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WISCONSIN NATURAL RESOURCES

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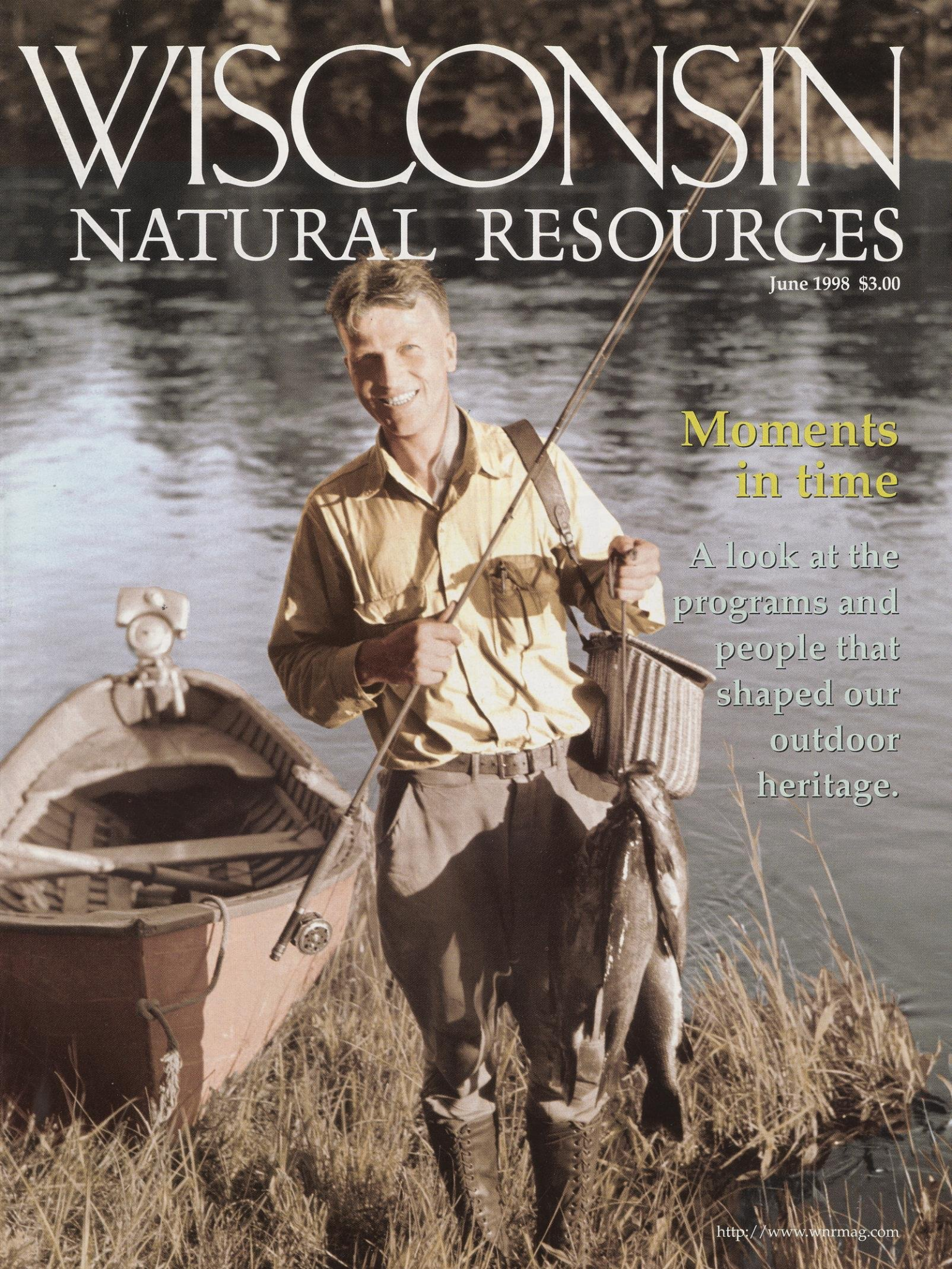

Moments in time

A look at the programs and people that shaped our outdoor heritage.

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Robins' nests and sticktights

Dave Crehore

Back in 1919, Henry Ford said "history is bunk." I don't know what he had in mind when he said it.

Maybe he meant history is biased. If so, he was right. History books tend to be written about people who are white and important. The stories of ordinary people don't get told very often.

But if he meant that history doesn't matter, he was wrong. There's plenty to learn from history.

About 15 years earlier, another important white guy, George Santayana, said that those who don't remember the past are condemned to relive it. I think most of us would agree with George. Old heroes should be honored. Old mistakes shouldn't be repeated. Of course history has faults; it's written by people. But it isn't bunk.

Along with language, history is what makes us human. We understand that actions have consequences. We anticipate the future. We consciously make records and pass them along through time. Animals can't do any of these things.

Take robins' nests for example. Robins build them instinctively. But they can't tell other birds how to build them. If the last robin were to die, there would be no more robins' nests, ever, because robins have no language, no memory of the past and no concept of the future. No culture, in other words.

No, history isn't bunk. History and humanity create each other. We survive because our culture makes it possible for knowledge to transcend time. The things we learn become the property of the species and the future.

In 46 B.C., the Roman philosopher Cicero said that to be ignorant of what occurred before you were born is to remain always a child. And that's why observances like the Wisconsin Sesquicentennial are important. They blow the dust off the history books. There are bright chapters and dark chapters in our history. Understanding them can help us grow up.

We're all busy people. Once the sesquicentennial parades are over and the ceremonial swords and hoopskirts have been put away, what should we remember?

First, history is always beginning. It began this morning. It will begin again tomorrow.

Second, history is local. It isn't owned by Washington or Wall Street. It starts on your street.

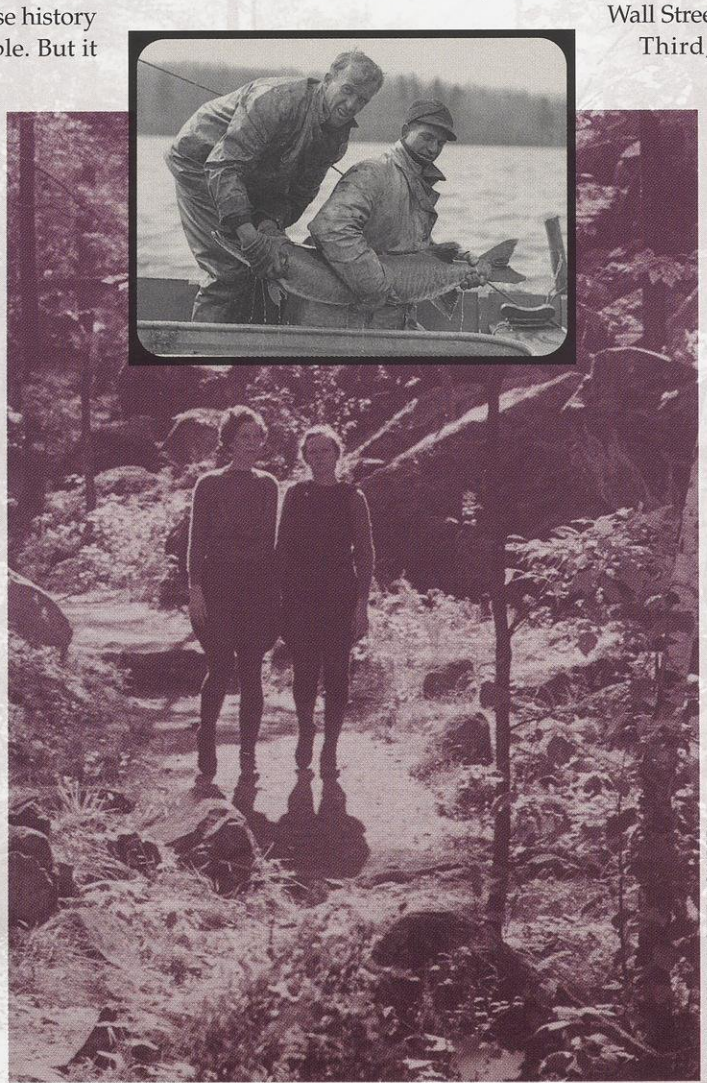
Third, history is personal. At its heart, history is your story.

And fourth, if we want to have a tercentennial, you and I must take responsibility for the history we create every day.

Last week I took my golden retriever for a run in the woods. He came back covered with those little burs called sticktights. It took an hour to comb them out; they were a pain in the neck.

But sticktights are what we have to be, if we want to take responsibility for history: tenacious burs, sticking to the places we treasure — the Northwoods, the lakeshores, the farms, the country towns, the urban neighborhoods — holding on because people and places need each other.

Remembering, worrying, sacrificing, anticipating, and always, always giving a damn—sticking tight, making history. □



BOTH PHOTOS BY EUGENE H. SANBORN

History is the big and little things we do to places we care about. A walk at Interstate Park, 1937; spawning large muskies on Little Crooked Lake, 1938.

Dave Crehore is public affairs manager for DNR's Northeast Region in Green Bay.

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WISCONSIN NATURAL RESOURCES

June 1998 Volume 22, Number 3

Past and future presents

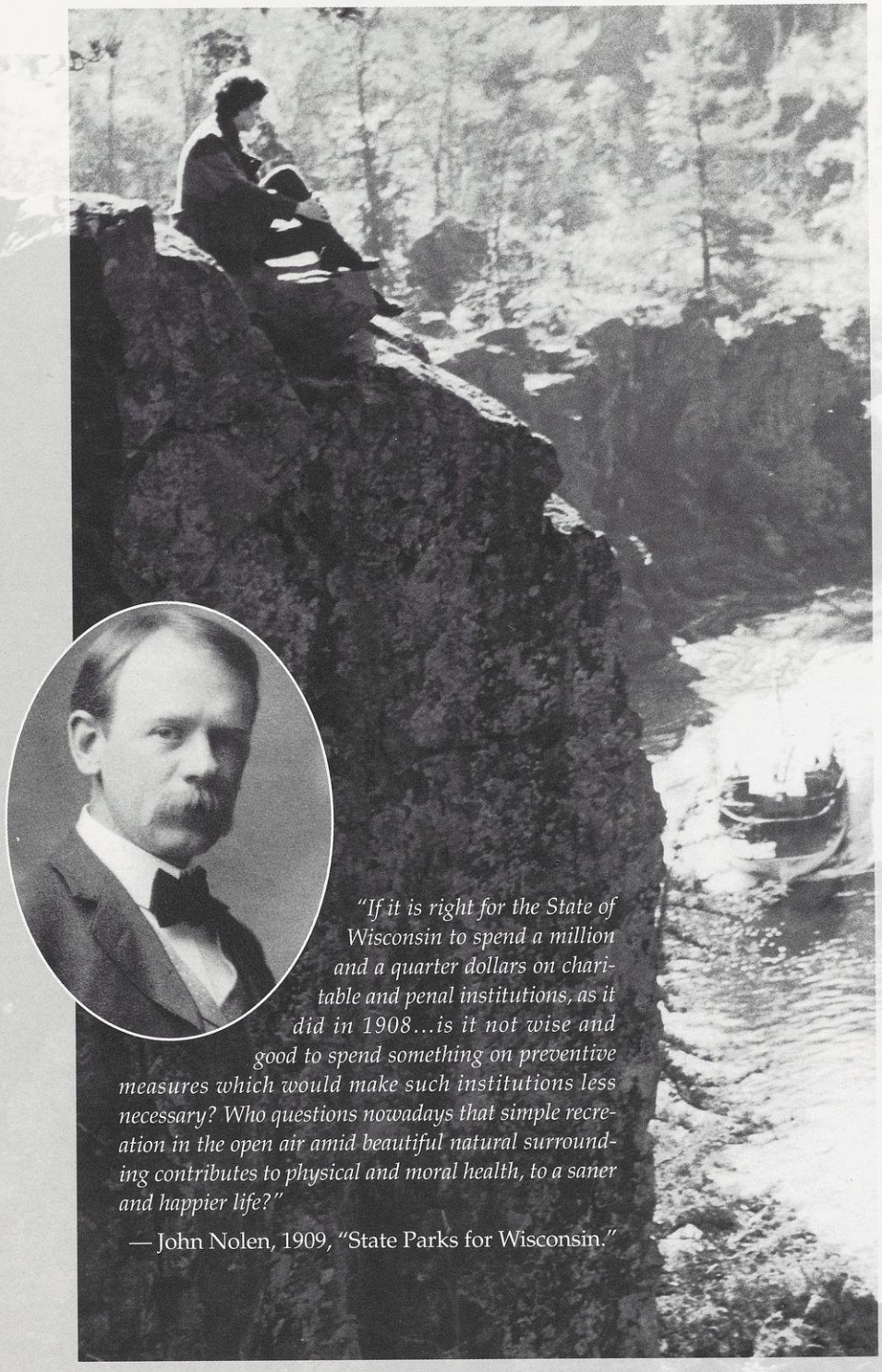
Editor's Note: *Like any good party, the sesquicentennial gives us a reason to relax and visit with old friends. We asked staff to pull out a memento from the past — a snapshot of a person, a program or an idea that proved to be important to our past and future.*

So pull up a chair and spend a few minutes talking over old times. And pass a piece of that sesquicentennial cake, will you?

FRONT COVER: Savor special moments, like Berny Pollac's August 1938 outing on the Wisconsin River.
DOROTHY FERGUSON, WCD Photographer

BACK COVER: Avoca Prairie-Savanna.
THOMAS A. MEYER, Mount Horeb, Wis.

Where memories are made



"If it is right for the State of Wisconsin to spend a million and a quarter dollars on charitable and penal institutions, as it did in 1908...is it not wise and good to spend something on preventive measures which would make such institutions less necessary? Who questions nowadays that simple recreation in the open air amid beautiful natural surrounding contributes to physical and moral health, to a saner and happier life?"

— John Nolen, 1909, "State Parks for Wisconsin."

DOROTHY FERGUSON

Nolen's vision for parks? Save places of stunning beauty, keep parks affordable and foster outdoor recreation that keeps people healthy.

Diane Schwartz

Our State Parks system remains a lasting, visible, popular contribution to our welfare and enjoyment. It was born out of Wisconsin's Progressive Era of politics (1900–1925), an era characterized by idealism and a pressing need to provide for the average citizen. Having witnessed the deforestation of northern Wisconsin, the depletion of mineral wealth in our southwestern region, and rapid urban development nationwide, Wisconsin leaders acted to preserve our most scenic landscapes for all people before private interests took control.

This foresight resulted in our first state park in 1900, called Interstate, where St. Croix Falls forms the Wisconsin/Minnesota border. In 1907 the first parks board was appointed. One of its first actions was hiring noted Massachusetts landscape architect John Nolen to propose four locations for state parks and justify such a system.

When selecting those first park sites and setting standards to judge future parks, Nolen clearly stated that the most important reason to choose a property was its stunning scenic beauty. It's no surprise that he recommended Devil's Lake (1911), Peninsula (1910), Wyalusing (1917), and The Dells of the Wisconsin River as the first state parks. Fortunately for all of us, the Legislature liked Nolen's ideas and the park system was born. All became state parks except the Dells; Nolen believed the dam under construction at the Dells and other human intrusions would destroy the scenic values of the property. Some of that original splendor was saved and a portion was recently purchased and set aside as a State Natural Area using Stewardship funds.

Conservation innovation

Wisconsin State Parks remained at the forefront of the conservation/recreation movement in Wisconsin and the nation.

Between 1934–1942, our state parks saw the benefits of planning and financial support. The Civilian Conservation Corps established camps in Copper Falls, Devil's Lake, Interstate, Nelson Dewey (present

Wyalusing) Pattison, Peninsula, Perrot, and Rib Mountain. You can still see and enjoy many of the beautiful stone and wood buildings, trails and staircases, built by CCC crews.

Long before it was fashionable, Wisconsin State Parks formed partnerships with private interests. In 1949, Devil's Lake Concession Corporation took over concessions at the park. Today, partnerships are the norm in state government, and there are 55 local friends groups with over 1,000 volunteers working on behalf of state parks. A Statewide Friends Group was established in 1996.

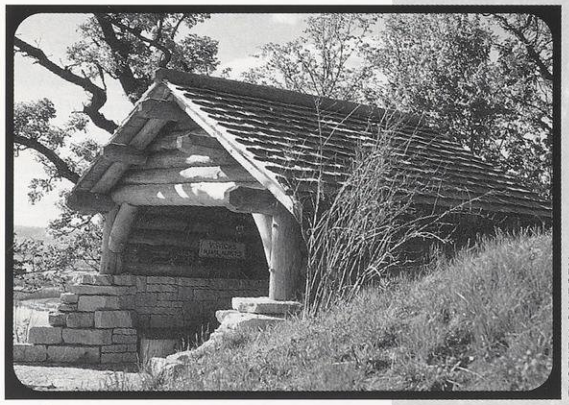
In 1965, the 36-mile Elroy-Sparta State Bicycle Trail became one of the first trails in the nation built on an abandoned railroad bed. This trail has served as model for countless similar projects across the country. Since then, Wisconsin has converted more than 600 miles of abandoned railroad grade into trails, creating economic opportunities for many rural communities and providing recreation for thousands of people.

Enjoying a guided nature hike or program at a state park is another time-honored summertime tradition in Wisconsin. In 1966, the first nature centers opened at Devil's Lake and Peninsula state parks and the first permanent naturalist was hired at Devil's Lake. In 1984, the Junior Ranger and Wisconsin Explorer programs were developed to encourage parents and children to explore the natural features of state parks together. Today, more than 65 state properties offer interpretive services.

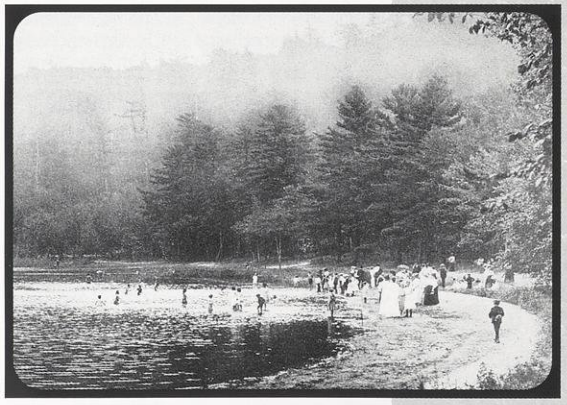
Our parks also provide services to meet the mission of providing healthy, outdoor opportunities for everyone. In 1991, state parks, in partnership with the Telephone Pioneers of America, built a cabin at Mirror Lake State Park to allow people with disabilities to enjoy the outdoors — the nation's first cabin of its kind on public property.

Our parks remain places of exquisite beauty where we relax. We can thank the first parks board and John Nolen for laying the framework for the 44 state parks, four recreation areas, six southern forests, and 23 trails currently open for public use. Each year, more than 13 million people enjoy these lands and create lifelong memories with family and friends. □

Diane Schwartz writes about parks history and nature interpretation for the Department of Natural Resources.



