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WISCONSIN NATURAL RESOURCES

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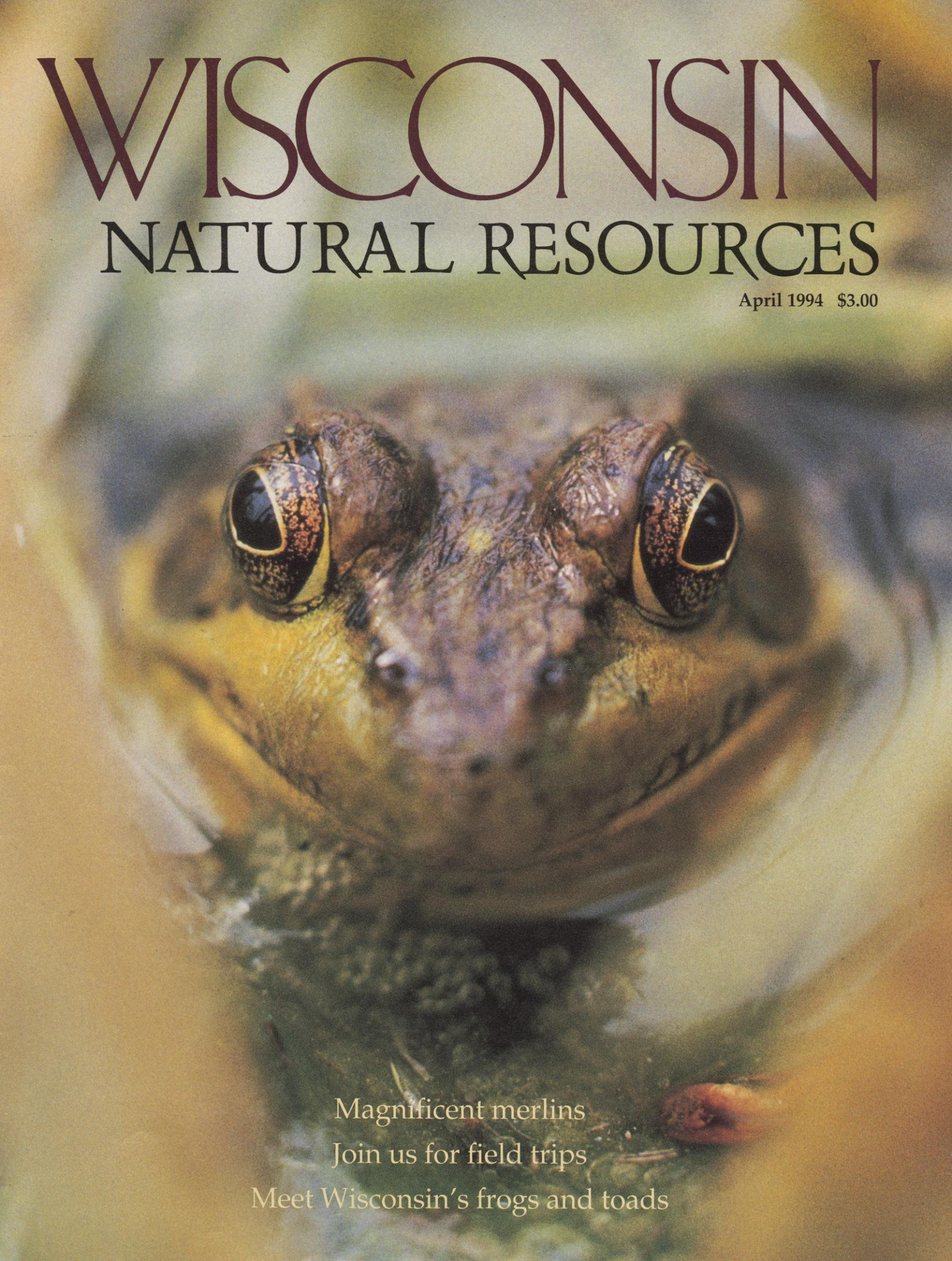

Magnificent merlins

Join us for field trips

Meet Wisconsin's frogs and toads

Trailing arbutus

Get your knees a little muddy to see this ground-hugging greenery.

Anita Carpenter

To walk in the woods on a warm spring day is to reawaken another season. Rising sugar maple sap drips sweet, sticky drops from a broken branch. Sluggish flies buzz lazily about, perhaps searching for flowering skunk cabbage by the gurgling creek. A Compton's Tortoiseshell butterfly awakens from winter's torpor and floats among the trees. From its burrow, a perky chipmunk surveys its surroundings for the first time in the new year.

The ground is soggy from the spring thaw. Boots are a necessity. Shielded from the sun's warming rays, scattered patches of crusty snow remain. Except for the purplish hoods of skunk cabbage, this year's flowers have not yet sprouted. Although the earth appears to be many shades of brown, look around. You'll discover the ground is not totally devoid of green. From Christmas ferns to club mosses, dewberry to Labrador tea, many plants remain green year-round.

One of our rarer evergreen plants grows almost exclusively in the dry, rocky, sandy soils of the Northwoods. Trailing arbutus is not a flashy plant that boldly stands up and declares its whereabouts. Instead, it creeps along the ground, hugging the earth. Its scientific name, *Epigaea repens*, refers to its prostrate posture. From the Greek, *epi* means "upon," *gaea* means the "earth." *Repens* is Latin for "creeping." In spring, you may have to brush aside the coverlet of last autumn's fallen leaves to discover this plant.

Although it doesn't look it, trailing arbutus is technically a shrub because it has a woody stem. It's a member of the heath family, as are Labrador tea, leatherleaf, wintergreen and blueberry. The ½ to two-inch alternate leaves have an oval to oblong shape. The succulent leaves and stems bristle with rusty hairs.

In April, trailing arbutus bursts into flower. Spicy, fragrant, delicate blossoms of white to pink nestle in tight clusters among thick evergreen leaves. The tubular flowers are insect-pollinated. When the flowers fade, the new year's leaves appear. Later, dark red spherical capsules form that contain numerous small rounded seeds.

The plant's other common name, mayflower, may have originated with the Pilgrims. In the 1600s trailing arbutus grew in the vicinity of Plymouth, Mass. It was the first flower to greet the Pilgrims following their first hard winter. They may have named the plant after the month in which its flowers first appeared or in affectionate memory of their sailing ship.

In 1856, John Greenleaf Whittier immortalized the plant in "The Mayflowers," his poem about the Pilgrims' struggle through their first winter, buoyed by the hope that they could survive if a small green plant could survive winter's harshness.

Trailing arbutus is a lovely plant. Unfortunately, loss of habitat and overpicking has reduced its abundance. It is now considered fairly uncommon. If the plant grows on land you own, consider yourself blessed. Study the plant. Get muddy knees as you kneel to smell its flowers, but please safeguard its future. Its survival depends on all of us. □

On bended knee or at full stride, Anita Carpenter keeps an eye on wild comings and goings near her Oshkosh, Wis. home.

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WISCONSIN NATURAL RESOURCES

April 1994 Volume 18, Number 2

FRONT COVER: Green frog *(Rana clamitans melanota).*
CHARLES FONAAS, MILWAUKEE, WIS.

BACK COVER: Spring crocuses.
SCOTT NIELSEN, SUPERIOR, WIS.

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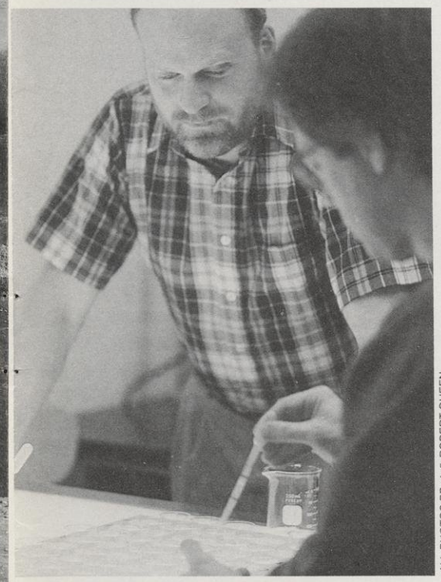
The forgotten corridors

Streams that run past the byways and back doors of metropolitan life could be oases for city neighborhoods.

Natasha Kassulke

As a spring storm erupts, Milwaukee's Lincoln Creek quickly rises. Two boys seize the opportunity, grab a raft, and ride the storm out alongside the trash and abandoned shopping carts that litter the creek's frothy, milk-chocolate colored waters.

At the same time Lincoln Creek is drowning in flood waters, scientists miles away are working to toss it a life preserver.



ALL PHOTOS PP. 4–5 ROBERT QUEEN

Professor Ronald Crunkilton and students gauge the toxicity of Lincoln Creek water. Such streams need better chemistry with city neighborhoods to keep shopping carts and trash out of the waterway.

People are responsible for the creek's poor condition, and it is people who will make amends — people like Dr. Ronald Crunkilton, professor of aquatic toxicology in the College of Natural Resources at the University of Wisconsin-Stevens Point. Although he is more than a hundred miles from Lincoln Creek, the possibilities for rescuing it are on his mind.

"We are interested in improving these urban streams for recreation," Crunkilton says. "This stream no longer supports the aquatic animals it once did. We gradually lost the native community, but we didn't know why."

Until now.

Crunkilton and his students, together with state and federal agencies, are unraveling the causes of Lincoln Creek's degradation. Their suggestions for rejuvenating the water would also add value to the city neighborhoods that line the creek. They believe cleaning polluted urban streams is just as important as protecting pristine streams.

"To help Lincoln Creek, to restore the aquatic and human community, we first must know what is causing the problem," Crunkilton says. The portrait that two years of research paints isn't pretty.

Crippled creek

The nine-mile creek drains 22 square miles of northwestern Milwaukee County. It weaves through commercial, industrial, residential and park land in Brown Deer, Glendale and Milwaukee. Concrete channels in many portions cover much of the natural habitat.

It's a place where kids swim and fish among tires and beer cans. And, Crunkilton adds, it's the last image that comes to mind when someone says "creek."

Lincoln Creek carries the same water that hours before was running across parking lots, streets, golf courses, roofs, driveways and lawns. By the time the water reaches the creek it likely has picked up solids, oils, phosphorus, bacteria, pesticides and heavy metals that are toxic to fish and other aquatic organisms.

Other wastes are piped directly into the creek, mostly cooling waters from processing plastics, food, lime, cement and batteries. The nature of contaminants is not entirely known.

Had enough? More than 200 storm sewers also empty to Lincoln Creek.

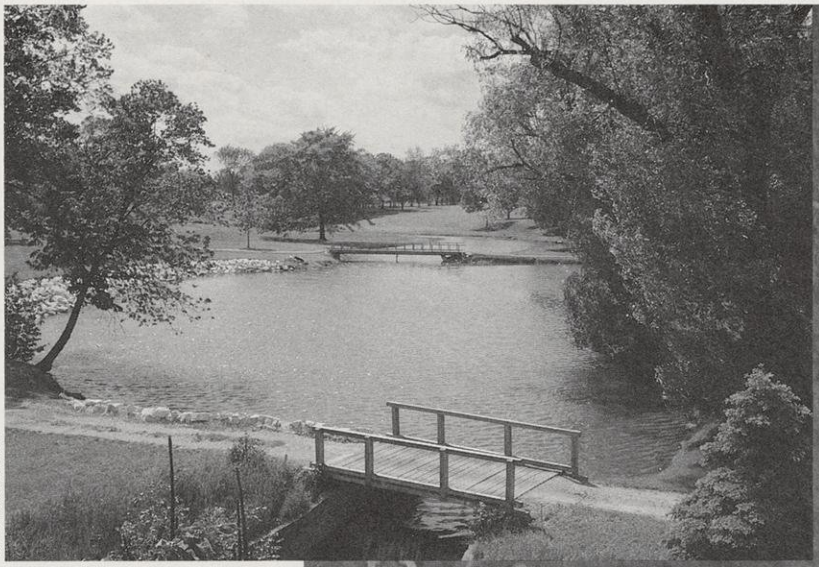
Why did a creek long viewed as a drainage ditch suddenly attract attention? It became obvious that the nation's 20-year multibillion dollar investment in clean water would not restore healthy rivers and lakes without cleaning up the runoff from cities.

In 1992, metropolitan areas with more than 100,000 residents had to start measuring pollution loadings as rain and melted snow traveled through storm sewers to rivers, lakes and harbors. Milwaukee actually had to get state permits to discharge stormwater to its streams and lakes. Federal proposals would extend similar controls to communities with more than 50,000 residents. That decision would affect Green Bay, Appleton, Oshkosh, Sheboygan, Racine, Kenosha, West Allis, Waukesha, Janesville and La Crosse.

