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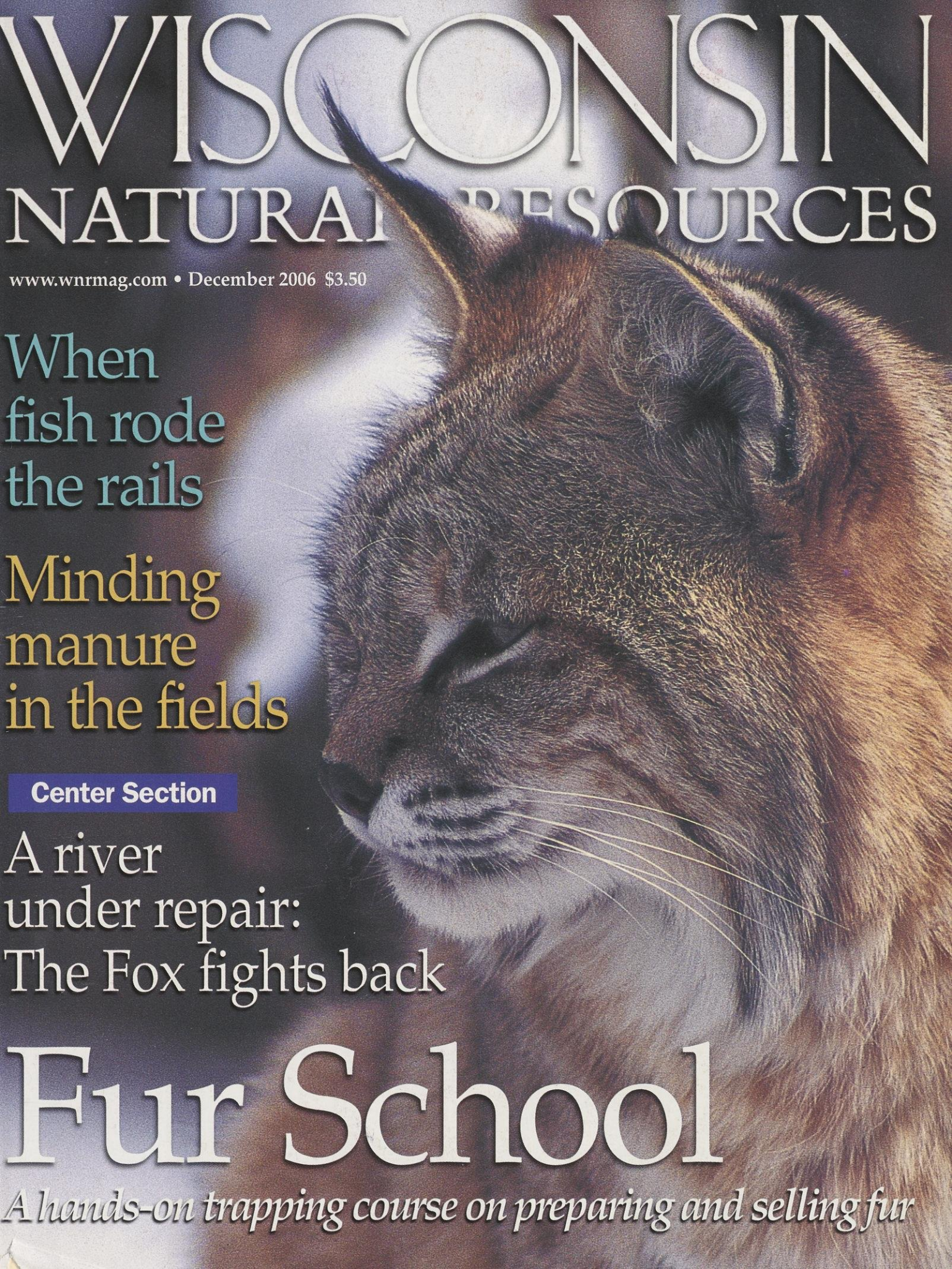

When fish rode the rails

Minding manure in the fields

Center Section

A river under repair: The Fox fights back

Fur School

A hands-on trapping course on preparing and selling fur

Window stickers

Treefrogs adapted to scurry up bark and fend off the big chill.

Anita Carpenter

Gray treefrogs spend their time in the timber. So as November deepens into December and winter approaches, where do they go? Do they remain in the leafless trees? Seems unlikely. Do they return to their breeding ponds like the leopard frogs? Do they seek shelter in the ground? If so, where?

Treefrogs are so at home in their treetop canopy that they are devilishly difficult to observe. These shy amphibians are active in the darkness of night and hide out, resting, during the day. As protection from predators, they are true experts at camouflage and readily change color to blend in with their surroundings. A gray treefrog may look gray to brown when resting on an oak limb or green when sitting on a maple leaf.

continued on page 27

Treefrogs display an amazing range of colors to blend into the background whether on a tree trunk or on the ground. They bury themselves under logs and soil in winter and secrete a form of biological antifreeze that allows them to revive in spring after essentially freezing solid.

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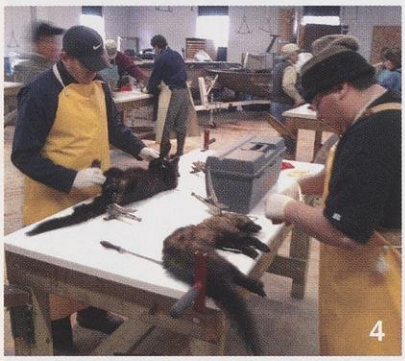
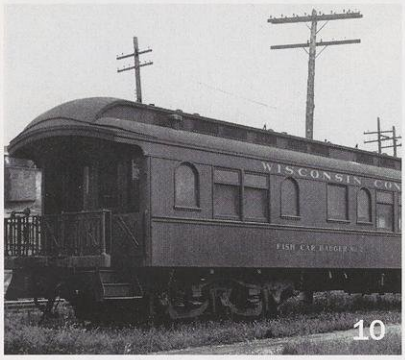


ROBERT QUEEN



MID-CONTINENT RAILWAY HISTORICAL SOCIETY

ROBERT QUEEN

FRONT COVER: Bobcats (*Lynx rufus*) prefer thick forests and alder thickets in the north and upland areas in southern Wisconsin. Trapping education courses are geared to offer training to both seasoned professionals and hobbyists. Read about our Fur School for professionals starting on p. 4.
GREG VANDELEEST, Kohler, Wis.

BACK COVER: Gibraltar Rock State Natural Area in Columbia County. For more information, contact the State Natural Areas Program, Bureau of Endangered Resources, DNR, P.O. Box 7921, Madison, WI 53707 or visit *dnr.wi.gov/org/land/er/sna*.
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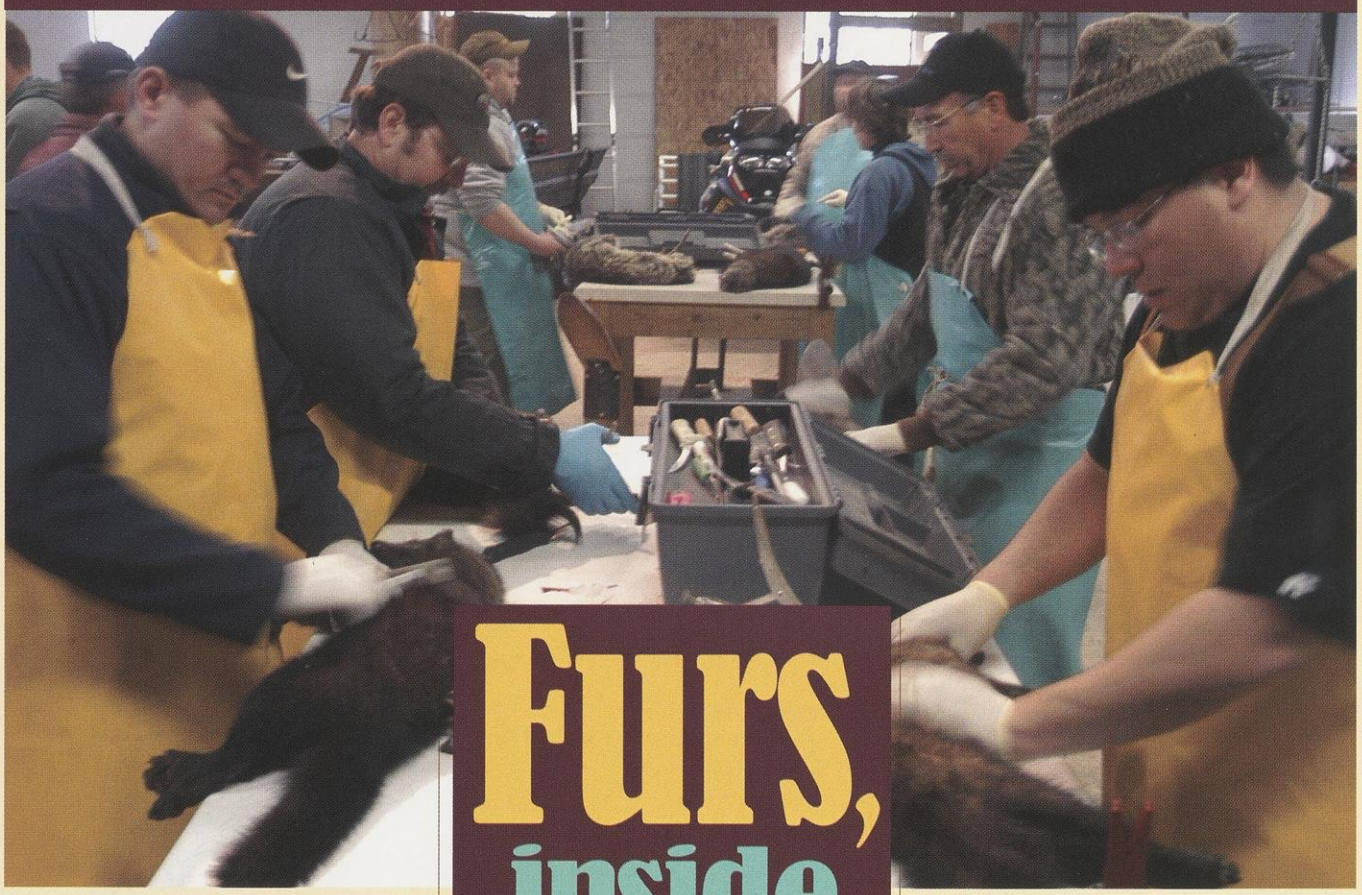
Fur School provides hands-on, four-day training on trapping laws, trapping techniques, fur preparation and fur marketing to wildlife professionals and conservation wardens.



Furs, inside and out

Wildlife biologists and wardens tan a few hides in a short course on trapping.

Story by Kathryn A. Kahler
Photos by Robert Queen

The chance to attend "Fur School" held intriguing appeal. Would we learn what to look for in a Russian Barguzin sable coat or dyed beaver jacket? A map pinpointing the school's location and the list of suggested student attire hinted that wouldn't be the case. Participants were told to report to the end of a dead end road, in the boondocks north of the Dane County Airport, just past the truck stop, in a cinderblock building succinctly known as the Fur Shed. Wear Sorel boots and coveralls, we were advised; knives and rubber gloves would be provided.

The Fur Shed, a modest brown building, has a colorful past. Rumored to have been a bordello decades ago, the shed was later used to store equipment from the 1985-86 Mesabi Fur Company sting operation, in which undercover state agents from Michigan, Minnesota and Wisconsin infiltrated the market in unlawfully taken fur and eventually charged 275 people in six states with violating federal statutes to protect rare fur-bearing animals. With all the equipment in-hand and knowledgeable wardens in place, a Fur School evolved to provide law enforcement and wildlife management professionals direct, serious training in trapping and furbearer management. Eventually, with the help of the Wisconsin Trappers Association, the building was renovated in 1999 into the Fur Resources Training Center.

Fur School's eighth cohort, the Class of 2006, brought together 24 participants from DNR, the Great Lakes Indian Fish and Wildlife Commission, and the U.S. Fish and Wildlife Service. For four days during the last week of March, the students engaged in intensive, hands-on training led by DNR Furbearer Specialist John Olson, Dennis Brady of the Wisconsin Trappers Association and other experts.

Classroom sessions are taught by experienced trappers, wardens, DNR biologists and wildlife researchers who spend a significant amount of time each year pursuing, studying and managing statewide populations of muskrat, mink, weasel, beaver, fisher, otter, skunk, raccoon, fox, coyote, bobcat and opossum.

Day One: Deep background

An unusual blend of sensory stimulants greeted participants on the first day of school. Steel traps, wire cages and luxurious beaver, otter, fox and raccoon pelts lined the classroom. An odor of sawdust and dried blood, with hints of musk and strong coffee, lingered in the air. Conversation halted as an occasional jet on its landing path roared just overhead. Heat was an all-or-nothing affair. Adjacent to the classroom, a fur drying room, walk-in freezer and large skinning room equipped with tables big enough for four to work comfortably awaited. Gambrels hung from the ceiling and rubber aprons from hooks on the wall.

In his introductory comments, Olson promised that after two days of classroom lectures, the students' strength of hands and stomachs would be tested by training in trap-setting and putting up fur, the polite term for skinning and fleshing.

Lectures opened with a presentation by Virgil Schroeder, President of the Wisconsin Trappers Association (WTA). The nonprofit organization of 3,800 members places a strong emphasis on education and ethics to help improve the public perception of trapping. The association partners with the Department of Natural Resources by conducting and funding research on dryland cable restraints and mercury concentrations in otter. Members proactively work on solutions to emotion-charged problems like the incidental trapping of pets, recognizing that such problems left unchecked could lead to further restrictions of their sport.

"Very seldom does somebody who has gone through trapper education classes, who learns and uses modern techniques, cause a problem," Schroeder said. "It's more often the older trapper who's been trapping 20 years, never had to take a trapper education course and is set in his ways."

Trapper education has been required in Wisconsin since 1992. Jolene Kuehn, DNR's former trapper education coordinator, said Wisconsin's program is a cooperative effort between the agency and WTA, many of whose members are volunteer instructors. The program is funded by $2 from each trapping license sold. Novice trappers can choose from instructor-led classes, weekend workshops or a correspondence course, and must pass a test before purchasing a license.

Wisconsin's program evolved from a strictly economy-driven management philosophy to one that encompasses furbearer ecology, habitat management and cultural issues like animal welfare. A Technical Furbearer Advisory Committee of 25-30 experts statewide recommends changes to policies, procedures and regulations. The group, including DNR wildlife biologists, endangered resource specialists and wardens, as well as representatives from WTA, Wisconsin Conservation Congress, University of Wisconsin and the U.S. Fish and Wildlife Service, meets annually in late May.

Implementing changes to trapping regulations is a two-year process. "That may seem like a frustratingly long time to some people, but it keeps us and others from making knee-jerk reactions," Olson said. "For example, the body gripper emergency rule passed in 1998 was driven by trap incident reports of 33 dogs caught in traps, 25 of which died. We quickly sat down with members of the WTA and Conservation Congress and said, 'We have to do something about this.' It was an emotional issue with high public visibility. We came up with a complex rule regulating the use of #220-body-grippers on dry land that virtually put a stop to incidental trapping of dogs within two years, without having to ban any traps."

Brian Dhuey, a DNR wildlife research scientist, described the agency's efforts in furbearer surveys and population modeling. Surveys include harvest estimates from registration records and parts collection, population estimates from track counts or helicopter surveys, hunter and trapper questionnaires and market value of furs. Population modeling allows managers to consider "what if" scenarios: By entering factors like population size, sex and

age comparisons, harvest mortality and regulation compliance into computerized modeling programs and comparing that data with winter tracking surveys and other independent population estimates, DNR wildlife managers can make calculations to set harvest regulations and keep populations stable over time.