EUGENE H. SANBORN



(LEFT AND RIGHT) DNR FILE PHOTO

Natural beauty is complemented by craftsmanship at state parks. Rock walkways, bridges and buildings were built at many parks. *(top)* The CCC built this shelter at Brady's Bluff in Perrot State Park. *(above)* Partnerships at Devil's Lake brought food and boat concessions to the park. *(right)* The Elroy-Sparta State Bicycle Trail opened in 1965 and became a national model for converting abandoned railroad tracks into recreational trails.

Walking on water

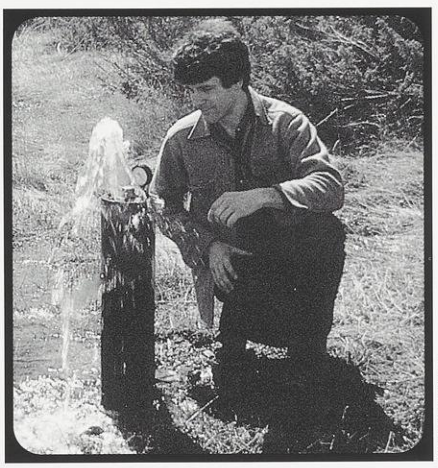
Dave Johnson and Laura Chern

BUREAU OF DRINKING WATER AND GROUNDWATER

With every step, you're walking on one of Wisconsin's buried treasures. In fact, much of what you love above ground can be credited to what you don't see underground. That's groundwater — one of Wisconsin's most important natural resources. And there's about two quadrillion gallons of it to go around.

Unless you live in one of a few large cities in Wisconsin such as Green Bay or Milwaukee, the water you drink or use for washing comes out of the ground.

Groundwater also supplies fresh water to: 2,444 trout streams; 5,002 warmwater streams; 14,949 lakes; and 5,331,392 wetland acres in the state. Your favorite fishing hole, marsh and wild rapids are replenished by groundwater.



KEN BRADBURY

Wisconsin's well codes were national models to protect groundwater from surface contamination and keep drinking water safe.

Groundwater plays an important role in agriculture too. According to a 1992 Department of Commerce census, about 331,000 acres of Wisconsin farmland are irrigated. And cows need about 100 gallons of water a day to produce 45 pounds of milk.

So what are we doing to guard what we can't even see?

In 1903, the Wisconsin State Supreme Court set out to better define well water rights.

In the court case of *Huber v. Merkel*, the State Supreme Court interpreted the State Constitution to mean that a landowner could use as much water as he wanted, regardless of how it affected adjoining property owners. Huber and Merkel were neighbors near Germantown and each had a well on his property. Merkel allowed his to run freely, letting the water run out on the ground. Huber charged that Merkel's well mismanagement caused his well to run dry.

The Supreme Court held that a landowner had a clear right from his land ownership to sink a well, and use that water as he chose, or allow it to flow away, regardless of the effect upon his neighbor's wells, and that such right is not affected by malicious intent.

Despite several challenges, the law remained unchanged until 1974 when the Wisconsin Supreme Court threw out *Huber v. Merkel* in the case of *State of Wisconsin v. Michels Pipeline Construction, Inc.* The latter case revolved around a contract with the Milwaukee Metropolitan Sewerage Commission to put in a sewer. During construction, Michels Pipeline dewatered the aquifer. As a result, the water table plummeted on surrounding properties. Several private wells dried up and others suffered as water flow to their wells slowed and water quality decreased. Also, the lower water table caused ground settling. Foundations cracked. Driveways and basement walls crumbled.

The *Michels* case established the concept of collective rights to groundwater and is credited as a founding tenet of Wisconsin's groundwater law. Now a property owner is entitled to reasonable use of the groundwater under private property and must consider impacts on the water table and other users. The *Michels* decision allows the State to regulate groundwater for the common good of all citizens.

Another pivotal moment came in

1984 when Chapter 160 of the Wisconsin Statutes became state law. The "groundwater law" has been hailed as the most comprehensive program for managing and protecting groundwater in the United States.

Four concepts make the Wisconsin law notable among the nation's groundwater protection programs:

- All groundwater in Wisconsin is considered a potential source of drinking water that must be protected and managed to assure that it can be potable;
- All state agencies involved in regulating groundwater uses meet as a Groundwater Coordinating Council, to provide the same level of groundwater protection regardless of which agency oversees a given regulation;
- The Department of Natural Resources sets numerical standards to define at what point a regulatory agency must intercede to start cleaning up the pollution source and prevent groundwater contamination; and
- There are separate numerical standards designed to protect the environment, public welfare and public health.

Through the Groundwater Coordinating Council, state agencies work together to address issues ranging from applying fertilizers and pesticides to controlling road salt and stormwater infiltration.

Local governments are taking more responsibility to protect groundwater through zoning laws and education programs.

The future looks bright even for places that the light doesn't reach — like our underground lifeline — groundwater. □

Dave Johnson and Laura Chern are hydrogeologists in DNR's Bureau of Drinking Water and Groundwater

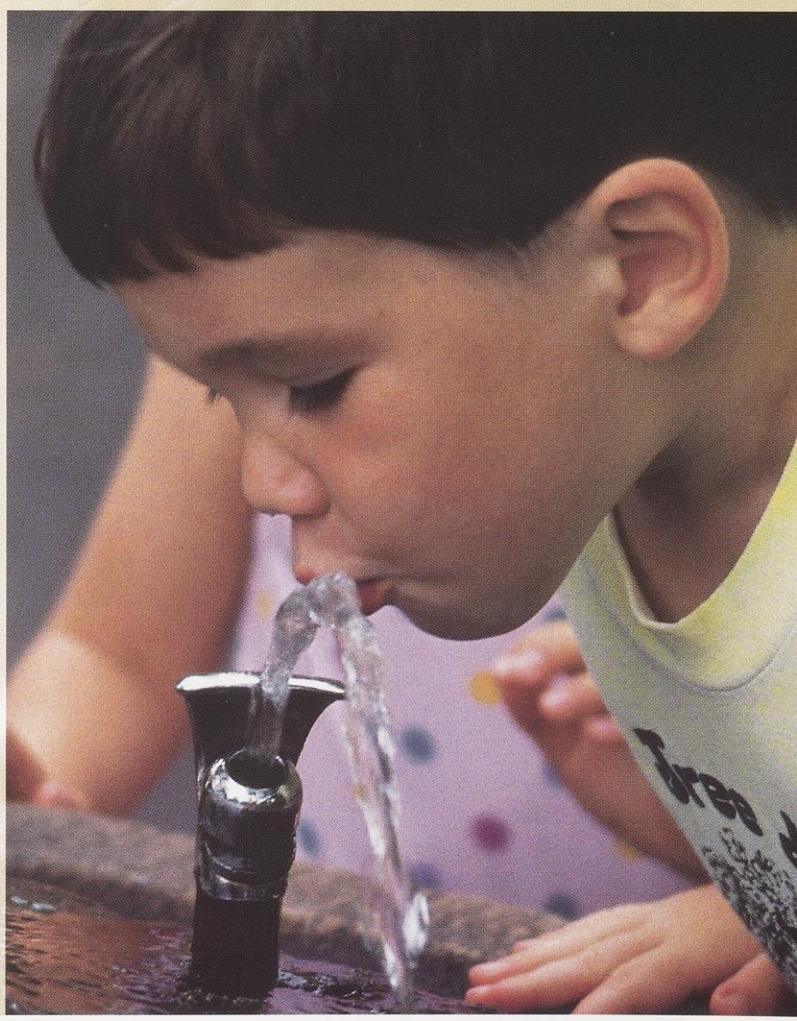
Drink up!

Robert Baumeister

In the 1800s and early 1900s surface waters in Wisconsin were more than just swimming holes and fishing hot spots; lakes and rivers were also disposal sites for human and industrial waste as well as the source of our drinking water.

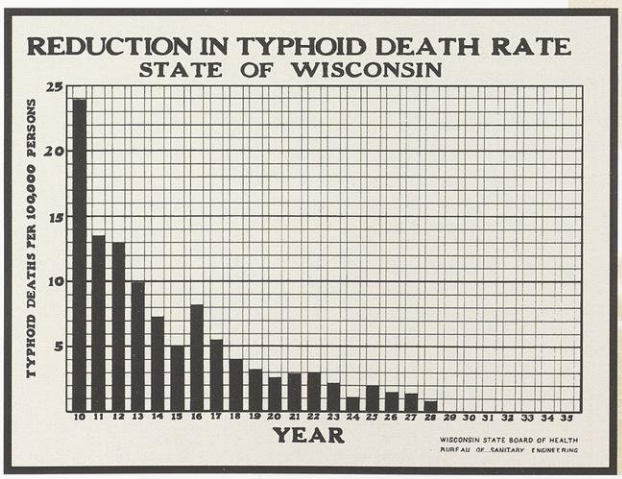
Wastewater treatment wasn't very sophisticated at the turn of the century. Many lakes and rivers became grossly contaminated and drinking water supplies received little, if any treatment despite the growing population and growing demand for water. The resulting tainted drinking water was too often fatal.

Deaths and illnesses from waterborne diseases such as typhoid fever, cholera, small pox, diarrhea and gastroenteritis were common. In the



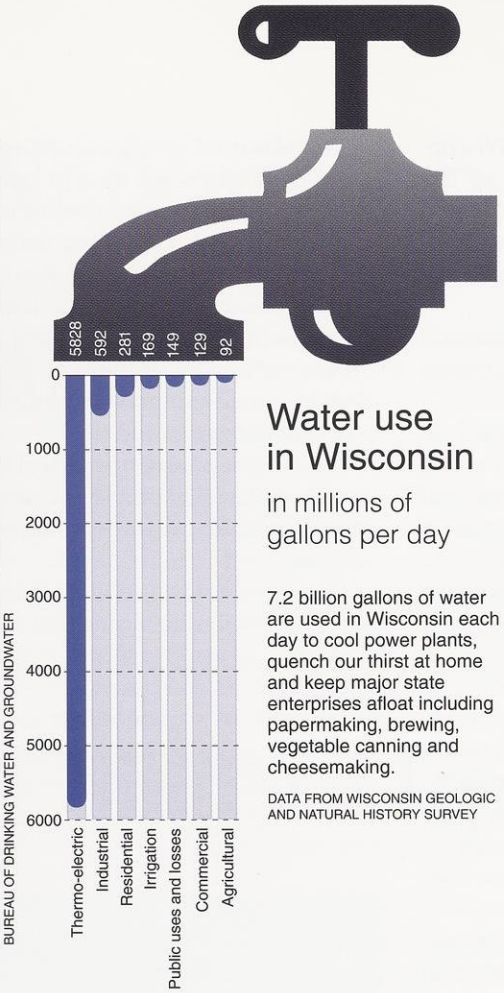
ROBERT QUEEN

Contaminated drinking water was a major disease source until public water pipelines, water treatment and sanitary sewerage systems were installed and maintained.



BUREAU OF DRINKING WATER AND GROUNDWATER

Small well systems that supply remote parks, schools, restaurants and taverns may still need help to provide safe drinking water.



outbreaks when Cryptosporidiosis found its way into the public water supply. An apparent breach in treatment at one Milwaukee waterworks is believed responsible for over 400,000 cases of illness.

The finding in Milwaukee, and in other U.S. water systems that use lake water for drinking supplies, opens a new era in monitoring raw and finished water for contaminants.

Today, Wisconsin's drinking water program remains an essential part of the environmental protection program to safeguard a clean, reliable supply of drinking water. □

Robert Baumeister is chief of the Public Water Systems Section, DNR Bureau of Drinking Water and Groundwater.

early 1900s the death rate from diarrhea and gastroenteritis was about 11 per 1,000 people; typhoid fever cases were about one per thousand people. Drinking water, a necessity, had also become a health hazard.

The Wisconsin Legislature eventually responded by establishing a State Board of Health in 1876. The Board recommended guidelines to improve sanitation practices, but was hampered by lack of funding to enforce recommendations. The Board also had little authority to control wastewater or drinking water treatment.

The quality of drinking water would remain largely unregulated until 1919 when state law recognized that safe water was no accident. To provide safe water supplies and sanitary wastewater, municipalities needed to follow basic sanitary engineering principles, review construction plans for proposed treatment plants, and regularly analyze water quality at the State Lab of Hygiene.

In the 1920s and 30s, under State Board of Health's direction, sewage treatment improved. Drinking water was routinely treated using chlorine as a disinfectant and filtration systems to eliminate waterborne disease contamination. Wisconsin's last typhoid outbreak attributed to a public water system occurred in 1929.

Wisconsin's leadership in the mid 1930s set the national standard for protecting private wells and home water supplies.

Treatment plants alone could not assure safe drinking water. The people running plants needed to perform routine inspection and maintenance. Mandatory certification of plant operators was finally required in 1965.

Drinking water and wastewater programs continued to evolve under DNR direction. And in 1974, buoyed by wide public support and improved lab techniques to detect contaminants, Wisconsin adopted its first drinking water standards to minimize bacteria, and organic and inorganic materials. The federal Safe Drinking Water Act was enacted in 1974 and Wisconsin showed it could meet all national standards by 1978.

As technology has evolved, water supplies have been monitored to prevent chemicals, pesticides and other contaminants. Despite our best efforts, new health challenges continue to arise. In 1993, for example, Milwaukee was struck by one of the largest known waterborne disease

On common waters

Mary Ellen Vollbrecht

…the river Mississippi and the navigable waters leading into the Mississippi and St. Lawrence and the carrying places between the same shall be common highways and forever free as well as to the inhabitants of the State as to the citizens of the United States, without any tax, impost or duty therefor

— Article IX, Section 1,
Wisconsin Constitution

STATE HISTORICAL SOCIETY OF WISCONSIN (WHI H GX83 1792A)

The Public Trust Doctrine was formed in the 1770s to ensure that waters north of the Ohio River, west of Pennsylvania and east of the Mississippi River would remain open for commerce and westbound settlers. It's the basis of Wisconsin public water rights.

This provision of law was adopted by the Territorial Convention on February 17, 1848 as a condition of admitting Wisconsin to the Union. So the guarantee of public rights to Wisconsin's waters is older than the state itself. Just as a stream meanders to find its stable course, so our water laws have been argued and shaped throughout our history by the courts and Legislature, defining public and private rights to the waterways and the wiggly line where shoreland meets water.

In 1848, rivers truly were the vital arteries of the young nation and its newest state. Though the Wisconsin landscape today bears scant resemblance to presettlement conditions, our rivers and lakes are no less vital to our present or our future. And water law remains a battleground as people expect our waters to accommodate a broad range of public interests.

'Twas ever thus.

The first sawmills in Wisconsin were built on the Fox River at DePere in 1809, on the Black River in 1819 and on the Wisconsin River in 1831. The territorial courts lost no time in designating any

History and commerce shaped water law. Ours guarantees that waters that can float a sawlog will remain public waters. (April 26, 1920. A lumberjack rides on the last log drive on the Flambeau River.)

DNR FILE PHOTO

STANLEY KMIOTEK

BUREAU OF FISHERIES MANAGEMENT AND HABITAT PROTECTION

Private uses of public waters test how far public water rights reach. *(top)* Creamery wastes on the Yellow River, Taylor County, July 1947. *(above)* Marina development.

stream that could be used to float a sawlog as "public water." The Legislature reinforced those rights in 1895 by enacting laws that all lakes in the state which had been meandered and surveyed would remain public.

In the era when lumber barons ruled landscapes, wealthy hunters and anglers formed private clubs to protect streams, lakes and marshes for their exclusive use. The "have-nots" settled for the poor remains. Diverse individuals from Civil War veteran Frank Wade of Hudson (1898) to State Senator Paul Husting of Horicon (1911) challenged these private clubs, brought suit and prevailed at the State Supreme Court contending that all navigable waters were public, and public rights in Wisconsin included fishing and hunting on lakes and streams.

The fast pace of commerce changed demands on the water as well. By 1900 log driving had practically ceased. It was cheaper to purchase power than to maintain a gristmill or sawmill. Gradually recreation replaced lumber and power as the most valuable commercial enterprise on water. The Legislature recognized that keeping up appearances and access along waterways was key to protecting its value for tourism. Chapter 523 of the Laws of 1929 affirmed "the enjoyment of natural scenic beauty is declared to be a public right..." The law stated that no permits would be issued for a dam that would be contrary to the public interest, considering natural scenic beauty. The law effectively stopped obstructions to public rights in lakes and streams, but stopped short of preserving the look of the shoreline.

Wisconsin's population grew and thrived. Second-growth forests became valuable to papermakers. Irrigation and drainage enabled vegetable growing and canning industries. Waste products from these industries and from riverside communities ran into the rivers. Citizens demanded and got action. Through a new conservation group, the Izaak Walton League, industries and agencies cooperated in cleaning up waters.

With prosperity, more and more Wisconsinites were able to live their dream of vacationing at water's edge, building a summer cottage on the shoreline, or retiring on a lakeside lot. Each bit of development took up only a tiny fraction of the abundant lakeshore or riverfront, but bit by bit, these shallow shores are lost. As the Supreme Court ruled in a 1966 case where a landowner extended his property into Plum Lake, a little fill here and a little fill there and soon a great waterbody is gone. "Our navigable waters are a precious heritage, once gone they disappear forever."

Economic success in Wisconsin continues. Today, those who can no longer find a lakeshore property procure their slice of the waterfront by renting a boat slip at a marina pier. Such development has consequences for people and waterways. Lakeshore owners, anglers and sailors alike list peace and quiet as their top reason for being on the water. Biologists are showing us that these boat slips are built over the same shallow waters that are critical habitat for the spawning fish, but scientists can't yet predict just how much habitat loss our fisheries can take. Citizen lawsuits on these matters are making their way through the courts in Waukesha and Florence counties. Lake groups and local governments are cooperating to map out future waterfront uses. And so the tussle to define private privileges on public waters continues. □

Mary Ellen Vollbrecht is chief of the Rivers and Regulation Section of DNR's Bureau of Fisheries Management and Habitat Protection.

The long run at state fish hatcheries

Stephen J. Gilbert

Before 1870, fisheries work in Wisconsin was carried out by private hatcheries and aquaculture hobbyists. Gentlemen like Alfred Palmer of Boscobel, H. S. Dousman of Waterville, and N. K. Fairbank of Lake Geneva ran small hatching facilities and independently distributed fry to stock private ponds and local waters. They mainly raised and stocked brook trout, collecting eggs from local, wild fish. These aquaculturists closely guarded their fish-rearing secrets and published little on the topic.

The decision to stock fish raised in state-run hatcheries brought enormous changes to Wisconsin lakes and streams. Stocking expanded the natural ranges of brook trout, lake whitefish, lake trout, walleye, bass and muskellunge. Those efforts and the introduction of non-native species forever changed fish communities around the state. Not all of the state's well-intentioned efforts had favorable results; carp, for instance, were stocked in most counties that were within reach of rail lines by 1888.