To find the pollution sources, you have to know what drains into the storm sewers. A countywide study of streams like Lincoln Creek started to pinpoint where contaminants came from and how they could be controlled. Monitoring showed that the stormwater contained heavy metals such as lead, copper, zinc, cadmium, chromium and arsenic which can cause serious health problems.

One of Crunkilton's former students, John Masterson, now works alongside him coordinating activities of the Department of Natural Resources, University of Wisconsin-Stevens Point and the United States Geological Survey along the project route. Since June 1992, Masterson has spent uncountable hours surveying Lincoln Creek's health and making diagnoses. He knows the creek's curves and crannies like the back of his hand.

Lincoln Creek is tamed from the start. The headwaters begin at a storm sewer outfall at 76th Street and Good Hope Road in Milwaukee.



JOHN MASTERSON

JOHN MASTERSON

(above and right) Playing through. Near the headwaters, Lincoln Creek takes a leisurely swing through a series of ponds running through Brynwood Country Club and golf course. There's habitat here for a variety of fish.

The quick and oh so dirty tour

Masterson's Lincoln Creek tour begins at the headwaters near 76th Street and Good Hope Road in Milwaukee. Here, hungry Brown Deer workers munch lunch at an Arby's restaurant on the streambank and the creek starts as a storm sewer outfall.

Newspapers and soda cans are trapped where the water pours through heavy grates. The headwater section is a concrete channel that was built in 1960. Its sole purpose is to prevent flooding by funneling, draining, and quickly whisking precipitation away faster than a natural creek would.

It does.

Unfortunately, what was lost in the process were the characteristics that made Lincoln Creek natural.

"Concrete channeling covers the stream bottom and robs the organisms of their natural habitat," Masterson says.

Below him large blocks of concrete force the water to swing to the left and swerve to the right. In the background names such as "Mike" and "Andy" are scrawled in red on the cement that curls up the banks. A couple yards away a couple quietly putts through a mini-golf course in Johnson's Park. Across the street a woman pushes a shopping cart to her car.

Ten blocks downstream, the creek blends into the landscaping and winds through the Brynwood Country Club and golf course. In a series of ponds, Lincoln Creek supports a fish population of black bullheads, green sunfish, largemouth bass and goldfish.

"It is deeper here than at the headwaters or most other portions of the creek. The ponds probably provide the best habitat for fish in the whole creek," Masterson notes.

From the golf course, the creek creeps under a bridge and spills over a small dam into a pond. Then it passes under 60th Street and follows a line of railroad tracks. Beside cattails and trees on the other side of the tracks, the creek yawns and spreads out, picking up a little speed as it runs with the tracks for another half-mile.

Masterson notes that the track ties treated with creosote are possible sources of PAHs (polycylic aromatic hydrocarbons) in the water, which can cause cancer.

The water quality here is a far cry from the water scientists are using as a reference to judge what life Lincoln Creek might have supported if it had not been exposed to pollutants from the city.

Since it's urban impacts that scientists seek, that's what they find where Lincoln Creek passes Green Tree Road beyond the railroad tracks. A splintered wooden chair and other urban debris sit in the middle of the creek near three culverts.

"This is one of the areas where we found the heaviest sedimentation," Masterson says.

Near Daniel Webster Middle School, Masterson collected sediments by scooping mucky samples from the creek bottom using a Teflon ladle. The samples were placed in sterile glass jars and sealed with Teflon-lined lids. Jars were packed on ice and kept in the dark to keep the sun from warming them or chemically changing any pollutants present.

Some samples were filtered through a sieve to separate the fine silt from the sand. Most metals and PCB pollution adheres to the fine silt particles, Masterson notes.

Traveling downstream, Masterson follows the blackbirds that fly to the

ROBERT QUEEN

At Havenwoods, Lincoln Creek gets slow, shallow and muddy. The water quality is poor, but the area has great potential. One possibility? An artificial wetland that could trap sediments. The woodlands and meadows on adjoining banks would provide ample fish and wildlife habitat once the water is restored.

Havenwoods Environmental Awareness Center. The DNR center on the site of a former military missile base is surrounded by large meadows and woodlands. Nature lovers welcome this oasis with habitat right in the city for white-tailed deer, fox, rabbits, squirrel and pheasant.

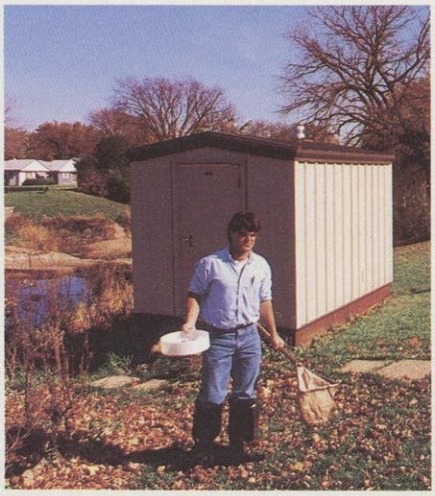
The creek slows down as it winds through here. Its flat, shallow bottom and warm water hold little oxygen on a sunny day. The shaded, turbid creek bottom is lined with rotting leaves.

It's here that the creek doctor sampled for invertebrates. Masterson donned waders, dipped a D-Frame net into the water and stirred up the gravel upstream with his feet. Critters that tried to run were caught in the net, placed into plastic jars and preserved in an alcohol solution.

"All we found were a few crayfish, sow bugs, scuds and midges, indicating poor water quality," Masterson notes.

The limited bug life earned Lincoln Creek a seven on a scale of 0 to 10 where 10 is the most polluted, a lot like getting a D on a final exam.

In the same stream stretch, Masterson used a backpack shocker to temporarily stun fish so they float to the surface where they can be netted and identified. Up floated goldfish about six inches long and enough crayfish to test their tissue for pollutants. Tests showed these crayfish had accumulated metals and PAHs.



ROBERT QUEEN

John Masterson samples conditions manually and automatically at the gauging station.

Despite the results, Masterson suggests this is one of the best areas on the creek to begin habitat improvement because there is space on the shore to work. There's talk of building a wet detention basin here; a pond or wetland that would settle out pollutants as the stream flows through.

Halfway at the gauging station

The next stop is the midway point — the USGS gauging station that automatically collects stream samples and monitors the discharge of Lincoln Creek.

Kids like to fish here and wade across the large, flat cement structure. This spot also could provide good fishing.

"There are rocks and scour holes for fish to hide," Masterson points out, "and it has an adequate depth, about five feet. During a storm, the stream really screams through here and scours out the bottom."

Mallards nest in the grassy banks. Across the street, a high-density residential area of tidy homes and apartment complexes overlooks the site. Masterson remembers the neighbors' initial reaction.

"We built the sampling station last summer. A crane perched it on four posts and intake lines were run under the floor into the creek. To a visitor, it just looked like a tool shed, but the neighborhood kids were naturally curious. We spent time showing them all

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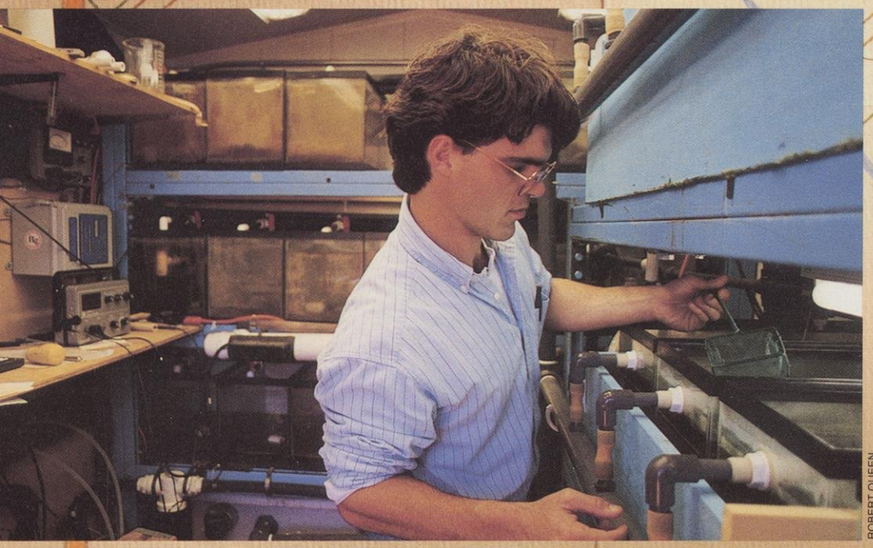


ROBERT QUEEN

Fish and aquatic bugs are held in 36 tanks at the streamside lab. Tests show if they can survive the mix of pollutants that flow down Lincoln Creek.

Lab in a box

Near the corner of N. 47th and W. Congress streets sits a humble metal shed that's the pride of the USGS and Stevens Point crews who built it.

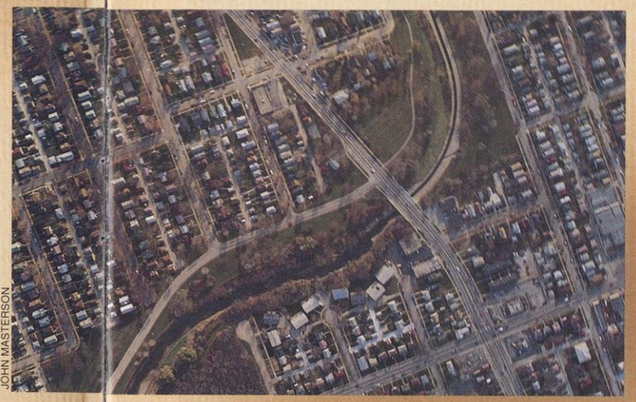
Packed tightly into the 8x12-foot shed is an automated sampling station equipped with a phone, electricity and heat. Inside is enough plumbing for a full-sized house. Thirty-six 10-gallon fish tanks constantly circulate stream water. Pipes, spigots and pumps regulate the water depth. The control tanks are set in troughs that circulate stream water much like a water bath or double boiler to keep temperatures uniform.

It's noisy inside. When the pump is running, it sounds like a garbage disposal running without water. Jars, beakers, tubes, pumps and switches line the shelves.

"It is a state-of-the-art system," John Masterson says, marveling at rows of tanks. "And it works great because stream water continually flows through so we can conduct toxicity tests that expose organisms to the same mix of water, runoff and pollution they would receive in the stream."

Some tanks are filled with stream water. Others contain tap water treated to remove chlorine and unwanted mineral ions.

Here, researchers expose tiny daphnia and small fish raised in a lab to both stream and control water. They measure how many bluegill, white sucker, rainbow and fantail darters die during the seven-day test.



JOHN MASTERSON

There's little chance to filter the runoff from back yards, highways and businesses that flow into the creekbed and concrete channels.

Joe Ramcheck, U.W.-Stevens Point grad student who runs the station, says creek water has not proven to be acutely toxic despite all the upstream pollution sources. However, fish exposed for a longer time are harmed. Many fathead minnows died when exposed to Lincoln Creek stream water for 15 days; by day 30, most of the fish were dead. The minnows in the tanks containing treated tap water survived. Researchers carefully monitored the temperature, dissolved oxygen and water flow in each tank to control other factors that might kill fish.

The gauging station computers notify researchers of each storm and automatically start sampling stream water. Each sample is collected in sterilized glass jars and refrigerated. Researchers have 24 hours to collect the samples and transport them to labs in Stevens Point and Madison. Between March and October last year, samples from 27 storms were collected and analyzed.

ROBERT QUEEN

MAP BY TOM LOWES

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the fish tanks inside and explaining how things work," Masterson says.

Downstream from the gauging station Lincoln Creek passes under 35th Street, where it combines with a sewer outfall. Throughout the city's sewerage system, raw sewage and stormwater mix in the same pipes and are transported to a wastewater treatment plant. During a storm, when the water volume is too much for the sewers to handle, gates open and a mix of sewage and stormwater is discharged untreated into Lincoln Creek.

It's a nasty sight. Toilet paper and garbage hangs in the trees where storm sewer outlets jet out of the bank.

"It's ugly," Masterson agrees, "but it was designed to prevent the water from backing up into people's basements and the streets."

Milwaukee's Deep Tunnel can now store the wastewater/stormwater mix until drier conditions allow the septic swill to be pumped and treated.

Ironically, this degraded portion of the creek was also the site of a beautification project 50 years ago. A tall stone wall shaded by weeping willows lines about a half-mile of the creek. The handcrafted wall was a Works Progress Administration erosion control project. At the time, the stream was called Mud Creek, but the masons, who respected their handiwork, gave the creek a more respectable name — Lincoln Creek.

