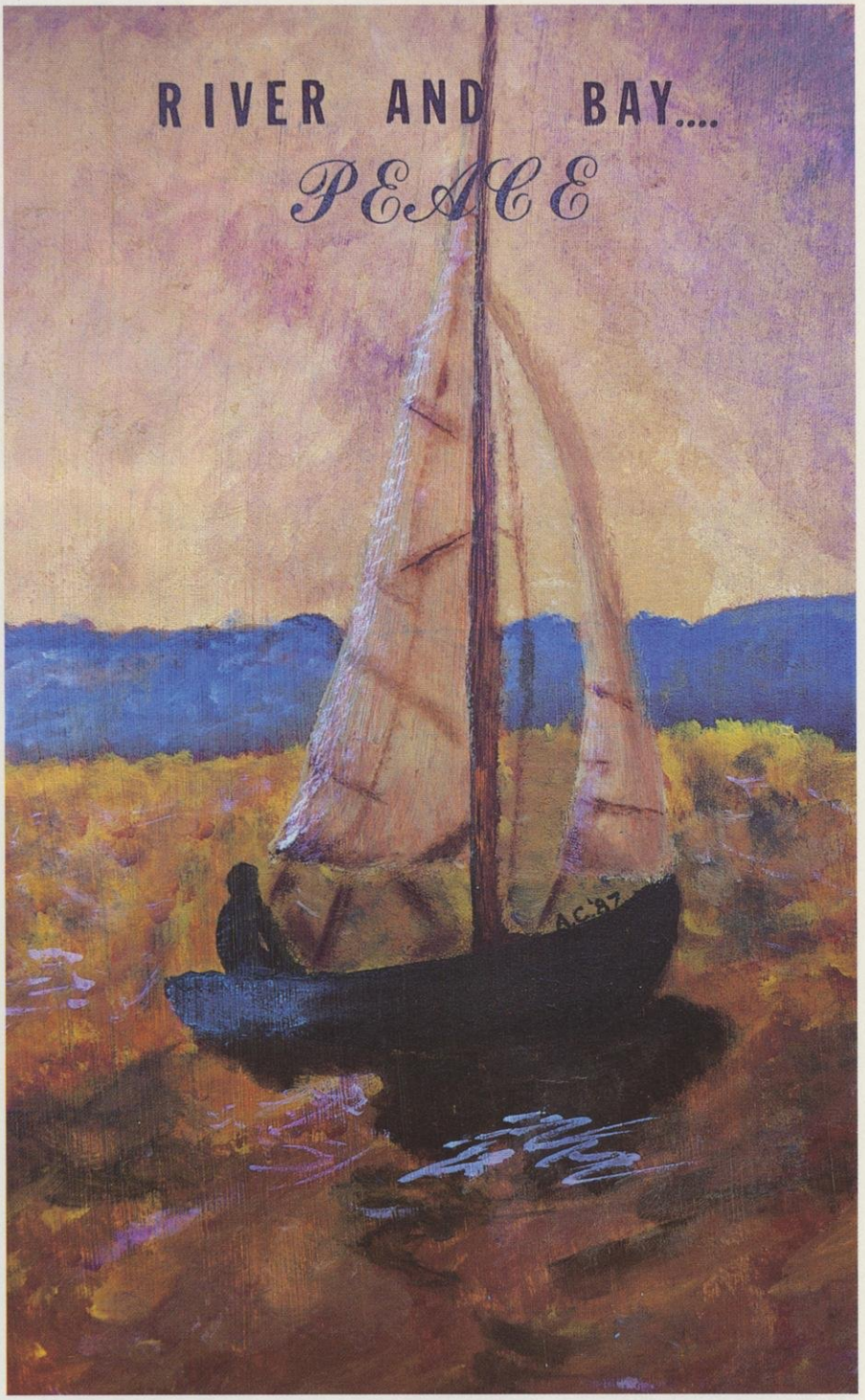
The need for cooperation in implementing the plan is widely recognized. The plan now needs state and local commitment if its goals are to be realized. Many groups have offered to help, including: fishing and boating clubs, local agencies, industry, environmental groups, the Oneida Indian Tribe and the Green Bay Metropolitan Sewerage District. The department will be setting up an implementation committee to help coordinate cleanup efforts.

SIGNS OF PROGRESS

Even as the plan was signed, some implementation efforts had begun, and others are scheduled to begin shortly. Here's part of the picture:

- A $3 million to $7 million research project — the Green Bay mass balance study — will be started by the Environmental Protection Agency and other agencies to learn sources and movement of toxic substances in the system.
- A comprehensive nonpoint source control project will begin on the East River Watershed, which was recently selected as a state priority watershed.
- The Green Bay Chamber of Commerce has proposed to sponsor a river cleanup day in 1988.

Some key actions will require changing people's attitudes and actions. They focus on the people and their use of the bay and river. Beyond the community's environmental commitment, the cleanup plan will attract more people as enhanced urban waterfronts pull folks to the water and downtown business districts. Reopened public swimming beaches, and better boating and fishing facilities will all be important attributes of a recovering shoreline. These actions recognize the economic and recreational value of a healthy environment.



"River and Bay . . . Peace," by Amy Cisar, Grade 9, Oconto Falls.

The citizens advisory committee that helped develop the plan understood this as well as any group. They set the tone for deep local commitment to make this cleanup work. In the plan's introduction, they stated, "We live here — this is our home. For some of us, it is our ancestral home. Our families arrived here centuries ago. Others of us have only recently arrived. But we all have a common commitment to the land and water that surrounds us." ■

Beloved statesman

Wisconsin's state bird is a crooner, carpenter and busy parent.

Mary Mercier Wicklund

The harbinger of spring, the worm-tugger, the feathered alarm clock, the crafter of tight, cozy nests — robins are the first birds many people learn about; their song is known from coast to coast. And we should be proud and happy to have the American robin representing us — our own state bird.

Despite robins' popularity, few people know them well. Yet their lives show an interesting mix of many trades and skills — soloist, navigator and construction worker. Even the dullest routine gets a creative sparkle. Who would have thought that bathing could be choreographed so well?

Robin lovers have been following "their" bird's tracks for a long time, counting and recording everything from wormy meals to nursery sites. And they have found a very industrious sort — so busy, in fact, that one must get up rather early to discover its trail.

Adult robins will feed nestlings three pounds of food in two weeks. Photo by Stephen J. Lang

THE EARLY BIRD . . .

The robin, as many of us have learned through experience, rises at a most inconvenient hour. The eastern sky has barely begun to lighten before robins fill the yard with the piercing notes of reveille — sometimes as early as an hour or two before dawn. Considering the robin's workload, this early start is understandable.

Actually, we can only blame male robins for this intrusion. Only the male sings, females give warning calls. Robins must consider morning wakeup a very important duty, for robins sing in all weather. Even in a storm, with thunder clapping about them, their clear song may be heard. Perhaps it is a song of thanksgiving because rainstorms provide mud, which robins must have for their nest building.

Science claims that robins sing for two reasons: first, to advertise their claim on a certain territory, about one-half acre; second, to attract a mate, for robins must find new partners each year. In the spring, males spend most of the day singing. Later in the season, after territories are secure and mates found, males sing only in the mornings and evenings.

EATS MORE THAN JUST THE EARLY WORM

After the morning concert, the robin channels his energy into other work. Much of the day is spent looking for food. Although robins have food sites within their own territories, there are usually other feeding areas, places with wide stretches of short grass which are so valued for their food supplies that no one robin may "own" such a property. In these areas, robins may feed together without argument.

Many of us have watched a robin engage in a tug-of-war with a well

Mary Mercier Wicklund lives in Swallow Hill on the banks of the Clam River in northwest Wisconsin. She's an avid birder, gardener, writer and aviator.

anchored worm, but the robin's diet consists of much more than that. They are omnivores eating about 60 percent plant matter and 40 percent animal food. Robins do eat many worms, of course, but also snails, spiders and insects such as beetles, caterpillars, grasshoppers and flies. They also eat fruit, especially berries when in season. And robins can be lured to bird feeders to eat such things as beef suet, white bread, apple pieces, raisins, grapes and cherries. So, their fare is far from dull.

Getting dinner is not always easy though. As you watch sturdy brown robins hop across your yard and pause to cock their heads, they seem to be listening to all those worms and insects tunneling below. But that isn't what they're doing at all. Robins do not listen for their prey; they actually look for it, or for some slight movement in the grass that suggests a meal. Robins have good eyesight, but they must turn and tilt their noggins to see the ground in front of them because their eyes are located on the sides of their heads. So, eating out requires a certain amount of concentration and speed.

Staking Out a Territory and Solid Shelter

Looking for food cannot take up too much time for the day's tasks are endless. In spring, robins spend their days defending their territories and courting. Males return from the south first, stake out territories and patrol their borders until mates can be attracted. Then, both male and female defend the territory until nesting begins.

Here they divide their labors. Usually, the female chooses the nesting location. The male may try to make suggestions or even hint at repairing an old nest. But the female is very fastidious and rarely uses an old nest. She looks for a new site, five to 20 feet off the ground, which will provide her with a strong foundation. Many times it's a window ledge, broad fence or bridge. Apparently, robins consider a firm foundation more important than seclusion.

Once a suitable site is selected, construction begins. The female is the principal carpenter, though the male may fly in some materials to help. Then again, her decision to build in a certain place is not always final. If she likes several locations, she may begin several nests before choosing a favorite and final one.