Wisconsin is one of 31 states helping to develop and use Best Management Practices (BMPs) for trapping. Wisconsin trappers field-test and evaluate traps based on their humaneness, efficiency, selectivity, practicality and safety to trappers and the public. BMPs evolved to continually improve humane treatment in taking animals and to address anti-trapping sentiments of the 1960s and 70s. This effort was invaluable in international negotiations among Canada, Europe, Russia and the United States about the humaneness of foothold traps. Since 1996, federal and state wildlife agencies have invested $4.6 million on trap testing, public education and BMPs.

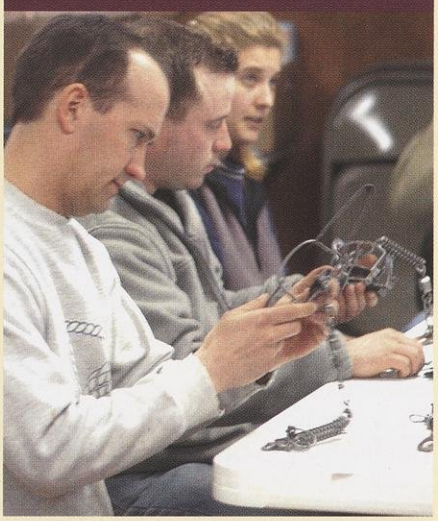
Foothold traps capture live animals for many purposes, such as to reduce human/wildlife conflicts, move animals that become a nuisance to people, protect rare or endangered plant and animal species, conduct wildlife research or relocate species in efforts to establish populations in other states. "We need to sustain trapping as a wildlife management tool and BMPs help us by enhancing public awareness and understanding of modern trapping," Olson said. "A survey conducted by the Association of Fish and Wildlife Agencies in 2001 showed 73 percent of Wisconsin residents support regulated trapping."

Later in the day students learned furbearer and trap identification. Generally described as an animal whose fur has a dense undercoat of soft hair with longer "guard hair" on top during the winter, the term "furbearer" in Wisconsin is by law specifically restricted to muskrat, mink, weasel, beaver, fisher, otter, skunk, raccoon, fox, coyote, bobcat and opossum.

Wisconsin trappers use a variety of traps, based on three general categories. **Foothold** and **box traps** hold animals live until they can be released or quickly, humanely killed. Foothold traps come in many sizes and designs, including the single and double long spring, coilspring, guarded foothold, and the padded foothold trap. Each type has an advantage in different situations. Foothold traps can be used both on dry land and as drowning sets for beaver or muskrat. Box or cage traps are used most extensively for research or to trap target animals where the potential of accidentally trapping domestic animals is high.

Body-gripping traps, which usually kill the trapped animal quickly through a combination of striking and clamping forces, also come in several sizes and are most often used in water sets. They are useful on land but care must be taken to avoid trapping nontarget species. Wisconsin regulations prohibit the use of body-gripping traps larger than 7 x 7 inches on dry land. Snares (used underwater) and dryland cable restraints are simplified body-gripping devices that can either kill (snares), or hold animals alive (cable restraints).

Students handle the tools of the trade learning to identify which traps are effective for each species and situation.



Each step in preparing furs for market is demonstrated and tried out by each student.

Day Two: Know the rules and regs

Wardens Nathan Kroeplin and John Welke opened the second day of classroom lectures with an overview of Wisconsin trapping regulations. Students learned where and when trappers can pursue their sport, what kinds of traps they can use in each situation, how they can and can't place them, license and permit information, requirements for checking traps, possession restrictions, what to do if they accidentally trap a nontarget animal, which species are protected at all times, and other information about pine marten restoration, trapper education and BMPs.

Dave Bouche, park naturalist from Devil's Lake State Park, gave one of the more "cerebral" presentations of the course: He demonstrated a technique called brain tanning, which uses the oil in an animal's brain to tan its hide.

Brain tanning was the traditional method of converting animal skins into clothing used by Native Americans and early settlers. "Why would anybody want to brain-tan today?" Bouche asked. "It's a link back to a simpler time when our ancestors were more self-reliant. It's a natural process that involves no harsh chemicals. But most importantly, it's a cheap and relatively easy method of tanning pelts for poor naturalists."

Bouche demonstrated by rubbing a mixture he had prepared at home — cow's brain simmered in a little water and then pureed — into the pre-soaked skin of a raccoon. The skin is left to dry, and then it is scraped and "worked" over the edge of a workbench or board until soft and white. It's a gradual, rather time-consuming process, but extremely gratifying, Bouche said.

Jonathan Gilbert, a wildlife researcher with the Great Lakes Indian Fish and Wildlife Commission, told how he uses traps to catch and release

animals for his research. Gilbert detailed the intricacies of setting traps to selectively capture only the animal he is studying. "A foothold trap, for example, can be selective by adjusting the pan so a 10-pound fisher won't set it off, but a 20-pound bobcat will," Gilbert said. "Just like the commercial trapper, the more we know about how an animal behaves and acts, the more effective and selective we can be. We know that fishers and martens are curious by nature so we don't have to worry about disguising our scent. Bobcats, on the other hand, are more wary so we use gloves when setting traps for them."

Researchers also use hair traps, designed to lure animals like the endangered pine marten; hair samples attach as the animal passes through, confirming a specific species' presence in an area. Gilbert also makes extensive use of box traps — called Tomahawk traps after their manufacturer located in Tomahawk, Wis. — in mark/recapture and radio-collar studies, and motion-triggered video cameras. Besides "catching" animals on tape, this technology gives researchers valuable visual evidence and insight into animal behavior.

Veterinary Wildlife Health Specialist Julie Langenberg gave an overview of furbearer diseases in Wisconsin. She stressed that much of the determination of an animal's health is behavioral. "If an animal is behaving strangely, it's best to be wary," Langenberg said. She emphasized the importance of rabies vaccinations for wildlife biologists, whose occupation carries a "high-risk" ranking from the Center for Disease Control.

Langenberg listed and described several zoonotic diseases that can be transmitted from wildlife to people through breaks in skin, contact with feces or bodily fluid, or by eating infected animals. Although zoonotics like rabies, tularemia, sarcoptic mange, echinococcus canid tapeworm, raccoon roundworm and leptospirosis may be rare in Wisconsin, precautions should be taken nonetheless. Furbearer diseases that don't pose a risk to humans include canine distemper virus and parvovirus.

Langenberg cautioned students not to aid in disease transmission. "Use good hygiene by cleaning your traps and gloves between catches so you don't spread disease from one animal to the next."

Langenberg told an especially sobering story about raccoon roundworm. When this parasite commonly found in raccoons infects humans, its larvae penetrate the small intestine and migrate through the body to the brain, eyes and other organs. It is very difficult to treat and Langenberg said wildlife managers should stress in their public contacts the importance of keeping children and pets away from raccoons and their nesting areas.

Tuesday concluded with a field trip to the North American Fur Auction, an auction house that brokers the sale of over two million ranch mink and one million pieces of wild fur each year (see sidebar).

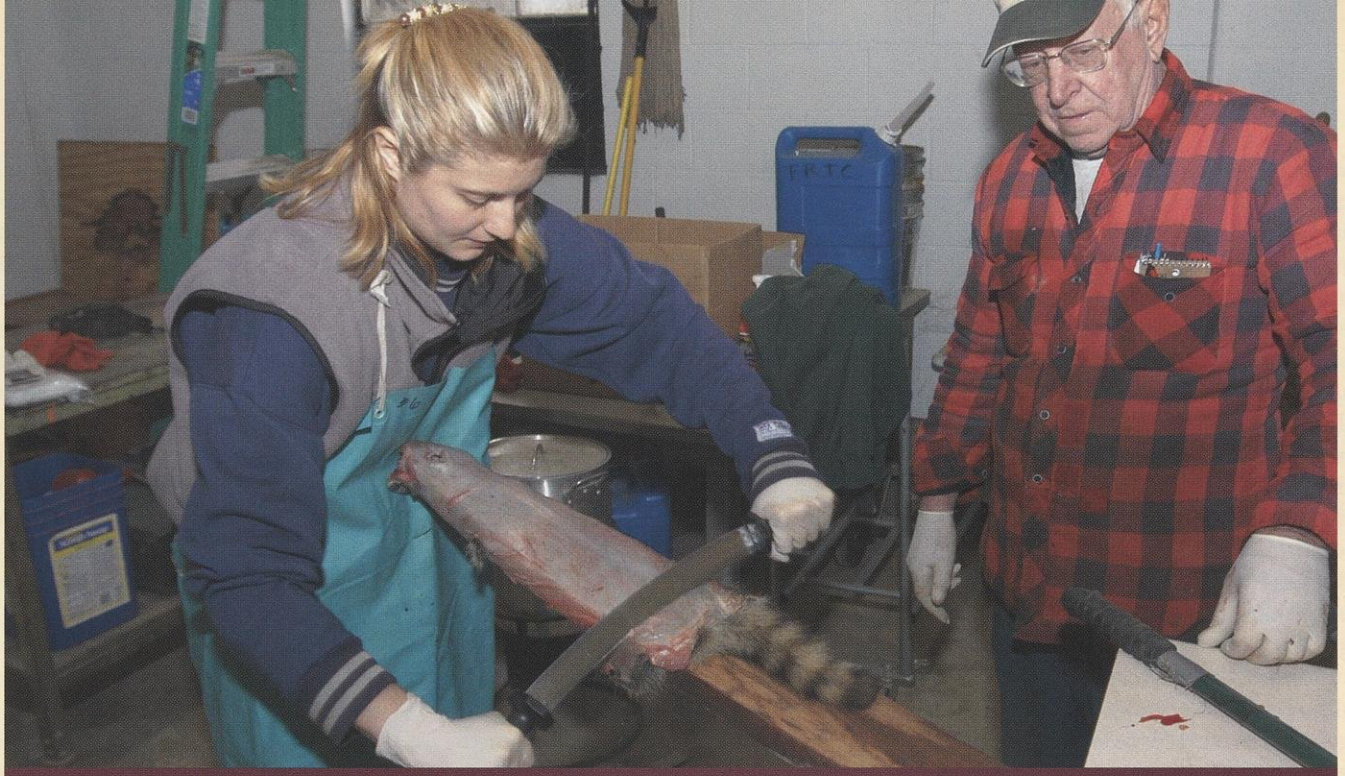
Teachers explain all the judgment calls and careful preparation trappers take to place traps so they can outsmart animals with keen senses.

Day Three: Setting and skinning

The day many had eagerly anticipated arrived when Dennis Brady and other volunteer WTA instructors handed out foothold traps to pairs of students, who first practiced setting them in the classroom. Instructors then set off for the wilds around the Fur Shed, traps in hand and students in tow, to demonstrate the fine art of setting a dry land set. Other traps shown included the body-gripper, Egg, Duffer, Lil' Griz, cage, snare and cable restraint.

After mastering trap-setting, students were issued rubber gloves and aprons and introduced to the skinning experts. This was the point to check queasiness at the door, take a deep breath and pay close attention, because after watching one demonstration, we would step into the walk-in cooler, pick out an animal and get to skinning.

The animals used in Fur School are collected throughout the trapping



Students try their hand at stretching and fleshing animal furs to remove every bit of muscle and fat without tearing the hide. It takes a lot of practice to do this well and quickly.

season and kept frozen until the start of school. Some are road kills, but most are incidental catches handed over to conservation wardens and donated to Fur School.

Some students were obviously experienced skinners and grabbed the larger otters and fishers. Others of us subscribed to the "smaller is better" theory and stuck with mink and muskrat. Instructors passed among us with hints for stripping tails, avoiding scent and oil glands, and hanging animals from gambrels to ease the process.

Most animals, with the exception of beaver, are skinned by slitting the skin from one hind foot to the other and peeling the skin down over the animal's head as we would remove a pullover sweater. The resulting tube-shaped pelt is called a "cased" fur. Some cased furs are left skin-side out, most commonly muskrat, mink, weasel, raccoon, otter and skunk. Pelts prepared with the fur side out include gray and red fox, coyote, fisher and bobcat. Beavers are skinned "open" by making an incision down the underside from tail to nose.

After the animals were skinned, they had to be fleshed, the process of scraping away the meat and fat. Skins were pulled taut fur side in over a pointed board — like a narrow ironing board — called a fleshing beam. Starting at the head and using a two-handled curved scraper, the instructors showed us how to use just the right stroke to remove the flesh without applying too much pressure to weaken or puncture the fur, and how to reposition the skin from side to side, gradually moving toward the tail until the skin was clean. Instructors stressed the importance of removing all fat to prevent fur spoilage.

Fleshing was followed by stretching on special wooden boards. Skins were stretched fur side in, centered so that forelegs and belly were on one side and eyes, ears and back on the other, then stapled in place. Beavers were stretched by nailing to a round board or sewn into a hoop frame. Skins were then allowed to dry in a place away from direct heat or sunlight. Pelts that would be finished fur side out were only partially dried on the boards, then after six to eight hours were turned fur side out to finish drying. Depending on the drying conditions, skins take two to five days to dry thoroughly.

Day Four: The test

On the final day of Fur School students practiced placing some of the trickier sets like body-gripper, snare and cable restraint traps in the woods and wetlands near the fur shed. They also picked up more tips on handling and preparing different types of pelts including a demonstration of skinning and stretching beaver.

Then it was time to step back and admire what four days of new knowledge and hours of careful scraping had wrought. Laid out on the tables, the drying pelts worked by the students would soon be irresistible to touch. Hands would reach out to stroke the gleaming furs, marveling at the soft, smooth textures. Some students were so enthusiastic that they put up a fur for a local biology class, prepared a set of skulls for classroom use or even preserved jars showing internal parasites they picked out of and off of the specimens!

Furs put up by students are donated for educational purposes to park naturalists, wildlife managers and other governmental agencies on a first-come, first-served basis. Any furs that remain after those requests are sent to fur auctions. Starting this year, thanks to legislative support, proceeds from such incidental furs are returned to the trapper education program. "This will be an important funding source to further our trapper education training," Olson said.

To wrap up the course, students took the trapper education exam, a 50-question test covering all aspects of the Fur School training. As with other outdoor education courses, the cost for the first year's trapping license is included in the course fees for state residents who

The class visits the North American Fur Auction in Stoughton, Wis., the only facility in the nation where both wild furs and ranch-raised furs are graded, sorted and brokered to fur markets worldwide.

pass the exam and receive a completion certificate. They also had fun with a sort of Fur School Jeopardy. Students were divided into three teams named for the largest fur companies of the 1700s. When they knew an answer, team members grabbed a stick, banged a 50-gallon barrel at the front of the room and blurted out the answer. That lively and noisy competition ended as all students were recognized for their achievements.

Next semester

Fur School will be back next spring by popular demand. Olson says the school has branched out to offer condensed three-day training at UW-Madison, UW-Stevens Point and Northland College so that wildlife ecologists in training can also share the experience.

Fur School graduates overwhelmingly rate the course as excellent with "some of the most informative, hands-on training" offered by the Department of Natural Resources. In fact, feedback from some students suggests the course be lengthened to five days, with more time devoted to tracks, setting traps and skinning. Harvey Halvorsen, a 2006 graduate, suggested that an extra day would allow students to set live traps overnight and learn how to handle what they catch.

Kris Johansen, another 2006 graduate, said, "Much of the information I learned will be incorporated in talks I give to clubs, school groups and hunter education groups. I'll have a better understanding and be able to communicate better with the trapping community. And I'll definitely be doing some more trapping!"