This stretch also has deep pools that Masterson says could support a larger, diverse fish population if the water were less polluted and the flow less flashy. During storms, this section of Lincoln Creek rages. Only a few suckers, sunfish and fathead minnows survive here, but there are other signs of life: Raccoons explore the storm sewers and squirrel nests sway in the willows.

Below lie Lincoln Creek's most polluted sections. Sediments are laden with lead, copper, zinc and cadmium.

Some of the older residents across the Lincoln Creek Parkway remember signs posted along the banks that warned against contact with polluted water, Masterson says.

The last concrete channel section runs a mile between 32nd Street and Teutonia Avenue. Two boys skip stones and walk along the bank's steep graffiti-lined slope. The boys live in the neighborhood and the creek offers recreation space despite poor water quality and aesthetics.

"Some kids come down here in the summer and ride their bikes up and down the slope like it's a ramp," 14-year-old Michael Urbanek says. "I've been fishing here a couple times but I never caught much of anything, and if I did, I wouldn't eat it."

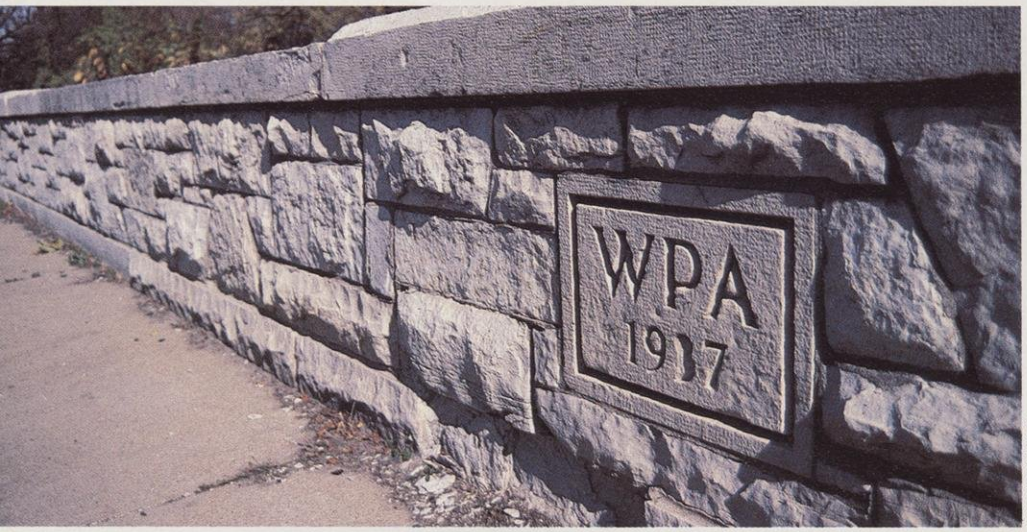
"That is not an uncommon problem in cities," Masterson notes. "During my work here I have seen kids fishing, wading and swimming in the creek. They know it is polluted, but they don't know why. They fish, but they don't eat their catch."

Masterson asks what kinds of improvements the kids would like to see.

"I'd like to see all the junk cleared out to start," 15-year-old Richard DeBerry says. "And there's no fish here.

(below) It was WPA masons who changed the creek's name from Mud Creek to Lincoln Creek out of respect. Ironically, raw sewage flowed into the creek just upstream from here during heavy rains.

(*bottom*) Despite pollution and rubble, neighborhood kids are still drawn to Lincoln Creek to wade, have fun, and catch and release small fish.



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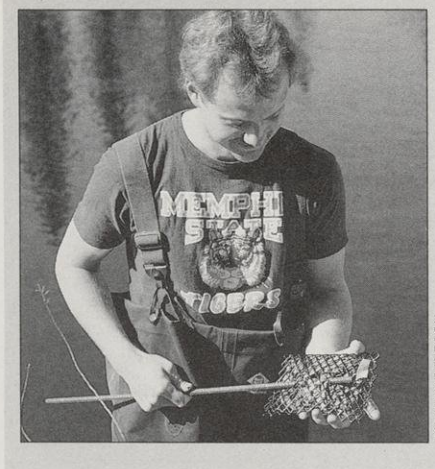

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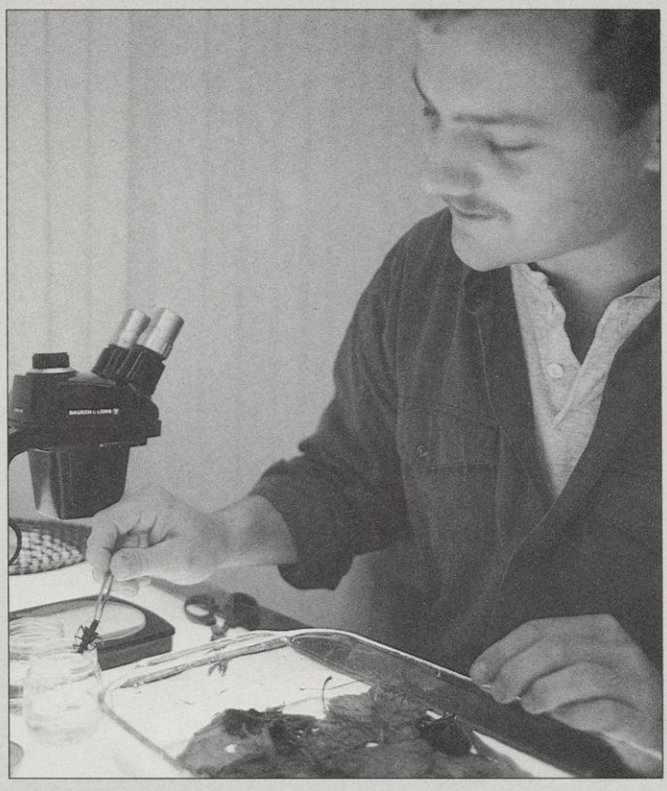


ROBERT QUEEN

New tools in the stream trade

When checking human health, doctors test blood, urine and tissues. When checking stream health, researchers test the water and what lives in it. But how do you look for organisms when the creek is lined with cement instead of rocks, sand and sediment?

You make your own stream bottom.

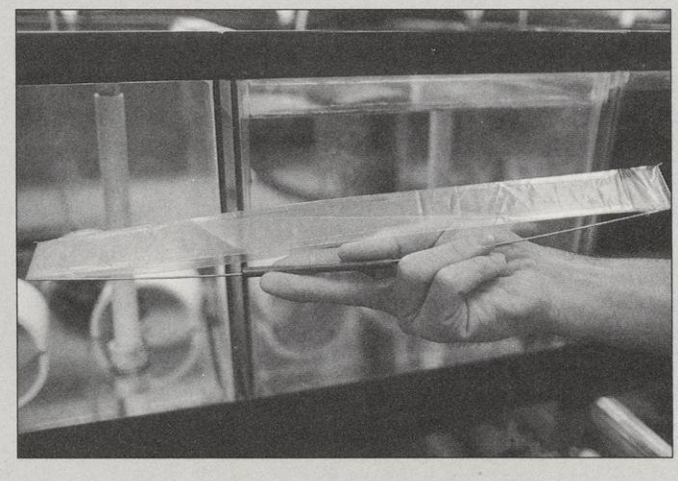
Joe Ramcheck sewed together rectangles of plastic mesh and stuffed each pack with dried oak and cottonwood leaves. The leaf packs were placed in the Plover River in Stevens Point for two weeks where they were colonized by healthy aquatic bugs like stoneflies and mayflies. Then the leaf packs were taken to the Lincoln Creek gauging house and exposed to control and stream water tanks for 48 hours.

Live and dead insects are then laboriously separated and counted from each pack. "We didn't find any significant mortality we could attribute to stormwater," Ramcheck said, "but the leaf packs worked well. A wide variety of aquatic bugs colonized them."

(top left) Joe Ramcheck prepares a leaf pack.

(above) Ramcheck dissects a leaf pack and tallies aquatic organisms that died and survived.

(below) This lipid bag will be filled with a fatty fluid to simulate how pollutants are absorbed by aquatic organisms.



ROBERT QUEEN

Similarly, researchers are experimenting with lab techniques that can simulate how animals slowly accumulate contaminants that polluted streamwater can carry. William Devita, of the Environmental Task Force Lab at U.W.-Stevens Point, makes semi- permeable polymeric membrane devices, lipid bags to you and me.

The bags resemble the long narrow plastic bags used to package and protect posters. The plastic bag is actually a very fine filter that allows contaminants to filter in much like the the way pollutants migrate through fish skin. The fatty substance inside the bags absorbs pollutants similar to the way triglycerides absorb pollutants in fish tissue.

Crayfish and fathead minnows exposed to the same pollutants proved less sensitive than the lipid bags in accumulating small amounts of pollutants. The lipid bags trapped PCBs, pesticides and aromatic hydrocarbons typically found in oil and gasoline residues that wash into creeks.

"Once inside, the contaminants are trapped and not metabolized like they would be in fish," Devita said. He believes the lipid bags may be an inexpensive way to test how pollutants could affect aquatic life without using live animals as test organisms.

I'd like to see some catfish and rock bass. I wouldn't mind if they replaced all this concrete with dirt or rocks.

"We like to raft here when the water gets high," DeBerry says. "But you won't catch me swimming in here."

"During the summer lots of kids do come down here to swim and catch crayfish along the shore," Urbanek adds. "There's just nothing else for kids to do around here."

The boys go back to skipping stones. Back at the Parkway on 27th Street the creek returns to a natural bottom near Meaux Park and St. Michael's Hospital. Masterson shocked fish in the area and found crayfish, carp and suckers. Occasionally largemouth bass, shiners and chubs float to the surface temporarily stunned.

"This is where the city may begin habitat improvements," Masterson notes. "They might start by dredging it out. Who knows what they'll find."

A half-mile from the Milwaukee River much of the creek bed is dry. Floodgates are raised annually so the Estabrook Dam can be maintained. The mud cracks under foot, sounding like a cat plowing through a litter box. The

dirt is coarse and gritty.

In a quarter-mile area 30 shopping carts are partially embedded in the sand. The sediment samples, like those upstream, show lots of metals and small amounts of PCBs. Sand spread on wintry streets blankets the stream bottom as it washes into the creek.

The waterway continues through some backyards into Lincoln Park. It makes a figure eight pattern around several small islands before emptying into the Milwaukee River upstream of Hampton Avenue.

At the confluence, squirrels busily bounce along the sidewalk then dart down a boardwalk. Raccoon tracks are plentiful in the crusty and cracked muck where the water has receded. Reed grass whistles in the wind. Birch trees seem to dance. Lincoln Park is a haven for bicyclists and picnickers.

"Lincoln Creek contributes about 40 percent of the pollution load that enters the Milwaukee River," Masterson notes as he stands at the banks where the two connect. "Below this confluence the Milwaukee River is more polluted than above this meeting place."

Restoration work may start at the confluence and work upstream in stages.

"Some simple modifications can greatly improve the fish habitat," Masterson notes. "It's so poor right now that fish are actually starved for any kind of habitat."

But the researchers on the Lincoln Creek project certainly are not starved for work.

Viewing urban creeks as resources

The technical tasks in restoring Lincoln Creek are considerable. The project's greatest value, however, may be a public call to maintain open spaces and to restore places where people can get in touch with nature near their homes.

ROBERT QUEEN

Near the confluence with the Milwaukee River, the combined runoff from soil, parking lots, roads and back yards mounds up in Lincoln Creek as a crunchy cat litter-like sediment. Restoration is expected to start near the confluence and work upstream.

Cost-share dollars from Wisconsin's voluntary nonpoint source program can help fund community efforts to improve streams, create catch basins, manage flood waters and create wildlife habitat.

"But the best habitat won't support a diverse aquatic community if we don't eliminate some of the pollution sources," Crunkilton says. "A slug of contaminants can come by and destroy our work. We can make changes that will support fish, but the ultimate goal is to keep the environment clean enough that we can eat those fish too."

Goldfish, suckers, green sunfish and fathead minnows could be supplemented by 20 other species under ideal conditions.

"Wetlands could capture stormwater runoff and keep temperatures in check," Crunkilton says. "When trees were cleared to make room for more buildings, we lost much of the shady canopy. Water running across the pavement gets very hot. We could replant trees and replace the natural habitat."

And Crunkilton advocates removing the concrete channels. A long time ago the city armored the banks and streambeds with concrete to control erosion and drain floods quickly, he said. In doing so they sped up water velocities which scoured and destroyed fish habitat.