One of the best displays of this indecision came from a female in Ohio. She discovered and fell in love with part of a building under construction. Where the roof rafters lay across a wooden joist, there were spaces for numerous nests. Which to choose? It was plainly giving her trouble. In one week's time that robin built 26 nests in 26 of those spaces. Her efforts were watched and studied by an amazed group of construction workers who provided her with mud and other nesting material. And they couldn't resist placing bets on her final choice — which she at last made, picking one nest to raise her family.

Most robins select their nest sites with less drama. Once building begins, the project takes about five or six days. Later in the summer, other nests will be built, for robins raise two or three families a season. But these second and third nests get less time and attention than the first.

Several Steps From Nesting Through the Hatch

Nest building has several stages. First, the foundation is woven of grass, straw, leaves, roots, paper and other stiff or tough materials. As the female constructs her nest, she shapes its interior with her body and wings. Next, she lines the inside with mud, laying it thicker on the bottom than on the sides. Usually, this mud is collected in the early morning when the ground is still damp with dew. If the weather has been very dry, the robin may delay nest building until rains make mud available. She plasters the mud shaping the nest with her feet, wings and body. Lastly, before the mud hardens, she insulates the inside with a blanket of soft grass. Her nursery is now ready for its charges.

One or two days later, the female begins to lay sky-blue eggs, one each day, until there are three or four. Unless the weather has been very cold, she waits until all the eggs have been laid before beginning incubation. In that way, all eggs will hatch on the same day and no one will have the advantage of a head start. The female does all of the incubating, sitting on the eggs all night and most of the day. The male does not bring her food, so she must take short, five- or 10-minute breaks to look for a meal. Her diligent 24-hour care includes turning the eggs periodically to ensure even heating and proper development.

This careful attention continues until the beautiful eggs finally hatch, 12 or 13 days later.

Nestlings Need a Lot of Attention

The robin nestlings, as the baby birds are called, are born featherless, blind and unable to sit up. They can only support their heads for a few moments to grapple with food from their parents. It is hard to believe that in less than two weeks they will be fully feathered and too large to even consider staying home.

Nestlings demand an enormous amount of food. Now, the male becomes irreplaceable. Even with both parents helping, the workload is exhausting. The growing birds eat unthinkable amounts of food. During their two weeks tending nestlings, the adults feed them about three pounds of grub — mostly worms and insects. Both adults must work from dawn to dusk collecting food. They return to the nest every five or 10 minutes to refill the gaping beaks. It takes a lot to satisfy those beaks. One

scientist recorded that one nestling ate 14 feet of earthworms on its last day in the nest.

The parents, especially the female, must also protect the nestlings from the weather: cold, heat, rain, storms and drafts. This is more important when the nestlings are very young and have few feathers. During this time, the female may interrupt feeding runs to warm the nestlings. If the female dies during the nesting season, the male has a most difficult job. Although he may manage to keep up with feeding the nestlings, he cannot keep them warm if cold weather threatens the nest. Nevertheless, lone robins (including males) have successfully raised young.

When the nestlings are between 10 and 14 days old, they begin to show an interest in the world beyond the nest. Fortunately, they usually leave the nest one at a time, which gives the adults more opportunity to supervise things. After a young bird has toppled out or glided to the ground, the adults feed and watch over it for a day or two. But after two days, the female leaves to begin work on nest number two or three.

Robins nest two or three times a season. The first nest receives the most attention. Photo by Dennis Yockers

MALES TAKE OVER FLEDGLING CARE

From here on, the male has charge of the awkward youngsters, now called fledglings. For two more weeks, he must follow them about, gradually weaning them, protecting them from danger. Even after young birds are fully trained in the art of catching dinner, they try to get free meals from adults. Added to that, adults must be ever alert for danger,

Male robins are the true red-throated crooners.

Photo by Charles Fonaas

Once nestlings fledge, the male robin takes over guard duty. Photo by David L. Misterek

for at this time fledglings are most susceptible. Dangers come in all forms — a drooling cat, or a concerned human who thinks the gawky youngster is an orphan.

These months certainly keep adult robins hopping. But even days filled with feeding, guarding and teaching have peaceful moments. At twilight, the youngsters settle down, and there is a chance for adults to search out a meal for themselves. For the female it must be a quick one, she must get back to warm her nest.

For the male, there is finally time for a real rest. He flies to the roost: a sheltered, secluded area of thick brush or trees where males and their fledglings spend the night. A roost may be near to or far from a bird's territory. It is "owned" by no one bird but shelters many robins and perhaps other bird species. The roost remains a mostly male domain until fall when the females, freed from their nesting responsibilities, join their mates for the evening.

Then, the robins' busy day ends as the female settles her downy feathers over her nest and young. The male ruffles his wings for his evening flight to the roost. But before he goes, from the top of his favorite tree, he spangles the twilight with song. ■

SPRING TONIC

After a March snowfall, I went to shovel the snow away from our gate when I noticed a robin resting against the base of a serviceberry tree. Its beautiful spring plumage — dark head and orange underparts — appeared even brighter than usual against the white snow.

As I took a few steps closer toward the bird, it took off and flew directly into the gate post, falling unconscious on the snow. I took the warm body into the house to show my wife, Theresa. Its crop was bulging with half-inch serviceberries.

"You should use the robin for a model and paint a picture of him resting under the bush just like you saw him," Theresa suggested. "You never painted Wisconsin's state bird."

I made several sketches of the robin, then decided to go out and get some of the serviceberries and dried leaves from under the tree to sketch for the painting. When I returned, I picked up the limp bird off my desk. He suddenly blinked his watering eyes, regaining consciousness, so I gently carried him outdoors. He flew out of my hand in an erratic course, still slightly intoxicated.

After eating frozen serviceberries, he became inebriated as the fruit fermented in his crop. When I first saw him under the tree he was apparently hung over. I was going to entitle the painting "Drunken Robin," but Theresa convinced me to change it to "Spring Tonic."

George S. Bachay, retired DNR warden and game manager, paints, writes a newspaper column and hosts a radio show. The Bachays live in Albany, WI.

"Spring Tonic," by George Bachay

Parks Almanac '88

Coordinated by Linda Nehls

Summer adventures in state parks

The orange-red glow of a crackling campfire, stars twinkling in the night sky, the early morning call of a whippoorwill, these are the sights and sounds of a summer adventure. State park visitors can begin their adventure with over 5,300 campsites available throughout the state. Do you envision your summer adventure to include a rustic campground with hand pumps for water and pit toilets, or do your prefer the conveniences of home such as flush toilets, hot showers, and electricity? These and more are available at your state parks.

Depending on the facilities available, state park camping fees range from $4 to $6 per night for residents and $6.75 to $10 per night for nonresidents. Electricity is available at some campgrounds on selected sites for $1.75 per day.

While we invite you to explore all the state parks have to offer, camping is permitted in designated campsites only. A permit is required prior to setting up camp unless otherwise posted. Camping permits are available at the park where the overnight stay is made. Each site must be cleared by 3 p.m. of the day the permit expires. If a camping party wishes to stay another night, they may do so if space is available. However, they must re-register by 10 a.m. on the day the permit expires.

Several different types of camping are available at various parks. Family campsites are the most common and can accommodate up to five people or one family. Other types of camping include organized group camping, backpack camping, horse rider's campgrounds, and indoor group camps. Camping fees for the group camps will vary. Further information is available at your favorite park.

Yacht Harbor Breakwall at High Cliff State Park. Photo by Dave Crehore.

In addition to the camping fee, most state parks, forests, and recreation areas require a vehicle admission sticker on all vehicles entering the state park for camping, hiking, picnicking, swimming, and other activities as well. Vehicle admission stickers are available at any state park office. Daily stickers are $3.50 for residents and $6 for nonresidents. If you are a frequent state park visitor, annual stickers are available at $14 for residents and $30 for nonresidents. These stickers are valid for the calendar year and can be used for winter activities also. A senior citizen recreation card is available for residents age 65 and older. This card has a one-time charge of $15 and will provide lifetime admission for the card holder plus the vehicle and occupants to all Wisconsin state parks and forests. All the fees collected help to improve the quality of the service provided by the state parks by helping to pay for the maintenance and operations of the state park system.

Reserve your place for fun in the sun

You can reserve a spot for your summer adventure now. Reservations can be made at 32 state parks for a total of 1,950 campsites, for the period from May 1 through the last weekend in October except the Northern Highland — American Legion Forest where campsites can be reserved for May 27 through September 5. The remaining 3,350 campsites are available on a first come — first served basis. Reservations are accepted beginning the first working day of the new year. For example, for 1988 the first day that reservations were accepted was January 4, 1988.

Reservation applications must be submitted on an official reservation form and mailed or delivered in person to the park or forest where the reservation is desired. Mail applications cannot be postmarked prior to the first day of the reservation season. Official forms can be picked up at state parks or forests, DNR district offices, and the Department headquarters at 101 South Webster St., Madison. Forms can also be obtained by calling (608) 266-2181.

Your summer adventure can begin now with a reservation to visit your favorite state park. Reservations must be received at least seven days before you plan to camp, so start planning today. All reservations are confirmed by mail and a specific site is assigned to each camping party. Campsites are available at many state parks for disabled persons with special needs.

Discover more gems

Looking for a new adventure? A place with unique attractions, peacefulness and picturesque scenery? Read on...each of the following properties meets that criteria.