By the end of 1874, the newly-appointed Wisconsin Commissioners of Fisheries realized that federal hatcheries could not provide enough eggs and fish to meet the stocking needs of all states. In Wisconsin, the commissioners saw opportunity and grandly envisioned using the state's abundant waters to raise enough fish to feed the state populace, if not the entire country.

"...The importance of these lakes to the State as a source of food-supply, can not well be exaggerated. With them well stocked with fish, Wisconsin can never have a famine."

To meet the demands for stocked fish within Wisconsin, the state would need to build its own hatching houses and hatcheries.

Before 1900, fish were artificially raised in two types of facilities: hatching houses and hatcheries. Hatching houses produced only fry (tiny, newly hatched fish). Zinc-lined pine hatching troughs, and later, stackable wire mesh trays held the eggs. These facilities had no artificial ponds or raceways to hold fish, so the fry were shipped as soon as they hatched. Hatcheries had the same equipment, but also had wooden raceways and earthen ponds for holding brood stock and rearing young fish to larger sizes. Brood stock were kept and spawned on site so there was no need to collect wild adult fish each year for this purpose.

Pensaukee — the first state fish hatching house

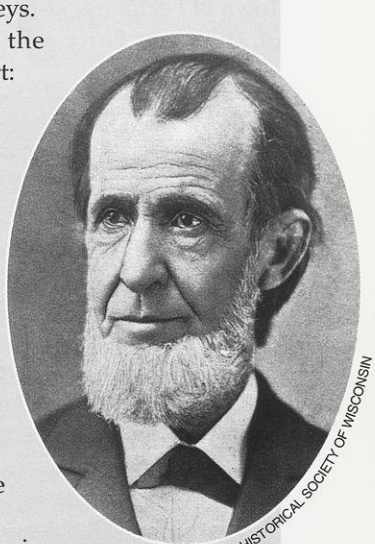
In 1875 the commission was concerned about declining whitefish and lake trout fisheries of Lake Michigan. They searched for a hatching house site near rail lines and the lakeshore. The hatching house needed a good source of water and adequate building space to house the hatching troughs. The commissioners arranged to use an old mill house on the Pensaukee River, a tributary of Lake Michigan, in the town of Pensaukee. Attempts to rear fish at this site began in October of 1875, but things went wrong from the start.

Dr. fish commish

In 1874 the Legislature created three unpaid positions to serve as Commissioners of Fisheries. The first gubernatorial appointees were William Welsch of Madison, Alfred Palmer of Boscobel, and Dr. Philo R. Hoy of Racine.

Dr. Hoy, a physician, was very interested in animal life and started the first fisheries surveys.

His influence is reflected in the commissioners' 1875 annual report: "These investigations [could provide] data by which we can tell what species of fish would be best to introduce in each individual lake. If all lakes could be carefully surveyed, and every species of animal ascertained that inhabit the waters, or burrow in the bottom, it would be of the greatest interest to science, and of permanent value to the cultivation of fish."



STATE HISTORICAL SOCIETY OF WISCONSIN

Dr. Hoy, could be called the first state fisheries biologist.

In his five years on the commission, he carried out many lake surveys statewide, none more ingenious than an attempt to inventory southern Wisconsin fisheries in 1876. Dr. Hoy sent questionnaires to postmasters asking them to record lake acreage, maximum depth, bottom type, inlets or outlets, and fish species present in each lake within the postal service area. Thirty-nine questionnaires were completed and returned to the Fisheries Commission.

So the postal service not only delivered the mail, it surveyed local lakes!

—Steve Gilbert

Commercial fishermen who had been contracted to catch lake trout could not find ripe fish to spawn. Nets were set to collect whitefish, but earlier than usual winter weather forced the fishermen to pull their nets in the middle of the spawning run. Heavy rains that winter increased the silt load of the water supplying the hatching house and smothered most of the eggs.

This first failed attempt hardly dampened the commission's desire to raise fish. In 1875, commissioners again asked the Legislature for additional funds to build a hatchery and lawmakers allocated $10,000.

Nine Springs — the first state fish hatchery

The selected site was in the Town of Fitchburg, just south of Madison. Forty acres of land were purchased from a Mr. Crawford for $35 per acre. During the summer of 1876 a hatching house, living quarters, and a storage barn were quickly erected at this site. Two raceways were built for holding fish next to the hatching house. M. D. Comstock, an aquaculturist from Columbia County, was appointed the first superintendent of this hatchery. His salary was set at $1,000 a year and hatchery operating expenses for the first year were $1,180.72.

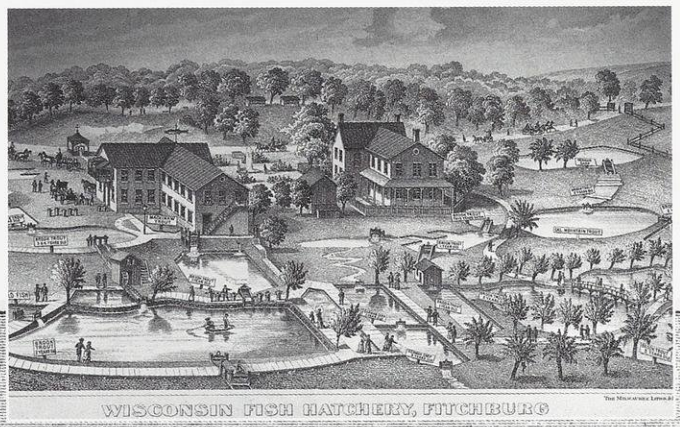
That first summer 2,000 adult brook trout ("speckled" trout) were purchased for brood stock from a private Wisconsin hatchery. These fish were kept in raceways at the Nine Springs Hatchery and spawned in the fall. The temptation of all those trout dinners swimming around the raceways was too great for some Madison residents: 300 fish disappeared that summer. Fish dinners notwithstanding, 200,000 eggs were collected and incubated at the hatchery yielding 179,000 fry. These fish started the stream stocking program in southwestern Wisconsin.

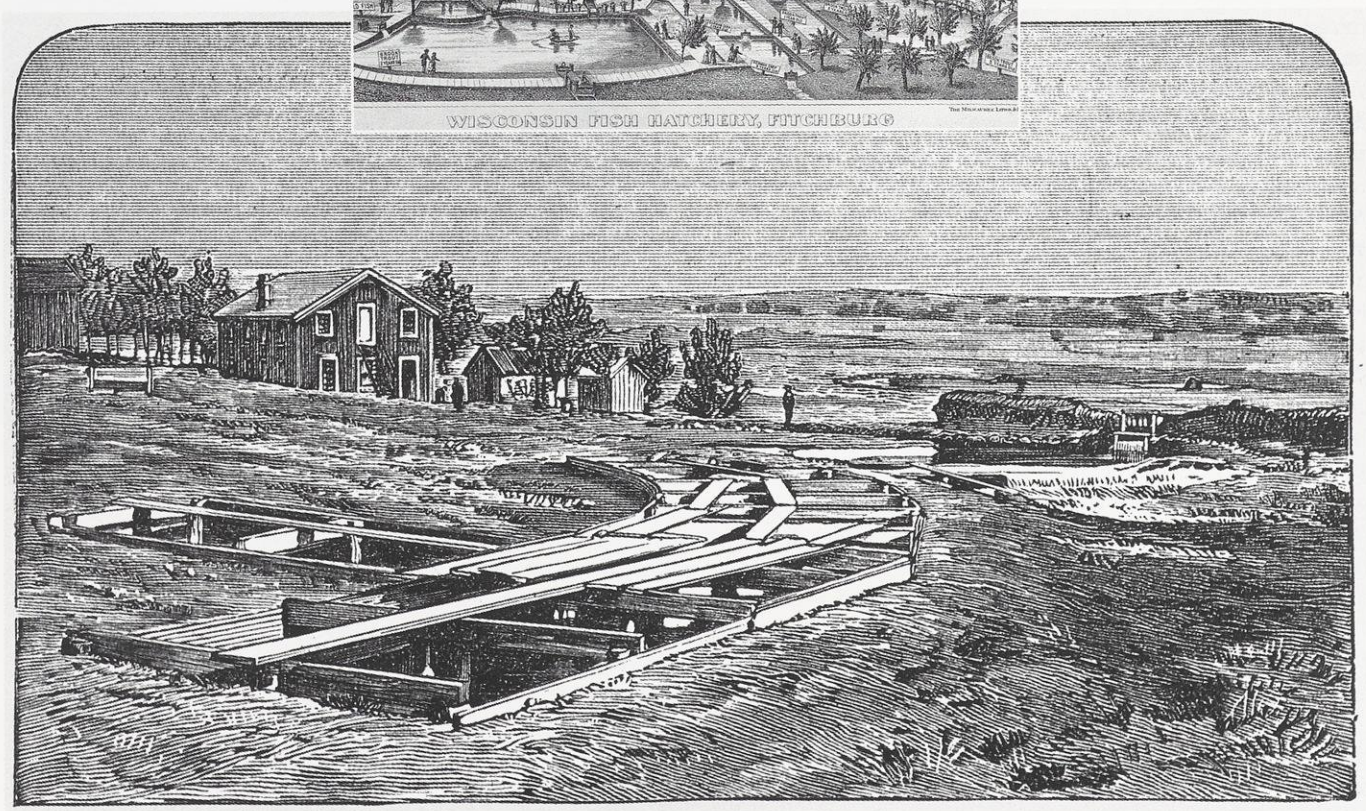
Nine Springs Hatchery was later renamed for James Nevin, Superintendent of Fisheries from 1882 to 1915. It remained the state's only hatchery until the Bayfield Hatchery opened in 1895.

Milwaukee — a new home for the state's fish hatching house

After the Pensaukee problems, the fish commissioners sought a new location for a hatching house on Lake Michigan. In 1876 the City of Milwaukee offered its North Point waterworks building free of charge to raise lake trout and whitefish fry. H. S. Welsher, an experienced fish culturist from New York, was selected as superintendent. Renovations were quickly made and operations were in full swing by that fall.

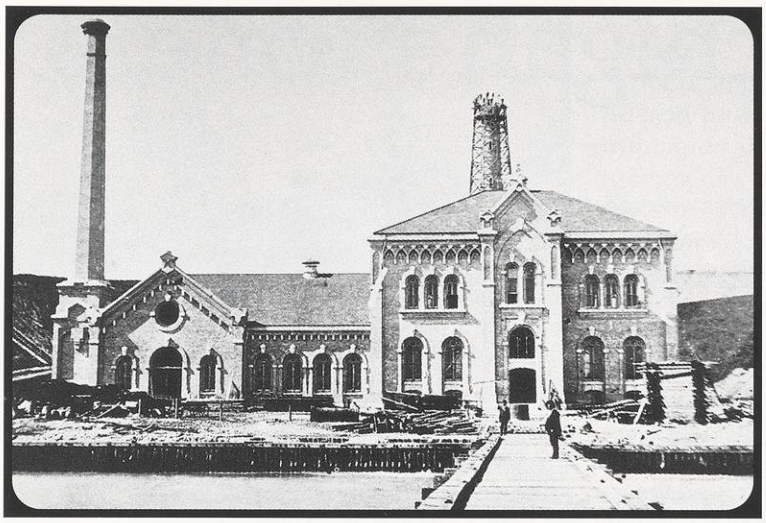
1875. The Nine Springs hatchery in Fitchburg as envisioned and built.





WISCONSIN FISH HATCHING HOUSE AND GROUNDS.

DNR FILE DRAWINGS



MILWAUKEE HISTORICAL SOCIETY

Fish were raised at the North Point waterworks in Milwaukee for five years.

Lake trout and whitefish eggs were collected and taken to the hatchery. The following spring, 1,736,000 lake trout fry that hatched were stocked into inland lakes around the state and in Lake Michigan. Of the 6.3 million whitefish fry that hatched, 40,000 were stocked into Elkhart Lake in Sheboygan County and the rest went into Lake Michigan.

The North Point site was used until 1880, when urban expansion warranted returning the waterworks to its full capacity. The hatching house was relocated to the basement of the Milwaukee Exposition Association Building at Cedar and Fifth streets where it operated until 1898.

Despite early setbacks, the fish hatchery propagation program continues to grow and modernize. Through the years Wisconsin's hatchery personnel have attempted to raise fish of the highest quality and staff have developed rearing techniques that are used worldwide. Recent renovations of the state hatcheries at Bayfield, Lake Mills, Woodruff, and Spooner show continued commitment to providing anglers a quality, diverse fishery to complement our work to maintain quality habitat where fish populations can naturally thrive. □

Stephen J. Gilbert is a fisheries biologist stationed in Woodruff.

The badger fish cars

Stephen J. Gilbert

In 1881, the U.S. Fisheries Commission contracted, and built specialized "fish cars" — rail cars that could transport live fish coast to coast for stocking. The Wisconsin Commissioners of Fisheries had been transporting its fish in milk cans that were stacked in standard baggage cars. By 1892 the Wisconsin Commission was shipping almost 45 million eggs, fry, and fingerling fish around the state from its hatcheries. The fish cars seemed a better means of safely shipping more fish, greater distances. In 1883, the State Legislature appropriated $5,000 to purchase a fancy fish car for Wisconsin fish stocking programs. The appropriation for this pricey acquisition was partly justified to carry Wisconsin fish to the World's Fair (the Columbian Exposition of 1893) in Chicago.

The fish car, named the Badger #1, went into service in the summer of 1893 and remained in use until 1914. In most years the car logged more than 20,000 rail miles delivering fish and fry where the Wisconsin rail system reached. Badger #1 was sold to the Canadian government and its whereabouts today are unknown. A replacement, Badger #2 was purchased in 1912. Its steel construction and sturdy design could travel on modern rail lines and the train held many more fish than its predecessor.

DNR FILE PHOTO

Badger #2 carried fish from state hatcheries to streams and lakes throughout Wisconsin from 1912 through the mid 1940s.

By the early 1930s, Wisconsin's road system was improving and highways reached many areas of the state not served by regular rail service. The Conservation Commission purchased two new fish trucks that could each haul only half the number of fish cans as the Badger #2, but required less handling to stock the fish. As rail transport costs rose, more fish trucks were added to the fisheries fleet, and the end of the fish car era was in sight.

In the mid 1940s, the Badger #2 was sold to a private railroad contractor and turned into a rolling office. In 1960, it was sold to the MidContinent Railway Historical Society in North Freedom, Wis., where it rests today. □

Stephen J. Gilbert is a DNR fisheries biologist stationed in Woodruff.

Into Lake Michigan's waters

Paul Peeters

From the surface, Lake Michigan seems timeless and unchanging, but the waterscape, like the landscape, has been altered dramatically since statehood. Events in the watery world set the stage for changes that would allow exotic species into the Great Lakes and spell the demise of many native species.

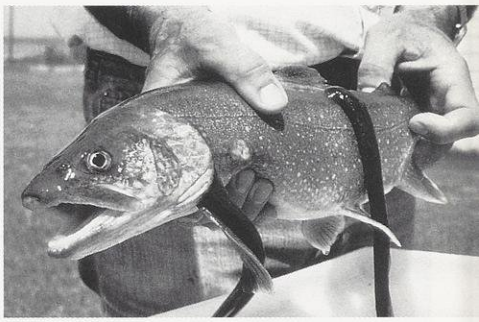
In 1848, Lake Michigan was an important trade route, and a source of food and income. Lake trout, lake whitefish, lake herring, and seven species of lake chub dominated the native fish community. Yellow perch, lake sturgeon, emerald shiner, spottail shiner, white sucker, longnose sucker, burbot, round whitefish, and four species of sculpin were also part of the mix. These fish had evolved together since the retreat of the Ice Age glaciers in a diverse, yet balanced fish community, isolated from the rest of the aquatic world. The 200-foot vertical drop of the Niagara River plunging over Niagara Falls was an insurmountable barrier to fish from the outside world.

But Niagara Falls wasn't a barrier from people, and people brought dramatic changes to the native fish community. In the late 1800s, sawdust and wood scrap from sawmills were dumped in rivers destroying fish spawning areas in many streams. Lake sturgeon were considered a nuisance by commercial gill netters and were caught and stacked like cordwood on the Great Lakes beaches. Dam construction on tributary streams also prevented sturgeon from reaching their spawning grounds, which all but eliminated these relics from Lake Michigan. Unregulated commercial fishing further depleted various stocks of fish. However, none of these factors caused a bigger or more permanent change in Great Lakes fish populations than the unintended introduction of exotic species. These new species upset the delicate balance of fish communities that had developed in Lake Michigan.

Exotic species entered the upper Great Lakes by many routes. The Welland Canal, completed in 1829, bypassed Niagara Falls and connected Lake Erie to Lake Ontario and the St. Lawrence Seaway. The canal system was designed to give ships a navigable route from the Atlantic all the way to the Great Lakes ports in the Midwest. Naturally, fish used the new passages as well. Sea lamprey, alewife, and white perch migrated through the canal system and invaded the upper Great Lakes. Other species like river ruffe, zebra mussels, and spiny water flea "booked passage" as stowaways in the ballast water of large vessels. Many fish like rainbow and brown trout, chinook and coho salmon, and carp were intentionally introduced by people.

More than 140 exotic species of animals and plants have taken hold in the Great Lakes since the early 1800s. A partial list includes Atlantic and pink salmon, goldfish, smelt and round-nose goby. As in any ecological system, these exotic species settled in at the expense of something that was there before.

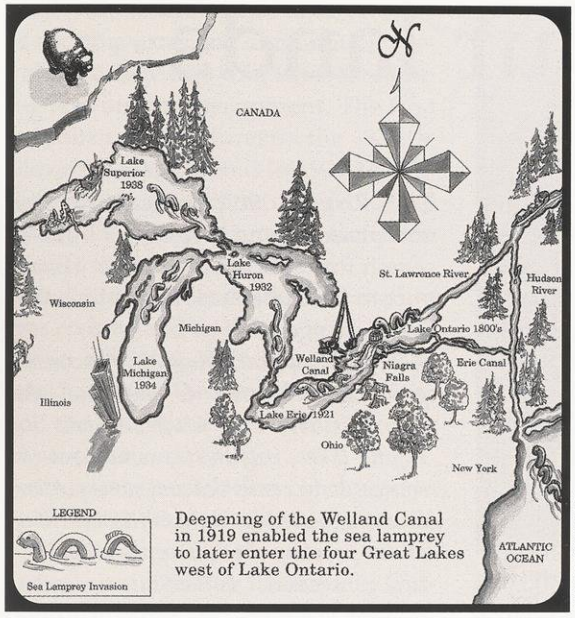
The sea lamprey was first observed in Lake Michigan in 1936. This eel-like predator with rasp-like teeth victimized lake trout, lake sturgeon, lake whitefish, and burbot. These fish had no natural defenses against the sea lamprey. By the mid 1950s, lamprey had all but eliminated the native population of lake trout in Lake Michigan, and significantly reduced populations of other species.



Great Lakes lake trout populations were decimated when sea lamprey moved in.