A Lincoln Creek steering committee has addressed some of Crunkilton's suggestions and developed goals which take into account flooding, fish and wildlife, water quality, recreation, safety, aesthetics and community concerns. The plan calls for removing two concrete-lined reaches of Lincoln Creek, widening and deepening the channel, replacing bridges and creating better fish habitat.

Some housecleaning to remove junked carts, furniture and garbage could help. Other changes will be more than cosmetic. In urban areas where bacteria in stormwater can be as high as in raw sewage, it takes a whole new way of thinking about creeks.

"It's time to stop looking at urban streams as disposal sites and dumping grounds for garbage," Crunkilton says. "It's time to start looking at urban streams as places to take our families. We need to change opinions that urban creeks are open sewers."

" We have to show people what important resources these creeks are and can be," Masterson adds.

The Lincoln Creek project is a pioneer of sorts, giving scientists a head start for other creeks. And it gives Lincoln Creek another try at being what nature intended it to be.

Healthy. □

Natasha Kassulke is an environmental writer with DNR's Bureau of Water Resources Management in Madison, Wis.

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Barb Barzen

Want to see wildlife, canoe wild rivers, learn how to landscape to attract animals or want to learn about solutions to pollution? Department of Natural Resources employees are eager to be your guide.

The Natural Resources Foundation of Wisconsin is sponsoring 41 field trips so magazine readers can meet DNR employees who work on a wide range of topics. Whether you're looking for a two-hour hike, a day-long bus tour or an evening slide show, these field trips are a fun way to learn, a great way to spend time with your family and friends, and a wonderful opportunity for you to see some of Wisconsin's most beautiful natural treasures. And all but a few field trips offered here are free of charge.

Take a look through this list. Note that trips are listed by number. If you wish to attend one of the trips where we can only accommodate a limited number, please register on this form and return it to: Field Trips, Natural Resources Foundation, P.O. Box 129, Madison, WI 53701. Enclose a stamped, self-addressed envelope so we can confirm your trip and forward directions and other relevant information to each party. You can also call in a reservation to the Natural Resources Foundation office at 608/266-1430 between 8 a.m. and 4 p.m. Monday through Friday.

The registration deadline for each session is one week prior to the field trip date. All trips will be booked on a first come-first served basis.

Those registering for field trips which have a fee should include a check payable to the Natural Resources Foundation of Wisconsin.

Barb Barzen provides staff services for the Natural Resources Foundation in Madison, Wis.

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1. Coulee Stream Trout Habitat Improvement/ Stream Shocking

Learn about the ecology and management of western Wisconsin's coulee streams and the trout that inhabit them. See a demonstration of stream shocking techniques for counting fish. WHEN: May 14, 9:00 a.m.–noon. WHERE: Coon Valley, Vernon Co. LEADER: David Vetrano LIMIT: 30

2. Forest Birds, Wildflowers and Management at Florence Natural Resource Center

Take a hike searching for birds and spring wildflowers; tour the only facility in the U.S. housing federal, state and county resource agencies together. Learn how they co-manage area forests. WHEN: May 14, 8:00–10:00 a.m. WHERE: In Florence, intersection of Hwys. 2 & 101, meet in parking lot. LEADER: David Arndt LIMIT: none

3. Tour of the Crex Meadows Wildlife Area

Learn about the history and management of one of Wisconsin's largest and most heavily visited wildlife areas. Explore the flora and fauna of the area's brush prairies and wetlands. WHEN: May 15, 9:30–11:30 a.m. WHERE: Grantsburg, Burnett Co. LEADER: Jim Hoefler LIMIT: 30

4. Northern Pike Research Project and Wetland Mitigation Site

Visit a site where fishery researchers estimate the number of young northern pike that emigrate from a tributary into Green Bay. Learn about the wetland mitigation process and view a variety of birds at a new 90-acre wetland completed in 1992. WHEN: May 21, 9:00 – noon. WHERE: Oconto LEADERS: Richard Rost, Al Stranz LIMIT: 30

5. Industrial Stormwater Runoff Monitoring: Designing and Building of a Monitoring Station

See a slide presentation and visit a local manufacturer to learn about designing and building equipment to monitor industrial stormwater runoff. WHEN: May 21, 9:00–noon. WHERE: Madison LEADER: Aicardo Roa-Espinosa LIMIT: 30

6. Wisconsin's Wild Rivers

Take an auto tour of the Pike River, including stops at scenic overlooks, environmental problem areas, sites the state has cleaned up, and sites of future development projects for users of the river. WHEN: May 21, noon–4:00 p.m. WHERE: Wausaukee, Marinette Co. LEADER: Dan Heath LIMIT: 30

7. Patrick Marsh – A Glorious Wetland Restoration

Explore this 160-acre marsh, which was drained in the early 1960s, farmed for nearly 30 years, and restored in 1992. Search for birds and nests, tadpoles, aquatic insects, plants, and much more. WHEN: May 21, 10:00–noon. WHERE: Sun Prairie LEADER: Alan Crossley LIMIT: 30

8. Case Study on Conflict Resolution in Natural Resources Management: FERC Dam Relicensing on the Wisconsin River

See a slide presentation and hear a discussion of issues arising from the Federal Energy Regulatory Commission's dam relicensing pro-

gram on the Wisconsin River and how these conflicts are being resolved. WHEN: May 24, 7:00–8:00 p.m. WHERE: DNR District Headquarters, 107 Sutliff Ave., Rhinelander LEADER: Bob Martini LIMIT: none

9. State Game Farm, MacKenzie Environmental Center, and Prescribed Burn

See all phases of pheasant rearing, from hatchery to adulthood. Tour the wildlife exhibit and museum displays at MacKenzie. See fire equipment display and demonstration. Conduct a prescribed burn if weather allows. WHEN: June 4, 10:00 a.m.–4:00 p.m. WHERE: Poynette, Columbia Co. LEADERS: Kevin Schilling, Don Bates, and Derek Duane LIMIT: 30

10. Shallow Lakes Management: A Tour of Beaver Dam, Fox, and Puckaway Lakes

Learn about problems and successes in managing fisheries, wildlife, and water quality in shallow lakes. View projects involving chemical treatments, carp control, and eutrophication problems. WHEN: June 4, 8:30 a.m.–4:00 p.m. WHERE: Beaver Dam LEADERS: Mark Sesing, James Congdon LIMIT: 30

11. Tour of Bong State Recreation Area

Start with a slide presentation on area history, then hike through woodland, prairie, and wetland sites; picnic lunch; and auto tour of the property. WHEN: June 11, 9:00 a.m.–4:00 p.m. WHERE: Bong State Recreation Area, Kenosha Co. LEADER: Gary Patzke LIMIT: 30

12. "People of the Dunes" Archaeological Dig

Learn about the archaeology of the Whitefish Dunes State Park area through a slide presentation of two digs conducted in 1986 and 1992. Visit the 1992 dig site. WHEN: June 11, 11:00–noon. WHERE: Whitefish Dunes State Park, Door Co. LEADER: Dr. Victoria Dirst LIMIT: 60 COST: State park admission sticker

13. Horicon Marsh and the International Education Center

Learn about the history, geology, wildlife, and management of the Horicon Marsh. Visit the site of the future Horicon Marsh International Education Center and hear about plans for that project. WHEN: June 11, 10:00–noon. WHERE: Horicon, Dodge Co. LEADER: Bill Volkert LIMIT: 30

14. Bus Tour of Brule River State Forest: Land Management

Learn how the forest is managed for recreation, aesthetics, watersheds and wildlife in addition to timber by using land type classifications. WHEN: June 11, 10:00 a.m.–2:00 p.m. WHERE: Brule, Douglas Co. LEADERS: Chuck Zosel, Jay Gallagher LIMIT:40 COST: $5

15. Planting for the Future – Griffith State Nursery

Take a walking tour of this nursery which produces seedlings for reforestation projects, distributing 7.5 million trees and shrubs annually to Wisconsin landowners. WHEN: June 16, 9:30–11:00 a.m. WHERE: Wisconsin Rapids LEADER: Jim Storandt LIMIT: 40

16. Tour of Namekagon Barrens Wildlife Area, Burnett Co.

Tour the 5,000-acre shrub-prairie plant community on foot and by vehicle. Learn about managing prairie grasses and forbs and search for the grassland birds, including sharptailed grouse. WHEN: June 18, 9:00 a.m.–1:00 p.m. WHERE: Namekagon Barrens Wildlife Area, Burnett Co. LEADER: Pat Savage LIMIT: 30

17. Management of Bluff Prairies Along the Mississippi River

Explore bluff prairies and oak woodlands within the 1,400-acre Rush Creek State Natural Area. Look at different management practices being conducted by the Bureau of Endangered Resources. WHEN: June 18, 9:00–noon. WHERE: Ferryville, Crawford Co. LEADER: Mark Martin LIMIT: 40

18. Environmental Repair Program — Gas and Leachate Extraction System at Middleton Landfill

Discuss the Environmental Repair Program, operation and maintenance of the landfill, and effects on environment. Visit a landfill site in Middleton to observe gas and leachate extraction system. WHEN: June 21, 9:00 a.m.–noon. WHERE: Middleton Public Library, 7426 Hubbard Ave., Middleton LEADERS: Sally Kefer, Terry Evanson LIMIT: none

19. Tour of the St. Croix Falls Fish Hatchery

Tour the fish hatchery and learn about everything involved with breeding and raising fish for stocking purposes. WHEN: June 25, 10:30–11:30 a.m. WHERE: St. Croix Falls, Polk Co. LEADER: Jeffrey Tabat LIMIT: 30

20. Management of Streambank Erosion: Story Creek in Dane & Green Counties

Inspect and discuss damage caused to a trout stream by cattle grazing, along with methods of controlling that damage and restoring the stream. Hands-on activities will demonstrate healthy versus degraded streams. Optional picnic dinner, evening fly fishing, and viewing spectacular mayfly hatch at dusk. WHEN: June 25, 2:30–5:30 p.m. WHERE: Belleville, Dane Co. LEADER: Topf Wells LIMIT: 15

21. Tour of Hayward State Nursery

Learn about the process of growing trees for forestry, wildlife, and environmental protection uses. WHEN: July 5; 1:00–3:00 p.m. WHERE: ¼ mile west of Hayward on US Hwy. 63 LEADER: John Borkenhagen LIMIT: none

BARB BARZEN

22. Ernie Swift Youth Conservation Camp Open House – Minong

Learn about the Youth Conservation Corps program, a residential summer program which offers youth ages 15–18 educational and work experiences related to natural resources. Tour the camp, learn about the program's goals and accomplishments, meet current program participants, and visit a work site. WHEN: July 9, 1:00–3:00 p.m. WHERE: US Hwy. 53 to Minong, w. on US Hwy. 77 two mi., n. on Cty I three mi., n. on Smith Bridge Rd. four mi., w. on Youth Camp Rd. one mi. LEADER: Diane Conklin LIMIT: none

23. Mecan River Youth Conservation Camp Open House – Wautoma

Same as #22. WHEN: July 9, 1:00–3:00 p.m. WHERE: From Wautoma, Hwy 22 s. 11 mi., w. on Dixie Ave. over bridge, first driveway on south side. LEADER: Mike Primising LIMIT: none

Mark Martin *(left)* will lead trip #17 along the brush prairies that overlook Ferryville and the Mississippi River.