- Enjoy a leisurely stroll on a mile-long beach at Harrington Beach.
- Discover a boater's paradise at Kinnickinnic State Park.
- Take a walk back in time at Heritage Hill.
- Experience breathtaking views of the mighty Mississippi at Perrot.
- See for miles and miles from the 60-foot observation tower at Rib Mountain.
- Find seclusion yet closeness to the Wisconsin Dells at Rocky Arbor.
- Exercise your right to bike or hike in the shadow of the Red Cedar River — on the Red Cedar Trail.

These and six other unique properties — Brunet Island, Buckhorn, Hoffman Hills, Lake Wissota, Mill Bluff, and Roche-A-Cri — we give to you to enjoy. Why not include one of these properties in your vacation plans this year...and find out why we say, "Explore and Enjoy" Wisconsin!

Red Cedar Trail. Photo by Jim Janowak.

What's new?

Glacial Drumlin Trail. The trail section around the Lad Lake property is expected to be completed later this summer. Completion of this section and the short segment at Cottage Grove would open all state-owned land on the property to trail use. Only the unowned section around Jefferson Junction does not provide for trail use. This section is still an operating railroad.

Great River Trail. Surfacing is expected to be completed on the entire 20-mile trail later this coming summer. This trail connects Onalaska with Trempealeau and Perrot State Parks.

Paradise Springs. This pleasant area in the Southern Kettle Moraine State Forest will have an additional new restroom and shelters open for public use this summer.

Devil's Lake. The bypass road around the south shore public use area and new parking areas will be completed this summer. Construction is also continuing on the north shore. A new sanitary sewer collection system is also operating at the park. The construction continuing on both shores of the lake may be of some temporary inconvenience to the public.

Willow River. A new bridge links the north section with the south section of the park across the Willow River. No convenient access across the river existed prior to the bridge project.

Kohler-Andrae State Park and Point Beach State Forest have new restroom and shower facilities.

Peninsula. The Weborg pier has been entirely rebuilt and is open for public use.

Cadiz Springs-Browntown Recreation Area and Wyalusing State Park have new fishing piers.

Park sticker design contest

The Department of Natural Resources, Bureau of Parks and Recreation, is sponsoring an art contest to design the 1989 park vehicle admission sticker. The contest encourages young artists to apply their skills and talents, to support the arts in our state's high schools, and to create an attractive park sticker for park visitors. The contest is open to all Wisconsin high school seniors.

The winning artist will be awarded a $500 post-high school scholarship and plaque. Second and third place plaques will also be presented. The winning sticker design will be displayed on over 150,000 vehicles across the state.

The contest is being underwritten by Laacke & Joys, a retailer of sporting goods in Wisconsin.

The DNR has been aided by the Department of Public Instruction in developing the guidelines for the contest. Entries are due April 1, 1988. Winners will be announced in May. The DNR and Laacke & Joys would be pleased to present the awards to the winning artists at school programs.

The DNR appreciates the opportunity to share the design of the state park sticker with the state's high school seniors, and to support art education in Wisconsin. We look forward to the selection of the 1989 sticker design and making this an annual event.

Friends groups

Are you looking for an opportunity to get more involved in helping state parks? Consider a friends group. Many state parks enjoy the support and assistance of friends groups. Friends groups are nonprofit corporations organized to assist a state park with its programs and facilities. Friends groups raise money to help a park fund special programs and provide volunteers. Some friends groups are small and limit their activities to the promotion of the parks interpretive programs. Others are quite comprehensive in their scope. Friends groups actually operate Heritage Hill State Park in Green Bay and the Olympic Ice Rink in West Allis.

The Department is actively promoting the formation of new friends groups. Recently the Department drafted a statewide policy on friends groups and received permission from the Natural Resources Board to hold hearings later this spring on that proposed policy. If you are interested in finding out more about friends groups, contact either your favorite state park or call us at (608) 266-2181.

COMING THIS FALL! An all new edition of *Wisconsin State Parks: Explore and Enjoy.* Also a 1989 Wisconsin State Parks Calendar! Due to the success of our 1988 calendar, we are in the process of designing an even better 1989 calendar for you.

Park concession task force

An 18-member citizen task force is preparing recommendations for the Natural Resources Board on how concessions can better serve park visitors and provide more revenues to the park system.

The group's approved mission for state park concessions is:

Wisconsin state park concessions should offer services and products to make parks accessible to more people and to help people enjoy and learn about the natural environment, while protecting the parks' natural and cultural resources. Concessions should augment park system revenues and not unfairly compete with private business.

To help come up with recommendations on carrying out that mission, the task force held open house forums in Superior, La Crosse, Green Bay, and Milwaukee, and encouraged written comments from the public.

The group has been considering questions like: Which kinds of parks should have which kinds of concessions? How should the State ensure the quality of goods and services offered in the parks?

The task force is also probing if some Wisconsin state parks should offer indoor lodging for visitors. The only indoor lodging Wisconsin state parks have now is group camps. According to a public opinion survey reported to the task force, many Wisconsin residents would visit state parks more often if there were cabins with plumbing. There was less interest in lodges, motels, or inn rooms.

David Gackenbach, Chief of the National Park Service's Concessions Division, told the group that national parks are phasing out cabins in favor of hotel-type lodging, which makes "a smaller footprint on the environment" and is less costly to operate.

The task force, appointed by Helen Jacobs, Natural Resources Board chair, includes legislators and members from university faculties, business organizations, and other groups. Richard Lange, former Natural Resources Board member, chairs the task force.

Free open house

On June 18 all Wisconsin state parks, forests, trails, and recreation areas will welcome the public free of charge. In addition to the regular activities offered such as hiking, picnicking, swimming, and boating, many parks will offer scheduled special events for the open house day. Special events will vary at each park; however, some of the more common activities include nature hikes, film screenings, and slide shows. Complimentary refreshments are also provided at many parks.

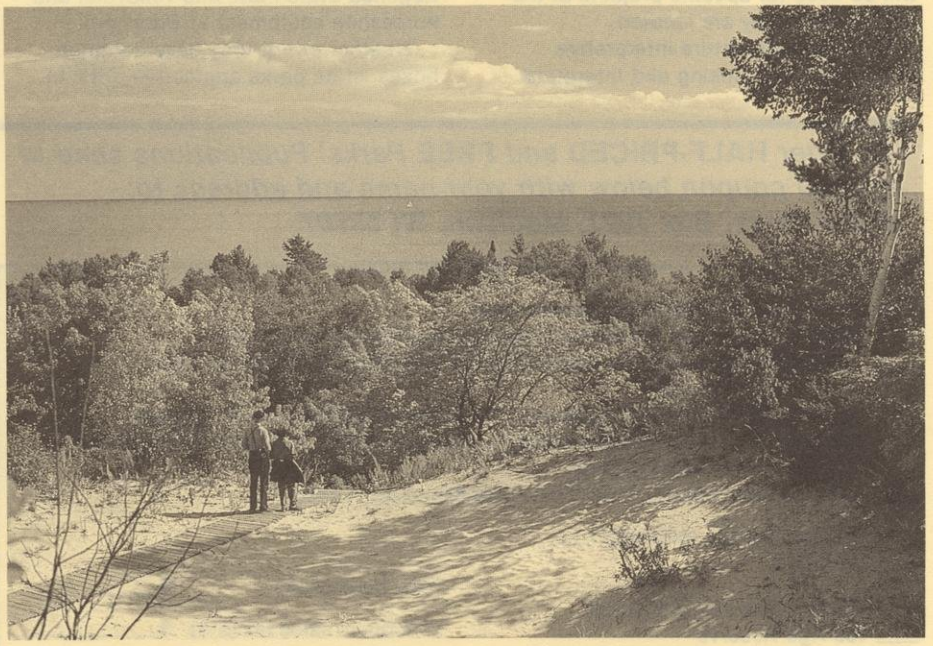
For example, Harrington Beach State Park has several activities scheduled. There will be a discussion of game and fishing laws, an ecology contest, the winning photos for the 1987 photo contest will be on display, and the Wildlife ARC will conduct a presentation on birds of prey.

The new Governor Nelson State Park will also be dedicated on June 18. In addition to the other festivities, Senator Gaylord Nelson will be present at the public dedication.

The Open House Day also provides a good opportunity to meet park staff and to see recent improvements. While all state parks will have open house on June 18, there are several parks that hold other free days throughout the year. Many of these other free days correspond to special anniversaries, dedications, or local festivals. Terry Andrae State Park will celebrate its 60th Anniversary on Sunday, October 9. According to the park superintendent, Jim Buchholz, some of the scheduled activities include a park photo contest, special historical displays and programs, and a demonstration of old-time high-wheel bicycle riding.

The parks Open House Day corresponds with another event this year — Free Fishing Day. On June 18 throughout the state of Wisconsin, everyone will be permitted to fish without purchasing a fishing license. Other fishing regulations such as size and bag limits will still be in effect. To promote fishing in Wisconsin, free fishing clinics will be held at several state parks. Some of the topics covered in the clinics include fish management in Wisconsin, aquatic food chains, knot tying, casting, and fishing equipment. Lake Wissota, and the Kettle Moraine State Forest — Southern Unit, are just two of the parks that will be holding fishing clinics this year. Many other state parks will be concentrating on fishing on their nature hikes and giving presentations on the aquatic community, fishing, boating, and boating safety.