Like the sea lamprey, the alewife also entered the upper Great Lakes through the Welland Canal and was first documented in Lake Michigan in 1949. When the lake trout population collapsed in the 1950s, there were no predators to control alewife and their population grew rapidly. By 1967, alewife comprised an estimated 85 per-

Without natural predators, alewife populations exploded in the Great Lakes. Spectacular die-offs were common along the coastline. Salmon were introduced to control the alewives and bolster sport fishing.



DAVID BRICKERTT

(above) The Welland Canal bypassed Niagara Falls creating an uninterrupted link from the St. Lawrence Seaway into the Great Lakes.
(right) Fish from the Pacific Northwest, including these Chambers Creek steelhead, changed the native fishery, but made angling more enjoyable.

cent of the mass of the Lake Michigan fishery.

The alewife population explosion affected many other fish species in Lake Michigan. Six of seven chub species were eliminated and the commercial chub season was closed. Lake herring, yellow perch, and emerald shiner populations crashed. From the mid 1950s through the mid 1960s, neither commercial netters nor sport anglers found the Lake Michigan fishery desirable.

During the mid 1960s the U. S. Fish and Wildlife Service and its Canadian counterpart developed techniques to limit sea lamprey reproduction. Selective chemicals and physical barriers were used throughout the Great Lakes and lamprey populations were reduced, but not eliminated. Unfortunately, lamprey control came too late to save Lake Michigan lake trout.

Predatory fish were desperately needed to control the burgeoning alewife population. Fish managers selected strains of Pacific salmon to do the job. In 1966 coho salmon were stocked in Lake Michigan followed by chinook salmon in 1967. Salmon did well, and grew quickly. Twenty-pound coho and 30-pound chinook were not uncommon. Rainbow, brown, brook, and lake trout were also stocked in Lake Michigan.

Sport anglers quickly learned how to catch the trout and salmon, and an exciting new sport fishery was born. Alewife are now considered an important part of the Lake Michigan food base that supports trout and salmon. As alewife numbers dropped, other Lake Michigan fish species have recovered. The one species of chub that survived the exotic invasion has come back strong and is currently fished commercially. Also, Wisconsin commercial fishers currently harvest more lake whitefish than at any time in history.

The Wisconsin Department of Natural Resources, other state and federal agencies and sporting groups are attempting to restore some of the native Lake Michigan fish species. The effort has had little success, and lake trout and lake herring still don't reproduce naturally in the lake.

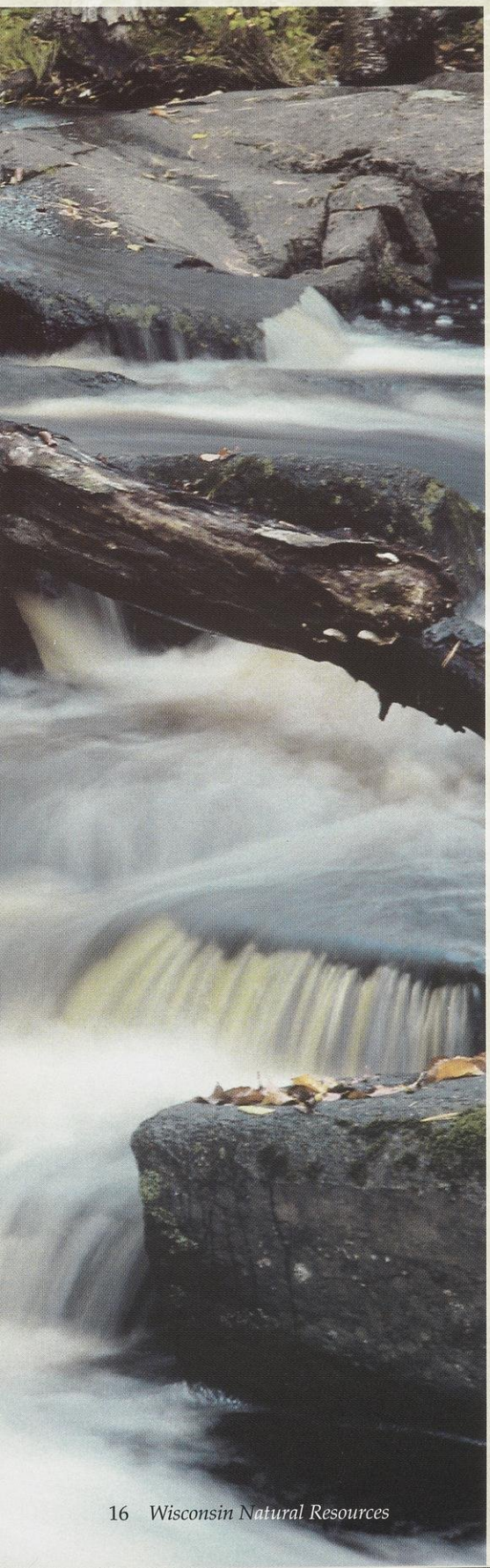
Some people favor managing Lake Michigan exclusively for native species, but many species that were part of the original fish community are now extinct or have been extirpated from Lake Michigan. Also, many of the exotic species are so firmly established, that complete elimination is not feasible. Like it or not, many of these are now a naturalized part of the Lake Michigan fishery community.

If properly managed, Lake Michigan can provide both a world-class sport fishery and a healthy, viable commercial fishery. Effective management includes ongoing surveys to understand the changing nature of the fishery, a sustained commitment to limit pollution sources, controls on development and attention to other changes people can bring to resources as vast as Lake Michigan. □

Paul Peeters is a Lake Michigan fisheries biologist.

PAUL PEETERS

These lands are our lands



ROBERT QUEEN

Greg Delwiche and Tracey Teodecki

Public lands enhance our high quality of life, tourism, and economy. The Department of Natural Resources acquires an average of 17,651 acres each year under the Stewardship Program and DNR manages 1,300,200 acres in state parks and trails, forests, natural areas, and fish and wildlife areas. Such holdings are impressive, but our land legacy might have been even greater.

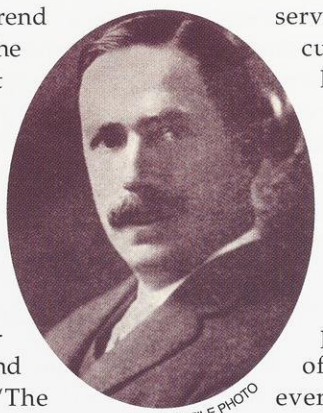
At statehood in 1848, the federal government awarded Wisconsin 500,000 acres that could be sold to help finance the new state government's operations. Subsequent land grants transferred almost 10 million acres to state hands. The main concern in those early days was making land available to new settlers, creating a prosperous economy, and raising money to fund the new government. Business at government land offices was brisk, but the holdings were so vast that it was well into the late 1800s before most state land was sold.

Long afterwards, the trend began to reverse. In 1876, the state purchased its first land south of Madison for the Nevin Fish Hatchery. Two years later, 50,000 acres in Iron, Vilas and Oneida counties were set aside as "The State Park." Twenty years later funds were short, most other virgin timber had been cut, and the Legislature sold off "The State Park" to lumber companies for $8 an acre. Ironically, much of this same land would later revert to the state as tax-delinquent, cut-over land to create the Northern Highland State Forest.

State interest in land conservation was reborn in 1900 when the first state park, Interstate, was created on the St. Croix River. In 1907, landscape architect and planner John Nolen was hired to search for other suitable sites. His report to the State Park Board included this challenge:

"The issue appears plain. Is Wisconsin going to look upon its bays and lake shores, its rivers and bluffs, its dells, its inland lakes, its forests, as natural resources to be conserved and some portion at least acquired and held for the benefit of all the people — both for present and future generations? Is the State to display foresight and act in time in this important matter, recognizing and providing for the increase of population?"

The challenge was heard. The Nolen Report set the criteria, rationale, and vision for state land purchases that still apply today, including preserving places of scientific or historical significance, providing public access for all people, and clearly stating the economic value of investing in public lands.



DNR FILE PHOTO

The idea of "state forest reserves" began to evolve. The cut-over lands had been logged off, abandoned, and were growing back as brush. Wildfires, flooding, and erosion were common on these lands. State Forester E. M. Griffith detailed the solution in 1909 — gradual state purchases and restocking of denuded areas would eventually recover the land and produce a sustained crop of mature timber.

Much more slowly than the lands were sold, they were reacquired parcel by parcel. Wetlands, too. In 1927, the 11,000-acre Horicon Marsh, destroyed by dredging, was acquired and slowly restored to provide wildlife habitat, hunting, and trapping. This fine example prompted a 1937 program to use money from hunting license sales to buy land for game refuges and public hunting and fishing grounds. That

(left) Designating the Pike as a Wild River preserved natural splendor for the public. *(above)* Our first forester, E.M. Griffith, formed the blueprint that restored cut-over timberlands into the Northwoods.

same year, federal excise taxes on sales of sporting arms and ammunition provided funds to buy wild lands for hunting and outdoor enjoyment. The first southern state forest, the Kettle Moraine, was created in 1937 to preserve the unique scenic and geological features and provide outdoor recreation close to the population centers.

In 1951, the Natural Areas program was created and in 1968, a Wild Rivers program. Today, 9,471-acres have been purchased on the Pine-Popple River and the Pike River preserving 72 miles of pristine river frontage.

The state population continued to grow faster than our ability to provide wide-open spaces. A one-cent tax on each pack of cigarettes financed the Outdoor Recreation Act Program (ORAP) in 1960 to buy lands and secure conservation easements. By 1967, it was clear that ORAP alone would not finance the broad range of public recreation people wanted. A statewide referendum approved the sale of state bonds to acquire public spaces.

ORAP was replaced in 1989 by the Knowles-Nelson Stewardship program which has purchased large parcels like the Turtle-Flambeau Flowage, the Willow Flowage, the Wisconsin Heights Battleground and the Wolf River Bottoms. Stewardship has enlarged public holdings in 547 properties including parks, trails, forests, fishery areas and wildlife areas as well as disbursing grants to non-profit conservation organizations and local governments to develop conservation projects and buy recreational lands

DNR FILE PHOTO

Louis "Curley" Radke and the Izaak Walton League hosted an Open House for legislators to garner support to restore Horicon Marsh as a public wildlife refuge. The conservationists lobbied in the legislature for seven years before the dream became a reality.

What are our options to maintain opportunities for outdoor enjoyment? A special task force will make recommendations to the Governor for the future of the Stewardship program. □

Greg Delwiche is regional real estate manager for DNR's South Central Region and Tracey Teodecki is easement coordinator for the Bureau of Facilities and Lands.

On things lost and brought back from the brink

Sumner Matteson, Adrian Wydeven and Barbara Zellmer

DNR FILE PHOTO

The commemorative plaque at Wyalusing.

Wisconsin has a rich diversity of natural resources. Some of our natural heritage, however, has been lost forever. In many cases, we neither note the occasion, nor know when a species becomes extirpated.

This was *not* the case with the passenger pigeon.

The last passenger pigeon was shot in Babcock when the state had barely turned 50 years old. On May 11, 1947, the Wisconsin Society for Ornithology (WSO) commemorated that loss with a plaque that resides on a high ridge at Wyalusing State Park overlooking the Mississippi River Valley, where flocks of innumerable migrating passenger pigeons once filled the skies. Aldo Leopold, present for the dedication, captured the regret at losing the passenger pigeon and expressed hope to prevent similar, future tragedies in his essay, "On a Monument to the Pigeon," in *A Sand County Almanac.*

Today, we think Leopold would be pleased with the progress we are making in managing threatened and endangered species; in designating, managing, and restoring State Natural Areas; and in broadening our knowledge of plant and animal communities. In some cases, such as with the trumpeter swan and peregrine falcon, what was once lost is now

SUMNER MATTESON

Double-crested cormorants have made a spectacular comeback, though most birds remain concentrated on four islands in Green Bay.

being restored.

Here are the stories of two other species, now fully recovered from near extirpation in the region.

Double-crested Cormorant

Double-crested cormorants historically occupied large, isolated lakes and wetlands in northern Wisconsin. There were no documented breeding colonies in the state until about 1920, when cormorants were reported nesting on Lake Wisconsin in south central Wisconsin. From the 1920s to 1950s, cormorants occupied 17 colony sites in 16 counties along the Wisconsin, St. Croix and Mississippi rivers. The total number of nesting pairs statewide reached at least several hundred in peak years.

Beginning in the 1950s, three factors contributed to a population decline: habitat loss due to tree thinning and blowdowns, reproductive failures due to the effects of DDT, and human raids on islands off the Door County peninsula to destroy nests, eggs and young. (Cormorants were viewed as competitors for fish.) By 1966, only 30 nesting pairs survived in the state, and in 1972, the bird was listed as state endangered.

In 1974, UW-Stevens Point in cooperation with the Department of Natural Resources started building cormorant nesting platforms. The artificial nests erected on phone poles were designed by then UW graduate student, today DNR wildlife manager, Thomas Meier. Platforms were first installed at 13 locations from the Cat Island chain in lower Green Bay to Crex Meadows in the northwest to the Trempealeau National Wildlife Refuge on the Mississippi River. The platforms, declining levels of DDE (formed as DDT is ingested) in their diet and protection as a state-endangered species, led to a notable recovery. Cormorants were taken off the state endangered species list when the population reached nearly 3,000 nests in 1986. Another important factor in the resurgence: cormorants fed heavily on Lake Michigan alewives. As cormorant populations began to recover in the 1970s, the alewife was highly abundant and easily taken.

By 1997, the state's cormorant breeding population had grown dramatically to over 10,000 nests at 23 colony sites. Still, more than 80 percent of these nests are concentrated on four Green Bay/Lake Michigan islands, raising concerns among some that large numbers of these birds are again viewed as competing with commercial and sport fisheries on the lake. For now, many celebrate that the double-crested cormorant is indeed back!

Timber Wolf

Timber wolves are the largest wild members of the dog family. Before Europeans settled North America, wolves roamed areas from the southern swamps to the northern tundra. They existed wherever there was an adequate food supply. Then, wolf habitat was slowly transformed into farms and towns. As the continent was settled, wolves declined in numbers and became more restricted in range.

Explorers, trappers and settlers transformed native habitat into farmland, hunted

Habitat changes and bounties drove wolves to extirpation before recent efforts restored them.

DNR FILE PHOTOS

elk and bison to extirpation, and reduced deer populations. As their prey species declined, wolves began to feed on easy-to-capture livestock. As might be expected, this was unpopular among farmers. In response, the Wisconsin Legislature passed a state bounty in 1865, offering $5 for every wolf killed. By 1948, at Wisconsin's centennial, wolves were disappearing; about 50 remained in the state. The bounty on wolves continued until 1957. By 1960, the wolves were gone.

In the mid-1970s timber wolves were more valued and protected under the federal Endangered Species Act of 1973. With protection, Minnesota's wolf population increased and several individuals dispersed into northern Wisconsin. In 1975 the wolves were listed as endangered in Wisconsin, and a wolf study program began in 1979. The state wolf population grew slowly: in 1985, only 15 wolves occurred in the state. A Wolf Recovery Program developed in the 1980s set a goal of maintaining 80 wolves for three years before the species would be reclassified as "threatened." By 1985, eighty-six wolves lived in the state; by 1997, the population had increased to 150 wolves. During the sesquicentennial year of 1998, Wisconsin's wolves may need less protection and will be upgraded from "endangered" to "threatened." Work is underway to develop a plan to manage the 300–500 wolves ecologists believe the state can sustain. The wolf is again part of Wisconsin's landscape. □

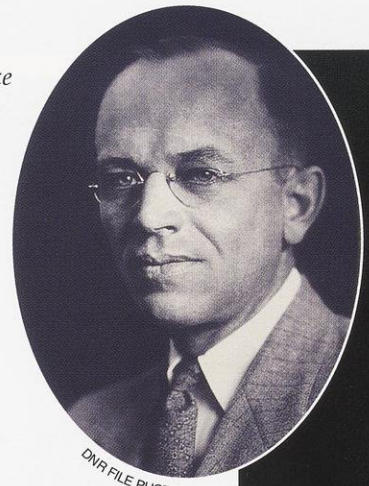
Sumner Matteson is an avian ecologist; Adrian Wydeven, a mammalian ecologist; and Barbara Zellmer, chief of the Ecosystem & Diversity Conservation Section for DNR's Bureau of Endangered Resources.

Preserving the living past

Virginia M. Kline

"What a thousand acres of silphiums looked like when they tickled the bellies of the buffalo is a question never again to be answered, and perhaps not even asked. "

— Aldo Leopold,
in *A Sand County Almanac*, 1949



DNR FILE PHOTO

Professor Leopold pondered the loss of vast acres of compass plant and our native prairies.

When renowned ecologist Aldo Leopold penned these words, Wisconsin had just celebrated its centennial. He was lamenting the demise of a small patch of compass plant, *Silphium laciniatum*, a species that graced acre upon acre of Wisconsin's once vast prairies. By 1949, compass plant and its prairie habitat had been reduced to highway and railroad rights-of-way and a few unplowed back forties.

To Leopold and others, the passing of the prairie and the bison, and the destruction of native plant communities, were like erasing pages of Wisconsin's history. At the time of statehood, most of Wisconsin still looked much as it had for thousands of years—a mosaic of woodlands, wetlands, and grasslands each composed of an interconnected web of plants and animals. In short order, land conversion by plow, cow, and saw not only destroyed the web, but broke our historical connection to the natural landscape.

The variety of natural communities in the presettlement landscape was indeed impressive. In his classic book *The Vegetation of Wisconsin*, University of Wisconsin Plant Ecologist John Curtis describes more than 30 types. Much of northern Wisconsin was covered with forests in

THOMAS A. MEYER

which sugar maple and hemlock dominated the canopy, accompanied by various combinations of yellow birch, basswood, and, in counties near Lake Michigan, American beech. Often a few huge, old white pines towered above the canopy. This was the northern hardwood forest, and it covered over 11.7 million acres — more than any other community in Wisconsin.

Where the soil was dry and sandy, fires occasionally swept over the landscape, and blocks of mesic forest gave way to "islands" of pine forest. Jack pine barrens occupied the driest, most frequently burned areas. Growing with the pines were red oak, northern pin oak and aspen. While the mesic forests were very shady and had few shrubs, the pine areas were light enough to allow shrubs such as blueberry, witch hazel and hazelnut to grow.

Some wet areas in the north supported tamarack/black spruce bogs and white cedar swamps. Others, including the sedge meadows and the open sphagnum bogs, had few trees. Orchids and other rare plants frequently occurred in these wet places.

Most of southern Wisconsin was covered with a shifting mosaic of prairie (2.1 million acres), oak savanna (7.3 million acres), and oak woods (1.4 million acres). These fire-dependent communities were not distinct, but blended into each other. They thrived on a wide variety of soils.

ROBERT QUEEN

The Natural Areas program documents the finest remaining examples of prairies, *(top)* oak savanna, *(above)* wetlands, and other communities. Private conservation groups, individuals and public agencies are preserving the finest available remnant acres of these natural communities.