24. Statehouse Lake Youth Conservation Camp Open House – Manitowish Waters

Same as #22. WHEN: July 9, 1:00–3:00 p.m. WHERE: From Manitowish Waters, Cty Trk W n. 1/4 mile. Camp is on west side. LEADER: Dennis Leith LIMIT: none

25. Tour of American Legion-Northern Highlands State Forest

Take a bus tour through the largest state forest in Wisconsin and learn about current management techniques and strategies. Picnic lunch. WHEN: July 9, 9:00 a.m.–1:00 p.m. WHERE: Manitowish Waters, Vilas Co. LEADER: Dennis Leith LIMIT: 30

26. Lower Wisconsin State Riverway Canoeing Tour

Participants will canoe the State Riverway, learn about management of the Riverway, and lunch on a 400 million-year-old escarpment. WHEN: July 16, 9:30 a.m. – 2:00 p.m. WHERE: Mazomanie, Dane Co. LEADER: David Gjestson LIMIT: 30 COST: $10

27. Restoring and Protecting Lake Superior Habitat

See a slide presentation on problems addressed by the Binational Program to Restore and Protect the Lake Superior Basin, including suggestions on how citizens can become involved in solving these problems. Co-sponsored by the Cable Natural History Museum. WHEN: July 20, 7:30 p.m. WHERE: Cable Natural History Museum; Cable, Bayfield Co. LEADER: Mike Koutnick LIMIT: none

28. Tour of Northern Highland Fishery Research Area

Tour fishery research station and several research lakes in the Northern Highland - American Legion State Forest. WHEN: July 23, 10:00–noon. WHERE: Woodruff, Oneida Co. LEADER: Steve Newman LIMIT: 30

29. Rockland Prairie Walk on the La Crosse River State Trail

Learn about prairie ecology and how to identify prairie wildflowers, grasses, and birds. WHEN: August 6, 9:30–11:30 a.m. WHERE: Rockland, La Crosse Co. LEADER: Bob Lee LIMIT: 30

30. Wilson State Nursery Production Facilities and Seedling Fields – Boscobel

Learn how we produce seedlings for reforestation, soil erosion control, and wildlife habitat improvement. WHEN: August 6, 10:00–11:30 WHERE: 1 mi. east of Boscobel on Hwy 133 LEADER: Tom Hill LIMIT: none

31. Bus Tour of Black River State Forest: "A Forest At Work"

Tour recreational facilities; hike up to a scenic overlook; view a diked waterfowl area; see habitat of the endangered Karner Blue Butterfly; view timber management sites. WHEN: August 10, 9:00 a.m.–3:00 p.m. WHERE: Black River Falls LEADER: Ed Vlach LIMIT: 30 COST: $4

32. Prairies of Navarino Wildlife Area

Learn about the ecology and management of prairies by taking a tractor-pulled wagon ride through extensive restored prairies. Picnic lunch. WHEN: August 13, 10:00 a.m.–1:00 p.m. WHERE: Navarino Wildlife Area, Shawano Co. LEADER: Lynn Ackley LIMIT: 25

33. Hike Through Kohler Dunes State Natural Area

Learn about the park's history, hike through sand dune areas, and view the rarest habitat in the state — an interdunal wetland. WHEN: August 13, 9:00–noon. WHERE: Kohler-Andrae State Park, Sheboygan Co. LEADER: Jim Buchholz LIMIT: 30

34. Trumpeter Swan Recovery Program: Decoy-rearing Cygnets

Learn about the Trumpeter Swan Recovery Program and see how biologists "raise" young cygnets in the wild using the innovative de-

coy-rearing technique. WHEN: August 20, 10:00 a.m.–2:00 p.m. WHERE: Necedah National Wildlife Refuge, Juneau Co. LEADER: Decoy-rearing Coordinator LIMIT: 30

35. Effects of Air Pollution on Plant Communities – A Case Study in Madison

Visit several milkweed colonies in Warner Park, observe and discuss natural and air pollution related injuries, and discuss potential effects of air pollution on plant communities in general. WHEN: **(a)** Aug. 23 or **(b)** Aug. 30, 6:00–8:00 p.m. WHERE: Madison LEADER: Ed Jepsen LIMIT: 15

36. Beach and Dune Hike at Whitefish Dunes State Park

Learn about the rocky cliffs and sandy beach, formation of the highest dunes on the western shore of Lake Michigan, and dune flora and fauna, which include five threatened plant species. Optional hike to "Old Baldy," a 93-foot dune. WHEN: August 27, 9:00–10:00 a.m. WHERE: Whitefish Dunes State Park, Door Co. LEADER: Ginny Haen LIMIT: 30 COST: State park admission sticker

Maureen Gross (left) will explain how trumpeter swan cygnets are raised in captivity for release to the wild in trip #38.

BARB BARZEN

37. Collins Marsh Wildlife Area: Wetland & Grassland Wildlife and Habitat Management

Tour the wildlife area by car and foot. Learn about wetland management and restoration, grassland restoration, and waterfowl banding. WHEN: August 27, 10:00 a.m.–3:00 p.m. WHERE: Collins Marsh Wildlife Area, Manitowoc Co. LEADER: Jeff Pritzl LIMIT: 40

38. Trumpeter Swan Recovery Program: Captive-rearing Cygnets

Learn about Wisconsin's Trumpeter Swan Recovery Program and see how biologists maintain young cygnets in captivity until their release to the wild at two years of age. WHEN: September 17, 10:00 – noon. WHERE: Pewaukee, Waukesha Co. LEADER: Maureen Gross LIMIT: 30

39. Wisconsin's Glacial Habitat Restoration Area

Learn how Geographic Information Systems (GIS) are used to help with management decisions. Visit wetland and grassland restoration sites. Participants are encouraged to stay until dusk to watch the peak goose migration. WHEN: September 24, 1:00–5:00 p.m. WHERE: Horicon, Dodge Co. LEADER: Ellen Barth LIMIT: 30

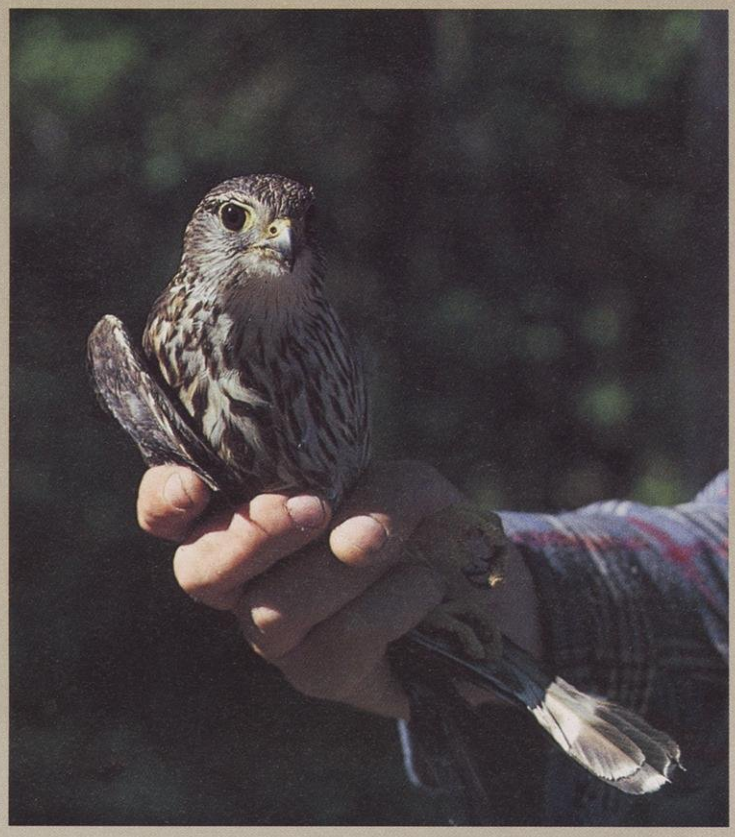
40. The Upper Mississippi River/ Illinois River Environmental Management Program

Learn about the Environmental Management Program for the Mississippi/Illinois River System. Tour the Environmental Management Technical Center, including the biological laboratory, Geographical Information Systems mapping/modelling center, and the DNR's Long Term Monitoring Field Station. WHEN: **(a)** September 30, 1:30–2:30 p.m. or **(b)** 3:00–4:00 p.m. WHERE: Onalaska, La Crosse Co. LEADERS: Terry Dukerschein, Heidi Langrehr LIMIT: 24

41. Tour of Theresa Marsh Wildlife Area

Tour this Dodge County wildlife area by car, making several stops to learn about the history of the marsh and current management practices. Participants are encouraged to stay to watch geese and ducks fly into the marsh as the sun sets. WHEN: October 8, 3:00–5:30 p.m. WHERE: From Milwaukee, USH 41 n. 35 mi., w. on Hwy 28½ mi. LEADER: Tom Isaac LIMIT: none

You'll find the trip reservation form on page 31!



A rare catch, a female from one of Wisconsin's 14 nesting pairs of merlins, was banded and released.

MAGNIFICENT MERLINS

Story and photos by David Crehore

"Morning's favorite, prince of daylight." The small but mighty falcon in these photographs is a female merlin (*Falco columbarius*). Merlins are jay-sized raptors, averaging 10 to 12 inches in length, and they feed largely on small birds which they catch in the air. Other prey species include bats and dragonflies.

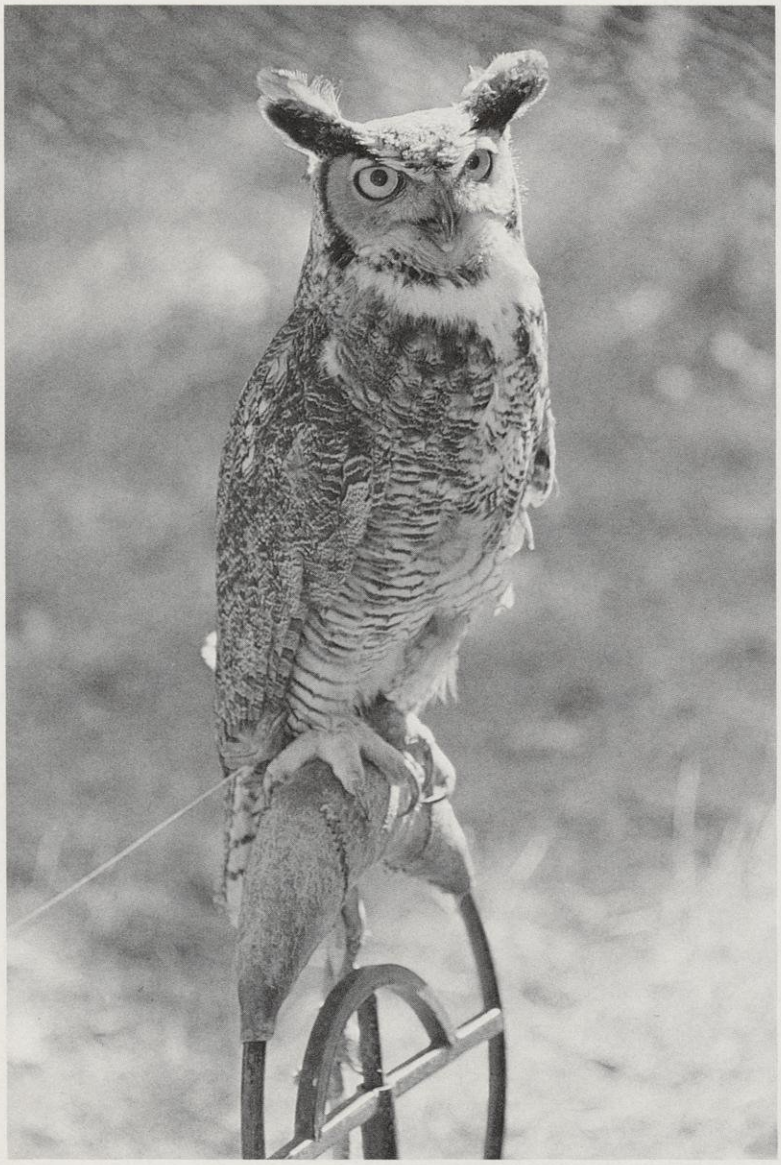
> I CAUGHT THIS MORNING MORNING'S MINION,
> KINGDOM OF DAYLIGHT'S DAUPHIN,
> DAPPLE-DAWN-DRAWN FALCON.
>
> — GERARD MANLEY HOPKINS, "THE WINDHOVER"

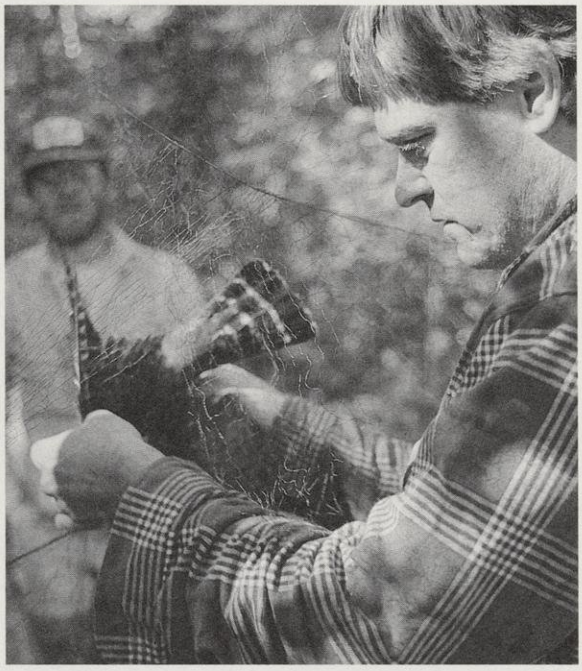
Meet one of Wisconsin's rarest treats, a truly regal falcon.