For further information on the free fishing clinics contact Tammy Peterson (608) 266-2272. Further information on the festivities being held at each park can be obtained by contacting your favorite state park.



View from Old Baldy at Whitefish Dunes State Park. Photo by Dave Crehore.

Parks Almanac '88

Volunteer opportunities

Are you interested in helping park visitors? Like to camp? Concerned about our state's natural resources? If so, you're invited to make your personal contributions available to Wisconsin State Parks and Forests.

As a volunteer you may chose to work in any area of your interest. Work projects are flexible to suit volunteers' preferences, skills, and available time. Examples of areas where you can help are: campground hosts, naturalist programs, ski or horse trail patrol, historical research, habitat improvements, construction, maintenance, clerical, and visitor information. Special projects can also be developed for groups or individuals.

If you'd like to be a campground host, you'd be selected based on your familiarity with the park system, camping experience, and knowledge of the surrounding area. As a host you would occupy a site for about a month, assisting campers, sharing information, and performing some campground maintenance.

Campground host at Hartman Creek State Park. Photo by Norm Pazderski.

Gifts and donations

The state park system is making it easier for people to give money, volunteer services, and other gifts to the state park system.

Donation boxes have been placed in 23 parks, and other parks will get boxes in the future. Money dropped in the boxes will be used for specific projects at the parks where they are located.

Examples are nature interpretive programs at Wyalusing and Interstate parks, mini rest shelters along the Sugar River Trail, more campsite electrical hookups at Mirror Lake State Park, nature displays in Kohler-Andrae's Sanderling Nature Center, a nature lending library at Northern Highland-American Legion State Forest, a shower building at Lake Kegonsa State Park, and volleyball and horseshoe equipment at Buckhorn.

Whether or not they have donation boxes, state parks appreciate gifts. In 1987, before the boxes were in place, the park system recorded $45,265 in donations. Among them:

The Perch Lake pedestrian bridge at Brunet Island State Park, the result of nearly 500 hours of volunteer labor and nearly $2,700 in donated equipment and materials.

A $29,412 grant from the R.D. and Linda Peters Foundation for the Junior Ranger/Wisconsin Explorer program, in which nearly 30,000 children and their families participated in 1987.

Gifts totaling $5,585 for interpretive displays at the new Governor Nelson State Park.

Funds from the Himsel family for a mini rest shelter along the Military Ridge State Trail.

Mounted seagull and fish to show habitat and animal life at Kohler-Andrae State Park.

Parks as well as other Department of Natural Resources programs are aided by the work of the Natural Resources Foundation of Wisconsin, Inc. The foundation is a nonprofit corporation which channels contributions from individuals and organizations toward land acquisition for parks, recreation and natural areas, educational programs, research efforts, and land management.

The foundation's address is P.O. Box 129, Madison, WI 53701-0129.

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Lucky Lake Onalaska

Good things keep rolling along on the Mississippi River. Cooperative federal, state and local work will restore a good fishing hole and build better roads along Lake Onalaska.

Craig Thompson

It's the environmental equivalent of making lemonade when life gives you lemons.

In Lake Onalaska, a river channel clogged with sediments spawned a project which now promises hotter fishing for anglers and zippier driving for Onalaska-bound motorists.

The project symbolizes bold changes on the upper Mississippi River and a fresh enthusiasm that neighbors, states, federal agencies and Congress are bringing to environmental challenges along the nation's greatest waterway.

The outlook was much bleaker as recently as six years ago. The upper Mississippi was slowly choking on a steady rain of sediment and it badly needed resuscitating. An environmental diagnosis for the upper Miss prepared in 1982 warned:

"The Upper Mississippi River System as we know it today is destined

Craig Thompson is DNR's Assistant Environmental Impact Coordinator stationed in La Crosse.

A backwater slough of the Mississippi River. Sediments can build up behind logs clogging up normal water flow. Photo by John Sullivan

Mississippi backwaters and bluffs are home to birds, fish, mammals, mussels, amphibians and reptiles. Photo by John Sullivan

to become a navigation channel and little else within the next century unless we take action to halt the degradation of the remaining environmental resources in the region."

Strong words. An especially ominous forecast given the river's importance.

THE UPPER MISSISSIPPI IS A COMMERCE AND A CONSERVATION CORRIDOR

The Upper Mississippi River System is a major transportation artery for the Midwest and it pulses with activity. The 1,300 mile waterway links five states between Cairo, Illinois and Minneapolis, Minnesota. The river is an aquatic jack-of-all-trades. Commercial barges carry grain, coal, oil, chemicals; millions of tons of commodities. It is also widely used for recreation, as a source of drinking water and manufacturing water, and it carries away industrial and municipal wastes.

Its vast biological resources support myriad wildlife: 281 species of birds, 112 species of fish, 52 species of mammals, 49 species of freshwater mussels, 41 species of reptiles and 20 species of amphibians. So significant is its ecological value that five national wildlife refuges have been established along the upper Mississippi's length.

An estimated 20 percent of North America's waterfowl use the river for feeding and resting. Among them, up to 75 percent of the migrating continental canvasback duck population. The fishery resource alone contributes an estimated $500 million annually to the economy. Fish caught commercially are sold in markets as far away as Milwaukee, Chicago and New York.

OLD MAN RIVER HAS BEEN MANIPULATED AND MANAGED FOR MANY YEARS

To fully understand how much the upper Mississippi has changed, we need to turn back the river history pages 160 years.

Since the early 1820s, the U.S.

Army Corps of Engineers has been working to tame the Mississippi River and its major tributaries for commercial navigation. Early work consisted of clearing river obstructions and maintaining deep channels by constructing dikes, dams, stone-lined embankments and other devices to control river flow, depth and flooding.

By the late 1920s, commercial vessels were getting larger and consequently navigation more difficult. In 1930, Congress authorized construction of a nine-foot channel between St. Louis and the Twin Cities to increase the navigation capacity of the river. Within 10 years the Corps of Engineers constructed a series of locks and dams converting the formerly free-flowing Mississippi into a chain of slack-water pools. The pools inundated vast river valleys, creating extensive backwater lakes, ponds and sloughs. Such was the origin of Lake Onalaska, a 7,700-acre backwater created when Lock and Dam 7 was completed near La Crosse, Wisconsin.

The 1950s, '60s and '70s witnessed an explosion of agriculture and urbanization within the system's watershed. The equation was and is simple: more cleared land washed more sediments into the river and its tributaries.

Development, erosion and navigation dumped a foot of sediment in the river every decade.

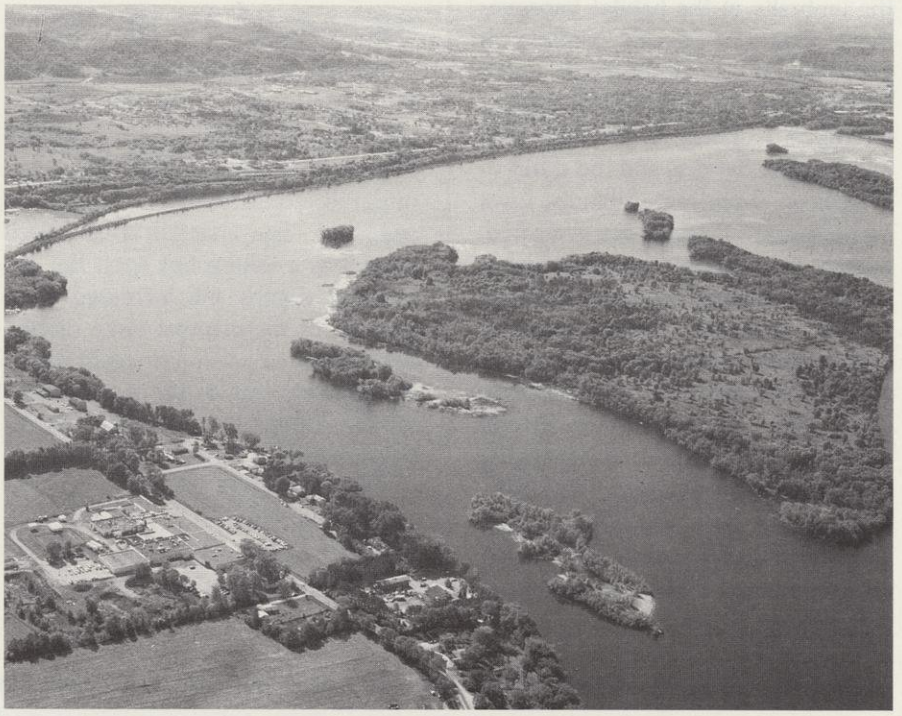
By the late 1970s some areas were filling in at the rate of one foot per decade. Increasing commercial traffic on the river contributed to the problem by accelerating riverbank erosion and recirculating settled sediments. Excessive sediment hinders commercial navigation and damages biologically fragile habitats. The Corps of Engineers is forced to spend millions annually to maintain a clear navigation channel. Fish and wildlife dependent on productive backwaters vanish as these areas are degraded. The welfare of the river is in jeopardy as are economics dependent on it.

Lake Onalaska is a biological gem; a vast mosaic of open water and wetland supporting an astonishing diversity of wildlife ranging from bullfrogs to black terns. It also supports one of the best fisheries in the area, especially noted for the large bluegills it produces — affectionately referred to as "slabs" by local anglers. Like all pools, Lake Onalaska also acts as a trap, accumulating sediment delivered by upstream tributaries.