In contrast to northern parts of the state, the southern landscape was open and sunny with spectacular vistas.

Within the prairie/savanna mix, three large blocks of southern mesic forest grew in moister areas which burned less frequently. Sugar maple, slippery elm and basswood were the most common trees, and showy displays of spring wildflowers carpeted the forest floor. Southern mesic forest covered about 3.4 million acres.

Public concern surfaced in the 1930s in response to uncontrolled draining and filling of wetlands, plowing of prairies, grazing of savannas, and logging of forests. Protecting the remaining unspoiled areas became urgent. In

1945, the Wisconsin Conservation Commission approved a motion by Commission member Aldo Leopold to establish a Natural Areas Committee. The committee was to obtain, by gift or purchase botanical areas of special value. The committee was superseded by the State Board for the Protection of Scientific Areas and is still active today as the Natural Areas Preservation Council.

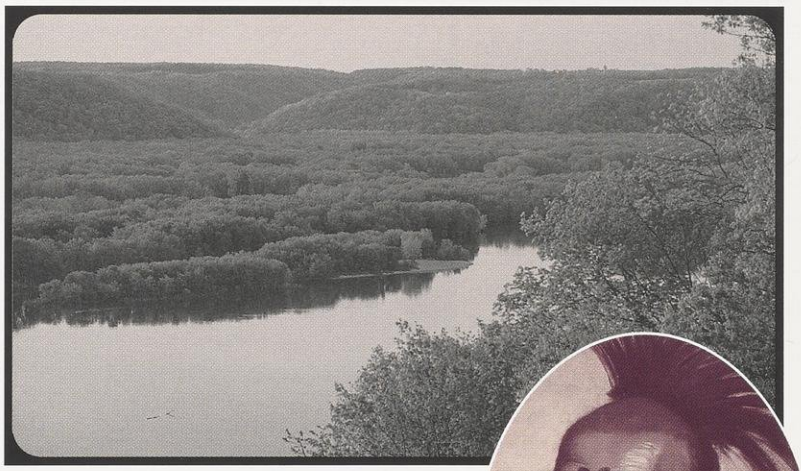
The State Natural Areas (SNA) program seeks to protect the best-remaining examples of plant and animal communities that were found in Wisconsin before statehood. The successful program has become a model for other states. As of February 1998, there were 326 SNAs encompassing more than 120,000 acres of land and water. From the Squirrel River Pines SNA in Oneida County to the Avoca Prairie SNA along the lower Wisconsin River (see back cover), these areas preserve intact natural communities, provide refuges for many rare species of plants and animals, and are excellent outdoor laboratories for teaching and research.

Though Holsteins long ago replaced bison, there remain a few places where silphiums still grow tall and where we can share, on a smaller scale, the vistas that inspired our fellow Wisconsinites 150 years ago. □

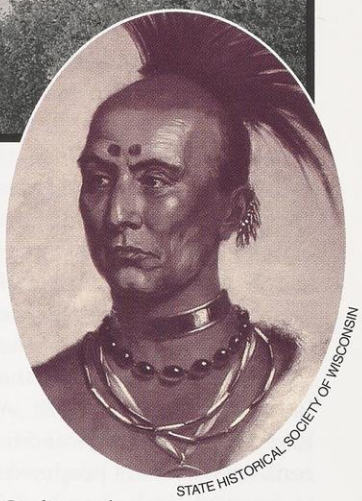
Virginia Kline of Madison recently retired as the Arboretum Ecologist with the University of Wisconsin-Madison. She is a former member of the Natural Areas Preservation Council. Thomas Meyer of the DNR's State Natural Areas Program contributed to this story. For more information on the State Natural Areas Program, write: SNA Program, Bureau of Endangered Resources, Box 7921, Madison, WI 53707.

In the shadow of Wisconsin Heights

David Gjestson



ROBERT QUEEN



STATE HISTORICAL SOCIETY OF WISCONSIN

Scenic beauty and cultural sites dot the lower Wisconsin Riverway. *(right)* One of Black Hawk's last standoffs is preserved at the Wisconsin Heights battleground.

It's fitting that the Wisconsin, a river steeped in our geologic, natural and cultural past, should continue as a focus for historic natural resource policies.

Bluffs stretch along the lower 100 miles of this 430-mile-long river. Over the course of 600 million years, the river carved a valley up to 500 feet deep between these bluffs, forming a natural corridor that drained Glacial Lake Wisconsin a mere 13,000 years ago. As the glacial ice melted, Paleo Indians followed the edge of the ice sheet from the west, arriving in the lower Wisconsin River valley. They hunted woolly mammoths, mastodon, bison and caribou and left behind rock art (pictographs and petroglyphs) to document their passing.

Along these blufflands from 600 to 1300 AD, a unique Indian tribe, the Mound Builders, formed earthen structures in animal shapes to reflect their spiritual traditions. Later, Ho-Chunk, Potawatomi, Menominee, Kickapoo, Chippewa, Sac and Fox lived in the region and used the "Wees-Kon-San" to travel throughout this wilderness.

Nicolet was the first European entering the area in 1634 exploring a path to the Orient. Marquette and Joliet in 1673 followed the path of the "Ouisconsin" River as Indians had for centuries. European immigrants displaced most Indian Tribes to territory west of the Mississippi River by 1830. From April 5 to August 22, 1832, a Sac warrior named Black Hawk tried in vain to reclaim tribal lands in Illinois. His warriors were massacred fleeing across the western part of the Michigan Territory (Wisconsin) just below the Bad Axe River. Black Hawk's major military triumphs in this conflict occurred at Stillman's Run on the Rock River and at Wisconsin Heights, a bluff adjoining the Wisconsin River.

Cultural and recreational preservation

In 1944, a small island in the Wisconsin River below Sauk City was given to the Wisconsin Conservation Department (WCD). The gift spawned subsequent purchases that formed a series of public hunting and fishing grounds along the lower river from Sauk City to the confluence with the Missis-

STATE HISTORICAL SOCIETY OF WISCONSIN

The site is the only intact Native American/U.S. Army battlefield in the Midwest east of the Mississippi River.

sippi River. During the next 30 years, the agency acquired over 22,000 acres on the lower Wisconsin River using funds from hunting and fishing fees. These properties formed the largest complex of state-owned public hunting and fishing grounds in southern Wisconsin.

In the 1980s, the Department of Natural Resources began a process to include a broader spectrum of the public in the agency's future land management decisions. The first project? Protecting the natural landscape along the lower Wisconsin River. A Riverway Board of local citizens now reviews proposals to harvest timber or build homes and businesses that would be visible from the river when shoreland trees have leaves. The goal is to preserve the wild feel of the river during canoeing season and also preserve the privacy of shoreland owners.

DNR land acquisitions in the river corridor aim to increase a wide variety of recreation including canoeing, horseback riding, hiking, camping and nature observation. The riverway plan also stresses the importance of preserving cultural resources like archaeological and historic sites.

ROBERT QUEEN

Volunteers cut brush and clean up the Wisconsin Heights site. Several interpretive programs will be held here this year.

New opportunities to buy public lands had a dramatic effect. Fueled by the Stewardship Fund, more than 20,000 acres of Wisconsin River shorelands were purchased in seven years. The mix of water, wetlands, timber, grasslands and brush habitat now in public ownership provides habitat for 47 species of mammals, 284 species of birds and 84 species of fish. Sixty-two species of plant and animal species on the riverway corridor are classified as endangered, threatened or of special concern.

Cultural holdings are equally rich. Several effigy mounds in the form of eagles, a bear and two panthers are now protected and a Black Hawk War battle site was purchased. In fact interpretive programs will be held there during our sesquicentennial celebration.

State purchase of the effigy mounds has forged partnerships with the Ho-Chunk Nation, the guardians of the mounds, to protect these sacred sites and to teach Indians and non-Indians alike about their purpose and significance. Few people realize that Wisconsin contains over 90 percent of the world's known effigy mounds!

The site of the Battle of Wisconsin Heights preserves a bit of riverside history in northwest Dane County, two miles southeast of Sauk City. It is the only intact Indian-U.S. militia battle site in the Midwest; the site of the last battle fought with Indians in the old Northwest Territory. On July12, 1832, the 65-year-old Black Hawk and only 60 Sac, Fox and Kickapoo warriors fought more than 700 soldiers, Winnebago, Menominee and Potawatomi guides to a standstill. Black Hawk's delaying tactics allowed several hundred women, children and elders to escape across the Wisconsin River.

His victory was short-lived. Army soldiers caught up with his tribe on August 2nd just below the confluence of the Bad Axe and Mississippi rivers. Few of Black Hawk's 1,000-member tribe survived that massacre.

Now, their story will live on as trails and auto tours of the historic battleground join the mix of outdoor recreation offered along the lower Wisconsin River. □

David Gjestson works in the DNR Bureau of Facilities and Lands.

The roots of our forest future

Kirsten Held

Private landowners were key players in regenerating Wisconsin's forests after they were cut and burned early in the century. They played an important role in transforming our state's forest resource from tragedy to triumph.

At the turn of the century, northern Wisconsin was promoted as a treasure chest of rich farmland. Many forests were cut or burned just to get them out of the way for agricultural crops. However, farmers' dreams were dashed by short growing seasons, soil suited for trees but not food crops, and low prices for farm products. It proved to be a tragedy for both the scarred, barren lands and the people who had moved north and were now destitute. Fires raged out of control and expanses of abandoned, burnt land stretched across northern Wisconsin.

Remaining landowners set about replanting the ashes of their forestland with jack pine, white spruce and red pine.

Two early actions by the state helped: establishing the first state tree nursery and passing the first tax relief program.

EUGENE H. SANBORN

The first state tree nursery was planned and built in 1911 at Trout Lake in Vilas County. Its first seedlings were planted to form the Star Lake plantation in 1913. The site is still a showcase for educating private landowners and school groups.

Other nurseries followed as the demand for trees increased. A 10-year project following the Dust Bowl of 1934 encouraged farmers to plant shelter belts of trees to buffet winds and conserve soil. Planting advice and trees were provided free-of-charge. State nurseries produced 38 million seedlings in 1940 during the CCC and WPA work programs and the production peaked at 42 million trees in 1959. Today, the three state tree nurseries at Boscobel, Wisconsin Rapids and Hayward produce about 22 million trees each year to reforest private lands and convert abandoned farm fields to forests.

While Wisconsin had been the world's leading timber producer in the 1890s, producing a million board feet of lumber every two days, the future of private forestry was very much in question by 1920. The vast pinery was gone. Tax-delinquent lands, abandoned by

EUGENE H. SANBORN

The state provided tax incentives starting in the late 1920s and educational programs to encourage reforestation. *(above)* Mr. Trenk illustrates proper planting techniques to farmers in Oxford, Wis., May 1937.

THURE BLOOMQUIST

(above) Foresters provide advice on thinning red pines. *(right)* Soil samples determined which trees would succeed. The demand for one-on-one consultation remains as strong as ever. Woodland owners want tips to keep their forested acres productive and a cadre of DNR foresters, Extension foresters and private services are kept busy.

DEAN TVEDT

destitute farmers, burdened the counties, even before the Great Depression.

In 1927, the legislature passed the first forest tax incentive program, the Forest Crop Law, which treated land as capital, but timber as income. This meant that people could afford to reforest the land and not pay taxes until the timber was harvested. Government leaders hoped this voluntary program would reduce tax delinquency, rebuild the local tax base and assure a stable supply of forest products.

A companion law, the Woodland Tax Law of 1954, gave similar benefits to owners of smaller parcels. The two laws were later combined into a Managed Forest Law in 1985. Currently 21,000 landowners controlling more than 2.5 million acres are enrolled.

Since 1936, about 60 percent of Wisconsin's forestland has been owned by private individuals. Technical help to manage these private holdings has been available since 1913. The Wisconsin Conservation Department struck an agreement with the University of Wisconsin in 1925 to start a "farm forestry" program specifically for private landowners. Last year, more than 70 DNR foresters prepared forest stewardship plans for 2,200 landowners, provided technical assistance to an additional 8,096 landowners and referred 1,642 landowners to private forestry consultants. However, we still reach just a fraction of the 200,000 individuals and families who own forestland in Wisconsin. Consulting foresters, UW-Extension foresters, and non-governmental organizations help meet the demand.

Today DNR foresters enjoy a close working partnership in landowner education with UW-Extension, Wisconsin Woodland Owners Association, the Wisconsin Forest Productivity Council, private consulting foresters and other landowner assistance programs.

Private landowners pulled triumph from Wisconsin's forest tragedy by replanting and harvesting the forest while learning conservation strategies that conserve soil and clean water. They helped create the incentive programs to renew the forest. And they learned to be good stewards so their great-grandchildren can also enjoy the benefits of managing Wisconsin's forest resource. □

Kirsten Held is the Forestry Issues Specialist for DNR's Bureau of Forestry.

Keeping things wild in Wisconsin

Mary Kay Salwey

Wildlife biologists and technicians provide a wide mix of outdoor experiences to meet a wide range of interests. Whether one chooses to watch warblers through binoculars, hunt deer with rifle or bow, photograph chipmunks at a park picnic table, sit in a waterfowl blind on a chilly October morning or simply revel in the sights and sounds of flocks of geese and sandhill cranes each spring, the public owes a lot to the efforts of wildlife conservationists.

History shows the difficulty of maintaining natural diversity. Wisconsin pioneers brought with them the hand-ax, the horse-drawn plow, and the market gun. In 1840, when only 31,000 European settlers lived in Wisconsin, development barely dented the wild bounty. But waves of immigration and new generations took their toll. Hunting and trapping went unregulated. Forests were cut over and burned. Native prairies were plowed under and wetlands drained, ditched or filled in.

Some animals like the wolf, cougar, bobcat, lynx, woodland caribou, sharp-tailed grouse and whooping crane simply couldn't tolerate the spreading human presence and retreated farther north, out of the path of European settlers' progress. Market hunting and habitat destruction drove the passenger pigeon and Carolina parakeet to extinction. Wild turkeys disappeared by 1881.

Unregulated trapping of marten, fisher and wolverine lead to their extirpation by the early 1900s. Poultry farmers and commercial fishermen slaughtered predatory hawks, owls and fish-eating mammals with a purpose. Market hunters decimated vast populations of geese, ducks, swans, cranes, shorebirds, and deer, as millions of breasts, thighs and briskets were shipped to Milwaukee, Chicago and points east.

Other animals fared better. The cottontail rabbit, cardinal, opossum, skunk, crow, beaver and white-tailed deer expanded their ranges as settlers opened up the land.

Pioneers also added new animals to the landscape. Early sportsmen's clubs introduced non-native ring-necked pheasant, mute swan, Hungarian par-

Resources seemed boundless, and we acted like they were. These Walworth County hunters had already killed 113 geese in spring when this photo was taken April 26, 1911. *(below)* Remains of cut-over pinery in Langlade County.

DNR FILE PHOTOS

tridge, rock dove, German brown trout and carp to give settlers a sense of "homeland" as they hunted and fished in their new surroundings. Other animals like house finches and feral cats escaped from captivity, while the Norway rat, house mouse and zebra mussel came ashore as stowaways. Today, all of these species mingle with native animals, some as welcome additions, others as nuisance and threat to resident populations.

The inception of wildlife management, under Professor Aldo Leopold at the University of Wisconsin-Madison in 1933, stimulated research that would eventually reveal a host of tools and principles for maintaining and restoring wild populations. Another important Wisconsin innovation — a 1935 law mandating the "teaching of conservation of resources" in schools.

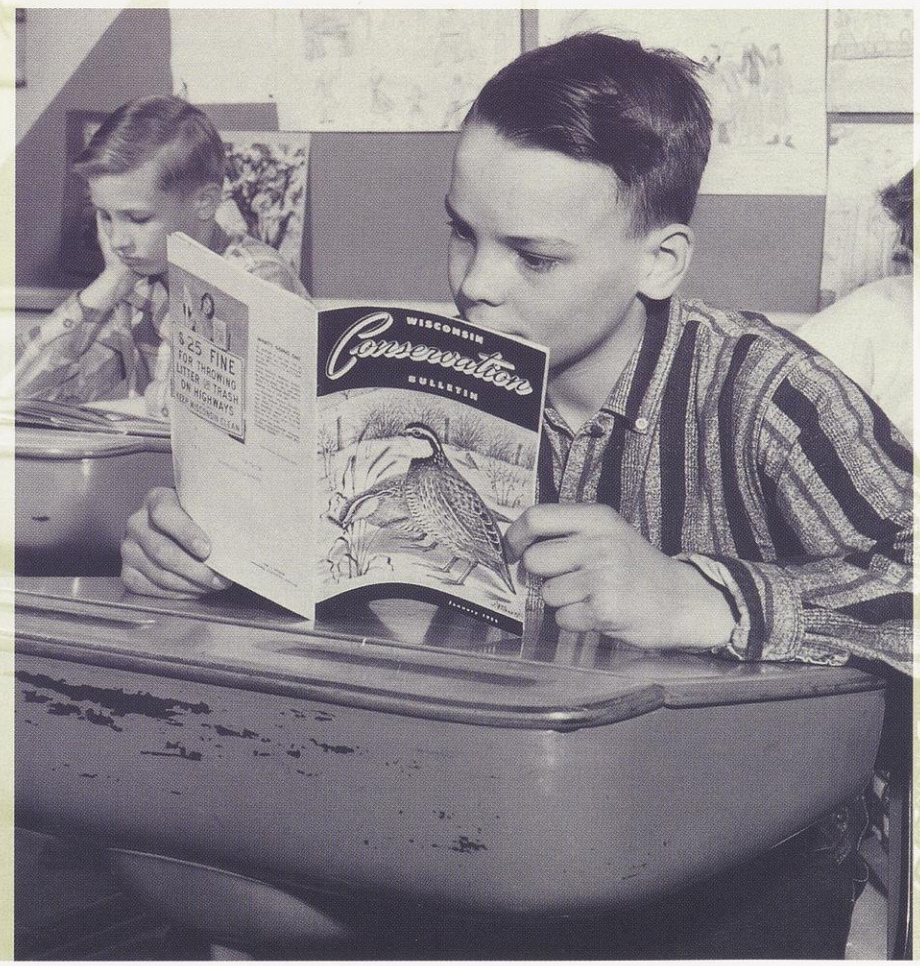
Wildlife recovery took many tacks. Among them:

Purchasing large tracts — As early as the 1920s and 30s the Wisconsin Conservation Department began purchasing significant tracts of wetlands as wildlife areas where management would support more wildlife and improve recreation. These purchases included such large complexes as Crex Meadows, Horicon Marsh, and Sandhill Wildlife Area, and continue today with the Stewardship Fund.