Kathryn A. Kahler is a Wildlife Ecology graduate, trapper in training and circulation/promotions manager for Wisconsin Natural Resources *magazine in Madison.*

Fur-ther information

Department of Natural Resources
www.dnr.wi.gov/org/land/wildlife/trap/index.htm

Wisconsin Cooperative Trapper Education Program Schedule
www.dnr.wi.gov/org/land/wildlife/trap/trapeduc/schedule.htm

Wisconsin Trappers Association
www.wistrap.org

BMPs, International Association of Fish and Wildlife Agencies
www.furbearermgmt.org

Brain-tanning
www.braintan.com

Fur marketing, big-time

Buy a fur anywhere in North America, or even Russia or China, and chances are it was handled by the North American Fur Auction in Stoughton, Wisconsin.

The 85,000 square-foot facility is the only fur auction house in the United States. It collects ranch and wild fur nationwide, then grades, consolidates and prepares skins for auction at its headquarters in Toronto, Canada.

A network of about 20 agents in a five-state region from Pennsylvania to South Dakota collects furs directly from trappers, or from collection points where trappers can drop their furs. NAFA is the commissioned agent for both sellers and buyers, who include fur dealers and garment manufacturers.

Grading ranched mink fu

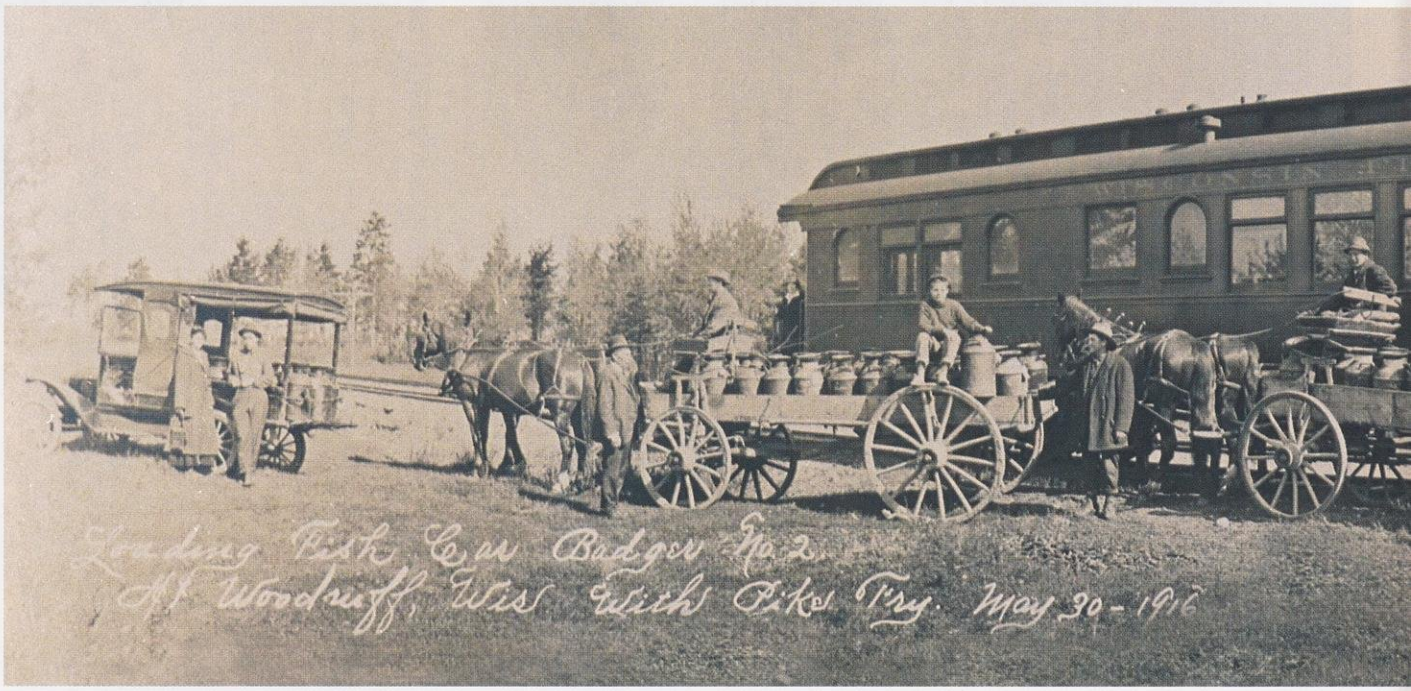
Fur experts at the Stoughton plant put up goods based on uniform size, grade and color; bar code each skin and organize them into lots; prepare auction catalogs and pull samples for buyer inspections. Auctions are held four times a year.

The company currently handles over two million ranch-raised mink and one million pieces of wild fur annually. Most of the wild fur they handle comes from two species – raccoon and muskrat.

Russia and China represent the fastest growing wild fur market and are helping sustain some of the highest market prices in years.

One of the most intriguing aspects of preparing wild fur for auction is the grading process. Each species has its own grading criteria based on the weight of underfur, the height of guard hairs, and where the animals were trapped. A raccoon taken in Missouri or Georgia, for example, will generally be of lesser quality than one from Minnesota because animals from colder regions have heavier fur than those from warmer regions.

Trappers who use NAFA to sell their furs have access to a world market and potentially higher prices for their furs. When it's time for their furs to go to auction, they can monitor the sale on NAFA's website, at www.nafa.ca.

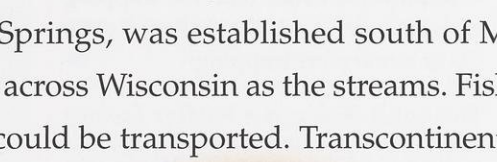


ACROSS THE TR

In decades long past, the Badger Fish Cars hauled fry to stock remote Wisconsin waters. Now old No. 2 may be back on track.

David L. Sperling

Part of the art in providing a quality product is delivering the goods, especially when "the goods" have a short shelf life. When the product is perishable, like live trout, success is measured in whether the stocked goods stink or swim. ■ When Wisconsin's first state fish hatchery, Nine Springs, was established south of Madison in 1876 the roads didn't stretch nearly as far and wide across Wisconsin as the streams. Fish could darn near swim to stocking grounds faster than they could be transported. Transcontinental rail lines had been completed only seven years earlier. As the rails carrying the iron horse spread a metallic web across the landscape, fish managers seized the opportunity to adapt the new technology to move fish more quickly to distant waters.



The builder's photo of the custom designed *Badger No. 2* when she was brand-spanking new back in 1912.

PULLMAN PHOTO COLLECTION, COURTESY OF THE SMITHSONIAN INSTITUTION

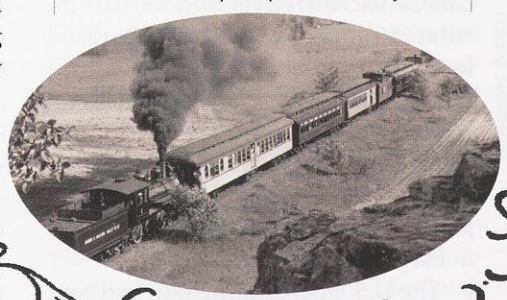
E. CUSTISS, DNR PHOTO

ESTLES OF TIME

In 1873, Dr. Livingston Stone of the U.S. Fish Commission made the first transcontinental train trip with live fish as cargo, transporting shad in milk cans from the East Coast to California for stocking. A team of assistants worked in shifts, changing water and continually added ice to keep the temperatures cool, maintain dissolved oxygen in the water, and skim off fish slime.

Early rail shipments of stocking fry were expensive and labor intensive. Milk cans containing fish fry were loaded into baggage cars on trains, and a crew of hatchery workers called "messengers" tended the fish. Getting the fry to stocking points in healthy condition was no picnic. Wisconsin Superintendent of Fisheries, James Nevin, described the chore in his 1891-92 report to the state Fisheries Commission:

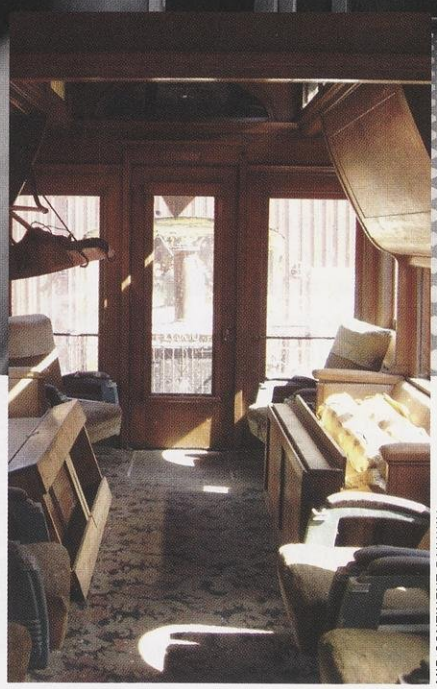
> *"In May and June it is very difficult to carry fish long distances without an accompanying abundance of ice to...keep the temperature down to the proper degree. An improved method of caring for the safety of the fish is needed. At present the employees are often compelled to change cars three or four times on a trip, transferring from one baggage car to the other all the cans and paraphernalia. If the train happens to be late and the employees miss connections, they may be left for some time upon some railroad crossing platform with their cans of fish. The chances are that with no facilities for giving the fry proper care, they will perish before arriving at their destination. Besides these inconveniences it happens that in nine times out of ten there is no room in the baggage car for more than 20 to 25 cans at a time, and then they are badly crowded, with steam pipes running around the car, ruining the fry and with no room to get at the fish to attend them. I often wonder at the employees getting them to their destination in as good condition as they do."*



JIM NEUBAUER, MID-CONTINENT RAILWAY HISTORICAL SOCIETY COLLECTION

In its middle years, *Badger No. 2* was painted and refurbished as a passenger car for Mid-Continent Railway scenic trips like this 1962 trip near Hillsboro.

BUILDER'S PHOTO, 1912 PULLMAN PHOTO COLLECTION, COURTESY OF THE SMITHSONIAN INSTITUTION



MID-CONTINENT RAILWAY HISTORICAL SOCIETY

TOP: Back in 1912, the observation car featured leather interior, comfortable furniture and swanky fixtures.
ABOVE: Age took its toll. Observe the current state of the same part of the railcar.

Most live fish moving by rail in the early days were destined for the tables of inland consumers who demanded it fresh. In 1880, a German inventor, Arno Gustav Pachaly, developed the first insulated railcars. His design featured iceboxes suspended overhead and pumps attached by pulleys to the train wheels that pumped air into water-filled tanks of fish. His patented contraption kept fish in the pink on the journey from Bohemia to fish markets in Berlin.

The U.S. Fish Commission and several states adapted Pachaly's insulated railcar design to carry hatchery fry for stocking streams. By 1892 state hatcheries were shipping about 45 million eggs, fry and fingerlings for stocking in state waters.

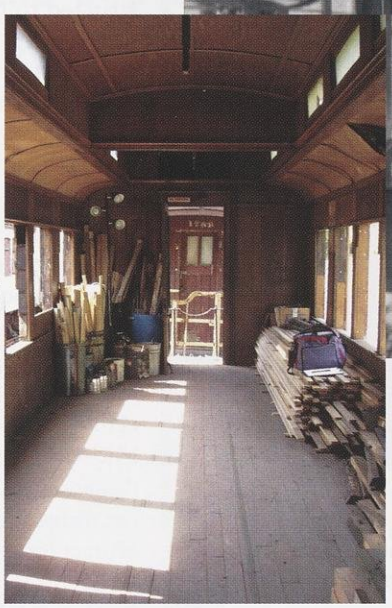
To ship more fish to stock at greater distances from the hatcheries, Nevin petitioned the state Fisheries Commission in 1893 to seek a $5,000 appropriation from the legislature to buy a rail car specifically designed for transporting and stocking fish. Seven other states had already made such investments, but lawmakers had another powerful incentive: Wisconsin wanted to make a good showing at the upcoming World's Fair in Chicago, the Columbian Exposition celebrating the 400th anniversary of Columbus's "discovery" of America. A highlight of the state display in the fisheries building included an aquarium of live native fish, which Nevin transported to the fairgrounds in the brand new rail car, dubbed *Badger*.

Both the fish and the rail car became novel fair attractions. The car, 55 feet long and divided into sections with a center aisle, contained a galley kitchen at one end to feed the crew of attendants. The other end was equipped with Pullman upper and lower berths on one side across from a small bathroom and closets. The main body of the car held 12 fish tanks, each three-feet square and 18 inches deep. The tanks were insulated with thick, galvanized iron and drain pipes that fed into eight barrels and tanks slung under the car; each held up to two tons of water and ice. A six-horsepower engine-and-boiler combination circulated jets of air and water through the bottom of each fish tank. Open-ended stand tubes at the top of each tank drew off slime and waste. When the car arrived at a stocking area, the train stopped over a bridge and tubes were lowered into the water to stock fish directly into rivers and streams. The car was built to passenger rail car standards so it could travel safely at faster speeds.

In spite of their sleek design, fish cars were a real challenge for railroad workers. The cars were much heavier than normal passenger coaches. It took powerful engines to start the cars rolling, well-engineered routes to keep

the cars on track, and good brakes to slow them down. Over the years the cars were blamed for some train wrecks and accidents, but their safety record remained strong enough that they continued to be built to move regional specialties across the nation: The 30-ton Stillwell Oyster Car built by the Pullman Company in 1897 transported live oysters from the Texas coast to Kansas City, Missouri. Special trains moved lobsters from Massachusetts to San Francisco and Dungeness crabs from San Francisco across the country to Chesapeake Bay.

As staff gained experience, the *Badger* was put to greater use in Wisconsin. In 1895, the car traveled just under 2,100 miles. One year later, the rail crew traveled 30,859 miles stocking fish in Wisconsin and averaged 15,000-20,000 miles a year through 1914, when the rail car was taken out of service and sold to the Canadian government to disappear down the tracks of history. Its whereabouts today are unknown.



MID-CONTINENT RAILWAY HISTORICAL SOCIETY

DNR PHOTO

ABOVE: (1912) Looking toward the wood and steel fish tanks on *Badger No. 2* that held fish for stocking around Wisconsin for almost 33 years.
LEFT: The same space awaits renovation today.

The Badger rides again

Badger No. 2 was built by the Pullman Company of Illinois for the Wisconsin Fisheries Commission in 1912. Befitting the $13,500 price tag, the 72-foot car featured wood and steel for added strength, 15 fish tanks, and linoleum floors for easier maintenance. Its crew of four enjoyed more spacious accommodations including bigger sleeping quarters, a kitchen, salon and an observation room. Old photos of the new car reveal the clean elegance of *Badger No. 2's* construction; the decorative linoleum, leather seats, well-fitted wooden berths, big windows and artful lighting fixtures reflect the fine craftsmanship of the day. Functional yet stylish, *Badger No. 2* was fancy enough to occasionally transport state Fisheries Commission members to meetings around the state.

But time and modes of transportation moved on. By the 1930s, the state's ever-growing network of paved roads allowed tanker trucks with aerators to reach even more waters more quickly using fewer staff to stock fish; by comparison, fish cars were costly and cumbersome to operate.

Badger No. 2 had a long, productive life and remained in service until 1945, when it was decommissioned and sold to a private railroad contractor, Walter H. Knapp, Inc. of Milwaukee. It was later sold to the Mid-Continent Railway Historical Society in 1960. The society, located in North Freedom, Wis., about seven miles west of Baraboo off Highway 136, specializes in preserving structures and equipment from 1885-1915, when steam locomotives were king and 90 percent of the nation's passengers and freight moved by rail. The society's collection includes 13 steam locomotives, 38 passenger cars, 31 freight cars, 21 cabooses, and 15 pieces of service equipment such as rail snow plows and wreckers. Like *Badger No. 2*, many of these pieces are one-of-a-kind items salvaged by society members for restoration to their original appearance.