During the 1970s the effects of sedimentation in the lake began to be noticed. In 1975 lake residents formed the Lake Onalaska Protection and Rehabilitation District to promote a healthier lake environment. Shortly thereafter, they proposed that certain areas of the lake be dredged to restore fish habitat gradually lost to sedimentation. River biologists concurred, but lake dredging is a costly venture and dollars were in short supply. The dredging proposal joined the ranks of other river projects shelved for lack of funds.

Recognizing the need to balance commercial navigation and recreational, economic and biological needs along the river system, Congress directed preparation of a "Comprehensive Master Plan for Management of the Upper Mississippi River System" in 1978. A massive, cooperative federal and multistate effort ensued. On January 1, 1982, the master plan was completed. In October 1986, the plan became public law, shepherded through Congress by Wisconsin Representative Steve Gunderson.

The plan includes provisions to rehabilitate and enhance fish and wildlife habitat, monitor and analyze the river's traffic conditions, assess physical, chemical and biological characteristics and expand recreation, Gunderson said. Known collectively as the Upper Mississippi River System Environmental Management Program (UMRS-EMP), these programs are administered by the Corps of Engineers.



A bird's-eye view of the channel between Rosebud Island and mainland in Lake Onalaska.
Photo by Darwin Krall

ENTER THE ENVIRONMENTAL MANAGEMENT PROGRAM

Some of the most potent medicine prescribed by the program falls under the umbrella of the habitat improvement program. Specific projects to preserve and protect high value habitat areas are proposed by agency biologists working for the U.S. Fish and Wildlife Service, and the states of Wisconsin, Minnesota, Illinois, Iowa and Missouri. Projects are evaluated, ranked, designed and implemented as necessary funding becomes available.

The Mississippi's future seemed a little brighter. Biologists, frustrated in the past, had reason for renewed optimism. Shelved projects were dusted off and reconsidered. A dredging project for Lake Onalaska? You bet!

Now, the Lake Onalaska Dredge Cut and Island Creation Habitat Rehabilitation and Enhancement Project is nearly ready to implement. Many years in the making, this project has grown into a highly coordinated, multiagency effort whose positive effects will be felt far beyond the banks of the Mississippi.

A CURE FOR THE BIG MUDDY BLUES

Studies by Department of Natural Resources biologists identified a channel between Rosebud Island and the Wisconsin mainland which has accumulated considerable amounts of sediment. The channel is also well known as a fishing hot spot. But decreasing depths and increased plant growth in the channel have dipped dissolved oxygen concentrations dangerously low in the summer and winter. Under severe winter conditions complete fish kill could occur.

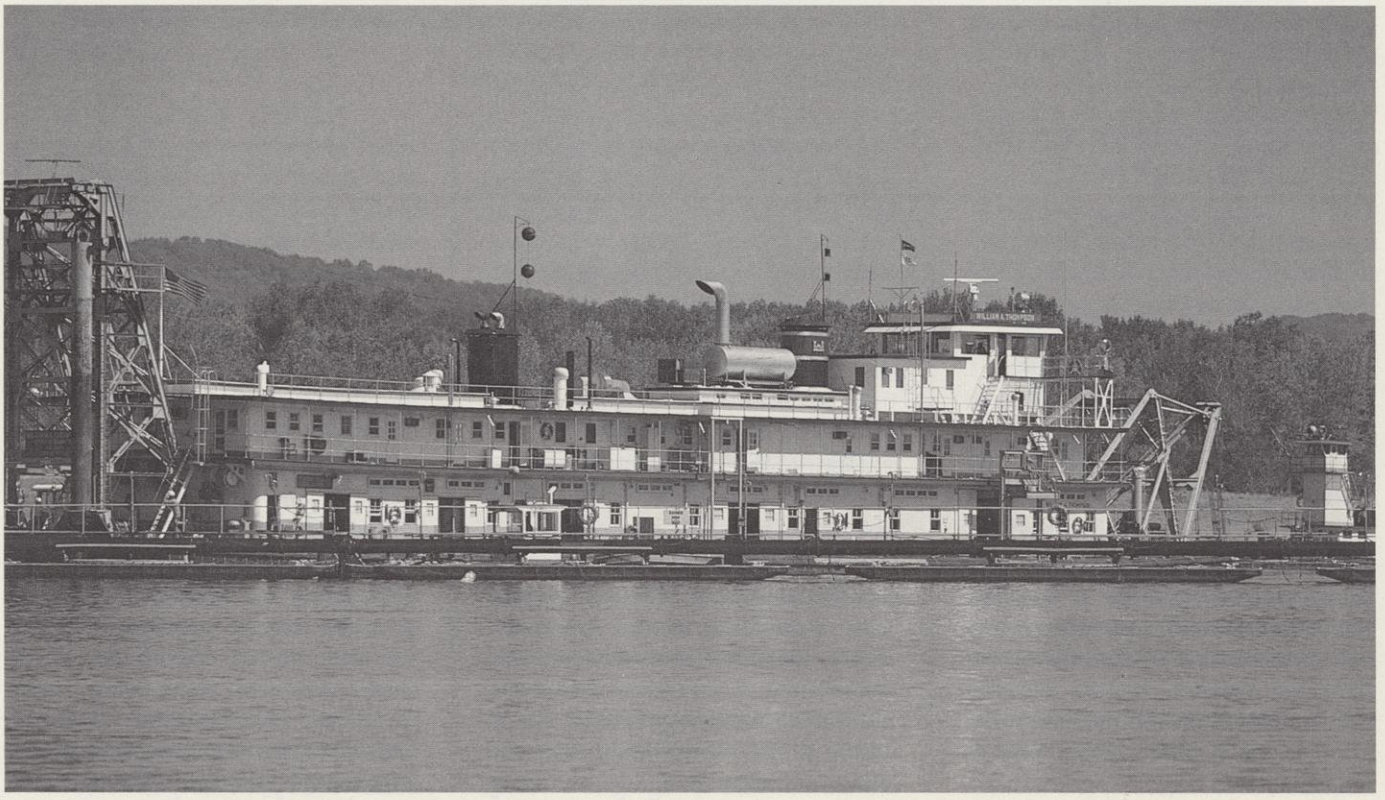
The solution? Create a deeper channel to induce a continuous flow of fresh, oxygenated water into the area by dredging three million cubic yards of material. Fish and Wildlife Service and DNR biologists also planned to use dredged material to restore and create islands in Lake Onalaska. Islands promote clear water and reduce lake bed erosion by blocking strong winds that often blow across a lake. Second, islands provide nesting and loafing areas for waterfowl, restoring some habitat diversity that had been lost.

> What luck . . . better fishing, deeper channels and new roads built on dredge spoils.

Early in 1987, everything appeared to be shaping up nicely, everything except funding.

Even EMP funds are limited. Once again tempered by fiscal reality, project biologists reluctantly scaled

It looks a little like a paddlewheeler, but it's a Corps of Engineers dredge at work on the Mississippi River. Photo by Pam Thiel



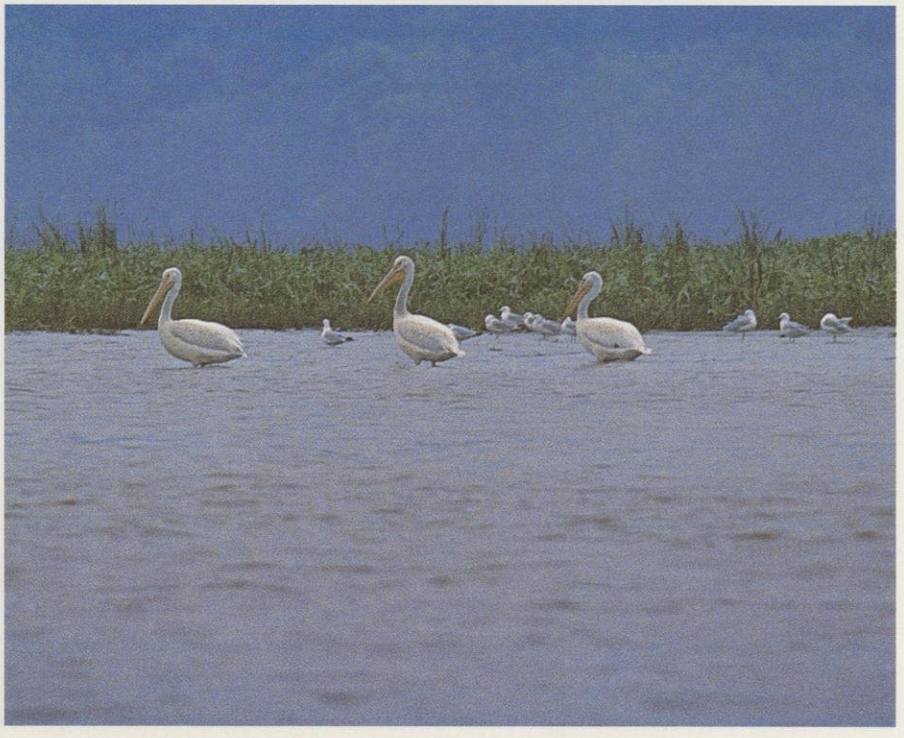
(above) Dredged sediments will be mounded and sculpted to form artificial islands for nesting birds and other animals at Weaver Bottoms on the Mississippi River.
Photo by John Sullivan

the project back to 750,000 cubic yards.