Merlins are among Wisconsin's hardest-to-find nesting birds. Only 14 pairs of merlins were known to nest in the state in 1993. Most nesting pairs favored the shores of large northern lakes, but three pairs nested within the City of Ashland.

Wisconsin is on the southern edge of the merlins' breeding range, so most of the merlins seen by birders are migrants passing through the state on their way to or from the forests of Canada. Of the many hawks, falcons and eagles that can be seen in Wisconsin, only the peregrine falcon is rarer. The merlin shown here was captured in July 1990 by Thomas Doolittle, who is now a professor of biology at Northland College in Ashland.

Doolittle's capture technique required the services of





(left) Merlin chicks are banded so their movements and habits can be tracked across the country.
(above) This tamed great horned owl, Jerry, was used as a decoy to lure the merlin away from her nest.
(top right) The merlin is carefully untangled from the mist net.
(bottom right) The female is quickly measured, banded and readied for release.

Jerry, a tame great horned owl. After locating a merlin nest, Doolittle set up a "mist net" of light nylon mesh nearby. Then Jerry was placed on a perch within a few feet of the net, and a string was run from the perch back into the hazelbrush, where Doolittle and his assistants hid.

Because the merlins had young in the nest, they remained close by, chattering at Jerry, whom they regarded as an archenemy. A few pulls on the string made Jerry flap his wings to regain his balance, and as soon as Jerry went into action, the female merlin began dive-bombing him. On her first pass, she narrowly missed Jerry and flew into the mist net.

Doolittle and DNR wildlife technician Jeff Wilson gently removed her from the net and, after examining, weighing, measuring and banding her, turned her loose. Then Doolittle climbed the nest tree and banded the young birds. Unfortunately, one band has already been returned. One of the young flew into an Alabama power line on its southward migration.

Like most raptors, merlins in Wisconsin went into a major decline in the 1960s, and began building in numbers in the mid-1980s. It is believed that merlins suffered the same effects as eagles, ospreys, peregrines and other birds of prey linked to food chains that accumulated pesticides. As contamination of the environment by these chemicals declines, the number of merlins is likely to increase — although 14 nesting pairs hardly constitutes a recovery. For that reason, merlins are being considered for addition to Wisconsin's list of threatened species. □

David Crehore is DNR's public information specialist stationed in Green Bay.

Making MOLEHILLS out of MOUNTAINS

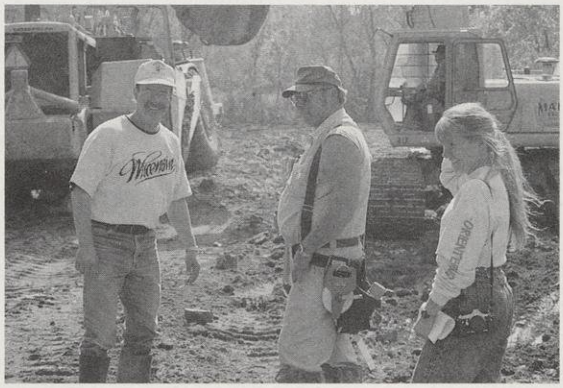
Eroding roaster pile at Mineral Point, April 1979. ROBERT WEBER

For more than 100 years, hillsides of mining wastes flanked Mineral Point. They're gone now.

Greg Matthews

On a crisp, mid-October morning, a small crowd is on hand as a DNR fishery operations crew stocks small brook trout in Brewery Creek. The stream is a tributary of the Pecatonica River, one of southwestern Wisconsin's best warm water fisheries.

A couple of young boys who happen to be biking by along the Tri-County Recreational Trail are asked to help stock the fish. They eagerly pitch in. The small trout swim away and quickly disappear in the water—not an especially amazing feat unless you consider that for 100 years this stretch of Brewery Creek could hardly keep a water flea alive.



GREG MATTHEWS

Bennwitz *(left)* with contractors and engineers planning how to recover the 100-year-old waste piles.

Dignitaries say a few words. The audience claps politely. All in all, it's a short ceremony to cap such a significant achievement. Yet, in just two years, gigantic piles of mining wastes that had loomed over Mineral Point for a century were gone—transformed like the stream and bike path into a pleasant recreation area. How did we make such short work of wastes with such a long history?

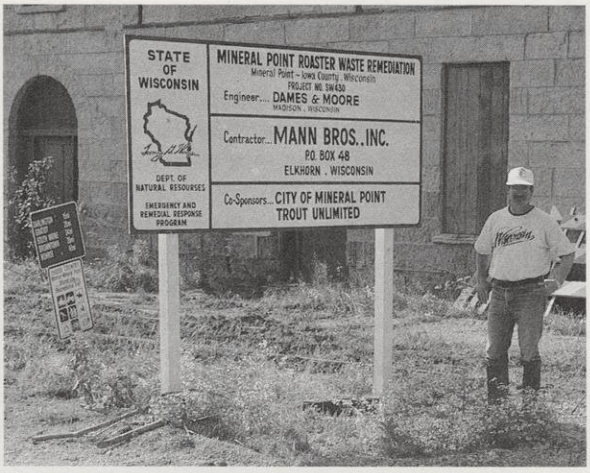
You might say the waste piles were the first byproduct of white settlement in Wisconsin. Mineral Point, one of the state's oldest permanent communities, is rich in history and resources. The unglaciated hills and valleys held rich deposits of ore, mostly lead and zinc. After the

U.S. Army subjugated the area's original inhabitants — Fox, Sauk and Winnebago tribes — miners flocked to southwest Wisconsin. It was said a man could literally make a fortune overnight.

Miners from Cornwall and Wales formed a distinct and unique society. They burrowed into hillsides for ore and used their mines for living quarters. These hardy folk, living in and off the ground, gave Wisconsin its nickname, the "Badger State."

Beginning in the 1830s, lead mining was the principal way of life in the Mineral Point area. The town swelled to 5,500 residents (more than twice the current population). Between 1827 and 1847, this region was the primary source of lead in North America.

Mineral Point thus became the Midwest's major center for processing lead. Ore was even imported from other areas to feed the processing mills. Then, in 1858, miners discovered another mineral, zinc carbonate. It harbored 52 percent metallic zinc, which was converted to white zinc oxide, a basic ingredient in paint. This new-found commodity and the outbreak of the Civil War brought prosperity to Mineral Point. It became the mining capital of the North, producing lead for munitions and zinc for paint.



GREG MATTHEWS

The state Environmental Remedial Response program fueled teamwork among 13 DNR programs, the city, land owners and conservation groups to restore the Mineral Point area.

Large furnaces were constructed to smelt or "roast" the ore to separate the lead and zinc. After the usable minerals were removed, the leftover waste rock was discarded in several "roaster piles." These hillsides of rubble contained high concentrations of sulfur as well as lead, zinc, iron and trace metals. When sulfur wastes mixed with water, they formed a sulfuric acid runoff that killed most aquatic life in the creek.

Mining thrived until the end of World War I, when a steady market decline and failing economy shut down the industry by 1930 at the onset of the Great Depression.

During the late 1960s, mining resumed using a method called "flotation" to extract zinc from limestone. Finely-crushed material was treated with liquid chemicals that floated the zinc to the surface. Although more efficient than roasting, this mining process left finely ground waste called flotation sand. The sand was dumped along the banks of Brewery Creek.

Viewed as a community wasteland, Brewery Creek suffered other indignities. The city located its wastewater treatment plant next to Brewery Creek. Since the creek was already degraded, the plant was only designed to meet minimal requirements. A landfill adjoining the creek was abandoned in 1972 but never properly closed.

The legacy from the mining era was not pretty—a one-square mile area southeast of town held six mine waste sites, an abandoned landfill, a wastewater treatment system and several poorly managed properties. All contributed to the poor condition of Brewery Creek.

Before detailing a cleanup plan, DNR project leader Tom Bennwitz spent a lot of time talking with residents. Then he stood back and took a long panoramic view of the scene. He saw a community, a creek, an old railroad track that had been converted to a bike trail, and a lot of waste. But that long view also helped him see the area's potential. He set six objectives: restore Brewery Creek and adjacent wetlands; restore the fishery; dispose of mining wastes; improve how surrounding land was managed; return Brewery Creek to its original stream bed; and make the area more inviting for recreation.

Bennwitz assembled a team representing 13 DNR programs and 14 other groups with a stake in the area's recovery including local property owners, the Pecatonica Rail Transit Commission, the City of Mineral Point and Trout Unlimited.

Nature tested the engineers' work last summer as torrential rains raged through restored creekbeds and compacted waste piles.


GREG MATTHEWS

"This was an excellent example of local government, state agencies, private organizations and concerned citizens pitching in to achieve a common goal," said Bennwitz.

At the outset, the cleanup was designed to give locals a big stake in its outcome. The city agreed to buy and maintain all restored properties. Trout Unlimited donated money to restore the creek. The Pecatonica Rail Transit Commission granted an easement so the recreational trail could be used to bring in heavy equipment, haul out wastes and move soil.

Clean-up costs, estimated at $1.5 million, would largely be covered by the State Environmental Repair Fund. "Innovative thinking and cooperation among all parties completed the project for under $900,000," said Joe Brusca, DNR Southern District's solid and hazardous waste program supervisor.

"The Rail Transit Commission saved taxpayers several hundred thousand dollars by giving repair workers access to the haul road. That one step opened the door to bid the project," noted Bennwitz.

In January 1992, all the necessary permits were secured from local, state and federal governments. Bids were awarded to Dames & Moore, an environmental consulting firm, and Mann Brothers, a construction contractor.

DNR's Southern District's Operations Crew began digging and reconstructing the creek's original bed during the winter. The area was too wet to work with heavy equipment in any other season.

The crews worked more like landscapers than 'dozer operators — cutting a meandering channel and grading new streambanks back to a more gradual 2:1 slope. The gentle curves were specifically designed to restore pools, riffles and banks that could hold fish. Water flow in the stream would then be fast enough to stay cool but slow enough to keep flood waters from eroding the banks. Gradual slopes on the shore would minimize erosion, provide easy access for anglers and could be seeded with plants that would provide both shade and overhanging vegetation to provide good trout habitat.

That's the theory. In fact, running diesel equipment in near sub-zero weather is no picnic and the old creekbed had been obliterated by tangles of downed trees and brush. More than 3,000 box elders had to be removed. The dedicated crews completed the stream project by March 1993 and the area was seeded.

GREG MATTHEWS

A tangle of shrubs and more than 3,000 trees had to be removed before Brewery Creek's natural meanders could be restored. Crews worked in sub-zero temperatures when the wetland soils were firm enough to support heavy equipment.

A 100-year flood tested their work just three months later. Eleven inches of rain fell between June 7-July 4, 1993. Another six inches of rain fell on July 5th. Though the brutal storms sculpted a few new channels and flooded the wetlands, the gently-sloped banks and cover vegetation planted just months before held. The erosive power of raging water was blunted.

While DNR crews reworked the creek, private contractors set to work consolidating the mining waste piles. In all, 180,000 cubic yards of roaster waste and flotation sand had to be moved, graded, capped and restored.

The mining wastes were difficult to handle. When they were dry, the material was fine and silty—easy to push but not stable enough to support heavy equipment. When it was wet, the wastes formed a clay-like goo that stuck to equipment and took a long time to dry out. The design engineers at Dames & Moore had their work cut out for them determining how to move, shape and compact wastes into stable hills. Each area was covered with a clay cap to shed water, topped with 18 inches of flotation sand, covered with six inches

Even so, heavy equipment got mired down in the huge piles of fine, silty wastes.

GREG MATTHEWS

GREG MATTHEWS

TOM BENNWITZ

(top) Less than three months after work was completed, heavy rains tested Brewery Creek's new curves and channels.

(above) Eventually more than 180,000 cubic yards of mining wastes were moved, compacted, gently sloped, seeded and mulched. Today, the restored area blends in so well that it is unrecognizable to most visitors.

of topsoil and finally reseeded with native grasses.

Work began at a site called the Sherman property in November 1992. This area contained more than 30,000 cubic yards of roaster material which was especially difficult to move because the groundwater table was only two feet below the surface.

"Most of the work took place in winter when temperatures dropped below zero," said Tom Bennwitz. "We needed to freeze the ground so it could support heavy equipment."

After roaster wastes were removed, the Sherman property was backfilled with nearly 10,000 cubic yards of clean dirt, covered by six inches of topsoil, seeded and then mulched.

Another property, the Ivey site, harbored more than 90,000 cubic yards of flotation waste. Over 35,000 cubic yards of this material was moved to the consolidation pile and used as part of its cap. The Ivey site, too, was then sloped, covered with topsoil, seeded and mulched. Work on both sites was completed in October 1993.