This goal was not very evident when *Badger No. 2* became the very first railcar purchased by Mid-Continent for its collection. *Badger No. 2* was moved to Hillsboro, Wis. in 1962 to carry passengers for the first operating season until the museum's home depot was shifted to North Freedom in 1963. The "Fish Car" served as a passenger coach on the museum's rail line for many years. It was last used on the Snow Train in 1985.

Badger No. 2 became a strong favorite for restoration when research performed by the society's Collections Manager, Leah Rosenow, revealed the car's unique status as the country's sole surviving fish-stocking car. The project was brought to the attention of Tom Jeffris, president of the Jeffris Family Foundation of Janesville. His willingness to help finance the refurbishment of the nearly century-old car came with two conditions: First, that it be restored to its 1912 appearance; and second, that everything on the car be functional, just as it was when first put into service by the Wisconsin Fish Commission.

Jeffris' input helped shape what soon became the society's most ambitious project. The foundation's challenge grant of $475,000, presented to Mid-Continent at a ceremony held at the

MID-CONTINENT RAILWAY HISTORICAL SOCIETY

MID-CONTINENT RAILWAY HISTORICAL SOCIETY

Details of the exterior woodwork and one of the interior Pullman berths that the railway society hopes to restore on *Badger No. 2* with financial support from railroad buffs and conservationists.

Nevin Fish Hatchery in August 2006, represents about half the cost to restore the car. The railway historical society now has approximately 16 months to meet the challenge by raising the remaining $475,000 needed to bring *Badger No. 2* back to its original elegance.

In addition to financial support from the Jeffris Family Foundation, Avalon Rail, Inc. of West Allis helped with the restoration plan. Prior restoration projects were kept within the historical society; members donated their time to do the hands-on work and their money to cover the costs of a project. Ordinarily, a coach restoration project might cost a mere $50,000 but would take 12 years or more to complete. Once the full amount of the Jeffris challenge has been met, *Badger No. 2* will roll down the rail to Avalon and receive a makeover that will be completed in a mere 12 months.

Restoring *Badger No. 2* will involve applying new exterior siding and renewing the underbody and interior. Windows will be replaced and refitted with much of the remaining original glass. The interior layout will be returned to its original configuration, including reinstalling walls and the 15 fish tanks. The kitchen, bathroom, salon and observation room will be reconstructed to full operational status, including the berths. All of the woodwork will be revarnished and repainted where necessary. The ultimate goal of the restoration is to return *Badger No. 2* to its 1912 form, meaning it will look as it did when it first rolled out of Pullman's shops.

Once restored, *Badger No. 2* will represent a unique period in railroad history, serve as an integral piece of Wisconsin and DNR history, and stand as a testament to the state's proud legacy of ecological preservation. On display at Mid-Continent, *Badger No. 2* will be a dynamic and tangible educational tool for museum visitors and an authentic artifact for academic research.

If you would like to help get some living history back on track, you can send your tax-deductible gift to a fund set up specifically to benefit *Badger No. 2*. Simply make your check payable to The *Badger No. 2* Fund, and mail it to Wells Fargo Bank, P.O. Box 529, Baraboo, WI 53913 ATTN: Cathy Althoff. Come aboard and help restore this special piece of Badger history that delivered so many years of fine fishing to Wisconsin streams and anglers.

David L. Sperling edits Wisconsin Natural Resources *magazine.*

WHERE RAILROADERS LET OFF SOME STEAM

A visit to the Mid-Continent Railway Museum is a chance to buy a ticket back in time to experience the sights, sounds and smells of railroading's finest era. Four train trips a day are offered weekdays from mid-May through Labor Day as well as weekend excursions in May and September. Special trips run fall and winter with dinner trains, Autumn Color rides and the Pumpkin Express in October, the Santa Express in November, and February's Snow Train. Visitors ride in restored steel coaches decked out in the best 1915 had to offer. Currently the cars are pulled by diesel locomotives, but soon working steam locomotives will haul the trains on the 50-minute trip through seven miles of the Baraboo countryside. The setting recreates old train depot magic, but arranging a visit to the museum or booking a trip is strictly cutting edge: Visit the society's website at www.midcontinent.org, book reservations at reservations@midcontinent.org, and get your questions answered at inquiries@midcontinent.org. You can also call the museum toll-free at 1-800-930-1385.

RON JONES

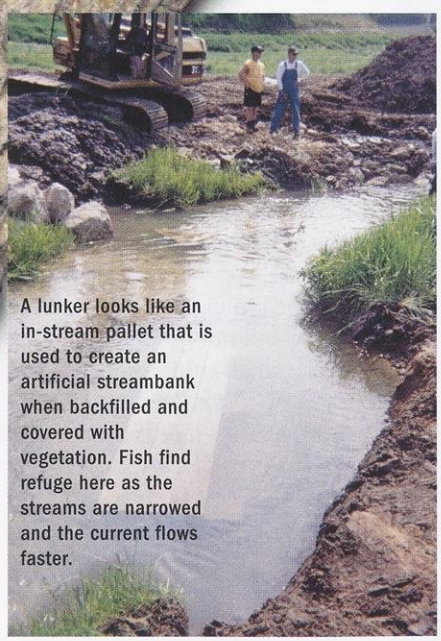
Badger No. 2 during her days as a passenger car in the mid-1960s.

A stick in time

Up from the depths, a malodorous, mud-covered piece of wood reveals a sliver of Wisconsin's natural history.

Story and photos by John Koch

It's not much to look at: A bit too big to call a stick, but not quite big enough to call a log, the piece of wood is more or less straight, eight inches long by about an inch in diameter. Black on one end, fading to gray on the other, it's splotched here and there with ocher-colored mud. ■ It smells funny, too. ■ I pulled it out of the bank of a small stream close to my home. This stream runs through an open field, a former pasture where a herd of cattle once grazed. Now the cattle and clover are gone; all that's left is the creek.



A lunker looks like an in-stream pallet that is used to create an artificial streambank when backfilled and covered with vegetation. Fish find refuge here as the streams are narrowed and the current flows faster.

I was at the creek with my seven-year-old daughter. We had met a couple of friends there, one a habitat biologist with the Wisconsin Department of Natural Resources, the other his seasonal assistant. We were waiting for more people to show up, and together we would help out with a restoration project that still another friend from Trout Unlimited had organized. The project centered on restoring the stream to a point where its wild brook trout could not only survive, but reproduce as well. A century of neglected land management practices had sapped the stream's vitality. High stream banks regularly collapsed, dumping soil that made the waters warm and murky. The silt blanketed gravel spawning beds and provided the barest minimum of underbank fish cover. Sloughing stream banks kept any overhead cover from setting root. Woody debris and constantly shifting loads of soil made the stream shallower and shallower after every rainfall. Shocking surveys indicated only a few small char lived here.

While we were waiting, my friend from the DNR caught me up on the details of the project. He showed me where the wooden "lunkers" had been placed a few hours earlier. Tucked along the stream's edge under the water, a lunker — basically a large wooden pallet — would serve as the base of a new bank. We'd pile rock on top of the pallet, and later bulldoze dirt over that. Once seeded with grass, a lunker eventually looks like a natural cut bank, accomplishing a number of

Volunteer work crews fill in soil and replant vegetation to stem erosion, restore a natural look and establish plantlife that will host insects as the streamside habitat recovers.

things all at once. The horizontal space between the slats of the wooden structure becomes home to many types of fish, both trout and other species. The turf-covered rock stabilizes collapsing banks, narrows the stream channel and attracts insects that eventually become fish food. In a narrower channel a stream runs swifter and colder than before, and is better able to scour away accumulated sediment smothering the gravel beds so vital for spawning fish.

My friend the biologist mentioned that he had pulled a very interesting piece of wood out of the sediment making up the river banks down underneath the water.

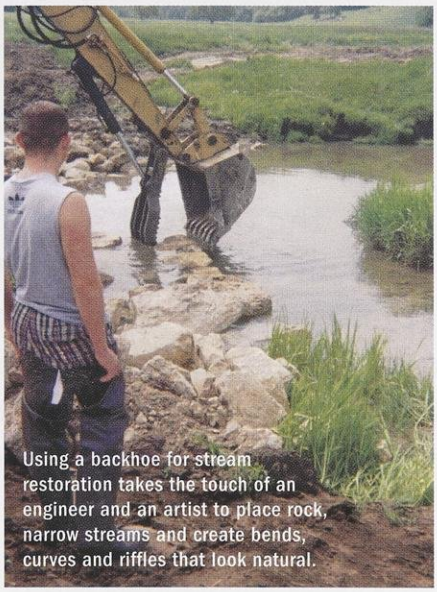
"I've sent it in to be Carbon-14 dated, but I'm pretty sure it's between four and eight thousand years old," he said.

Come again?

"There is a bunch of it down here. Let me show you."

We walked over to the bank, and he pointed down to the edge of the stream. Sticking out of the bank under the water was a snag of wood. I stumbled down to it and pointed a questioning finger at it.

"Yeah, that's one of them," he replied. "They're all over down through there." My friend went on to explain how you could tell the ancient timber's approximate age by the angle and depth of the wood deposition. Below



Using a backhoe for stream restoration takes the touch of an engineer and an artist to place rock, narrow streams and create bends, curves and riffles that look natural.

the agricultural runoff of the previous century lay the former stream bank. Below this lay gravel and fine-grained, wind-blown loess clay beds deposited by the glaciers. Sticking out of this was an ugly piece of wood, a bit too big to call a stick, but not quite big enough to call a log.

I grabbed hold and pulled the stinking, mud-covered branch out of the bank.

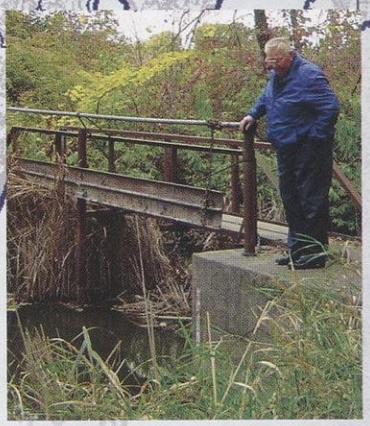
By its appearance, it was one of the primary branches from a large evergreen, perhaps a hemlock or a spruce. The tree provided shade and cover to a wide range of animal life: 1,000 years ago bears, large cats, rodents and ungulates such as deer, elk, moose and woodland caribou roamed the Wisconsin woods. If the piece of wood turns out to be truly ancient — 6,000 to 8,000 years old — then it's quite possible that a wooly rhinoceros or a mammoth had browsed along its branches.

The tree might have shaded this same creek, and while it's almost certain this little river was running then as it is now in this general area, it is anybody's guess exactly where the stream bed lay long ago. It would take a major excavation of the entire area to figure that out, and that isn't the point of this project. If this was the stream's original bed, brook trout were here. It would be something like a poem to say the fish flashing beneath our feet were descendants of Pleistocene brookies, but that is probably not the case: most of Wisconsin's brookie broodstock, except in a few rare cases, came decades ago from Maine, brought here after logging, overfishing and agricultural runoff choked out the original stocks.

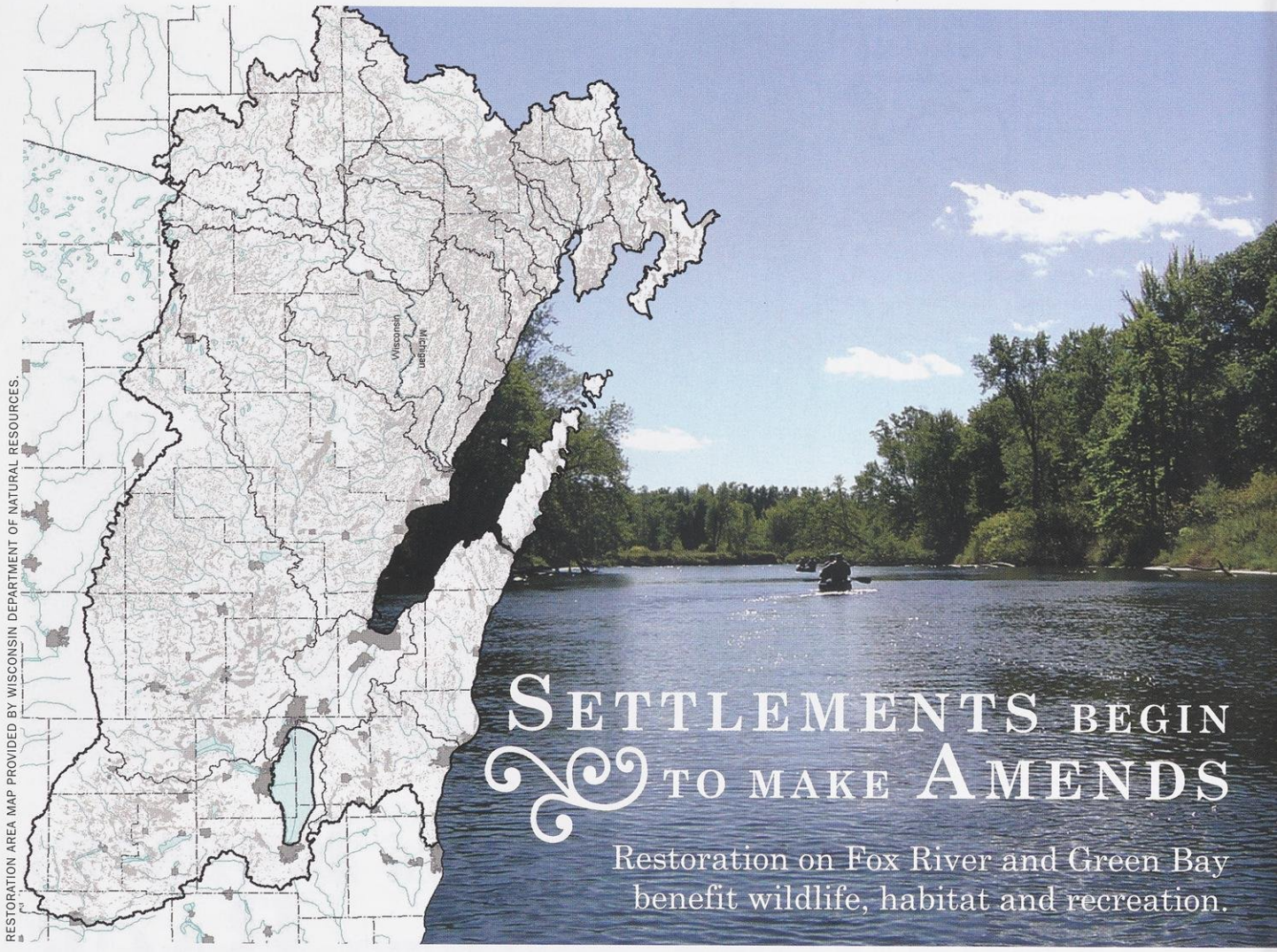
If the branch turns out to be not quite as old as we had hoped, amazing possibilities still remain. Perhaps this branch came from a tree that sheltered some of the earliest Wisconsinites. I watched my dark-haired daughter playing in the creek; I could imagine a similar daughter 2,000 years ago, playing under the majestic evergreen my stick came from. Kneeling at the base of the tree among its gnarled roots, she would have laughed into the shady gloam as the babbling brook splashed her. Or maybe she gazed at an approaching thunderstorm from the tree, clinging to my branch as she worriedly watched purple clouds build in the west, lightning walking the path of the primitive gods towards her and her family's camp.