Then the lake ran smack into some good luck in the form of State Representative Virgil Roberts of Holmen. As DNR biologists were scaling back the Lake Onalaska project, state Department of Transportation (DOT) engineers were busy planning and designing a much needed freeway. U.S. Highway 53, as it is officially designated, is a whopping, four-lane divided median highway that, in the first stage of construction, will stretch from Onalaska to Holmen.

Building a freeway of this magnitude will require a lot of dirt — almost 1.3 million cubic yards. Finding a suitable source for that much material is not an easy matter. In past projects, earth to construct roads was scalped from the river bluffs. The fill was cheap and nearby, but no one wanted to further erode these beautiful hills.

(below) No, it's not Florida. White pelicans and herring gulls rest on a Lake Onalaska sand bar during migration.
Photo by Pam Thiel



The bluffs along the Upper Mississippi are a unique scenic resource designated by federal and state authorities as the Great River Road Corridor. The wooded bluffs rise up to 600 feet above the river. Using sandy sediments from the channel dredging project could eliminate unnecessary bluff destruction by providing the fill material needed for highway construction.

At the urging of Rep. Roberts, the Department of Natural Resources and the Department of Transportation coordinated their work to benefit both the river and highway project. His effort was a needed catalyst.

Now, an extensive interagency project is under way. Participating agencies include the Department of Natural Resources, the Department of Transportation, the Lake Onalaska Protection and Rehabilitation District, the U.S. Fish and Wildlife Service and the Army Corps of Engineers. Project construction is scheduled to begin in 1989.

The amount of sediment that will be dredged from Lake Onalaska has increased from 750,000 to two million cubic yards due to project participation and cost-sharing contributions from the DOT. Of that total, more than one million cubic yards of fill will be hydraulically pumped to the Highway 53 right-of-way to construct the freeway.

By cooperating, agency planners can take pride in a better fisheries rehabilitation project for Lake Onalaska, better protection for the river's wooded bluffs, more lake islands and an environmentally improved highway project.

"The Lake Onalaska Project is one example of the kind of interagency initiative Congress envisioned when it approved the EMP," noted Rep. Gunderson.

Thanks to opportunities under the EMP, this project is not alone. It is one of the first of many that will benefit the river and its resources.

"Old Man River" has reason to smile again. ■

Green gems like Trempeleau Mountain at Perrot State Park rise from the pearly waters. Photo by Pam Thiel

Readers Write

GENERAL

Wisconsin Natural Resources is truly above and beyond most other really good magazines. We don't usually buy or subscribe to magazines because we aren't so inclined, BUT in this case, after seeing WNR, we knew we would like it and never tire of it.

Ed and Greta Vitous
Grantsburg

Until about a year ago, I didn't know there was a magazine like *Wisconsin Natural Resources* available. Curiosity and the reasonable price induced me to subscribe, and my first issue was *GREAT*. Congratulations, I'm certainly learning a lot, reading from cover to cover — enjoy the pictures as well.

Mabel T. Symons, Madison

We have been avid readers of *Wisconsin Natural Resources* magazine for many years and enjoy it very much. It was with surprise and delight that we discovered, on page 18 of the January/February issue, the picture of our son reclining in his lawn chair ice fishing.

Reva Meiller
Cottage Grove

BIENNIAL REPORT

The article on Havenwoods and Superintendent Al Stenstrup in the January/February Biennial Report was like a visit with old friends. I've been a volunteer at that park since its inception.

Volunteers can learn a lot working with the staff. They're all outstanding — Al, Beth, Judy, Kate, Kelly, Matt and Peter. All of them are professional and caring and create a warm, welcoming atmosphere at Havenwoods.

Rosemary Thielke
Milwaukee

WATCHABLE WILDLIFE

Congratulations! Your November/December 1987 issue was truly a great one. *Watchable Wildlife* was very thorough and interesting. I learned about wildlife areas that I didn't even know existed in my part of the state. It's also good to know there are places in Wisconsin that harbor some rare and threatened plants and animals — and there are people and organizations that are doing something to help our watchable wildlife.

Mark T. Carroll, Kaukauna

In all fairness, we must write to say that the November/December 1987 issue is the best we have ever received. About three or four years ago, we wrote a letter severely criticizing your magazine because 80 to 90 percent of it dealt with hunting, trapping, fishing and the like. We reminded you that although it is now the Department of Natural Resources, the parent department was the Wisconsin *Conservation* Department — and we felt that you had sorely lost sight of that goal.

"Nonhunters " also pay our share. How many bird watchers, tourists, sightseers, flock to Horicon to see the geese, not with guns but with binoculars and cameras? How about the snowmobilers (who also pay license fees) who enjoy seeing the animals, but also without guns? And the boaters? And the hikers, the skiers, the campers?

The money generated by nonhunters is not so obvious. It's not as easy as multiplying x-number of deer hunting licenses by x-number of dollars. But we would be willing to bet that Wisconsin derives more income from nonhunters than from hunters.

There's room for all of us.

Mr. and Mrs. Pauer
Ogdensburg

Calling all berry pickers, nut gatherers, mushroomers, bird watchers, seed gatherers, gnat eyebrow combers and asteroid watchers. I'm interested in setting up system for foragers, gatherers, naturalists, and land stewards to exchange information about phenological events. I thought your readers might be interested in the idea.

The exchange could take form in a periodical or via a computer billboard-type network. The goal is to share information that would help outdoor enthusiasts plan their trips — where to watch out because frost has nipped berries in the blossom stage, where certain wild crops are particularly abundant, and so on.

I'm looking for both field correspondents who would send in observations and people with publishing and computer skills. Contact Michael J. Riegert, P.O. Box 71, Stetsonville, WI 54480.

Readers Write

The best magazine I have ever bought is the special issue on watchable wildlife! It is very informative and well written; also, the pictures are beautiful. It has been difficult for me to put this magazine down.

As a result of reading *Watchable Wildlife*, I intend to: (1) visit as many of the places mentioned as possible this year, and (2) send a copy of this as a gift to someone in California who loves to visit Wisconsin.

You and your staff did an excellent job.

Roberta Johnston
Stevens Point

Your special *Watchable Wildlife* issue is fantastic! It shows a side of DNR far too often unseen; which should be the first and foremost side.

Observing nature puts everything in our own chaotic lives back in perspective. Educating people to the benefits of observing and learning from nature will make them aware of the utmost importance in preserving and maintaining this for ourselves and for future generations. Your issue shows how nature is life — there whenever you choose to take the time to enjoy it.

Dorothy Huffman, Horicon

CLARIFICATION

In our January/February story "Protecting and balancing future rights to water," a portion of WVIC president Robert W. Gall's quotation was incompletely transcribed and incorporated in the text. The quote should have read: "The Wisconsin Valley Improvement Company's goal is to produce as nearly a uniform flow of water as practicable in the Wisconsin and Tomahawk rivers by storing in reservoirs surplus water for discharge when the water supply is low to improve the usefulness of the rivers for all public purposes and to reduce flood damage."

Our January/February story, "Wisconsin Deer in Dixie," was written by William E. ***Schulz****, not Schultz.*

NEXT ISSUE:

Great Lakes Groceries
John Muir in Wisconsin
State Park Bike Trails

Black-capped chickadee

Photo by Stephen J. Lang

Maple decline and air pollution

The Department of Natural Resources is working with local, national and international groups to evaluate sugarbush conditions and monitor how environmental stresses affect maple trees.

Kendra Nelson

Wisconsin is the third largest supplier of maple syrup in the United States, producing about 125,000 gallons worth more than $2 million in 1981 (most recent available figures). Vermont and New York rank one and two, respectively, among U.S. producers.

Stateside production, however, has historically been *petite* next to Canadian production. As the world's major supplier, Quebec produced three million gallons of maple syrup in 1981 — that dropped to 1.6 million in 1984 and continues to drop.

In Quebec, Canada, maple syrup production decline parallels maple decline. The situation there affects the entire maple syrup industry, changing market shares and supply-demand ratios, and focusing concern on the natural resource base.

Boiling sap into sweet syrup—Wisconsin is the nation's third largest producer. Photo by Robert Queen

THE MAPLE DECLINE PROBLEM

Reports of widespread hardwood decline date back more than 100 years in North America. In the 1920s and '30s, maple decline occurred in several northeastern states. The Great Lakes region experienced a severe maple decline in the 1950s, which affected more than 10,000 acres in Wisconsin, Minnesota and Michigan.

Federal, state and industry studies of that decline in Wisconsin attributed it to combined insect, fungi, drought and frost damage. The studies also found: (1) that sugar maple were more susceptible to serious injury from brief insect defoliation episodes than were other hardwoods, (2) that tree mortality peaked two to three years after insect defoliation, as fungi invaded, and (3) that sugar maple were especially sensitive to insect defoliation and subsequent fungal attack when drought and defoliation coincided.

Those findings exemplify how stresses, both simultaneous (drought with defoliation) and accumulative (insects followed by fungi), can affect tree health.

Scientists divide factors that cause trees to lose vigor into three groups. *Predisposing* stresses are long-term and make trees more susceptible or predispose them to decline. *Inciting* stresses are short-term but intense, causing sudden, drastic injury. Finally, *contributing* stresses act in the long run upon trees already weakened by predisposing and/or inciting factors, contributing to overall effect.