The upshot of all this work? Meanders have now added 1,000 feet to Brewery Creek. Its gently sloping shores are better for both fish and angler. The creek water is clean enough to support fish. The recreational trail (restored after the haul work was completed) now runs through an attractive, pleasing corridor surrounded by native plants rather than past huge waste piles. The abandoned landfill is now properly closed and seeded, healing that ugly scar. Even the final disposal area blends in with its natural surroundings so well that visitors won't recognize it.

What's in the future? Brewery Creek and the adjacent wetlands will be sampled periodically to test water quality and keep track of how the area is rebounding.

Meanwhile, Bennwitz may have found a whole new career as the seasoned veteran of mining waste recovery. He's now considering potential remedies for others of perhaps hundreds of abandoned roaster piles in southwestern Wisconsin.

Just as in Mineral Point, many of these sites are polluting surface waters and some are likely seeping toward groundwater.

"Mining brought bounty to one generation, but our predecessors have left us with decades of work to do," he adds. □

Greg Matthews is the public information specialist for DNR's Southern District. His office is in Fitchburg, Wis.

How do you keep track of frog and toad populations? You do it by ear when Froggy Goes a Courtin.'

Mating wood frogs. DON BLEGEN

A Little Night Music

Harvey Black

On a warm, humid spring night, Randy Korb will get into his car and drive north from his Menasha home to the western shore of Green Bay.

On the same type of night, about 100 miles to the south in Whitewater, Arn Chamberlain will drive south and east from his home into the Kettle Moraine.

Chamberlain and Korb will spend the next hour or so driving some back roads, stopping occasionally along the roadside, turning off the car motor, noting the weather conditions and listening. They hope to hear the high peeps, croaks and groans of frogs and toads looking for love. They're two of approximately 100 volunteers who help the Department of Natural Resources track populations of the 11 kinds of frog and one toad species that are found in Wisconsin.

Scattering throughout the state each spring, the surveyors each visit 10 wetland sites on routes that can vary from just a few miles to 75. The surveyors learn the routes well so they can visit the same spots at night—twice in the spring and once in the summer—as the water temperature warms up during the amphibian mating season.

The survey work, begun in 1981, is headed by Bob Hay, herpetologist with DNR's Bureau of Endangered Resources, and biologists Michael Mossman and Lisa Hartman of DNR's Bureau of Research. Hay has coordinated the survey and collected information from volunteers for four years. He explains that keeping track of the state's frog populations helps gauge our understanding of the overall condition of the environment on land and in the water.

The ups and downs of frog popula-

Eastern gray treefrog. DON BLEGEN

Northern leopard frog. TONY GEIGER

Eastern American toad. SCOTT NIELSEN

Wood frog. DON BLEGEN

tions can be a marker of water quality because frogs lay their eggs in water and spend their early stage as tadpoles. Polluted water or even fluctuating water can stress or kill both eggs and tadpoles.

Although frogs have lungs, they also breathe through their permeable skin, which must stay moist. Consequently contaminated water and rain can also seep through their skin and affect the health of adult frogs.

Frogs also roam the land—some species hop as far as a mile from their breeding ponds to feed. Hay explains that without enough undeveloped land for frogs to roam and catch their food, the population can also shrink.

Since frogs are roughly in the middle of the food chain, their abundance can also indicate the health of numerous other animals. For instance, frogs are breakfast, lunch and dinner for a number of birds such as herons, egrets and red-shouldered hawks. Skunks and weasels also go after frogs. And of course tadpoles, the larval stage of frogs, are food for a variety of fish.

Frogs themselves feed on insects and other tiny invertebrates, such as worms. A large frog like the bullfrog may go after a young mouse or duckling, but such fare is not typically eaten.

As important as the frog survey is, Hay emphasizes that such rough censuses can't be looked at in isolation. They need to be tied in with other counts such as breeding bird surveys to give researchers a broader picture of environmental trends.

At the Apostle Islands National Lakeshore, that's what's done with data that frog surveyor Julie Van Stappen and her colleagues gather on several islands. As a resource management specialist for the National Park Service, Van Stappen monitors environmental conditions for 35 long-term projects. The frog data she has compiled for three years does double duty—providing information to the statewide frog survey as well as contributing to the Lakeshore's own monitoring program.

ROBERT QUEEN

Field observations often require a keen ear as well as a keen eye.

(below) This pair of green frogs rely on a combination of calls, air temperature and water temperature to start their mating season.

Why a census makes sense

Although the Department of Natural Resources' first frog and toad survey was done in 1981, the basis was laid several years prior. According to Ruth Hine, biologist and former publications editor for the DNR's Bureau of Research, interest in surveying frogs began in the 1970s when the federal government began asking state natural resource departments for information on endangered species such as wolves and eagles.

"We didn't really have a very adequate answer," she says.

Consequently she volunteered to help provide the answers and began working with other DNR staffers to keep track of such animal populations.

"Frogs came into it from a different direction," she continues. A University of Wisconsin-Madison graduate student, Dick Vogt, was determined to learn everything he could about the amphibians and reptiles that lived in Wisconsin. He asked if the Department of Natural Resources would be interested in supporting his work.

"Well, I was, because we didn't have any information on amphibians and reptiles," says Hine.

Vogt then started compiling field notes on the habits, ranges, habitats and populations of frogs, other amphibians and reptiles.

And Hine found herself fascinated by the frogs. "I really fell in love with them, " she admits. Coupled with the work of Bruce Hellmich, a one-time DNR employee and Ray Anderson, then professor of wildlife management at UW-Stevens Point, Vogt's data became valuable for subsequently judging which species were endangered.

Anderson and Hellmich started keeping records of when and where they found frogs in central Wisconsin. It's so difficult to see and count frogs in wetlands that the researchers made tape recordings of various frog calls. The tapes helped train researchers to identify amphibians by the calls and songs they made during the mating season. Anderson's tapes are still used to train the DNR's frog surveyors.

Hine recounts, "It was sort of an easy step for me to go beyond and say, 'Hey, why don't we do this statewide?'"

Hine then "wrote down the names of everybody I could think of" who might be interested in participating in a frog survey. The list included names from groups like the Sierra Club, DNR fish and wildlife managers, and naturalists from nature centers.

She asked if people would be willing to help keep track of the state's frogs, "and I got an absolutely wonderful return." The volunteers were equipped with a tape of frog calls, routes to travel, and a methodology to record what they heard. "That's the way it started, and that's the way it's still going," she says.

When it began, the survey was the first of its kind in the country, according to Mossman. Since then, Missouri, Kansas, Illinois, Manitoba, Utah, Wyoming and the province of Ontario have begun similar efforts or have written the Wisconsin Department of Natural Resources for information.

Early warning of trouble

Vogt's findings provided an early warning signal. His surveys in the late '70s revealed that two species—the cricket frog and the leopard frog—were in trouble in the state.

The tiny cricket frog, less than an inch long, was rapidly disappearing. Leopard frogs were being continuously collected; they were the frog of choice for high school biology classes and medical research.

While leopard frog populations now appear stable after dips in the mid-1970s, the cricket frog's decline continues, and the species is on the endangered list.

As of 1991, the most recent completed survey data, the cricket frog is found only in southwestern Wisconsin in Grant and Iowa counties. It was once abundant in the entire southern half of Wisconsin.

What's happening?

"It's still a mystery," says research biologist Michael Mossman. The cricket frog is found in spring-fed areas, but the springs it still inhabits are by no means pristine. "There's a good population of them in a spring-fed pond right where cattle are feeding in a barnyard."

Over the years, the survey has reported declines in other species of frogs, including the spring peeper, the green frog and the chorus frog. The only species whose population has increased is the American toad.

Unusual weather during several

The humble dozen
Wisconsin frogs and toads

Eastern American toad
(*Bufo americanus americanus*)

Blanchard's cricket frog
(*Acris crepitans blanchardi*)

Western chorus frog
(*Pseudacris triseriata triseriata*)

boreal chorus frog (subspecies)
(*Pseudacris triseriata maculata*)

Northern spring peeper
(*Hyla crucifer crucifer*)

Cope's gray treefrog
(*Hyla chrysoscelis*)

Eastern gray treefrog
(*Hyla versicolor*)

bullfrog
(*Rana catesbeiana*)

green frog
(*Rana clamitans melanota*)

pickerel frog
(*Rana palustris*)

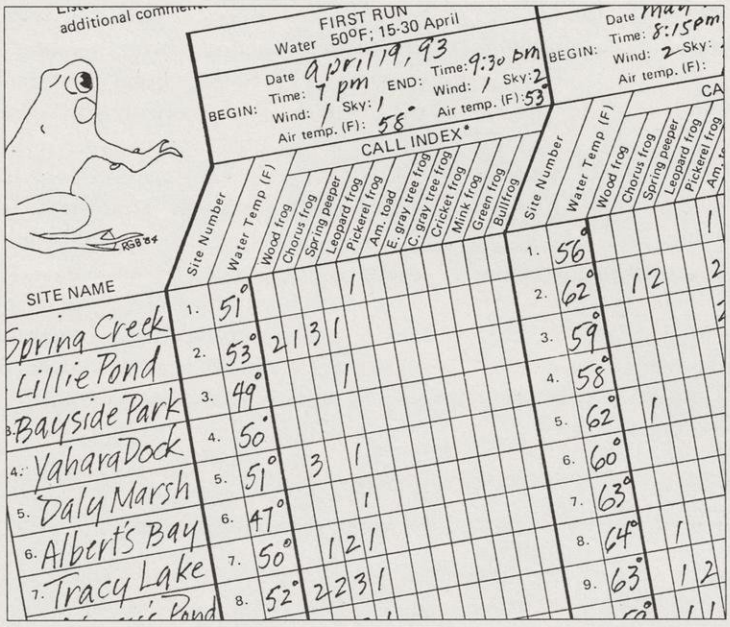
Northern leopard frog
(*Rana pipiens*)

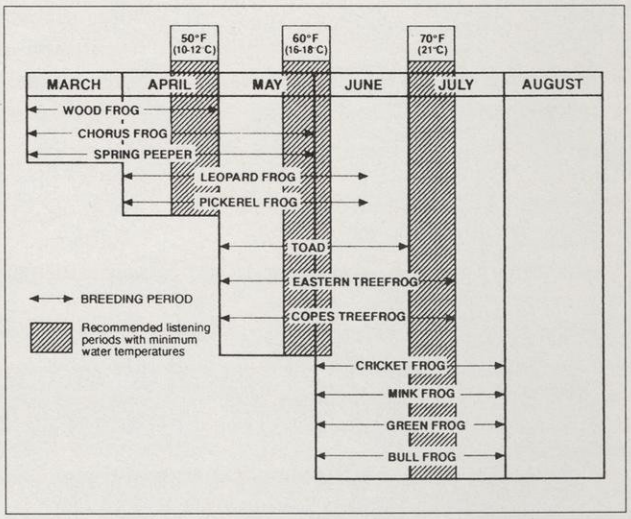
Burn's leopard frog (subspecies)
(*Rana pipiens, burnsii* mutant)

Mink frog
(*Rana septentrionalis*)

Wood frog
(*Rana sylvatica*)

SCOTT NIELSEN





(left) Surveys record the location, conditions and intensity of frog calls during the three peak mating seasons. The results are compiled to estimate each species' abundance and distribution statewide.

(above) Peak breeding periods for each species.

years of the survey might also have affected results. Hay recalls that during the survey's first seven years, there were three continuous years of drought. That likely decreased the numbers of frogs that bred in temporary ponds. Wetter and cooler summers like those the last two years can also affect results. "Such wet years should be excellent for amphibians," he says.

Since dramatic weather fluctuations from year to year can mask longer term trends, Hay advocates keeping an eye on these animals for decades to come. "We know little about the dynamics of amphibian populations and need to search for regular trends to assess if there is a problem," he says.

"The most important information we've gotten is detecting some significant declines in species that people haven't worried about too much because they're still fairly common," says Mossman. But a one percent change in the annual population can add up to a lot over 20 or 30 years, he notes.

Concern for healthy frogs is not confined to Wisconsin. The decline and disappearance of some frog species worldwide have worried scientists.

Speculation abounds as to the cause or causes — acid rain, increased ultraviolet rays from a thinned ozone layer, agricultural chemicals that can harm vulnerable frogs' eggs — no one is certain.

In Wisconsin, Mossman points to a more likely cause: wetland loss or degradation. Even if a wetland is not lost to development, other changes can decimate the frog populations. For instance, when flood gates are raised or lowered after frogs have laid eggs or emerged as tadpoles, whole populations can be swept away or desiccated. This factor isn't well documented, he says, but it does have an effect.