It's not much to look at. A bit too big to call a stick, but not quite big enough to call a log. It smells funny, too. But this branch has a history as vast as the centuries, and the story it tells is as old as wonder itself.

John Koch is a printmaker, photographer and essayist whose Trout Lily Studio is in Spring Valley. Carbon dating revealed the stick was 1,800 years old.



A River under Repair: the Fox fights Back



RESTORATION AREA MAP PROVIDED BY WISCONSIN DEPARTMENT OF NATURAL RESOURCES.

SETTLEMENTS BEGIN TO MAKE AMENDS

Restoration on Fox River and Green Bay benefit wildlife, habitat and recreation.

By Colette Charbonneau and Greg Hill

THE Lower Fox River and Green Bay areas hold a treasure of natural resources. Situated on one of the major bird migration routes in North America, the Mississippi flyway, the Fox River and Green Bay environment provides essential habitat for large populations of breeding and migratory birds. The terrestrial, wetland and aquatic habitats in the watershed support a wide diversity of songbirds, shorebirds and waterfowl.

Green Bay and its tributaries also support an important, nationally known fishery. The wetlands along the bay's west shore, as well as the wetlands lining the many streams and rivers that flow into Green Bay, provide critical fish spawning habitat for perch, northerns, walleye and the elusive spotted musky. Cold, deep waters characterize the open waters of outer Green Bay, which support coldwater fish such as trout and salmon.

The shoreline along Lake Michigan, Green Bay and its tributaries is popular for recreational activities such as hiking, boating and fishing as well as snowmobiling, cross-country skiing and ice fishing. Many state parks and state and federal wildlife areas are scattered throughout the watershed providing camping, trails and hunting opportunities for locals and visitors. The natural resources of the Lower Fox River and Green Bay are important to tourism and the local economy.

People have long used the region for transportation, commerce, energy, food (fish and waterfowl) and recreation. Industries developed rapidly in the Lower Fox River Valley due to water availability. The earliest paper mill was established in Appleton in 1853 with the paper industry growing to include 20 paper mills along the 37 miles of the Lower Fox River, which may be the largest concentration of pulp and paper industries in the world.

Starting in the mid-1950s, carbonless copy paper was developed and produced in the Lower Fox River Valley. Carbonless copy paper was manufactured between 1954 and 1971, however some other paper mills deinked and recycled the carbonless copy paper and continued to release polychlorinated biphenyls (PCBs) through 1980. As a result of

these processes, an estimated 70,000 pounds of PCBs were released into the Fox River. PCBs have become attached to the sediment in the river and carried downstream into Green Bay and, ultimately, Lake Michigan over the decades.

In 1971, PCBs at relatively low concentrations were shown to harm living organisms leading the U.S. Environmental Protection Agency (EPA) to prohibit the release of PCBs into the environment. PCBs do not readily break down in the environment, and in fact, tend to accumulate at higher and higher concentrations through the food chain.

PCBs are considered probable human carcinogens and are known to cause cancer in animals. PCBs are also linked to adverse health effects in humans such as developmental impairments, reduced birth weight and reduced ability to fight infections. Reproductive failures, deformities, and behavior abnormalities in fish and wildlife have been linked to PCBs.

The Department of Natural Resources (DNR) estimates that approximately 64,000 pounds of PCBs remain in Lower Fox River sediments today.

The DNR, EPA and liable paper companies are responsible for as much cleanup of the PCB contaminated sediment from the environment as is feasible. As part of the efforts to address this cleanup, the DNR, U.S. Fish and Wildlife Service (FWS), Menominee Indian Tribe of Wisconsin, Oneida Tribe of Indians of Wisconsin, and the State of Michigan are collectively rehabilitating impacted fish and wildlife, and have formed the Fox River/Green Bay Natural Resource Trustee Council.

The council has documented injuries to natural resources in the Lower Fox River and Green Bay through the natural resource damage assessment and restoration process (NRDAR). The NRDAR process is part of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA, more commonly known as Superfund) and is used to restore natural resources injured by releases of hazardous substances.

TIM LIZOTTE

Outlet channel on Rush Lake has been dredged.

The term "injury" refers to adverse changes or direct harm to natural resources as a result of this exposure.

Injured resources may also appear as diminished recreational opportunities such as fishing, boating and wildlife viewing. Injuries in the Lower Fox River and Green Bay include damage to surface water, sediment, fish, wildlife and their supporting habitats, recreational fishing, waterfowl hunting, and cultural resources of the Indian tribes of the area.

The process is funded by those found responsible for releasing hazardous substances into the environment, not by taxpayers. Today, funds come from a final NRDAR settlement reached with Georgia-Pacific Corp., and interim settlements reached with Appleton Papers, Inc. (Arjo Wiggins), NCR Corporation, P.H. Glatfelter Co., and WTM1 (formerly Wisconsin Tissue Mills). The Trustees have not reached any settlement agreements with the other potential responsible parties, Riverside Papers or U.S. Papers-DePere.

The term "damages" refers to the claim sought by the Trustee Council as compensation for injuries to natural resources. Compensation includes restoration projects by the paper companies and a cash settlement to be used by the Trustee Council.

Projects aim to restore or reclaim the injured natural resources, or, if that is not possible, replace or acquire equivalent resources that were lost or harmed.

The Fox River/Green Bay Natural Resource Trustee Council has allocated over $35 million from the settlements. The trustee agencies and partners have provided over $14 million in matching funds.

According to Bruce Baker, DNR representative on the council, "By using NRDAR funds to match funding from other sources, the agencies, local governments and other partners can accomplish projects that any single funding source would have difficulty putting together."

"It is wonderful to see good restoration projects brought to the trustee council for approval," stated Charlie Wooley, FWS representative to the council. "These projects will provide important habitat for natural resources and the Green Bay watershed as a whole."

Read on to learn more about projects supported by NRDAR funding.

— Colette Charbonneau is restoration coordinator for the U.S. Fish and Wildlife Service in Green Bay. For further information on NRDAR projects, contact Charbonneau at Colette_Charbonneau@fws.gov or at (920) 866-1726.

— Greg Hill is implementation coordinator for the Wisconsin Department of Natural Resources.

U.S. FISH AND WILDLIFE SERVICE

Great lakes musky Reintroduction

A top fish predator receives support.

By Colette Charbonneau

TOM NELSON

This spotted musky was collected during fall sampling.

THERE is something amiss in the waters of Green Bay and its tributaries — and it isn't just PCB contamination. The fish community is unbalanced — few fish, few species of top predators and little prey, but plenty of exotic species. Top fish predators are an important part of a fish community that keeps the underwater world in balance.

The Fox River/Green Bay Natural Resource Trustee Council has financially supported stocking Great Lakes spotted musky to help bring these large native predators back into the Green Bay watershed. Partners in the project included several musky clubs in Northeastern Wisconsin.

The NRDAR provided $300,000 to expand programs to reintroduce native spotted muskellunge, including expanding the Wild Rose Fish Hatchery production of fall fingerling and yearling spotted muskellunge from 4,000 to 10,000 fish. The fund also covers increased feed costs at the hatchery for 15 years.

TOM NELSON

"The DNR had success with limited stocking programs in 2002, when support from the trustee council provided a major expansion in 2003," says George Boronow, DNR's Lower Fox River and Upper Green Bay basins supervisor. "The DNR was able to more than double its production of these important fish."

In spring 2003, spotted musky eggs were collected and fertilized from wild donor populations. The fertilized eggs were transported to the Wild Rose Fish Hatchery where the eggs hatched and young muskies were raised to a "finger-size" for stocking. The major cost of raising the young fish to an appropriate size covers food.

"We had an extremely successful year producing approximately 40,000 small spotted muskies; 10,000 fish over our goal," explains Steve Fajfer, supervisor at DNR's Wild Rose Hatchery.

The young spotted muskies were released last fall into the Lower Fox River, Little Lake Butte des Morts, Peshtigo River, Menominee River, near Sturgeon Bay, Little Sturgeon Bay and Lake Winnebago. As these predators grow, they will become loners. They will lurk in the aquatic weeds, dart out, capture their prey and begin to balance the community of fish in the waters of Green Bay. The fish stocked by this project should start reproducing and further building the fishery population in the next three to five years. The fishing is excellent now and should get only better.

LAKE STURGEON HABITAT RESTORATION

Generating the data fisheries biologists need.

By Colette Charbonneau

COORDINATION among U.S. Fish and Wildlife Service, Wisconsin Department of Natural Resources and Purdue University staff led to assessing lake sturgeon habitat in Green Bay and northern Lake Michigan tributaries. The project will provide information to set a plan to preserve, restore and enhance lake sturgeon habitat. Fisheries biologists need this information to focus restoration efforts on the most productive lake sturgeon areas. The project is funded by the Fox River/Green Bay Natural Resource Trustee Council, Great Lakes Fishery Trust and Purdue University.

Co-funded with $50,000 of settlement money, the project has measured different habitat characteristics above and below dams in tributaries of Green Bay and the Manistique River in Michigan during the spring and summer.

Green Bay tributaries include the Fox, Oconto, Peshtigo, Menominee, Escanaba, Suamico and Pensaukee Rivers. Water depth, river current speed, temperature, dissolved oxygen and turbidity have been recorded in known sturgeon habitat and in areas where experts believe sturgeon feed, spawn and rear their young.

All of this information will be used to make maps available of lake sturgeon habitats in each tributary. The maps will then be used by sturgeon experts for ranking:

- the relative size, type and quality of habitat found
- if the habitat can be enhanced or restored
- if the fish can reach the habitat without swimming into existing barriers such as dams.

Rob Elliott, U.S. Fish and Wildlife Service fisheries biologist, explains the importance of understanding this complex fish. "By increasing our understanding of available habitat and habitat quality during all lake sturgeon life stages, the project will direct future lake sturgeon habitat enhancement and restoration."

ROB ELLIOTT

Sturgeon populations are rebounding.

Lake sturgeon are relics from the dinosaur age. They are non-bony fish with bony plates along the body instead of scales. They have a flexible notochord in place of a spine, a long snout and a tubular mouth with no teeth. In the United States, Wisconsin and Michigan have the largest remaining populations of these fish.

They can live to be 150 years old, grow to over eight feet in length and weigh over 200 pounds. Female lake sturgeon do not produce eggs until they are 20 to 25 years old and spawn only once every four to six years. Male lake sturgeon mature at around 15 years old.

For these reasons, these fish have a low reproductive rate. It can take many generations to recover from human intervention. Other population threats include overfishing, pollution and dam construction, which blocks movement to spawning areas.

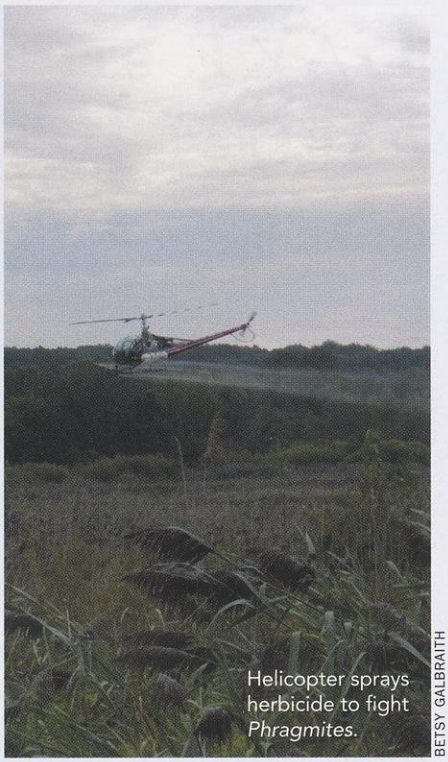
Early settlers quickly realized the economic value of these fish, harvesting sturgeon eggs for caviar and selling the succulent flesh smoked or fresh. A gelatin extracted from the sturgeon's swim bladder was used to congeal jams, jellies and to clarify alcoholic beverages. The tough hides were used like leather. Wisconsin established a minimum size limit in 1903. Commercial harvest in Lake Michigan was closed in 1929. Highly restrictive fishing regulations continue today. While the lake sturgeon population has started to increase in some Wisconsin river systems, they are still rare in Lake Michigan including Green Bay.

Water quality improvements and harvest reductions have allowed populations to recover in Lake Michigan, but limited spawning and nursery habitat in historically important tributaries are a major problem.

"Assessing past and present habitat availability is necessary to rank efforts to replace, enhance or renew sturgeon habitats for successful restoration," Elliott says.

Betsy Galbraith and Jonas Hill, an intern who worked on invasive species for the Oneida Nation.

WES JOHNSON



Helicopter sprays herbicide to fight *Phragmites*.

BETSY GALBRAITH

On the 'Edge of the Woods'

Stopping the spread of giant reed grass in wetlands.

By Betsy Galbraith

IF you've driven by the "Edge of the Woods" in the Duck Creek Watershed in northeastern Wisconsin lately, you probably noticed the tall, brown grass covering the site. Giant reed grass, also called *Phragmites*, is invading many wetlands on the Oneida Reservation.

Originally from Asia, this grass crowds out native plants and wildlife. "We didn't think there could be anything worse than purple loosestrife in our wetlands, but then *Phragmites* came along," says Jonas Hill, an intern with the Onieda Environmental Quality Department.

Wetland habitat within this 80-acre tribal-owned property is degraded due to aggressive giant reed grass invasion. Duck Creek flows across the southern half of the property and its confluence with Trout Creek in the southwestern corner.

In 1998, a series of wetland scrapes and several dikes were constructed on the property to provide habitat for waterfowl. Since that time, *Phragmites* has gradually invaded the site and currently inhabits about 40 acres.

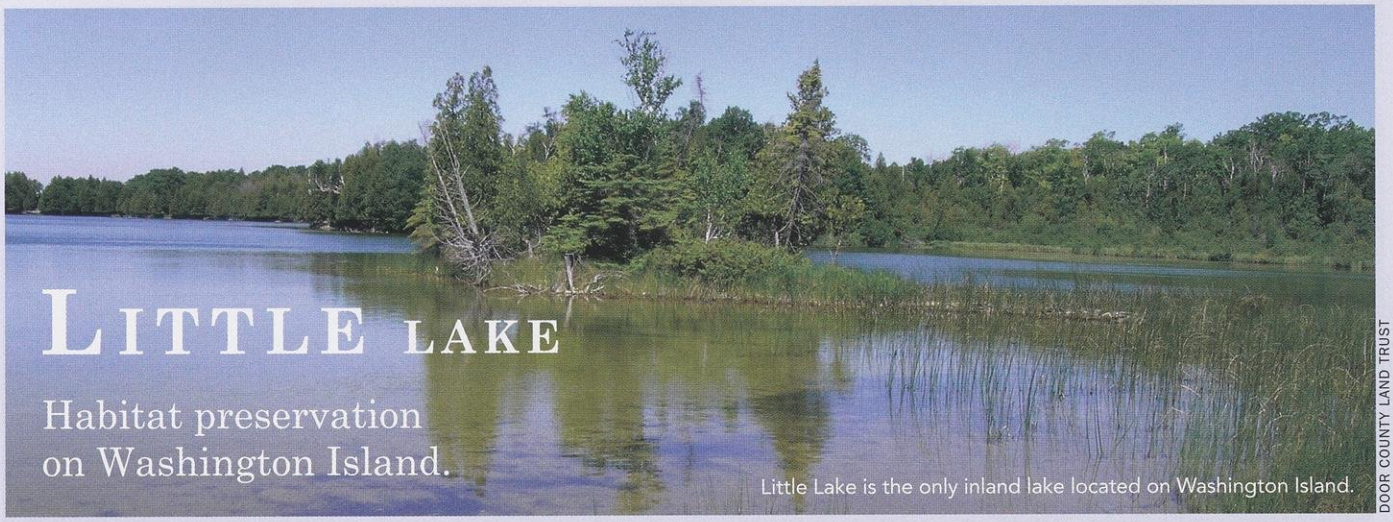
Much planning and research occurred to determine the best way to remove *Phragmites* and restore the wetlands. Research shows the best way to fight this aggressive grass is aerial herbicide application. Due to the extreme height of the grass, 10-14 feet, a helicopter was used to spray herbicide. It is likely the site will need to be sprayed next summer too. A strategic reforestation plan will then be implemented with the help of the Oneida conservation crew.