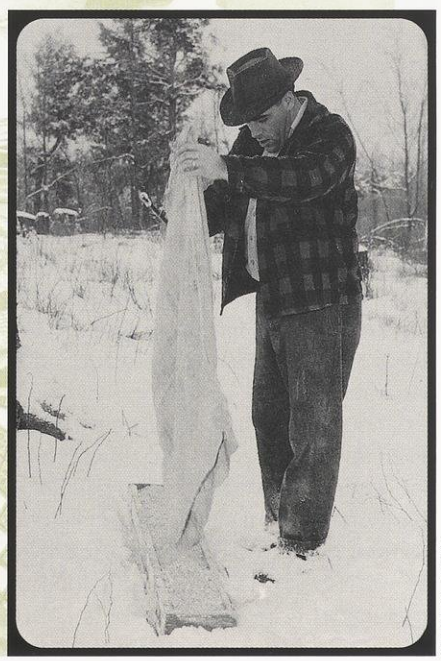
Managing wetlands, forests and grasslands for diverse purposes — Creating impoundments by building a variety of earthen dams, dikes and water control structures, was an important first step in saving wetland wildlife. Since then, wildlife research has shown that many wildlife populations cannot survive on small parcels of land. Biologists now focus more attention on purchasing, leasing or otherwise cooperatively managing wetlands across an entire landscape.

Forest wildlife, especially whitetailed deer reached their valley and their peak under human management. Aggressive market hunting decimated deer populations. The first one-buck law was passed in 1915 and the first closed deer season occurred in 1925; the season would remain closed in odd-numbered years through 1936. Deer yards, important places where deer over-winter, were purchased and a statewide deer feeding program began in 1925 to support a weak herd. We now know such feeding programs are ineffective. Slowly, the herd started to rebound. In 1953 hunters had to start registering harvested deer to provide information for wildlife biologists. The concept of a deer management unit meant the herd would be managed in naturally-occurring blocks of habitat rather than along human boundaries like roadways and township lines. Records of the ages and sex of harvested deer began in 1959 and two years later the important mathematical model called the S.A.K. (Sex-Age-Kill) model helped estimate the deer population in each unit. By 1962 over-winter population goals and antlerless deer quotas were set. Today, we continue to fine tune this modern method of deer management.

Managing our aging forests presents a continuing challenge. Young forests



DEAN TVEDT


STABER A. REESE

Conservation education has been part of the school curriculum in Wisconsin since 1935. *(below)* Winter deer feeding in March, 1944. The well-intentioned practice proved fruitless. Population control and better habitat are key to herd management.

are filled with sun-loving trees like aspen, jack pine, scrub oak and white birch that provide food and shelter for a number of animals including deer, bear and grouse. As forests mature and shade-tolerant trees proliferate, game and nongame animal populations can decline. Yet, we need to maintain a mix of each forest type to maintain Wisconsin's natural biodiversity.

Grasslands also support a rich mix of species. Native prairies once covered two million acres. These fertile, treeless expanses were plowed into cropland and wildfires were controlled which used to keep the encroaching forest at bay. Today, less than 12,000 scattered acres of native prairie remain.

DEAN TVEDT

DNR FILE PHOTO

Research and field observations underlie our wildlife success. *(above)* Drawing blood from wild ducks, 1964. *(left)* Stocking pheasants raised at our Poynette game farm.

Pastures and hayfields which provided habitat for pheasants, ducks, bobolinks and meadowlarks steadily were converted to other uses. Farm fields got larger, small grain farming gave way to corn and soybean cash-cropping, pesticide use increased and quick-growing alfalfa strains allowed earlier cuts, during the bird-nesting season. Programs like the Conservation Reserve Program, the Glacial Habitat Restoration Project, and pheasant stamp funds are providing incentives to restore large tracts of grassland landscape.

Stocking — Pheasants are stocked on public hunting grounds and day-old chicks distributed to sports clubs to meet the interests of upland bird hunters.

Recovery — Restoration programs have brought pine martens and fisher back to the Northwoods, wild turkeys to the fields and woodlands, wild pheasants to new grasslands, and elk to portions of the northern forest.

Recognizing a broader constituency —Wildlife management programs have made significant strides to serve the needs of citizens interested in wildlife — even people who don't choose to hunt and trap. Biologists realize the public has broad interest in wildlife education, learning outdoor skills and watching wildlife. Outreach programs also target non-hunting audiences who are deeply concerned and interested in seeing wildlife and participating in public discussions of wildlife issues.

Building partnerships — Public enthusiasm for wildlife has created many fruitful partnerships to improve wildlife habitat and restore wild populations. Nonprofit groups help restore waterfowl, upland birds and game populations; set reasonable fish and game laws; purchase property; improve forests; conserve soil and support outdoor recreation.

Monitoring and surveying — By monitoring harvests, interviewing outdoor enthusiasts, conducting field surveys, and tracking animal health, wildlife health specialists provide a host of services to their clients. Survey work helps determine how wildlife respond to changing land uses and tally the impacts of hunting and trapping. Biologists use this information to set population goals, hunting seasons, harvest quotas and hunting permit levels, as well as determining when health advisories are warranted. Wildlife biologists recognize that people have diverse interests in conserving rarer wildlife species, sustaining species that are in high demand, reducing populations that damage the environment and economic interests, and providing a fair opportunity for those who choose to hunt or merely explore the outdoors in search of wildlife. □

Mary Kay Salwey heads DNR's wildlife education programs.

A case that became a cause

Anne Urbanski

A lawsuit filed by the State of Wisconsin 11 years ago eventually led state and federal agencies to totally rethink their approach to cleaning up ozone pollution that drifts across state lines.

In April 1987 Wisconsin filed suit against the U.S. Environmental Protection Agency, alleging that EPA had failed to require Illinois and Indiana to submit adequate plans to reduce ground-level ozone and meet federal health standards.

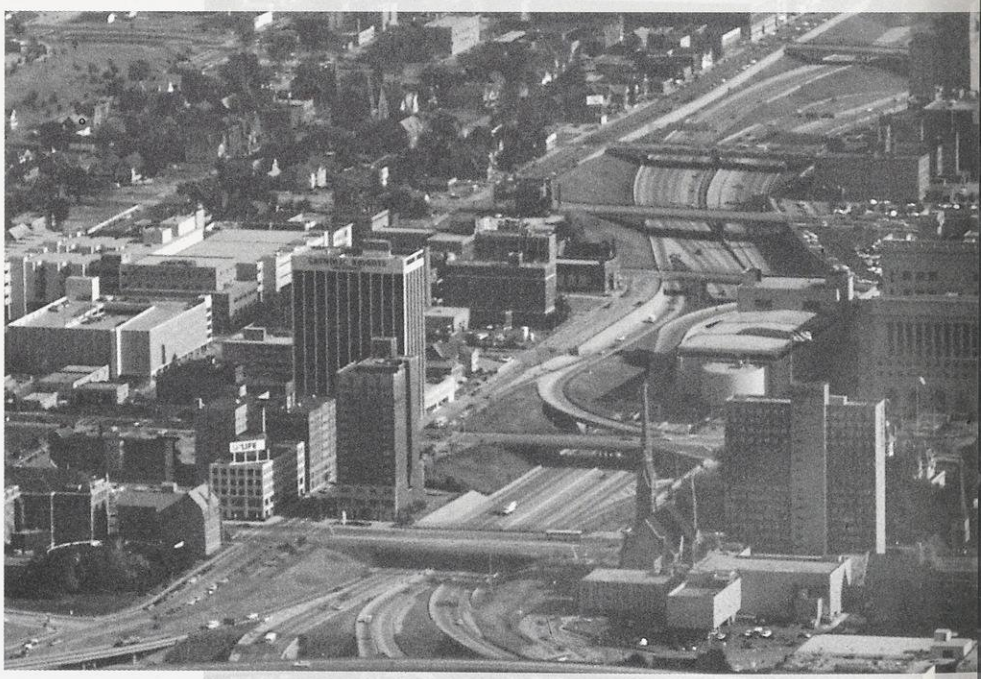
The Wisconsin DNR was convinced that air pollutants from the Chicago area drifted into southeastern Wisconsin and were part of the reason we couldn't meet the federal ozone standards in the greater Milwaukee area, said Larry Bruss, chief of DNR's Ozone & State Implementation Plan Coordination Section. "We filed suit to force planning to reduce ozone in the Chicago and Gary industrial area, and to apply the federal penalties for ignoring the deadlines to submit such plans," Bruss added.

In January 1989 the court found in Wisconsin's favor. During the next few months, as EPA worked to meet the federal court order, it became apparent that EPA's air quality model was outdated — it couldn't accurately simulate complex environmental interactions nor calculate how ozone forms and moves throughout the southern Lake Michigan area. As a result, the parties to the lawsuit agreed to set aside the court order and work together to research and develop solutions to the ozone-transport problem.

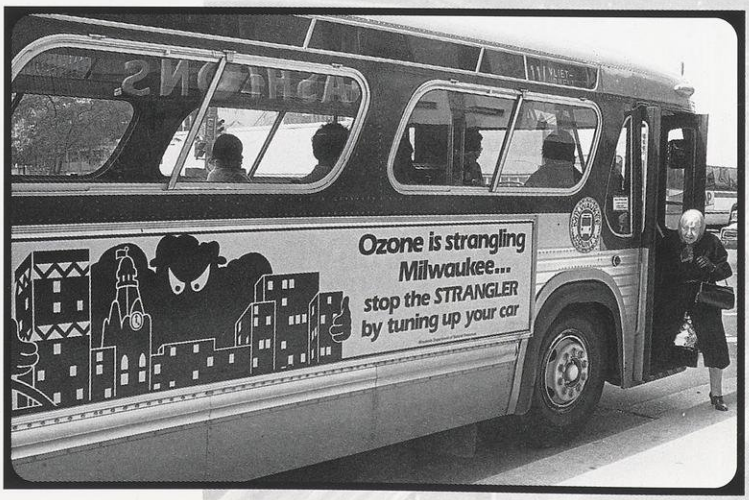
Since it appeared a much broader area than the Milwaukee-Chicago-Gary corridor was affected by drifting ozone, Wisconsin, Illinois and EPA invited Indiana and Michigan to join their pioneering effort. In September 1989 the four states and EPA agreed to pool their data, tools and research capabilities. The program, which started in 1990, continues today.

Preliminary findings released in April 1994 surprised researchers and policy makers alike. Results showed that much more ozone enters the southern Lake Michigan region from outside the area than was previously thought. That finding, coupled with similar data from other ozone studies, led policy makers to believe that a larger-scale effort would be needed to reduce ozone that forms and drifts across the eastern United States. In early 1995 the Ozone Transport Assessment Group involving 37 states and hundreds of stakeholders started meeting. By November 1997, the group's collective recommendations formed the basis for EPA's plan for 22 states to significantly reduce emissions of nitrogen oxides, now believed to be the main culprit in forming unhealthy levels of ozone in the eastern United States. □

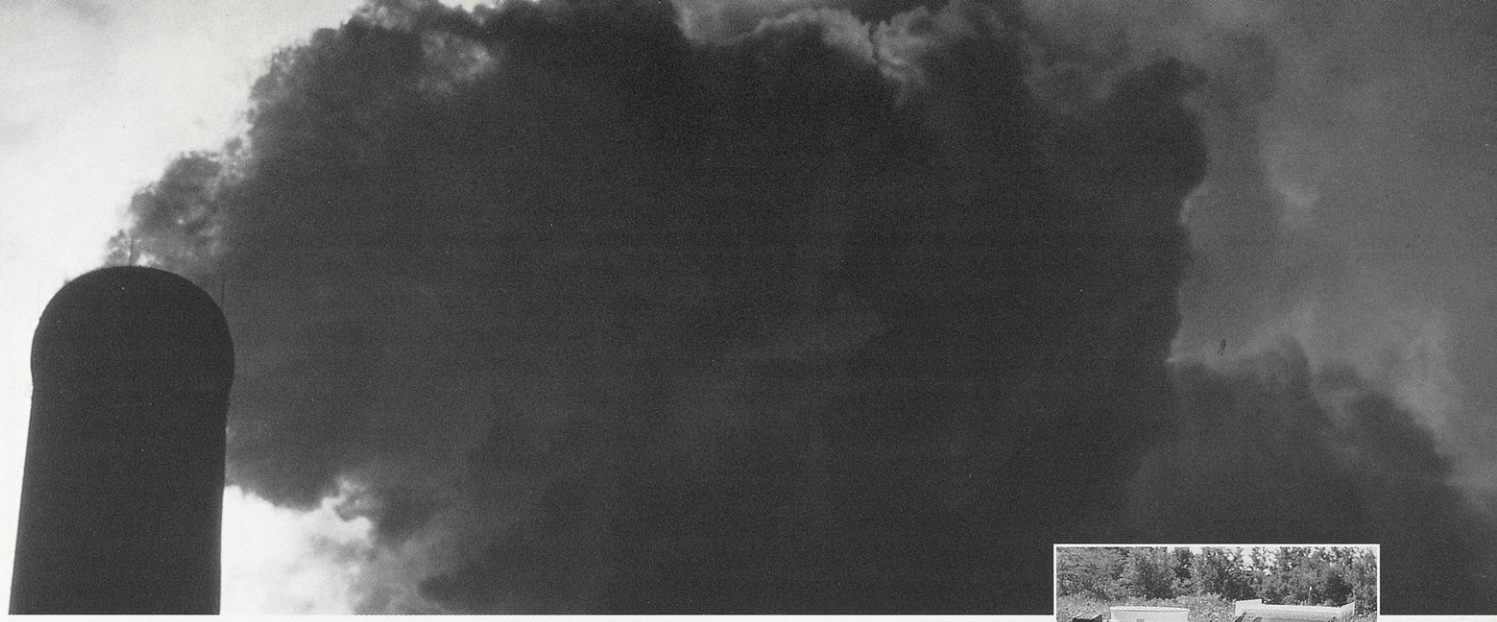
Ozone pervades metropolitan centers. The pollutants that form it can drift hundreds of miles. Public awareness and campaigns to use mass transit are part of the clean air solution.



BUREAU OF AIR MANAGEMENT



DNR FILE PHOTO



Passing the acid test

Anne Urbanski

ROBERT QUEEN

What we sent up, came down. *(above)* Samplers collected rainfall which was analyzed for pollutants and acidity.

Early action and partnerships protected northern Wisconsin lakes. This resulted in sound public policy that helped resources, prepared state utility companies and paved the way for a national program to stem acid rain. Wisconsin's 1986 law spawned a host of research projects that helped unravel how acid rain is carried, where it falls and which natural resources are particularly susceptible to acid damage. How did it happen?

Acid rain first became a concern in the late 1970s when reports from Canada and Europe showed that rain and snow, acidified by pollutants as a consequence of burning coal, were damaging lakes and forests.

Could it happen in Wisconsin? Researchers aimed to find out.

During the summer of 1979, DNR research teams tested lakes and concluded that half of the waters sampled in north central Wisconsin had relatively low alkalinity. Plant and animals in these lakes would be vulnerable to damage as rainfall and melting snow became more acidic.

This preliminary data raised concern because 80 percent of the state's 15,000 lakes are found in 23 northern Wisconsin counties. Moreover, these counties depend on tourism, fishing and forestry industries for their economic well-being. Continued testing indicated that a substantial amount of the pollutants that cause acid rain were generated within Wisconsin. The damage that acid rain could pose to buildings, building materials, human and animal health, and visibility also needed to be assessed.

In 1980 DNR formed a special Acid Deposition Task Force to guide research, evaluate potential problems and suggest policy issues that would have to be resolved. Between 1981 and 1985, a Joint Acid Deposition Technical Review Committee (comprising representatives from the DNR, Public Service Commission of Wisconsin, and Wisconsin electric utilities) conducted cooperative research funded by government, the Wisconsin utilities and the Electric Power Research Institute. The results of that research helped forge consensus to pass Wisconsin's acid rain law.

The legislation set limits to aggressively reduce nitrogen oxide emissions (NO_x) from gas-fired engines starting in 1991 and sulfur dioxide emissions starting in 1993. Major sulfur emitters included electric utilities, large industries and municipal sources.

Costs to monitor results through research were passed onto utility customers for 10 years, until June 1996. A council representing environmental groups, utilities, industry, the University of Wisconsin System, the Public Service Commission, the DNR and the Department of Administration, directed the research to evaluate how the environment would respond as sulfur dioxide emissions were reduced.

The work of this Acid Deposition Research Council formed a national model that made Wisconsin a national leader in acid rain research and policies. The council's consensus approach agreed to research goals and funding that enabled objective evaluation of the findings.

There were other benefits. Diverse interests who worked together developed trust in their collective judgment. As federal acid rain controls were debated, the Wisconsin utilities and the DNR were comfortable supporting strategies that gave electric utilities more flexibility to trade and sell emission credits while still reaching clean air goals. These provisions were incorporated into the federal law. The Wisconsin utilities, which had reduced their emissions earlier, when emission credits were less costly, consequently kept energy costs lower for ratepayers. □

Anne Urbanski writes for DNR's Bureau of Air Management.

A way from urban decay

Erika Kluetmeier

"Brownfields," a term coined in the 1990s, will continue in the forefront of environmental recovery for a decade or more. Brownfields describes contaminated lands, typically in blighted city neighborhoods, that have been abandoned or barely used for years. There is renewed interest in cleaning these properties because they can rekindle community and economic recovery, as well as restoring the environment.

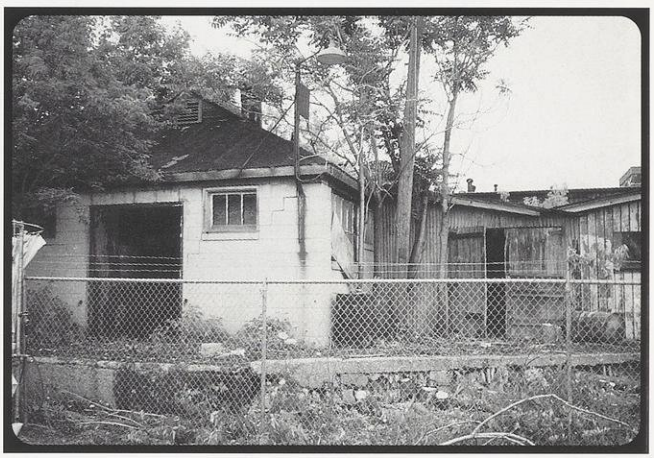
As urban sprawl swallows up farmland and "greenfields" at an alarming rate, the benefits of restoring downtown brownfields are especially attractive. Their location is key to their future success. Brownfield restorations not only clean up the environment and protect public health of city residents, they create jobs where people need them, provide workplaces people can reach on public transportation, restore the property value, and enhance surrounding property. Moreover a network of roads, electric lines, pipelines and sewers already serves these areas.

To keep up with growing interest in brownfield recovery, the Department of Natural Resources' programs evolved too, but change took time.

It started in 1978. A state Spill Law was enacted, mainly to train regional teams in Wisconsin to respond quickly when spills threatened streams, rivers and lakes. It was also the era of widespread awareness of hazardous chemical wastes that posed more serious threats to people AND the environment. This marked the beginning of emergency planning to prepare regional hazardous materials or "hazmat" teams, spur soil cleanup and prevent groundwater contamination from hazardous substances.