Tree decline may occur long before it's readily and visibly apparent. It generally occurs in mature trees. In fact, old age is among the causes of decline. Some visible indications of a tree in decline are late budding, abnormally small and pale green leaves, limited branch growth, dying

Kendra Nelson is an editorial assistant with Wisconsin Natural Resources magazine.

UNDERSTAND A FEW MAPLE TERMS

The mark of 100 percent pure maple products.
Graphic courtesy of the International Maple Syrup Institute

Understanding a few terms is critical to following the subsequent discussion.

A "sugarbush" is a stand of sugar maples managed to produce the highest possible yield of sugar-rich sap per acre of trees. To reach maximum yields, sugarbush operators cut and/or stock trees to encourage the growth of healthy, vigorous sugar maples with deep, wide crowns.

A "maple stand" is an undisturbed forest that has a naturally high density of sugar maples.

Reference to "maple" and "sugar maple" also includes black maple, red maple, silver maple and other tree species commonly tapped for sap to produce syrup and other maple sugar products.

Being in "decline" means, simply, that the health of sugar maples is deteriorating. It is not an irreversible process. Trees can recover if stresses are removed or if the tree receives treatments or nutrients to counteract stresses. When a periodic maple decline occurs, maple syrup producers and researchers seek its causes and cures.

"Dieback" refers to the death of portions of leaves and branches.

branches, and premature fall coloration and leaf drop. Also, tap holes and other wounds on declining trees may be slower to heal, if they heal at all.

Questions about the currently observed maple decline are challenging researchers more than ever to better understand entire ecosystems. It is a puzzle with many interacting pieces. It is a moving picture that science illuminates and attempts to bring into focus. Studies under way originated where the current problem is most acute, in the maple syrup province of Quebec. And Wisconsin is contributing information and research that helps explain pieces of the maple decline puzzle.

THE CANADIAN STUDIES

Reports of the current maple decline in southern Quebec began in the late 1970s. It now affects roughly two million acres from the St. Lawrence River Valley to the Canadian-U.S. border.

Researchers are investigating various causes. For example, there had been unfavorable climatic conditions. The severe winters of 1980-83 were similar to those of 1931-33, which had resulted in five to six years of maple decline. Also, there had been forest tent caterpillar defoliation for at least three consecutive years, 1980 through '82, and summer droughts in 1982 and '83. Such a defoliation and drought combination recalls the 1950s maple decline in Wisconsin. But, there is a new factor being considered.

The region of Quebec experiencing maple decline is at the confluence of prevailing winds carrying air pollution from highly populated, commercial and industrial areas of eastern Canada and the midwestern United States.

In 1983, Quebec's Ministry of Energy and Resources (MER) began an aerial survey to document maple decline's extent and severity in the province. With 2,060 square miles surveyed, 1985 results showed that almost 60 percent of sugar maples were healthy or had only trace damage. "Light damage was observed in 35.4 percent of the maple stands surveyed, while damage was moderate in 4.2 percent and high in 0.9 percent."

In 1983-84, MER established 130

Photo by Robert E. Strous

"The Wisconsin Department of Natural Resources shares the concerns of state maple syrup producers. We are committed to investigate the potential effects of air pollution on forest resources."

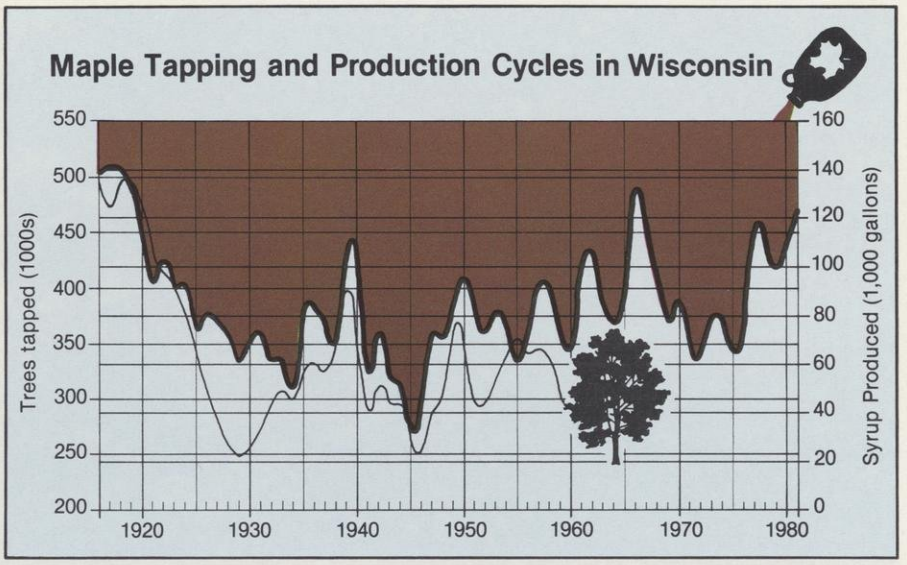
— Cheryl Rezabek, DNR environmental specialist in the Acid Rain Section

study plots. Observations have indicated that the current maple decline has increased through time, with the most severe damage to trees on mountaintops or in humid environments. Furthermore, maple decline extended beyond areas of adverse climatic conditions or insect infestations — but where severe winters, defoliation and drought had occurred, maple decline has been most intense.

Air pollution may be a factor in Quebec's current maple decline. It involves more than the sulfur dioxide and nitrogen oxides synonymous with acid precipitation. Oxidants, especially ozone, may independently cause damage. While acidic deposi-

tion seems to cause excessive leaching of elements important to plant growth, the oxidants affect leaves, which are important in photosynthesis.

Data from Quebec's neighboring province, Ontario, also point to widespread environmental stress. In 1985-86, Ontario's Ministry of the Environment investigated the province's maple growth trends since about 1800. There had been three distinct regional trends until 1970, but thereafter the curves "coalesce and enter a period of growth decline the length and degree of which is unique in the 180-year chronology." A common stress that had affected all three regions during the growth decline was unfavorable temperatures. Air pollution varied among the regions — but where air pollution levels were higher, growth decline was slightly more intense.



Data from the National Agricultural Statistical Service track the Wisconsin maple syrup industry's ups and downs. These long kept records have been discontinued due to budget cuts.
Graphic by Georgine Price

THE U.S. STUDIES

In 1980, the United States initiated a 10-year, nationwide, multiagency research plan "to reduce the scientific uncertainties regarding the sources and effects of acidic deposition and to assess the results in terms of control strategy." In 1987, this National Acid Precipitation Assessment Program (NAPAP) issued an Interim Assessment Report.

The report cited air pollution as a stress factor to trees. In one of its more controversial and carefully worded conclusions, NAPAP said that "most U.S. forests are not expected to show an abrupt change in health at current ambient air pollutant

Maple decline may be caused by a mix of natural disease cycles, environmental pollution, new growing techniques and new harvesting methods. Here, a web of plastic tubing drains sap towards a central collection tank.
Photo by Robert Queen

Syrup in the time-honored fashion—tree taps or "spiles" release sap a drop at a time.
Photo by Robert Queen

concentration levels and deposition rates." Note that the statement ascribes no *abrupt* pollution damage to *most* forests at *current* pollution loadings.

Other researchers characterized forest decline in the United States differently. In Congressional testimony on a historical perspective of U.S. forest decline, professors Robert I. Bruck and Wayne P. Robarge of North Carolina State University concluded that "never before has such large-scale and rapidly spreading forest decline been observed affecting so many different species under such varied ecological conditions."

In the interim report, NAPAP did call for further studies to determine acidic deposition impacts on forest soils.

In 1983, a federally sponsored study specifically examined the effects of ozone on trees. Levels of this air pollutant, associated with motor vehicle exhausts, are chronically high at Shenandoah National Park in Virginia. The National Park Service's Air Quality Division also noted that the mountainous park provides a pollution gradient, as average ozone concentrations increase with elevation.

The study evaluated five maple forest stands at different altitudes in Shenandoah National Park. "Low numbers of standing dead (1.6 percent of the live population) and dying trees (1.5 percent) were recorded in all five stands." There was normal growth, and leaves showed no symptoms or injury.

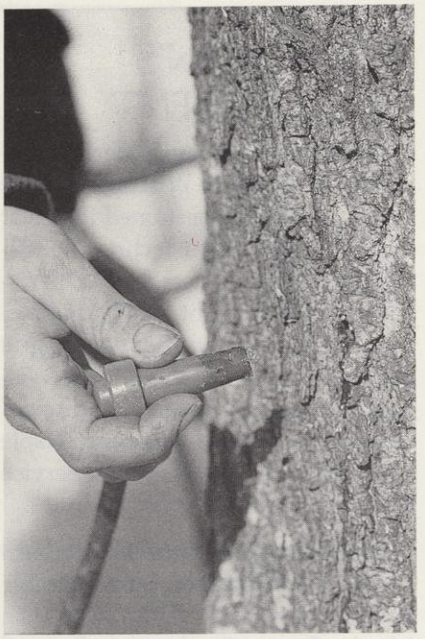
OTHER STATES' STUDIES

Besides cooperating in federal studies, states throughout the U.S. maple syrup producing region (from Maine to the Midwest) are initiating maple decline research.

In Vermont, the most recent U.S. Forest Service inventory (1983) calculated that growing stock volume of sugar maple had increased about 35 percent since the previous inventory (a decade before). Changes in land use over the region may in part explain this positive trend. Farm fields, abandoned earlier in the century, have reverted to forest stands of young to middle-aged, relatively fast growing sugar maples.