About $35,000 from the NRDAR is supporting the project. Add to that $5,000 from the NRCS Wildlife Habitat Incentive Program (WHIP) and $5,000 from the U.S. Fish and Wildlife Service Partner's Program. In-kind services from the Oneida Environmental Quality Department include staff time for design and implementation of the project ($2,000).

Within a few years, the wetlands at the "Edge of the Woods" will once again be an enjoyable place for ducks, frogs and people.

Wetland restoration will improve habitat for waterfowl nesting and rearing broods, and during migration periods. Restoring a portion of Duck Creek's floodplain and adjacent upland habitat are first steps toward restoring the Duck Creek Watershed. Eradication of *Phragmites* will limit its spread throughout the reservation and adjacent counties. Long-term monitoring will include measuring reforestation success, wildlife use, and a zero tolerance policy for the *Phragmites* reinvasion.

— Betsy Galbraith is an environmental quality specialist for the Oneida Nation.



LITTLE LAKE

Habitat preservation on Washington Island.

Little Lake is the only inland lake located on Washington Island.

DOOR COUNTY LAND TRUST

By Colette Charbonneau

AFTER five years of work and negotiations, the Door County Land Trust has protected one of Washington Island's most unique hidden jewels: 53 acres of wetlands, forest and a large stretch of undeveloped shoreline on the shores of Little Lake and Green Bay. The Fox River/Green Bay Natural Resource Trustee Council funded the habitat preservation project with $298,000 along with $265,000 from the Knowles-Nelson State Stewardship Fund and $10,000 from a Door County Land Trust endowment to cover annual maintenance and stewardship costs.

The first step was purchasing acreage and securing a conservation easement on the Kurt and Carol Meyer property, the key parcel in this project area. On January 2, 2006, the Door County Land Trust purchased 16 acres from the Meyer family. A conservation easement is being finalized for the remaining 37 acres to protect the upland forests surrounding Little Lake from any future development.

The Meyer property was once home to a large village of Native Americans and a Native American burial ground. The Little Lake museum has a large collection of artifacts found on the Meyer property dating back 3,000 years. An Archeological Preservation Covenant with the Wisconsin Historical Society on 15 acres along the east shore of Little Lake protects the Native American artifacts.

Today, activities on the purchased land are limited to public recreation. The conservation easement ensures no additional buildings, subdivision or activities will threaten the natural features of the property. Limited agriculture is allowed and forestry activities are permitted according to a DNR Managed Forest Law plan.

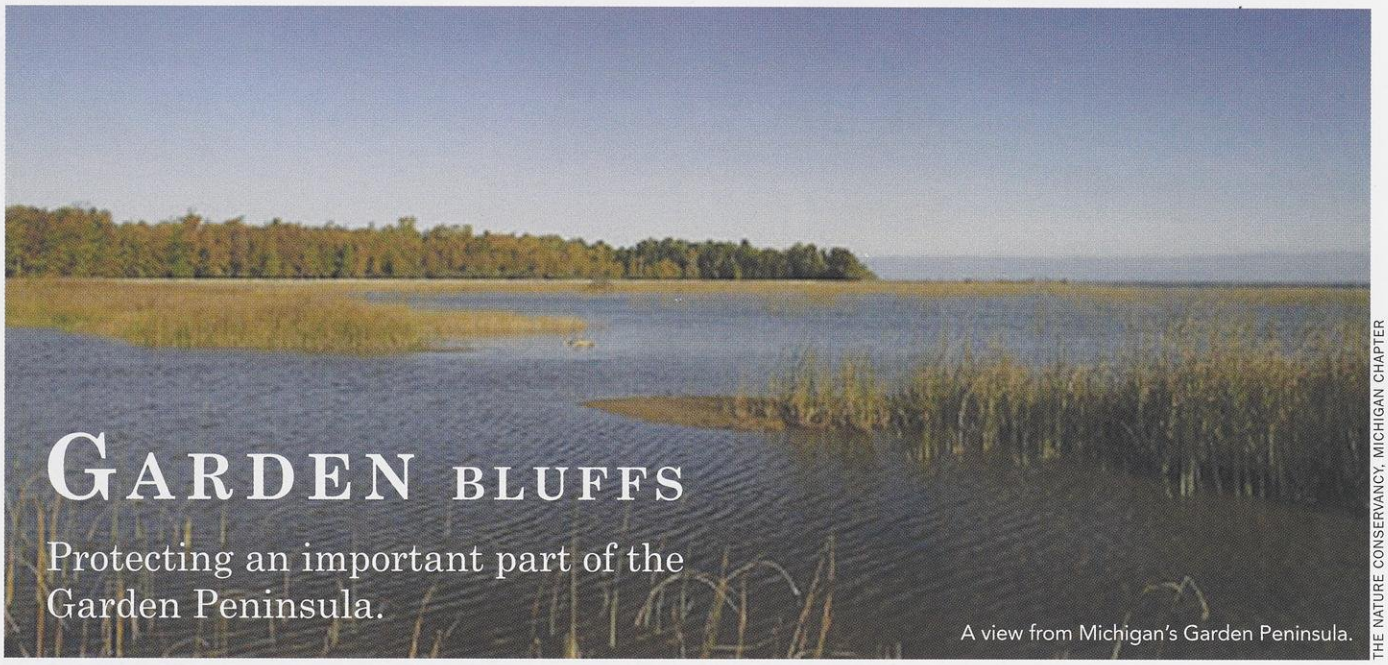
Currently, all lands adjacent to the Meyer property are in an undeveloped, natural state. The land protected by the land trust includes over 1,300 feet of shoreline and a small peninsula that extends into Little Lake. In addition, the groundwater springs that feed Little Lake as well as a five-acre spring-fed fen wetland and 10-acre lowland cedar forest have been preserved. The area is home to the dwarf lake iris *(Iris lacustris)*, a Great Lakes endemic plant found only on the shores of lakes Michigan and Huron.

The possible presence of the federally endangered Hine's emerald dragonfly in the wetlands is also significant. In addition, Little Lake supports a productive population of small panfish like perch, and rock bass as well as smallmouth bass. Little Lake also supports a large population of breeding waterfowl and the fen at northeast corner of the lake is a major breeding site for amphibians.

Little Lake is the only inland water located on Washington Island and is 24 acres in size with a maximum depth of only six feet. This small, landlocked lake, formed thousands of years ago as the shallow bay of glacial Lake Nippising was slowly closed off from Green Bay by sand and gravel deposits. As the glacial waters receded, a 250-foot wide cobblestone ridge formed to create Little Lake.

According to Terrie Cooper, Door County Land Trust's land program director, "Little Lake is one of Door County's ecological gems and an area most deserving protection. Unlike most inland lakes in Wisconsin, the majority of Little Lake's shoreline remains undeveloped." In December 2005, Cooper worked with the Department of Natural Resources to designate Little Lake as one of Wisconsin's newest State Natural Areas, a designation reserved for those places that still possess outstanding examples of the native plant and animal communities found here before European settlement.

For more information on Little Lake and other natural areas in Door County visit the Land Trust's web site at www.doorcountylandtrust.org.



GARDEN BLUFFS

Protecting an important part of the Garden Peninsula.

A view from Michigan's Garden Peninsula.

THE NATURE CONSERVANCY, MICHIGAN CHAPTER

By Colette Charbonneau

RESTORATION settlement funds paid for 230 acres of coastal plain marsh and buffering upland forest on the west side of Michigan's Garden Peninsula on Big Bay De Noc in northern Green Bay. The land acquisition added to a larger habitat protection project completed by The Nature Conservancy (TNC) that now encompasses over 650 acres and six miles of Lake Michigan frontage. The Fox River/Green Bay Natural Resource Trustee Council approved funding for the project in 2004.

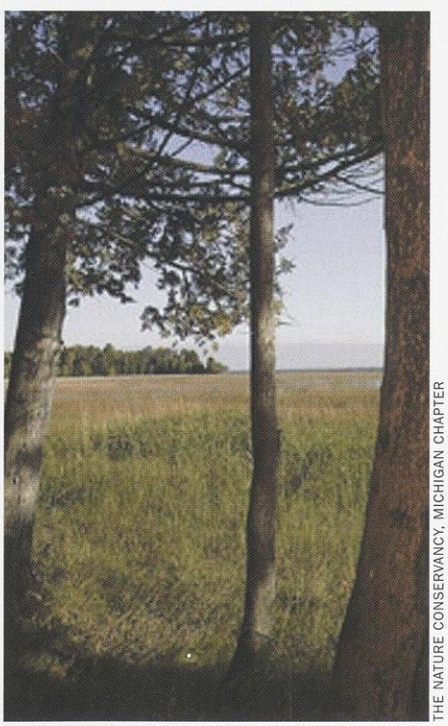
"This is a spectacular piece of property and we were fortunate that the owners care about conservation," says Jeff Knopp, TNC's director of protection for the Upper Peninsula. "We don't often get a chance like this to save miles of Lake Michigan shoreline and a spectacular hemlock forest." The new preserve, Garden Bluffs Conservation Area, will be owned and managed by TNC and open to the general public for passive recreational pursuits such as hiking, fishing and cross-country skiing.

The Garden Bluffs Conservation Area contains several exemplary natural communities from white cedar conifer mesic forest and coastal wetlands, to Great Lakes sand beach and extensive alkaline cliffs with rare ferns. Federally-threatened dwarf lake iris carpets the forest floor, while at least six other state-listed species can be found on the property.

The Michigan Department of Natural Resources has identified the coastal areas of the Garden Peninsula as outstanding cool- and cold-water fisheries due to the natural topography of the area. This includes the shallow shoals and coastal plain wetlands, most notably, shoreline areas in and around the Garden Bluffs. These coastal areas provide important nursery and foraging habitat for a variety of native fish species such as walleye, smallmouth bass and lake whitefish that were harmed due to the release of PCBs into the environment.

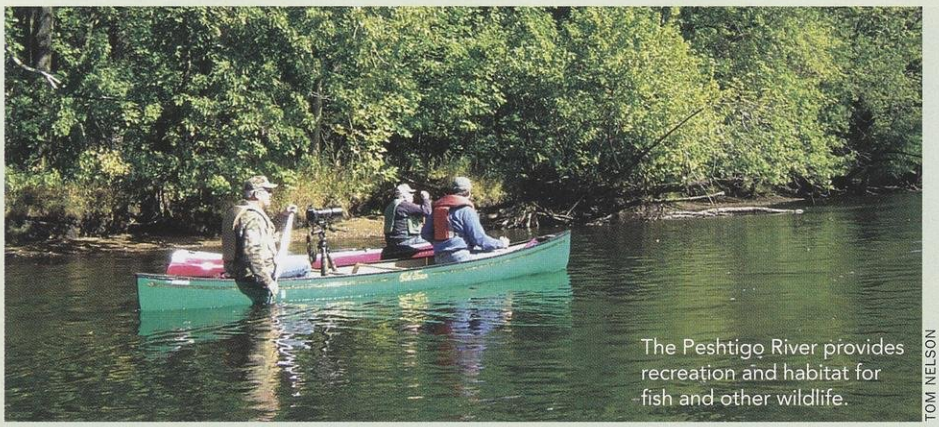
Birders have long considered the Garden Peninsula a haven for nesting and migratory shorebirds and songbirds. "While visiting the area with the Trustee Council's Restoration Technical Representatives Team in 2004, we found a pair of nesting bald eagles on the property," Knopp recalls. "The group also saw a pair of ospreys fly overhead." The area contains good habitat for other coastal birds including Caspian tern, common tern and black-crowned night heron.

Project partners include The Nature Conservancy, U.S. Fish and Wildlife Service, Michigan Department of Natural Resources, Michigan Attorney General's Office and two private land owners.



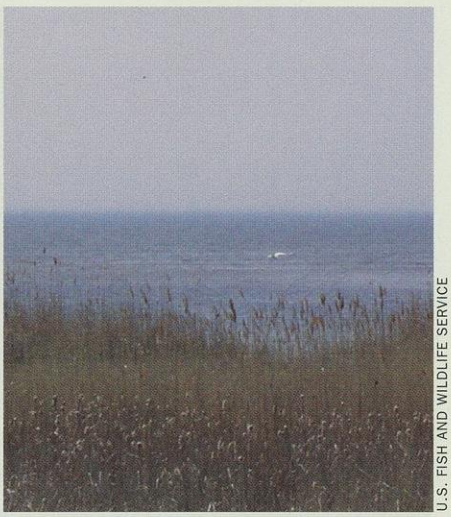
THE NATURE CONSERVANCY, MICHIGAN CHAPTER

The restoration area protects unique habitat.



The Peshtigo River provides recreation and habitat for fish and other wildlife.

TOM NELSON



U.S. FISH AND WILDLIFE SERVICE

LOWER PESHTIGO RIVER HABITAT PRESERVATION

Land purchase provides water and land trails.

By Tom Nelson

THE Lower Peshtigo River wetlands are a Wisconsin natural jewel. A diverse environment with hardwood and softwood forests, wetlands along a meandering river and coastal wetlands on the shore of Green Bay, these high-quality ecosystems are capable of supporting a wide variety of aquatic and terrestrial wildlife.

The Peshtigo River Trail, a canoe route from Peshtigo to the river's mouth on Green Bay, takes you past areas where fish, bird and mammal habitat has been preserved to help the fish and wildlife that have been injured by the release of PCBs into the Lower Fox River and Green Bay. This trail, along with three trails on state-owned lands in the coastal area, provides recreational opportunities and education about the wetland resources under protection.

Through the final NRDAR settlement with Georgia-Pacific, 900 acres have been acquired in the area and donated to the Wisconsin Department of Natural Resources. This acreage connects the Peshtigo Harbor Unit of the Green Bay West Shore Wildlife Area, the Bloch Oxbow Natural Area, and remaining underdeveloped river shoreline. The land has an estimated value of $2.5 million. This strategically located property ensures protection of frontage along the Peshtigo River — the last natural river emptying into the western shore of Green Bay — by the DNR.

According to Greg Cleereman, Marinette County conservationist, "Purchase of additional lands through the trustee council was the trigger to establish the water trail and now three land trails."

Emergent marsh (a swamp that dries up and comes back naturally), meadows and floodplain forests make up the wetlands. On a lazy afternoon canoe trip along the trail, you might see eagles, great blue herons, ducks and geese. Steep sand banks on the Bloch Oxbow Natural Area provide nesting sites for swallows, while the dry forested land above the bank is habitat for several threatened bird species.

The property is part of the foraging range of bald eagles from at least three known eagle nesting sites along the Peshtigo River. The forested shoreline and river provide good habitat for numerous species that may have been affected by PCBs, including bald eagle, osprey, red-shouldered hawk, mink, beaver, northern pike, suckers and sturgeon.

Portions of the property will grow into forested buffer areas and restore natural hydrological conditions, helping create and improve wetland habitat for fish and wildlife. Preserving this corridor will also benefit downstream areas such as Green Bay and the mouth of the Peshtigo River, through erosion control, nutrient recycling, and control of runoff pollution. The mouth of the Peshtigo River provides significant foraging habitat for numerous species of concern, including bald eagles, ospreys, and common, Forster's and Caspian terns.