At that time, we had one person in the DNR to handle spills from a wide variety of sources — derailed trains, accidental spills at businesses, or leaks from gasoline storage tanks," says Mark Giesfeldt, director of the DNR's Remediation and Redevelopment program. "We even responded when nine dead pigs were found floating down the Pecatonica River."

Congress and the Environmental Protection Agency took the reigns in 1980, creating the nationwide Superfund program to provide federal funds to clean up health threats at the country's worst hazardous waste sites. By late 1983, twenty Wisconsin places were named Superfund sites; eventually 41 former industrial sites and dumping grounds in the state would be placed on the list.



BUREAU FOR REMEDIATION AND REDEVELOPMENT

Before and after the Milwaukee tannery site was recovered.

Though its goals were admirable, Superfund spent too much money on protracted legal battles to pinpoint who would pay for cleanups, rather than conducting actual investigations and restoring contaminated land. The state started looking for faster and cheaper solutions.

The 1983 Abandoned Landfill Program and the 1984 Environmental Repair Law provided state money for cleanups when a "responsible party" could not be fingered to pick up the tab to restore the environment. To complement the 1984 package, a landmark state law set goals to prevent groundwater contamination and restore contaminated groundwater to safe uses.

In the mid-1980s, the cleanup workload grew tremendously. DNR began hiring private consultants to investigate and clean up serious contamination problems. Over the years, the Environmental Repair Fund has increased to $3.8 million and $21 million in bonding authority. Federal rules in 1988 required owners of service stations and even home fuel tank owners to replace or remove buried fuel tanks by 1998.

"Once owners started removing their tanks, we found that the old tanks were often corroded and many of them had leaked gasoline into soil and groundwater," says Giesfeldt. The tanks were everywhere — gas stations, homes, businesses and airports, he says.

The biggest explosion came as growth opportunity to environmental engineering firms.

The Petroleum Environmental Cleanup Fund Act of 1989, or PECFA, provided funds to investigate and cleanup gasoline contamination. The number of cleanups proceeded so quickly that at its peak even DNR employed 110 people to oversee environmental investigations and cleanups, and provide technical assistance to consultants. By the early 1990s, a backlog of thousands of contaminated sites needed cleanup and almost as many consultants lined up to do the job. Thus far 7,000 of 16,000 leaking tank sites on record have been recovered.

BUREAU OF REMEDIATION AND REDEVELOPMENT

Old industrial eyesores can create opportunity. Once sites are cleaned up, their downtown locations can become hot real estate for new businesses, new jobs and revitalized neighborhoods.

Cleanup requirements that had been scattered among groundwater laws, waste laws and spill laws were recodified from 1991–95 and Wisconsin set some of the nation's first soil cleanup standards to agree when a "contaminated" site would be clean enough to be reclassified as "recovered" and suitable for new development. So many sites need attention that Wisconsin's laws now allow some lower cost, more time-consuming cleanup methods. Even these sites will eventually be recovered and groundwater quality restored.

Which brings us back to brownfields. Cities and money lenders face several losses when businesses fail, and aging factories move or close their doors. If a bankrupt company walks away from its plant, local governments and lenders can "inherit" contaminated property they did not cause and cannot readily sell. The Land Recycling Law of 1994 was designed to keep these properties from remaining abandoned eyesores. The law requires that new owners will be provided an estimate of how much cleanup will cost and the owners must agree to make those repairs. Once the property is restored, new owners are guaranteed that they will not be held financially responsible if cleanup standards change, if the approved cleanup remedy fails or if old contamination is subsequently discovered.

"Purchasers want this added insurance that their property is clean and sellers use the cleanup certificate to attract buyers," says Darsi Foss, a team leader in charge of the DNR Land Recycling programs.

DNR's reorganization in September 1995 consolidated land recovery projects into the Bureau for Remediation and Redevelopment (R&R), which provides one point of contact for customers undertaking cleanups. One innovative R&R service is inspecting tax-delinquent brownfields on behalf of local governments to confirm whether contamination exists, pinpointing its location, and providing estimated cleanup costs to potential buyers. After DNR staff assessed an old tannery in Milwaukee, a neighborhood business owner bought the site, cleaned it up and expanded his business, creating over 40 jobs for area residents.

"We rely on neighborhoods to identify properties, bring together partners, and secure cleanup and redevelopment money," says Giesfeldt.

Foss calls the Milwaukee tannery case a "perfect example." "The neighborhood and a local health center rallied to get city, state and federal aid, and find a suitable buyer," she says. "They knew what they wanted the site to become, they wanted a new business that created jobs and that's what they got."

Progress will continue. Legislators have approved programs that provide financial assistance to investigate and clean up contaminated properties; the benefits of which are estimated to be worth more than $100 million. That's plenty of potential to green-up brownfields and revitalize neighborhoods in the process. □

Erika Kluetmeier is senior public affairs manager for DNR's Water Division.

Wisconsin's war on waste

Lissa Radke

A 10-year-old boy bundles his family's newspaper at the curb every Monday morning. A father adds food scraps to leaves and grass clippings in the backyard compost pile. Office workers keep office paper in special bins next to their garbage cans. All are habits that Americans had 50 years ago, lost and have redeveloped as we have rediscovered the value in wasted resources.

Approximately 97 percent of Wisconsin residents say recycling is now a regular part of their lives at home, work and school. Tough laws and progressive incentives have made Wisconsin communities and businesses innovators in reducing residential and business wastes, preventing pollution, buying recycled products, and developing markets for recycled products. Since 1995, approximately 40 percent of municipal solid waste — 1.6 million tons a year — has been diverted from landfills as a result of recycling and composting at homes and businesses; the national average is only 27 percent.

Each generation seems to learn then forget waste-consciousness. *(below)* A WWII scrap drive at Hartford High. *(bottom)* Collecting mixed wastes in Milwaukee, 1960s.

DNR FILE PHOTO

CITY OF MILWAUKEE SANITATION DIVISION

Dramatic reductions in our wasteful habits have always been born of necessity. During the Depression, when goods were expensive, metal cans, rags and glass were collected and sold. During World War II, when goods were scarce, scrap drives collected everything from tires, fats and cooking pots to bathtubs and peach pits (used to make filters in gas masks).

After the war, our waste disposal habits increased dramatically. The thrifty, resourceful culture began to crave convenient and disposable items. We became a throwaway society; packaging and product consumption increased 63 percent per person between 1958 and 1976. Billions of disposable pens, lighters, diapers, food containers and other packaging had to go somewhere. They ended up in the town dump.

New laws shape disposal methods

By the 1950s, almost every town, village, and city had its own dump — usually a simple ravine, pit in the ground, a wetland, or a perpetually burning pile of garbage at the edge of town. These sites and the private dumps operated by companies on their property became environmental problems 25–40 years later. Wastes improperly buried in the 1960s are still leaking into ground and surface water at about 40 sites statewide. Many of these "Superfund sites" now qualify for federal funding to clean them up properly. "Sanitary" landfills that were simply dug into sandy soils are contaminating groundwater, too.

It's easy to forget that until 1965, no state had formal agencies designated to manage solid wastes. Wisconsin was

ROBERT QUEEN

More than 97 percent of Wisconsinites recycle resources.

one of the first to establish such an office and our first rules to regulate dumps took effect in May 1969. New laws in the 1970s defined state standards for safe landfill locations, required annual licensing of all existing disposal sites, and set minimum design criteria for "landfills." "Dumps" — those open-air, unregulated holes in the ground — no longer made the grade. Landfills were carefully designed to reduce leaking, trap blowing debris, compact waste and prevent other public health hazards.

The passage of the federal Resource Conservation Recovery Act (RCRA) of 1976 strengthened state laws regarding waste disposal. RCRA prohibited open dumping of solid waste and required that small dumps either meet environmental requirements for new landfills or close. The law also recognized a new category of "hazardous" waste, whose toxic, flammable, corrosive or explosive qualities warranted additional protection. A Bureau of Solid Waste Management was formed in Wisconsin in 1978 to carry out numerous new state and federal laws.

ROBERT QUEEN

Return to our recycling roots

In 1990, the Wisconsin Legislature passed a state recycling law which included both regulations and financial incentives to reduce wasted resources from businesses and communities. Now, nearly 10 years later only a handful of states have recycling laws as comprehensive as this one. In less than five years time, Wisconsin communities made recycling mandatory for all sectors of the population and completely changed the state's throwaway habits.

The goals of this all-encompassing initiative were to reduce the amount of trash sent to landfills and incinerators each year, and to develop markets to use the recyclable material. We've made great progress toward both goals. Recycling and composting save the equivalent of a landfill of space every 1½ years and avoid $48 million in dumping fees. Further, the recycling industry has increased its capacity since 1990 to use our recyclables — paper, glass bottles, cans, etc. — to make new products. Each year new types of waste become recyclable as business finds new ways to handle and market such wasted resources as construction and demolition material, used oil filters and aerosol cans.

Our recycling law ranks solid waste management practices from most to least desirable: reduce (prevent) waste; reuse; recycle; compost organic material; incinerate with energy recovery; landfill; and incinerate without energy recovery. The Department of Natural Resources provides technical and financial assistance, as well as information and education programs to help communities and businesses comply with the new law.

The recycling law banned a list of items from landfills and licensed incinerators between 1990 and 1995. Local governments have developed effective recycling programs for containers made of glass, steel, aluminum and certain plastics; newspapers, magazines, and corrugated paper. Tires, yard waste, major appliances, used motor oil and lead-acid batteries are also banned from landfills. Some recyclables legally may be incinerated if energy is recovered. Disposal of all plastic containers was originally banned, but it proved impractical as markets have only developed for the two most common types of plastics. Local recycling ordinances carried out these state bans and provided homeowners and businesses with recycling options.

Our resolve to stem wastefulness and better manage those materials we discard has successfully eliminated scrap tire piles, and created grants and loans to manufacturers that use recycled products as raw materials. Since the recycling law passed nine years ago, every state resident has access to a recycling program. More than $7.8 million in demonstration grants have been awarded to develop new markets for recyclables. More than 125 businesses, individuals, and community groups have received awards from the Governor's Waste Reduction and Recycling Award program for their innovative efforts. Our commitment to recycling is helping us reclaim our conservation ethic and leave a legacy which is richer in resources than refuse. □

Lissa Radke writes for DNR's Bureau of Waste Management.

Outdoor allies

Though viewed as rugged individuals, DNR's conservation wardens take great pride in teamwork, especially the partnerships built to help the public safely enjoy outdoor recreation.

Partners have been important since the first warden, Rolla Baker, was hired in 1879 to stem illegal traffic of Great Lakes fisheries. Wardens continue to rely on law-abiding conservationists to report poaching, over-bagging and dangerous behavior in the outdoors.

That's the part of the job most of the public knows well. Two other aspects are equally important — environmental enforcement and safety programs.

The wardens have almost as long a history of enforcing environmental laws. Since 1915, state law has prohibited waste disposal into state waters. These early laws regulated common wastes from Great Lakes shipping, leather tanning and sawmills. They prohibited the disposal of lime, oil, tar, garbage, ship ballast, tanbark, acids, chemicals, slab wood, decayed wood, sawdust, mill refuse, manufacturing wastes and "substances deleterious to game and fish." Later revisions stemmed organic wastes like whey from cheese factories and creameries. These small plants developed near streams that could provide a ready supply of clean water to process dairy products.

In the 1970s, wardens were trained as first responders to oil and chemical spills since their field work often brought them onto the scene of accidents. In the 80s, the warden force added vigilance for "midnight dumping" of hazardous waste and the illegal burial of barrels of chemicals. Telephone hot lines, citizen tips and big fines helped stop that practice quickly.

Many agencies, sports clubs and schools now host courses to teach safe outdoor enjoyment of hunting, angling, boating, snowmobile operation and ATV use.

ROBERT QUEEN

ROBERT QUEEN

Thousands of dedicated hobbyists donate they time to teach outdoor skills to adult and youth classes. *(above)* A turkey-hunting class. *(below)* A marksmanship clinic.

Surely, the greatest satisfaction comes from successful collaboration to reduce accidents in the outdoors. In the 1950s and early 1960s the number of hunting accidents rose dramatically, in spite of the fact that fewer people were hunting. The Legislature was equally concerned about the rising injuries and deaths from recreational hunting, and in 1966, authorized hunting safety courses.

DNR law enforcement staff and experienced hunters developed course materials to teach old and new hunters alike safety tips, outdoor judgement, shooting skills and safe gun handling. Along the way, students learned to plan their hunt and appreciate many aspects of the hunting experience from packing for the trip through enjoying fresh game meals.

Community volunteers across Wisconsin who are committed to safe, enjoyable hunting have trained themselves to train others, and they do their job well. A network of 4,300 volunteer instructors now annually teach 1,200 gun safety and bow hunting safety classes in every Wisconsin county. Since courses were first offered in 1967, hunting accident rates have dropped more than 90 percent.

The volunteer spirit is similarly strong in providing other training. More than 1,000 snowmobiler safety instructors, 1,000 boating safety instructors and 250 all-terrain vehicle instructors provide classroom lessons and practical experience to novices of all ages as well as seasoned enthusiasts. Many volunteers are also getting involved in teaching outdoor skills like camping, orienteering, fishing and bird identification.

ROBERT QUEEN

To plant the seeds of safe outdoor enjoyment and to extend partnerships, conservation wardens have made a commitment to meet with children. For the last five years, wardens have annually sought invitations to visit every fifth grade class in Wisconsin. The program, Joining Forces, introduces the students to a local conservation warden to learn about his or her job. The wardens discuss why society passes laws to provide clean air, clean water and protect resources. They also explain the Department of Natural Resources' goals to give everyone a chance to enjoy healthy outdoor experiences in their own way.

The program is targeted to fifth graders as 10- to 11-year-olds are developing their own interests that can become lifelong hobbies or habits. Children at this age are also forming values, making independent judgements and drawing on their experiences.

Each year, the 185-member conservation warden force meets with these 70,000 students to encourage outdoor appreciation, foster tolerance of other people in the outdoors, nurture respect for nature, and make allies of youngsters who, perhaps, will one day volunteer as adults to teach about outdoor traditions. □

Building better knowledge

How science and technology help us manage resources

Wendy McCown

When Wisconsin joined the Union in 1848, European settlers were a minor part of a vast wild landscape, but they caught up quickly. Well before the turn of the century, humans had become the dominant force of change on Wisconsin's forests, lakes, and prairies. By 1898, when Wisconsin turned fifty, land, water, trees and soil were viewed as commodities that existed for people. There was little understanding that human activities would collectively threaten the abundance and balance of our resources.

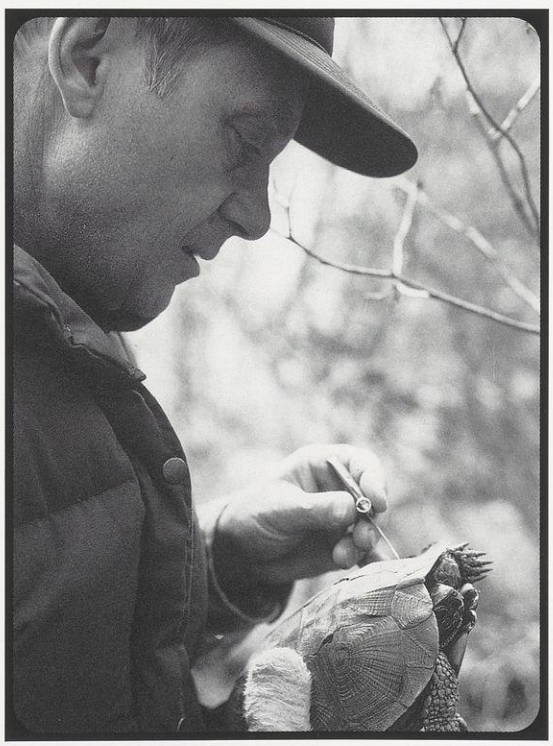
Over time, we've come to understand the power of our presence here. We also better understand how nature works and how we fit in. Through field work, monitoring, new research techniques and technologies, we have learned a lot about how the natural world responds to different types of pollution, human activities like urban development, hunting and fishing pressure, and the methods we use to manage natural resources. This knowledge guides our practical decisions and becomes more valuable as we keep learning more. DNR staff has participated in hundreds of research projects that helped build this knowledge base. Here are a few examples:

Acid rain: legislation that works

A 1985 Wisconsin law required power utilities and other large energy users to reduce emissions of sulfur dioxide. As part of the law, the utilities funded a 10-year research program to evaluate the effects of reducing those emissions. The studies showed it is important to continue using cleaner, low-sulfur fuels because:

- Hydrology is the key to understanding which lakes are sensitive to acid rain damage. We've learned that lakes are protected from acidification by chemical buffers naturally supplied by streams and groundwater. Many lakes in northern Wisconsin are especially vulnerable to acid rain because nearly all of their water is supplied directly by rain and snow.
- Acid rain affects aquatic organisms in complex ways. In an intensive whole-lake experiment, we found that acidification hurts some aquatic organisms by changing their food source or habitat rather than by direct toxic effects of increased acidity.
- Sulfur dioxide reductions have worked! Acidity of both precipitation and lakes has reduced substantially since the mid-1980s. In some cases fish are successfully reproducing in these lakes for the first time in many years. So far, acidity levels are still decreasing, which suggests that acid-rain control legislation continues to benefit sensitive aquatic resources in Wisconsin.

Marking a turtle as part of a forest biodiversity study.



U.S. FOREST SERVICE

Mercury: ultra-clean means better science, better regulations

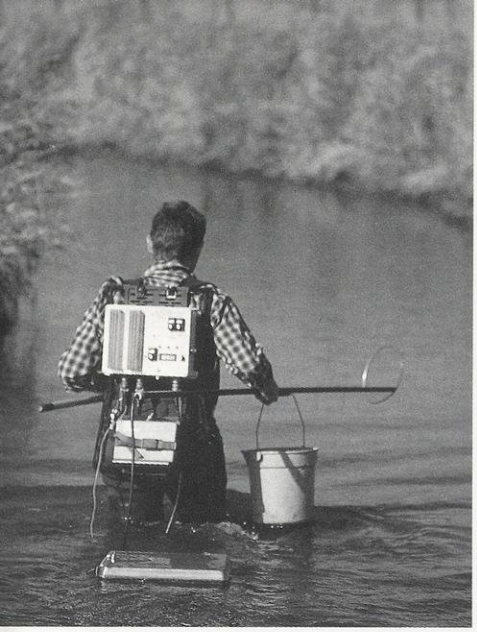
Until the mid-1980s, scientists struggled to accurately measure very small concentrations of mercury, a toxic heavy metal, in our rivers, lakes, and rainfall. Wisconsin DNR took the lead in adapting ultra-clean sampling techniques for freshwater ecosystems. The result?