Overlapping the federal inventory, a survey by Vermont's Department of Forests and Parks (DFP) compared the health of state sugarbushes through time. In response to maple syrup producers' concerns about the condition of their trees, DFP had examined 90 sugarbushes in 1977. Reexamination of 54 of the plots in 1985 showed that maple health had remained the same or improved.

In neighboring New York, Cornell University's Boyce Thompson Institute (BTI) began a five-year study of air pollution's effects on sugar maple in 1987. BTI is investigating how ozone and acidic deposition may weaken sugar maple, predisposing the trees to disease and other damage.



Less romantic but more efficient tube taps.
Photo by Robert Queen

Closer to Wisconsin the University of Michigan's School of Natural Resources is studying how the upper Midwest's steep acid precipitation gradient may be affecting forests. Interestingly, in certain soils, at moderate deposition rates, "nitrogen may have mainly beneficial effects on forest productivity." Nonetheless, other researchers caution that in other soils, this same amount of nitrogen could be considered overfertilization and plants might suffer. Comparatively, the Michigan report noted that "forest soils appear to be rarely deficient in plant-available sulfur," so additional sulfur is not necessarily beneficial.

Perhaps the most remarkable portion of the Michigan report stated that "evidence is building for natural selection against pollution-sensitive genotypes and species." Some resource managers question whether "unnatural" stresses such as air pollution should play a role in how forests naturally evolve. Indeed, most environmental policies are set to protect and sustain individuals most sensitive to pollution damage.

◄ Wisconsin producers are partners in the research to analyze maple decline. "We work together to bring you the finest maple products," says Roland Jorns, seen here at the family sugarbush near Egg Harbor in Door County. Jorns directed the Wisconsin Maple Syrup Producers Council for six years, serving two terms as its president. He currently represents Wisconsin on the North American Maple Syrup Council.
Photo by Dave Crehore

WISCONSIN'S INVOLVEMENT

Based on the maple decline observed in Quebec, Wisconsin maple syrup producers questioned if similar maple damage was affecting the maple syrup industry here. In 1987, Wisconsin's Department of Natural Resources began studies of maple decline in cooperation with the Wisconsin Maple Syrup Producers' Council, the North American Maple Syrup Council, the U.S. Forest Service and the Canadian Forestry Service.

Preliminary measures of sugarbush decline in Wisconsin were possible because members of the Wisconsin Maple Syrup Producers' Council agreed to have their sugarbushes sampled. The sampling was partially funded by a $1,000 grant from the North American Maple Syrup Council.

For the survey, DNR researchers established five one-fifth acre plots in each of 42 sugarbushes. They examined the 210 plots twice, once midsummer and once late summer, to evaluate the leaves, branches, trunks and root collars (where trunk meets ground) of sugar maples with DBH (diameter at breast height) of five inches or more.

Researchers noted that, in general, 35 state sugarbushes were in good or excellent health, six sugarbushes had potential health problems and one sugarbush showed serious dieback. Clearly, Wisconsin sugarbushes do not currently show signs of widespread maple decline.

The study provides important baseline data to monitor tree health through time. In fact, investigators recommend that soils, growth trends and nutrient levels be more intensely studied in the unhealthy state sugarbushes. Already, the North American Maple Syrup Council has approved another $1,500 for the project from its research fund.

The U.S. Forest Service and the Department of Natural Resources are taking another approach to measuring maple decline. On four million acres of Wisconsin's northern hardwood forest, sugar maple is a major component. An aerial survey will assess tree health over this vast range. Researchers will be able to figure into their analyses an acid precipitation gradient that covers the region. Plans are to complete the aerial survey study by 1989 at a cost of $81,400 — $26,000 budgeted from the U.S. Forest Service; $55,400 from the Department of Natural Resources.

An overall picture of maple decline in North America requires study of the entire U.S.-Canadian natural range for the species. This effort is, indeed, currently under way between the Canadian Forestry Service and the U.S. Forest Service. Wisconsin's part in the plan includes establishing 18 permanent study plots — nine in sugarbushes and nine in maple forests. This is the first NAPAP-sponsored study to specifically investigate sugar maple. During the next three years, DNR researchers will collect data from the plots, then forward it for analysis to U.S.-Canadian national agencies.

To study maple decline — many individuals, organizations and agencies are interacting.

WHERE TO NEXT?

Maple decline is a complex problem that's simply one piece of a larger puzzle: How do we relate forest decline to environmental stresses like air pollution? General forest decline of several species has been well documented in North America and Europe.

Our concerns that air pollutants, particularly acid deposition and its precursors (sulfur dioxide and nitrogen oxide) might damage forest resources have pinpointed similar problems here. In eastern Wisconsin, we can show where air pollutants have caused tipburn in white pines. In those areas where we have observed visible white pine injury, we have also discovered white pines with reduced growth rates. These damaged pines are located in tree stands that receive the state's highest pollution levels of ozone, sulfur dioxide and nitrogen oxide.

Results from these pine surveys, along with lake studies and other environmental investigations convinced state legislators to pass laws to protect natural resources from further air pollution damage.

The 1985 Wisconsin Act 296 sets goals for reducing sulfur dioxide emissions by 50 percent. The Department of Natural Resources and the Public Service Commission were further directed to evaluate how nitrogen oxides stress sensitive resources like streams and forests. The agencies will also assess costs of reducing nitrogen emissions and will conduct studies for the next 10 years to detail how sulfur dioxide and nitrogen oxides affect lakes, streams, soils and forests, including sugar maple.

As part of our task to unravel the complex interactions of pollutants, air, soil and trees, the maple decline studies may provide answers to questions of local, regional, national and international importance. How sugar maple and other trees respond to air pollutants can guide environmental policies and gauge whether further emission controls are warranted to protect forest resources. ■

WISCONSINITE LYNN REYNOLDS PERSONIFIES THE MAPLE INDUSTRY

"The American economy could well be based on the making of maple syrup."

That quote from Thomas Jefferson appeals to Lynn Reynolds. As vice president of the Wisconsin Maple Syrup Producers' Council (WMSPC), secretary-treasurer of the North American Maple Syrup Council (NAMSC) and director of the International Maple Syrup Institute (IMSI), Lynn is the industry relations specialist of the world's largest maple syrup producer — the Reynolds family.

Making maple sugar candy with her mother, young Dana is the seventh generation of Reynolds to enjoy a sweet maple heritage. Photo by Kendra Nelson

Brother Juan manages the processing of maple sap from approximately 100,000 trees annually, as well as bottling, sales, shipping and so on. All of which earned him NAMSC's achievement award last year.

And, "every child of the next generation," observes Lynn, "is involved in some form of the maple industry." That's six generations so far, and counting.

Lynn and Juan's father is also "a well recognized man in the world of maple." An inductee to the Maple Hall of Fame, Adin Reynolds was a founder and past president of WMSPC, a founder of NAMSC, first president of IMSI and director of both the latter organizations until his death in December 1987.

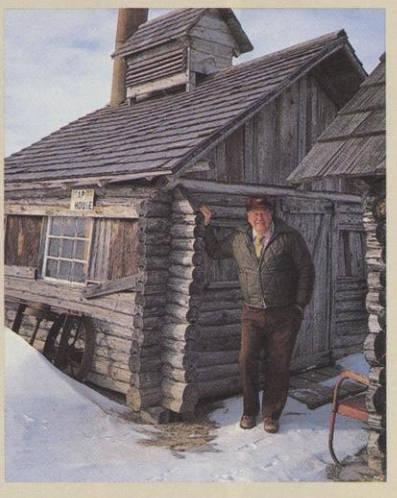
"Mr. Maple" Photo by Kendra Nelson

"We're just following in his footsteps," says Lynn. It was the family industry that determined his course of studies at UW-Stevens Point and the Institute of Paper Chemistry, where he earned a master's degree in chemical engineering and tree physiology.

Such knowledge serves him well these days as all of the major industry organizations he helps lead are concerned about the current maple decline. NAMSC provides funds for research. "Now, we choose," explains Lynn, who chairs NAMSC's research review committee, "which projects we will support as an industry."

NAMSC's research funding, however, is tied to industry sales, and last year, maple syrup yields were down everywhere except in Ohio, reports Lynn. Wisconsin's yield was down for the third year in a row to what he estimates as about 60 percent of 1981 levels. "The weather stayed very cold, and then very quickly it got warm" — not the combination of warm days with cool nights required for maple sap to flow.

It takes from 40 to 50 gallons of maple sap to make one gallon of maple syrup. An average sugar maple during an average year yields less than a quart of maple syrup. Furthermore, the trees must be at least 50 years old before they are large enough to tap — but they can live 300 years or longer. No wonder the maple syrup industry spans generations.



The old Sap House at the Reynolds' family museum in Aniwa—everyone's welcome! Photo by Kendra Nelson

"I guess it's kind of a heritage you just accept — and enjoy," says Lynn.

In fact, the Reynolds family hosts a celebration of their industry every year on the last Sunday in May. During this Wisconsin State Maple Syrup Festival, about 10,000 people visit the Reynolds' Aniwa sugarbush. They tour the family museum, enjoy music and special events, and taste tradition — pancakes with maple syrup that are served all day long.

American robins. Read about them on page 13.

Photo by Stephen J. Lang, Madison, WI

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