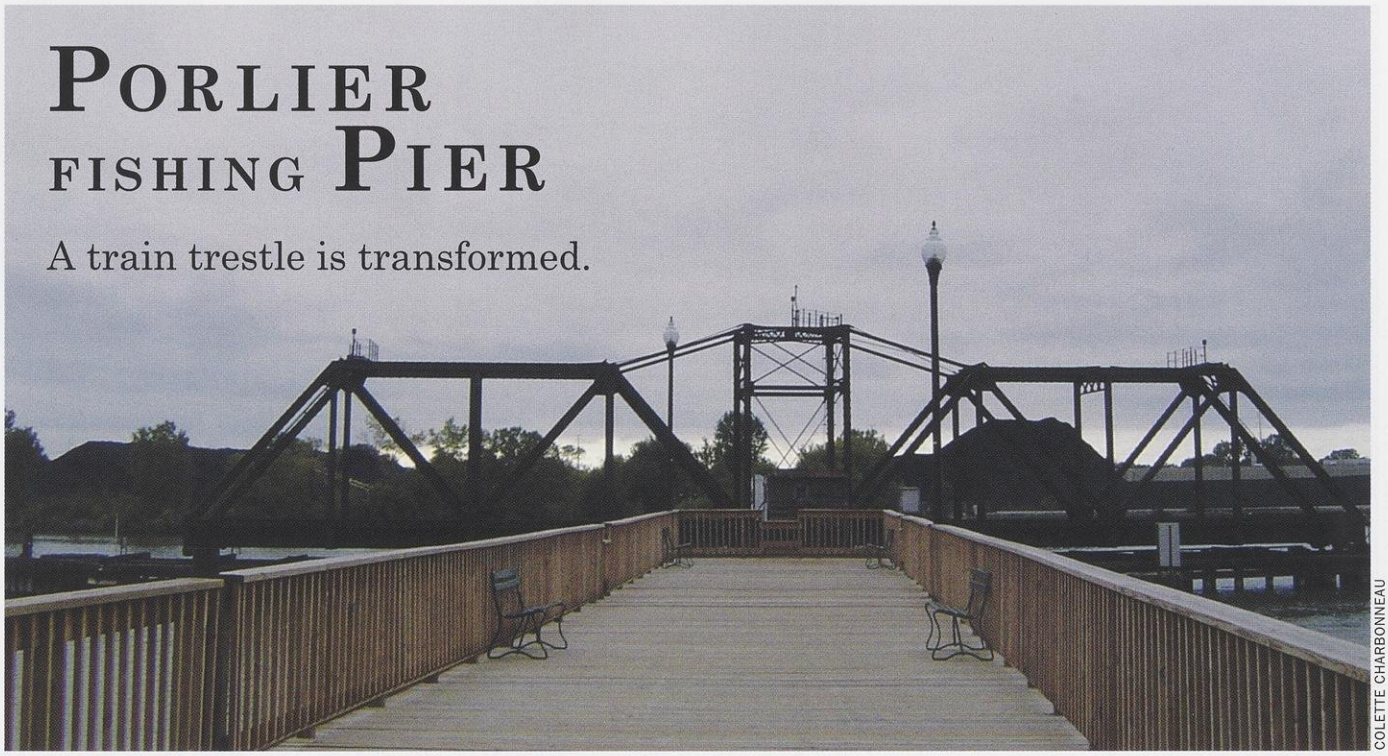
The river's rocky bottom is home to numerous fish species. Shallow areas and floodplains provide spawning habitat while other areas offer anyone venturing onto this stretch of the Peshtigo River the opportunity to go sport fishing.

While the shoreline provides excellent habitat for wildlife, it will also provide exceptional outdoor experiences for anyone making the trip into the area. Marinette County Land and Water Conservation Department, the University of Wisconsin-Extension and the DNR have acquired a grant to develop a land trail system through the area in addition to the existing water trail.

— Tom Nelson is a U.S. Fish and Wildlife Service volunteer.

Porlier fishing Pier

A train trestle is transformed.



COLETTE CHARBONNEAU

By Natasha Kassulke

WHAT was once an eyesore has become a popular fishing spot and viewing area for everything from sunsets to fireworks.

Using $200,000 from the NRDAR, the Porlier fishing pier and observation area was created on Green Bay's east side. The pier was once a trestle that carried trains across the Fox River, but it fell into disrepair and had been unused since the 1990s. The pier trestle was further damaged by arsonists in 2003 but remained structurally sound.

This project, led by the city of Green Bay, involved constructing a barrier-free fishing structure on the shore of the Lower Fox River at Porlier Street. The new facility also provides increased shoreline fishing access to the game fish passing through the waters of the Lower Fox River. The pier is enclosed by wooden railings.

This project seeks to bring people back to the waterfront to enjoy and appreciate the resource again. As an added attraction, the fishing pier connects to the Fox River Trail, which is popular with walkers and bicyclists.

George Boronow, a DNR fisheries program manager and avid angler, says the area also has become quite the hot spot along the Fox River for shoreline fishing.

— Natasha Kassulke is associate editor of Wisconsin Natural Resources *magazine.*

COLETTE CHARBONNEAU

An old pumphouse is renovated to allow great accessibility and ventilation.

KYLE ANDERSON

OUTAGAMIE DIKE REPAIR, PUMP AND PUMP HOUSING

A critical connection between water levels and wildlife.

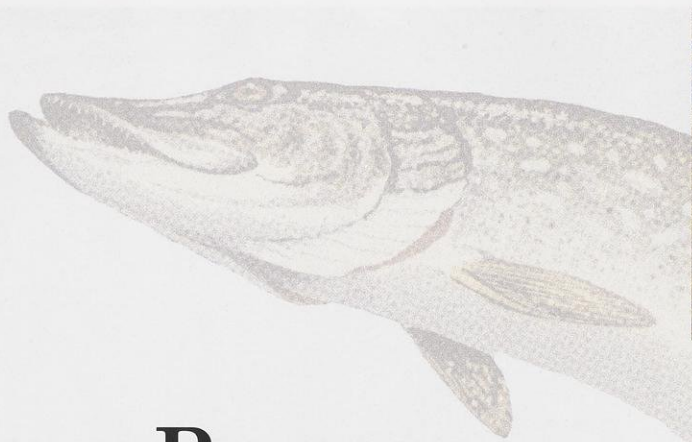
By Natasha Kassulke

THE 997-acre Outagamie Wildlife Area, located six miles north of Shiocton in the towns of Bovina and Maine, is a popular place for watching wildlife from the parking areas or from the dikes. Yet, during spring and fall, the Wolf River often floods the area. In the summer, droughts dry up important nesting and migratory areas. The major nesting species in these areas are mallards, black ducks, blue-winged teal, mergansers and wood ducks. Migrants include these species and a variety of dabbling and diving ducks.

To regulate the water levels in the area and provide protected areas and food sources for wildlife, the NRDAR has invested $50,000 in dike repair and securing a building for efficient pump maintenance. With no repairs, the structure would have deteriorated, causing bigger bills in the future. The old pumphouse did not provide adequate ventilation or security, and the pump was inaccessible. During the summer months, the temperature inside the pumphouse caused the pump motor to shut off. The small door did not allow efficient pump removal for repairs and the building was damaged by weather and vandalism.

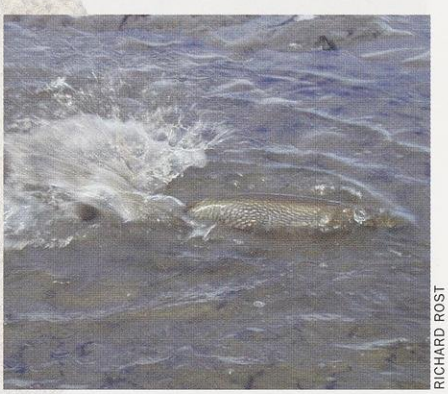
If successful, the Outagamie dike repair and pump project will increase waterfowl production, add brood rearing sites, stabilize water depths, and provide a sightseeing area for the public to view wildlife. Sedges and other native waterfowl food sources also are managed on this property by maintaining water flow. The pumping unit is very important in preserving plant communities.

Several hundred ducks live here and the property is also home to ospreys, great egrets, black terns, red shouldered hawks, northern shrikes, little green herons, yellow-headed blackbirds and Blanding's turtles. Several of these species are classified as threatened within Wisconsin. The community also stands to capitalize on the investment. The northern Outagamie business community will be relying on this area as a tourist attraction.



NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION FILE PHOTO

RICHARD ROST



RICHARD ROST

A TOP PREDATOR GETS A SECOND CHANCE

Northern pike habitat preservation project underway.

By Natasha Kassulke

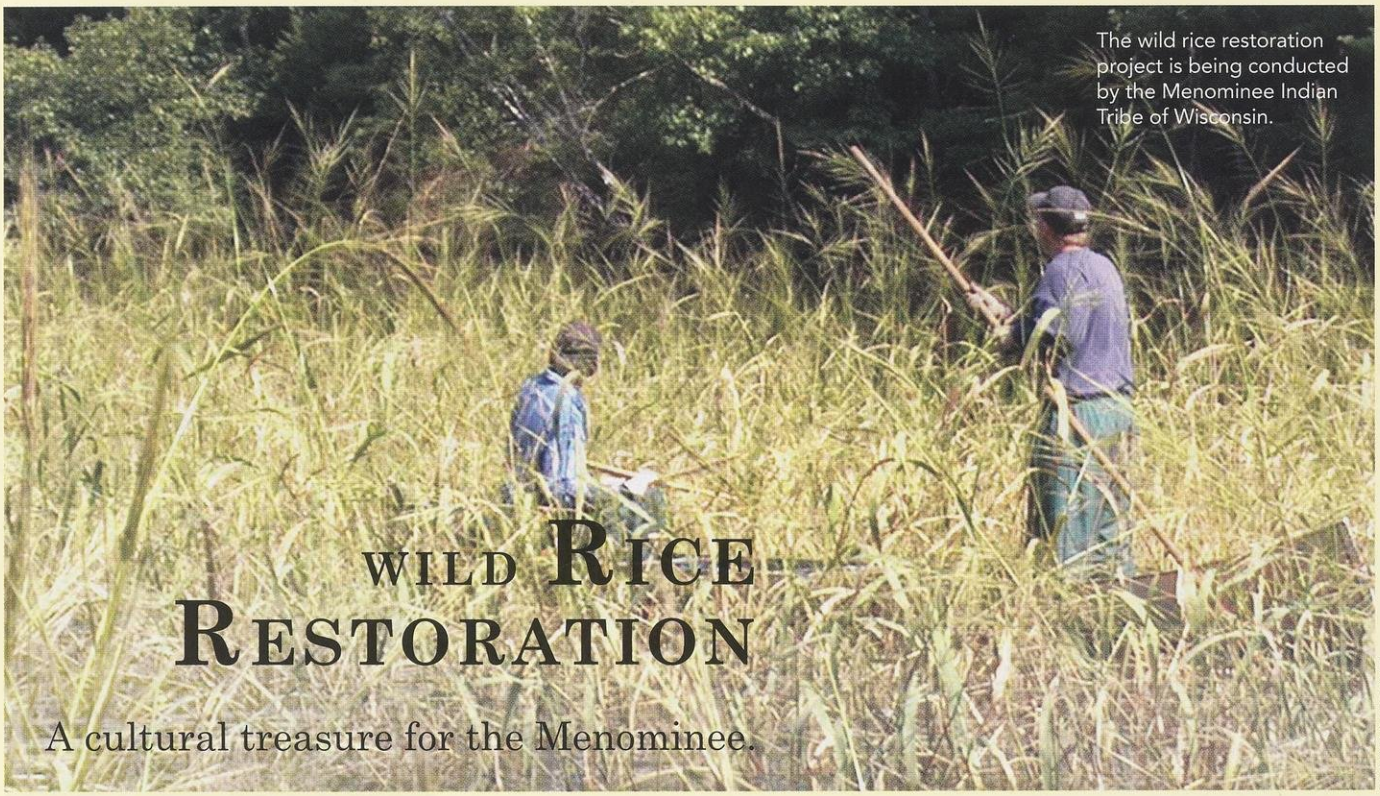
THIS project is an important story for another top predator in Green Bay. The Green Bay West Shores Wildlife Area, located along selected wetland parcels of 42 miles of shoreline between Green Bay and Marinette is critical habitat for northern pike on their annual migration to spawn and find nursery areas for their young.

Studies by Department of Natural Resources fisheries staff since 1991 indicate this top predator is largely dependent upon streams and wetlands along the west shore. They travel as far as 22 miles from the bay to spawn. These waterways include the major tributaries to Green Bay as well as smaller streams and creeks. Roadside ditches that drain to Green Bay are also used by northern pike to reach spawning habitats.

NRDAR funding specific to the Green Bay West Shores Area has created a unique opportunity to acquire critical habitats in this area. Public support is strong both from local units of government and conservation organizations including The Nature Conservancy, University of Wisconsin - Green Bay, and Northeast Wisconsin Land Trust.

To preserve this critical habitat, DNR has purchased 615.53 acres using $2.3 million of NRDAR settlement money with another $555,253 in matching funds. The department is negotiating for additional acreage in this priority area.

RICHARD ROST



The wild rice restoration project is being conducted by the Menominee Indian Tribe of Wisconsin.

MENOMINEE TRIBE

WILD RICE RESTORATION

A cultural treasure for the Menominee.

By Natasha Kassulke

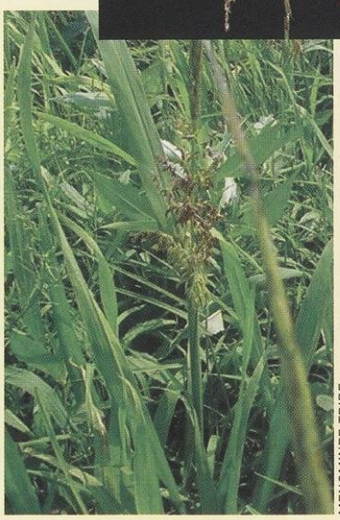
THE Menominee is an Algonquin speaking nation and the name "O-MAEQ-NO-MIN-NI-WUK" means Wild Rice People. Wild rice once grew abundantly in the great flats along the Menominee River and wild rice has always been a staple food for Great Lakes Indian people. Today, however, the distribution of wild rice has been greatly reduced from its historical range within the Great Lakes region and specifically within the Menominee Indian Reservation.

By the 1970s the amount of wild rice growing had dwindled significantly for unknown reasons. Also a large development in the southeastern portion of the reservation destroyed eight lakes. The development came about after a Congressional act terminated the tribal status of the Menominee, and before 1972 when a new restoration act was passed. The impacts of termination were severe economically, socially, culturally and environmentally. The tribe still feels the consequences.

This project strives to establish viable wild rice stands that can be harvested to sustain the Menominee people, something that has been absent on the reservation for nearly 50 years. The $95,226 NRDAR-funded wild rice reintroduction work on the Menominee Indian Reservation is an aquatic and near-shore habitat quality improvement project that comes with cultural benefits.

First, the tribe assessed wetlands in various lakes to determine the suitability of sediment and habitat for wild rice reintroduction. The ecology of wild rice is not well understood and not widely studied, but during the past two years the tribe has undertaken studies on 30 lakes within the reservation to determine acceptable conditions for wild rice growth. This fall, the tribe seeded about 74 acres with wild rice in areas deemed the most suitable.