- Much more accurate mercury data and a major change in methods and procedures used to sample freshwater systems worldwide.
- Immediate changes in how limits are set for the amount of mercury industries and municipalities can put into our waters.
- New techniques for collecting mercury from rainfall will allow us to distinguish how much mercury comes from within the state and how much comes from outside our borders.

Fish communities provide clues about ecosystem health

Fisheries research has progressed from studying single species to studying fish communities and how they respond to changes in their habitat. By comparing the combinations of fish species found in a stream or lake with a list of species we would expect to find in healthy waters, these "indices of biotic integrity" allow us to:

- Estimate the health of an aquatic system.
- Determine what's needed to improve the health of degraded waters.



ROBERT QUEEN

Sampling water chemistry and surveying the aquatic population to measure if this trout stream is still healthy.

- Guide further research efforts to understand the system.
- Monitor future changes in the lake or stream.

We now have indices for more than half the stream miles in the state and within five years we'll have indices for the rest of our waters. This method of assessing healthy aquatic systems is now used by natural resources professionals worldwide.

Sociological research: putting people back in the picture

For many years, natural resources managers focused mainly on the resources themselves — the land, air and water as well as plants and animals. Realizing that we also need to know more about the people who use our resources, Wisconsin DNR has had sociological researchers on staff since the mid-1980s to gather information through focus groups and opinion surveys. We were one of the first in the nation to conduct this type of research, now an important part of our management plans.

Today we assess regional attitudes about a wide range of outdoor issues including:

- Commuters' willingness to use mass transit to improve air quality.
- Northern Wisconsin citizens' values about their quality of life.
- Recreational uses and concerns in managing the state's northern forests.
- Citizen support for alternative ways to fund conservation programs.
- Hunters' opinions about proposed changes in hunting seasons.

Using science and high-tech tools for more effective wildlife management

The Habitat Restoration Area (HRA) program was started in 1990 to restore the grasslands and wetlands many wildlife species need to thrive. This program provides public funds to buy land, secure easements, and help property owners manage their property, mainly in the 900-square-mile Glacial HRA in east-central Wisconsin.

DNR researchers took the lead in using computer technology to make research results more useful as management plans are formed. GIS (Geographic Information System) allows us to electronically layer information about land cover, land ownership, wetlands, soils, archaeological sites, retired agricultural lands, other natural features and the populations of grassland birds living on these lands. By superimposing known habitat needs of ducks, pheasants, and grassland songbirds onto these electronic maps, the GIS programs help predict locations where habitat restoration will give the greatest benefits.

We will continue the challenge of better understanding the science of nature and human nature. The information gleaned from field work can help guide future decisions to preserve, protect and enhance our natural resources. □

Wendy McCown works for the DNR Bureau of Integrated Science Services.

Wildlife Biologist Harvey Halvorsen checks progress of this prairie restoration.

ROBERT QUEEN

Readers Write

MORE TALES

I just read Dave Crehore's story, "The digging out of Nip." It was delightful. There must be some more stories to be told. Please! I'm only two years older than Dave and can identify with the time and setting of his story. Can we look forward to more?

Kathy Kohlman
Princeton

Fear not. Mr. Crehore has crafted several pieces about family hunting and fishing trips and we intend to sprinkle them throughout future issues.

WEASEL MISCHIEF

I was happy to see the weasel get his due in February's "You little weasel."

When my "woods truck" failed to start I pulled off the air cleaner and found a weasel's cache consisting of three meadow voles, a deer mouse, a star-nosed mole and a chicken bone!

On another occasion we actually had one get into the house. The circus of chasing it around finally came to an end about an hour later when I cornered the weasel in the basement bathroom. When it jumped into a garbage can, I covered the opening with my fishing net, carried it outside and let the weasel go. I find them truly delightful little creatures.

Michael J. Ecker
Westboro

WELCOME VISIT

On our recent visit to Parfrey's Glen (featured on the back of the February issue) we struck up a conversation with a young couple and their two children. We commented that they must have been reading the same magazine we had and that's what brought them to this spot. We were delighted to find out we were talking to the author and photographer of that piece! Thomas Meyer assured us your magazine would be featuring more of the little-known natural wonders in State Natural Areas, and we're writing to say "We sure hope so."

Thanks for letting us know about Parfrey's Glen. It was wonderful.

Tom and Jean Zaremba
Muskego

EVENT ROASTED

Announcing the "World's Longest Weenie Roast" on Lake Namekagon (February Wisconsin Traveler) is surely inconsistent with water quality objectives discussed by the DNR Water Division earlier in the issue.

How can the ash from a 1,000-foot fire trench and attendant litter from participants help but contribute excessive polluting materials entering the lake after ice-out?

Art Oehmcke
Spooner

Event organizers contacted the Department of Natural Resources to procure permits. The sponsors had to make plans to collect all litter and also repair any damage to the ice so the fire would not leave bumps or trenches that would impede foot, car or snowmobile traffic. The event has not run afoul of environmental regulations in its first two years.

Originally wood fires were set in a narrow trench and the ashes were later collected with an end loader and disposed of. Last year, they burned charcoal on a long strip of aluminum foil. This year, they were constructing a 10-inch curved trough that would have been suspended above the ice to hold charcoal. We say ***would have*** *because the weenie roast was not held — ice conditions were not deemed safe enough to support a big party of snowmobiles and people.*

We mention the item for two reasons: First, please call the events we highlight before you attend because conditions can change after we go to press. Second, one can't assume that it's okay to host large events on public properties. Check to determine what permits and guarantees must be met and what liabilities must be covered to host a public event in a public place.

TO CALL-IN ANIMAL COMPLAINTS

A February letter writer was advised to contact the U.S. Fish and Wildlife Service through a toll-free number to handle Canada goose problems in communities. The number listed in your response is not a USFWS number, but is one of two U.S. Department of Agriculture Wildlife Services numbers cooperatively funded by USDA and the Wisconsin DNR. This popular service provides the public with technical advice on resolving myriad wildlife-related problems. We receive more than 10,000 calls a year.

There are actually two numbers your readers should use. Those callers living south of an east-west line running through Wisconsin at Green Bay should call USDA's Waupun District office at 1-800-433-0688; callers living north of this line should contact USDA's Rhinelander District office at 1-800-228-1368. The telephone lines are staffed by wildlife specialists between 8 a.m.–4:30 p.m. Monday through Friday.

John R. Maestrelli
State Director
USDA Wildlife Services
Sun Prairie

SAFE BOATING

I liked how you explained boating laws and safety issues in the June 1997 issue ("On the Water, safety and judgement issues for Wisconsin boaters"). I do a lot of boating with my kids on the Mississippi. I'd like to see a lot more stop checks conducted to keep the river safe. The Wisconsin DNR people do a very good job on the river, and I want to say thank you. I know how important the Mississippi is because I grew up along it and have stayed nearby.

Kenneth K. Huseman
Dubuque, Iowa

CLASS PRIDE

The April issue had tremendous impact at our school. The students were in shock over the beautiful pictures and summation West Allis Central High was given in the story "The Earth Day project." The article was a fine example of how environmental education is being applied in all walks of life. We are proud to have been a part of this tremendous program.

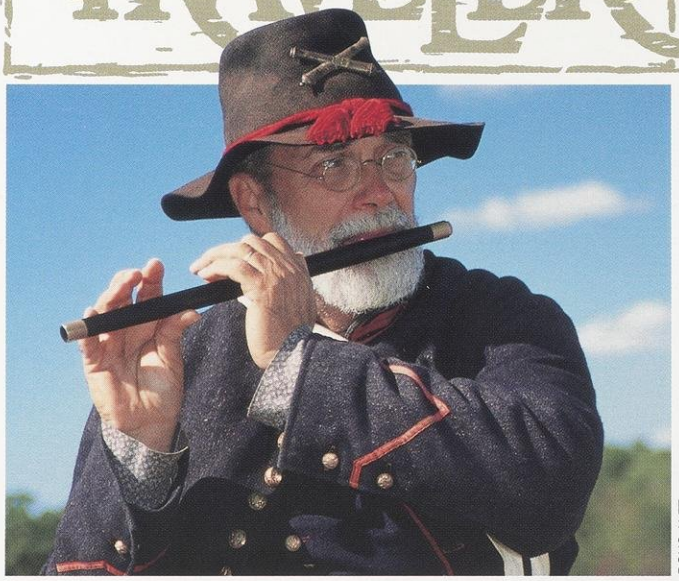
Laura Felda
West Allis

BIRD DOG FAN

I was looking for grouse hunting articles on the Web and found your article "The practical grouse hunter" (October 1997). I agreed with most of it but I did find one thing to argue about — the importance of using a dog to locate birds. I agree dogs are very important to find downed birds, but they are equally important for flushing grouse. I hunted for years without a dog, but I'm now hunting with a good one. I know I've flushed many more birds with the dog than without him.

Matthew Bump
Owosso, Michigan

WISCONSIN TRAVELER



DOUG ALFT

Sesquisensational!

Sure, it may be difficult to pronounce, but that's not an excuse for ignoring Wisconsin's 150th year of statehood. Our Sesquicentennial Year is a milestone worth noting, and you'll find a myriad of ways to mark the event this month.

Canoes figure prominently in several sesquicentennial celebrations, with good reason. Once the primary method of transport for Native Americans, voyageurs and the settlers that followed, the canoe is a swift, sleek and silent reminder of the passage not only of distance, but of time.

Two 25-foot voyageur canoes will ply the **Wisconsin River** from June 13–20 and the **Fox River** from June 29–July 12. The big canoes will stop off at riverside communities, where DNR naturalists and other experts will relate the area's natural and social history. You're welcome to paddle your own canoe and keep the modern-day voyageurs company on the water routes that run deep in Wisconsin's past. For details, call Greg Matthews about the Wisconsin River trip, (608) 275-3317; Dave Crehore about the Fox River trip, (920) 492-5822.

Fountain City and **Merrick State Park** host Buffalo County's big sesquicentennial bash on June 6. During the day, witness a Civil War reenactment complete with a cavalry charge and firing cannon, and enjoy the lively motion, color and music of a powwow. Come evening, a torchlight canoe parade will drift down the Mississippi River into the mists and myths of history. (608) 685-6206.

Let the sight of that evening flotilla spur your curiosity. At the **Point Basse Pioneer Festival** in Nekoosa on June 13 & 14, you'll see how canoes are built by hand as trade- and craftspeople demonstrate the essential skills of bygone days. Performances by Czech dancers and folk musicians recall the people of many different ethnic groups who sank old roots in a new state. 1-800-554-4484.

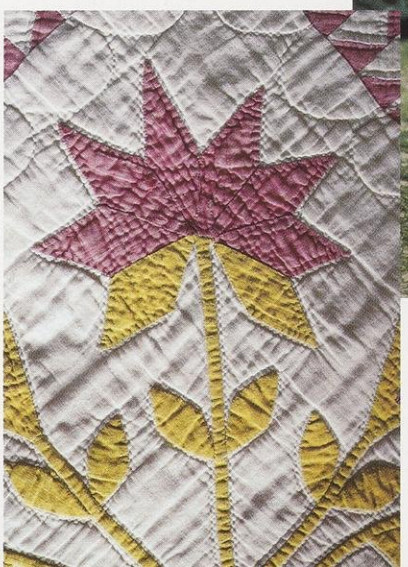
Off-water transport was equally important in Wisconsin's development. To acknowledge that fact, a **Wagon Train** will stop in Brandon, Fond du Lac County to dedicate a marker at the original Military Road, the route that once linked the frontier to the civilized world. On June 10 & 11, the 30 covered wagons will camp at Gallaway House and Village, and Ol' Cookie will prepare the best beans, bacon and biscuits this side of Milwaukee for an authentic pioneer supper. The wagon train also will stop at other locations; call (920) 921-7984 for details.

The Fond du Lac Symphonic Band honors the state's sesquicentennial — and its own centennial — with a performance on June 10 in Buttermilk Creek Park. The **Buttermilk Festival Concert** will feature period costumes and music from the early 1900s.

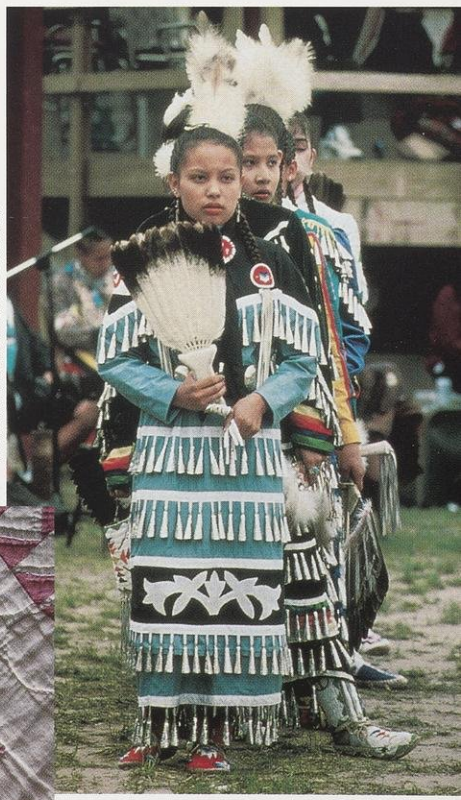
See more than 150 works of homespun, handcrafted beauty when the **Wisconsin Folk Art: A Sesquicentennial Celebration** traveling exhibit opens on June 23 at the State Historical Museum in Madison. Baskets and quilts will be on display, of course, but you'll also discover examples of lesser-known arts such as wheat weaving. The exhibit will be in Madison until November 8. (608) 264-6566.

Finally, to wrap up June with a big "Happy Anniversary, Wisconsin!" park yourself on Highway 27, two miles north of **Cadott** on Wednesday, June 24. There you, your family and friends can witness the historic ribbon-cutting for the geological benchmark sign denoting Cadott as the halfway point between the Equator and the North Pole. (715) 289-3365.

Take a lot of snapshots. Of such moments grand and small are a family's — and a state's — history made. □

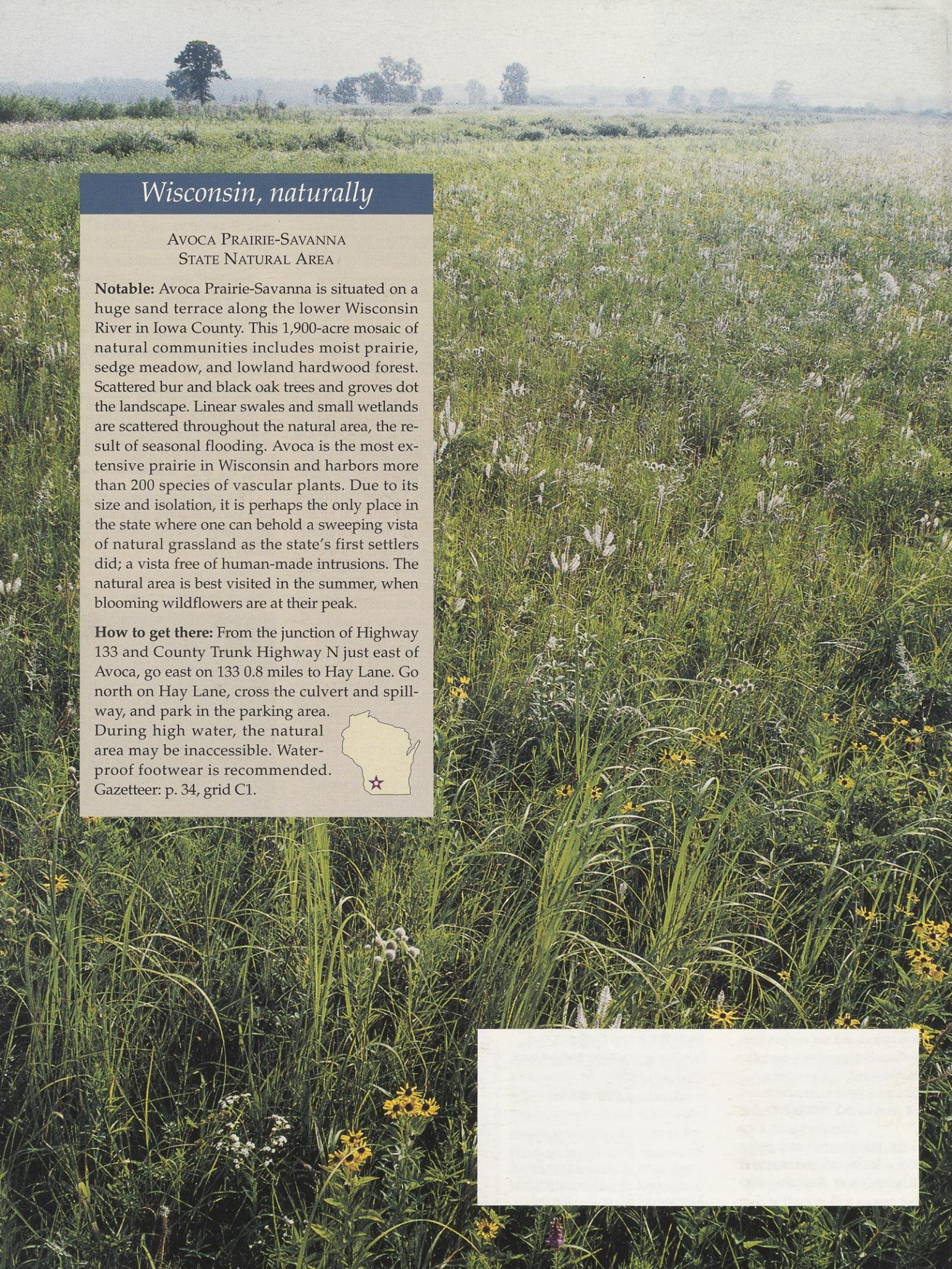


WISCONSIN DEPARTMENT OF TOURISM



WISCONSIN DEPARTMENT OF TOURISM

Civil War reenactments, ethnic dances in colorful costumes, arts and festivals statewide will celebrate 150 years of statehood this summer and fall.



Wisconsin, naturally

Avoca Prairie-Savanna State Natural Area

Notable: Avoca Prairie-Savanna is situated on a huge sand terrace along the lower Wisconsin River in Iowa County. This 1,900-acre mosaic of natural communities includes moist prairie, sedge meadow, and lowland hardwood forest. Scattered bur and black oak trees and groves dot the landscape. Linear swales and small wetlands are scattered throughout the natural area, the result of seasonal flooding. Avoca is the most extensive prairie in Wisconsin and harbors more than 200 species of vascular plants. Due to its size and isolation, it is perhaps the only place in the state where one can behold a sweeping vista of natural grassland as the state's first settlers did; a vista free of human-made intrusions. The natural area is best visited in the summer, when blooming wildflowers are at their peak.

How to get there: From the junction of Highway 133 and County Trunk Highway N just east of Avoca, go east on 133 0.8 miles to Hay Lane. Go north on Hay Lane, cross the culvert and spillway, and park in the parking area. During high water, the natural area may be inaccessible. Waterproof footwear is recommended. Gazetteer: p. 34, grid C1.