Croaker crooners

The frog-trackers travel about 95 different routes to find the ditches, ponds, marshes and swamps where frogs and toads breed. The calls surveyors count are the male frogs' mating calls. Like birds, male frogs let females know they're around by calling. And like female frogs, the surveyors must distinguish each call by species.

All species of Wisconsin frogs and toads (collectively called *anurans*, meaning "without a tail") call during one or more of three breeding seasons. The start and duration of these reproductive seasons are triggered by air and water temperature. The calling calendar shown here is calibrated for central Wisconsin. In southern Wisconsin, anurans may call earlier; in the north, later.

Some species call during two or more overlapping periods. For example, leopard frogs and pickerel frogs peak when the water temperature first reaches the mid 50s, but their season starts earlier and ends later. Cricket frogs first breed when the water temperature reaches the high 60s, but they can be heard throughout June into July.

Calling times also vary by the kind of water where the anurans breed. Early breeders like the wood and chorus frogs use shallow sloughs, potholes and roadside ditches that can heat up much more quickly than lakes. The eggs and tadpoles of these early breeders have to hatch and metamorphose within a few weeks before the waters dry up. On the other hand, the green frog, mink frog and bullfrog only breed in permanent bodies of water. Their tadpoles dig into the mud over winter and take two years or more to metamorphose into frogs.

Frogs and toads call for 4–6 weeks, except the wood frog, which only breeds for two weeks. Surveyors who hope to listen in when wood frogs are calling must be diligent to hit the "love tour" the first time that air and water temperature remain above 50°F night and day once frost melts.

Learning by ear

While female frogs don't need help distinguishing the croaking crooners, the surveyors get some guidance. Some new volunteers hit the field with an experienced hand to learn the songs,

GREG SCOTT

Spring peepers pipe up.

DON BLEGEN

learn the routes and get comfortable using the reporting forms.

The surveyors also receive Professor Anderson's tapes and verbal descriptions of each call or song. The northern spring peeper, they are told, has a "high ascending *peep*, sometimes with a short trill." The chorus frog's call resembles "running a fingernail over a fine-toothed comb." The leopard frog has "a deep rattling snore, interspersed with chuckling or the sound of a thumb rubbing against a balloon; similar to a pickerel frog."

The surveyors, who are officially addressed in DNR correspondence as "froggers and toaders" also estimate the abundance of each species at each site. They use a three-step rating system or index. A 1 means individual frogs can be counted or distinguished and there is space between each call. A 2 means individual calls can be distinguished, but there are some overlapping calls. A 3 is as good as it gets—a full chorus with constant, continuous, and overlapping calls.

While 100 surveyors currently survey 95 routes for the program, there's room for more surveyors who would like to form a listening team. For one thing, Mossman says it's important to have a back-up in case a surveyor can't do a route at the prime time.

Surveyor Arn Chamberlain says he likes others to accompany him on the route to help. "Some people will hear things that you don't hear, so it's nice to go out with a group."

Instructions on conducting anuran surveys are quite detailed. Warm cloudy evenings with constant temperatures are ideal. Frogs stop calling if the temperature drops suddenly. It's hard to hear calls on windy nights.

Surveyors are also told what types of sites to include in their route and what kinds of areas to avoid.

There has never been a meeting of all the surveyors with their DNR "bosses," something that Chamberlain would like so that concerns and questions can be shared on a wide basis. But Mossman isn't worried that the absence of such meetings has compromised the reliability and validity of the data. He says a good deal of effort goes into verifying the results, and the few mistakes that get made don't jeopardize its value.

Factoring in other factors

The frog and toad survey is an important tool, but it's not used in isolation to establish trends about changes in frog and toad populations. Other natural causes like drought, changing land uses, competition from other species and environmental pollution need to be considered as frog and toad populations change. Mossman would like to see that kind of comprehensive research done, but that hasn't really happened yet.

Though frogs are vital as indicators of the status of the environment, Van Stappen suggests amphibians are unlikely to attract the research dollars spent on more glamorous animals. "They're not glitzy; they're not eagles or wolves."

Nevertheless, some surveyors extend their interest beyond the survey to spark interest in frogs. Randy Korb wrote a pamphlet telling people where they can hear frogs in Brown County. Arn Chamberlain discusses the survey season and its importance in his science classes. He encourages students to come along when he and his friends go out on survey nights.

If you'd like to lend an ear when "Froggy Goes A Courtin'" or learn more about the survey, write Bob Hay, Department of Natural Resources, Box 7921, Madison, WI 53707. □

Free-lance science writer Harvey Black lives in Madison, Wis.

Readers Write

SUPERIOR CONTACTS

I'd like contacts for the organizations mentioned in your December supplement, "Superior: A Vision for the Future."

Tom Clarke
Osceola, Wis.

Happy to oblige.
***Lake Superior Forum**: contact Joanne Parker, igurd Olson Environmental Institute, Northland College, Ashland, WI 54806, telephone (715) 682-1489.*
***Lake Superior Center**: 353 Harbor Drive, Duluth, MN 55802, telephone (218) 720-3033*
***Lake Superior Riverwatch**: contact Jill Jacoby, Minnesota Pollution Control Agency, 20 W. 2nd Street, Suite 704, Duluth, MN 55802, telephone (218) 723-4927.*

TIMING TROUT

I noticed your coloring book last April said that brook trout start spawning in November. I know that brown trout spawn in fall, but I always thought brook trout spawned in spring.

What's the answer?

Dean V. Roebken
Cedarburg, Wis.

Brook trout spawn in the fall, typically in late October or well into November. Our Cold Water Fisheries Biologist, Larry Claggett, says it's common for brookies to hit their spawning peak during the week of the gun deer hunting season in late November.

The Department of Natural Resources crews spawn our hatchery brood stock in October to produce fingerlings for the Great Lakes and to hybridize with lake trout to produce splake. That stocking program is supported by fishing license and stamp purchases.

MYSTERY SOLVED

Thanks for Anita Carpenter's December article on snow buntings.

Back in the mid-1930s I lived in the Star Lake area in Vilas County. In the dead of winter, we often saw flocks of small birds in open fields. Their main characteristic was their flight pattern. The entire flock would take off before one could get close enough to identify them. They flew in very tight formation all turning at exactly the same time. The locals called them "snow birds," but from now on, snow buntings they are.

I also must comment on the "Pine knots" article. In the 1930s we collected them in precisely the same manner as described by Sigurd Olson in *Wilderness Days* and *The Singing Wilderness*. The multi-colored light given off as they burned in a barrel stove or fireplace was fantastic. To realize the burning resin was energy stored centuries earlier was mind-boggling.

By the way, I've been reading the magazine and its predecessors since 1938.

Wilferd J. Mueller
Madison, Wis.

Amazing! This publication started as The Wisconsin Conservationist in the late 1920s, became The Wisconsin Conservation Bulletin in 1936 and Wisconsin Natural Resources in 1977. Our reader loyalty is simply fantastic.

LYME DISEASE STUDY

I know your magazine has carried stories about Lyme disease in the past. The Gundersen Clinic/ Medical Foundation in La Crosse, is recruiting for 1,000 participants for a new study to test a Lyme disease vaccine. Any of your readers who are interested in participating can contact me at 1-800-526-6445 or write me in care of the Gundersen Medical Foundation, 1836 South Avenue, La Crosse, WI 54601.

Kay S. Martin, R.N. Ed.D.
La Crosse, Wis.

PORCH LIGHT MEMORIES

Justin Isherwood's "Porch light" story in the June issue sparked old feelings from my childhood. We lived in the city, but most of our relatives were on farms. Many years later, I still love to be outdoors at night.

As I walk down my neighborhood sidewalks, I love to see lights in the windows. I find the houses that have drapes all drawn to be cold and unwelcoming. Perhaps it is because I recall the lights in the farmhouses and barns that were on when we drove up to visit. You could see them from a mile away. The barn was so warm and inviting that we'd run out to say "Hi" to relatives finishing up evening chores on a brisk winter night. And everyone always greeted us warmly in those houses. Lighted windows meant loving welcomes and happy memories.

How sad it is to think that some of those farms won't have any lights in the future at all.

Marjorie Peterson
West Allis, Wis.

PROTECTING PIKE

I was very pleased to read in the December issue that the Department of Natural Resources is considering limiting the bag limit of northern pike by anglers. I have fished northern pike with a partner for years and we have found the availability of this fish greatly diminished over the last five to 10 years.

It didn't surprise me to read that Buffalo Lake was cited as one where populations seriously declined. In the mid-1980s, we could always count on Buffalo to produce memorable pike weekends. The fish cut through the huge weedbeds as we cast spinner baits from a 16-foot canoe. Now the frequency of northerns attacking our offerings seems to occur as infrequently as the Packers scoring a touchdown from inside the 10-yard line!

We've experienced the same decreases in pike on the Wisconsin River in the Stevens Point flowage. In the late 70s, anglers used to just "slaughter" the pike in those shallow sloughs. The fishing has never been the same.

I'm highly supportive of setting size and bag limits on this game fish. Personally, I've always practiced catch-and-release with northerns and I hope others consider it too.

Jim Canales
Stevens Point, Wis.

SHARING BACK ISSUES

The December issue was SUPER! I give my issues to a neighborhood school after we've read them. It's going to be tough to pass this one on, but I will.

Pat McDonald
Green Bay, Wis.

REMEMBERING WILHELMINE LABUDDE

I'm glad you wrote about Mrs. LaBudde. We never met, but I remember an incident about her from 1957. I was a Conservation Department warden and suggested it was important to protect timber wolves and bobcats. The bounties in those days had really cut down the populations.

Walter Scott, an Administrator with the Conservation Department, was then working for the

Wisconsin Academy of Arts and Sciences, told me he knew a lady with one of the garden clubs who could work on that issue. I was very impressed with her speed in getting that bounty taken off and instituting a closed season.

Chauncey Weitz
Luck, Wis.

THE FIRST TREK

I was interested in your article "A thousand miles on a ribbon of ice," (December 1993) but was a bit surprised there was no mention of the first person to hike the entire length of the Ice Age Trail back in 1979.

In his beautiful book *On the Trail of the Ice Age,* former Representative Henry Reuss noted the first person to hike the entire 1,006-mile trail was James J. Staudacher. He was a 20-year-old Marquette University student at the time. He carried a 55-pound sack and camped along the route.

Reuss further notes that this pioneer hiker had an "eyeball to eyeball" confrontation with a black bear near shelter 2 in the Northern Unit of the Kettle Moraine State Forest, dodged a lightning bolt in Manitowoc County and barely avoided a tornado along the Sugar River in Green County. He began his adventure in Sturgeon Bay on May 14th and ended it 81 days later on August 2nd at Interstate Park on the Wisconsin-Minnesota border.

James Staudacher also hiked the entire length of the Bruce Trail in Canada. After receiving his law enforcement degree from Marquette, he joined the Whitefish Bay Police Department and is still an officer there.

I can confirm these facts. Jim is our son.

Rosemarian V. Staudacher
Shorewood, Wis.

BARB BARZEN

Ask what footgear and clothing will make your field trip more enjoyable. You'll need long pants to brush off a stroll through a patch of stinging nettles.

continued from page 16

Meet the Foundation

The Natural Resources Foundation of Wisconsin is a nonprofit organization which develops, promotes and funds education, restoration and management programs related to Wisconsin's natural resources.

The Foundation was created in 1986 to expand the base of funds available for natural resources programs in Wisconsin. It seeks new ways in which the public and the DNR can benefit from mutual work toward a healthier environment.

The Foundation focuses on environmental education programs and facilities; management and restoration of endangered species and natural communities; provides support for conservation programs statewide via the Small Matching Grants Program; and organizes public outreach programs, including memberships, field trips, and an informal speakers bureau.

All members receive the Foundation's semi-annual newsletter and invitations to special events. Donors of $25 or more receive a one-year subscription or renewal to *Wisconsin Natural Resources* magazine and donors of $100 or more receive an annual state parks admission sticker.

Trip Reservation Form

Name _____ Phone _____

Address _____

_____

☐ I will attend the following field trip(s):

_____ Date _____ # people attending _____
_____ Date _____ # people attending _____
_____ Date _____ # people attending _____

☐ Please send me information on the Natural Resources Foundation.
☐ Please enroll me as a member of the Natural Resources Foundation at the following level (my check is enclosed):

Natural Resources Foundation Of Wisconsin, Inc.

_____ $15 _____ $25 _____ $50 _____ $100 Other $ _____

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