ANN MURRAY © 1998 UNIVERSITY OF FLORIDA



MENOMINEE TRIBE

RUSH LAKE RESTORATION

Water is clearer and the carp are on the run.


An aerial view of the outlet.

TIM LIZOTTE

Natasha Kassulke

RESTORING water quality and aquatic habitat are critical components of an intensive project on Rush Lake, a 3,000-acre prairie pothole in Winnebago County.

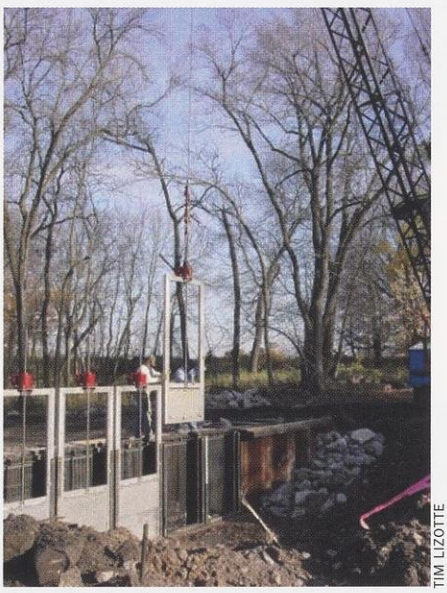
The project involves re-grading and dredging the outlet channel of the lake and replacing the existing dam with a more efficient structure that will allow a two-year drawdown of water levels. The drawdown is needed to stimulate the germination and establishment of aquatic vegetation that has severely declined on the lake over the past 20 years.

At the same time, non-native, invasive carp will be eliminated through winterkill and possible chemical treatment. These practices should restore the habitat for many species of wildlife and fish that use this wetland. In addition the DNR and partners are restoring smaller wetlands and native grasslands in the surrounding watershed.

Partners in this project include U.S. Fish and Wildlife Service, Ducks Unlimited, the Rush Lake Watershed Restoration, Inc., and the Wisconsin Historical Society.

Among the activities accomplished to date, Ducks Unlimited completed engineering plans for the new water control structure and channel dredging, DNR completed an environmental analysis and hosted a public hearing, water regulation permits were issued and the Wisconsin Historical Society completed a thorough archaeological survey of the project site and recovered artifacts in construction areas.

In addition, a new dam has been installed and the outlet channel was dredged and regraded. The new outlet channel follows the natural channel meanders, and includes rock and gravel habitat features. The new dam has six gates and will allow much better water level control in the lake. The dam also includes a mechanical carp barrier to prevent these harmful fish from entering the lake.


TIM LIZOTTE

Dropping the dam gates.


TIM LIZOTTE

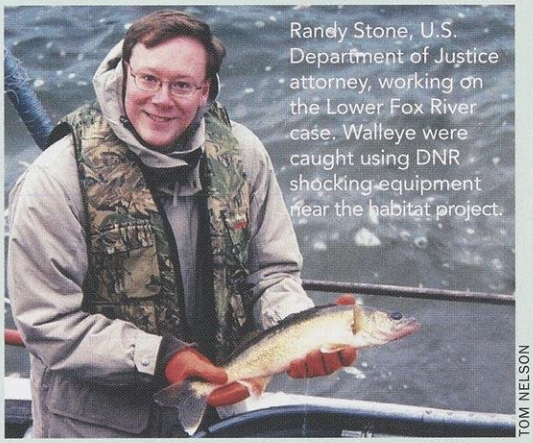
The 'Swamp Devil' cutting cattails.

Last year, the Bois Forte Band of Chippewa brought their "Swamp Devil" to Rush Lake to clear cattails from the outlet channel to the dam.

Most recently, old culverts on the outlet stream were replaced with free-span bridges that improve stream flow and facilitate the drawdown while allowing public access to the lake. The dam gates were opened last summer, and with the drawdown, mudflats were exposed and are beginning to green up with new plant growth. Over 3,000 acres of shallow and deep marsh will be restored in Rush Lake by project completion and water clarity is excellent.

Walleye habitat Restoration

South Bay Marina habitat enhancement project.



Randy Stone, U.S. Department of Justice attorney, working on the Lower Fox River case. Walleye were caught using DNR shocking equipment near the habitat project.

TOM NELSON

By Tom Nelson and George Boronow

THE Department of Natural Resources partnered with Walleyes for Tomorrow (WFT) and the owners of the South Bay Marina to install habitat structures as part of constructing a new marina. The purpose was to provide habitat protection and improvement of the environmentally degraded urban waterfront in the Lower Fox River and southern Green Bay. The project provided six acres of aquatic habitat.

The project also enhanced walleye spawning with reef habitat and rock boulders that provide spawning habitat for other predator species, such as smallmouth bass. The near-shore habitat provided fishery nursery areas. Boosting predator species enhanced the food web and improved the ecosystem balance over abundant prey species in the river and bay.

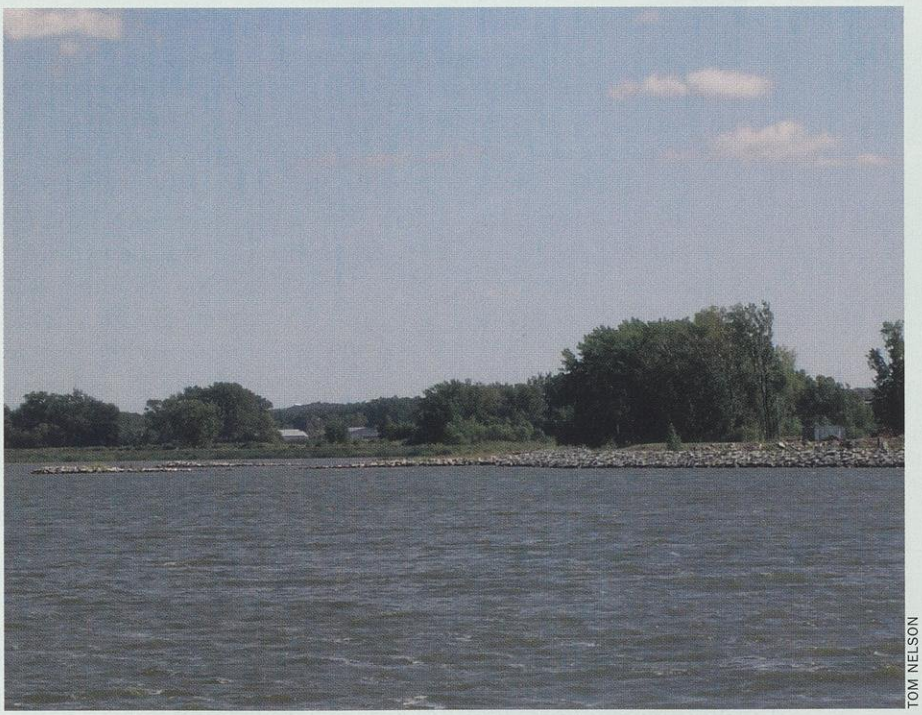
Shallow water habitat for fish, amphibians, reptiles and avian wildlife was developed by constructing two headland groins approximately 300 feet long. The headlands extend into the bay at a greater than 90-degree angle pointing northeast from the marina breakwall.

The headlands provide some wave protected habitat. A walleye spawning reef was constructed on the exposed, west side of the west headland. Wave action will wash the rock clean and maintain spawning habitat.

Construction was completed in 2003 with $98,000 from NRDAR funds to purchase stone, boulders, and gravel. Solar-powered navigation lights were purchased to place and mark the headlands to warn boaters of these shallow rock bars. Walleyes for Tomorrow provided $22,000 to purchase the crushed rock for the walleye spawning reef. The owners of South Bay Marina did the construction providing in-kind contributions for engineering, heavy equipment, time and all other costs.

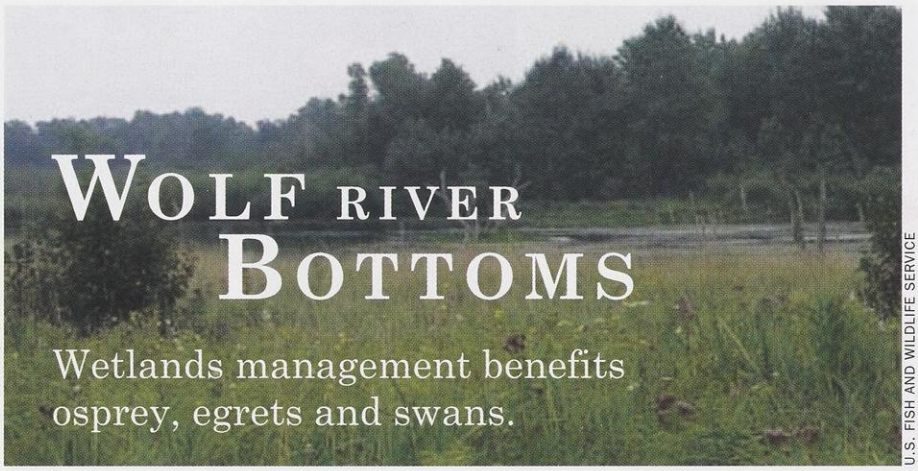
TOM NELSON

John Carlucci, Department of the Interior attorney working on the Lower Fox River case.



TOM NELSON

South Bay Marina walleye habitat.



Wolf River Bottoms

Wetlands management benefits osprey, egrets and swans.

U.S. FISH AND WILDLIFE SERVICE

By Natasha Kassulke

THE Wolf River Bottoms Wildlife Area project, in Outagamie County in the towns of Deer Creek and Maine has restored 850 acres of habitat for migratory waterfowl and threatened species such as osprey and great egrets. About 10 percent of the world's tundra swans also migrate through the Lower Wolf River Bottomlands Natural Resource Area in the spring.

To accomplish these goals, existing dikes have been improved and a new splinter dike was built, increasing the ability to manipulate water levels to benefit wildlife.

When this property was purchased by DNR in the early 1990s, nearly the entire dike system needed improvement. In the past few years, DNR staff reconstructed about three miles of dike and placed almost 1,000 acres of wetland under active management. Several miles of dike still needed to be restored in order to effectively manage the entire wetland complex on this property.

The restoration of the Wolf River Bottoms Wildlife Area was supported financially with $200,000 of NRDAR settlement funds. With this funding, woody vegetation has been removed from all dikes to provide access to water control structures in order to manipulate water levels. Filling in breaches and repairing muskrat damage on dikes, resetting or repairing water control structures, and recapping or rebuilding portions of dike were also completed. Pumping water into and releasing water from the wildlife areas was hampered by an unstable dike system.

Dike renovation allows more water on the property in dry periods, increasing the success of nesting waterfowl, allowing control of invading vegetation, and providing protected areas during the fall and spring migrations.

More recently, the Department of Natural Resources was able to purchase another 346.5 acres of land for $1.126 million in the Lower Wolf River Bottomlands Natural Resources Area that will be managed for wildlife and habitat, and provide public recreation and natural resources education. Funding for this land purchase was also provided by the NRDAR program.

INFORMATION ON RESTORATION AND PROJECTS that have been approved since 2002 can be found at dnr.wi.gov/org/water/wm/foxriver/restorationprojects.html or at www.fws.gov/midwest/nrda/

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ANOTHER SOURCE FOR FOX RIVER INFORMATION

Some of the articles in this supplement have also appeared in the *Fox River Current*, a quarterly publication of the Fox River Intergovernmental Partnership. Its purpose is to provide up-to-date information about cleanup and restoration efforts on the Lower Fox River. *The Current* is available at http://www.epa.gov/Region5/sites/foxriver/fox_current.htm or you can obtain a subscription by contacting Greg Swanson, DNR, CE/8, P.O. Box 7921, Madison, WI 53707-7921 or e-mail gregory.swanson@dnr.state.wi.us

Cultivating a better solution

Manure management is a fact of life for all livestock farmers, all year long. Before the crops are sown and after they are harvested, manure can be judiciously applied to farm soils. You have to have a plan to keep manure nutrients from becoming pollutants.

BOB NICHOLS, NRCS

Both in-ground and above ground storage areas can be designed to safely retain and contain manure in those seasons when landspreading is impractical. Here is an in-ground system on a Lafayette County dairy farm.

ROBERT QUEEN

Farms often developed near ready supplies of water needed for animals, irrigation and processing. Proximity to streams, ponds and rivers presents a challenge to keep nutrients in manure from reaching the water, but there are many solutions that protect both public health and the waterways.

Healthy farms, water protectors and communities are shaping better ways to manage manure.

DNR environmental communicators

It should have been just another sweet day on the Sugar River. Steve Haak and about a half dozen other members of the Upper Sugar River Watershed Association and the Deer Creek Sportsmen's Club had sharpened their pruning shears for a Saturday workout cutting back box elder and willow sprouts along the riverbanks. Five years, nearly $1 million and thousands of hours by volunteer groups had been spent cleaning up the west branch of the river that runs between Mount Vernon and Belleville in southern Dane County. The streambanks were riprapped, shoreline seeded, banks fenced and more than 1,000 fish habitat structures placed in a six-mile stretch of the west branch. This river reach had been hailed as a success story and celebrated as a place where clean water and dimpling trout again sparkled in the winter light. In February, the river should have flowed with about four to five feet of clear water.

But that wasn't the case.

"The water looked terrible," Haak recalled. "Gray, with about six inches of visibility and it smelled like manure. We trimmed brush on about a three-quarter mile segment and even in that murky water, we found eight dead trout in about two hours."

Later investigation showed that six miles upstream of where Haak and company were working, liquid manure spread on farmland had washed across frozen ground unimpeded into the waterway.

"It was bad. Even several miles downstream you could smell the manure 100 to 200 yards or more away from the water," Haak said.

As president of the watershed association and a farmer himself, Haak and Watershed Director Frank Fetter joined DNR fisheries crews the next morning to track upstream for signs of a fish kill. The pollution was still easy to see and smell. In a 1.5-mile stretch, they picked up 98 dead trout.

Once they found the spill site, the fisheries crews called for some heavy equipment and put in two earthen berms that dammed up the pooling liquid manure to keep it from reaching the water. The manure ponded up in ditches and was subsequently pumped out.

"The fisheries people checked for several more days, then did some live shocking to see what was still left alive after such a large amount of manure ran through the area," Haak recalled. The spill killed off the fish in the restored waters. A manure pumper had been working throughout the area the previous week spreading liquid manure on sloping frozen land in the Town of Blue Mounds south of Mount Horeb. Unfortunately in this location, the manure flowed right into the water.

NRCS

Proposed rules were designed to limit manure spreading from big farms especially in winter when liquid wastes can't infiltrate frozen ground and will travel downhill in melting snow or rainfall.

THOMAS M. TURNER

Last winter in the Brown County Town of Morrison, several private wells became contaminated with *E. coli* bacteria that are carried in animal feces. Investigations did not identify a single pollution source. Special legislation covered the cost of replacing wells for some whose water was deemed unhealthy to drink.

A flowing health issue

Seepage from manure spreading on land has been linked to drinking water contamination and other health concerns. Runoff can flow into abandoned or improperly sealed wells or through fissures directly into groundwater. In areas where manure is spread over fractured bedrock, the soil does not have enough time or capacity to filter out bacteria before they reach groundwater and drinking water supplies. That scenario is one possible explanation for bacterial contamination of private wells last winter in the Town of Morrison in southern Brown County southeast of Green Bay. Seventy-eight wells in the community of Wayside tested unsafe and some residents reported their water smelled like manure.

In searching for a source of contamination at Wayside, health and environmental officials did not identify one specific source, but that is not unusual in a region with fractured bedrock and many potential sources. Notices were posted advising residents in the surrounding area to boil water. More than 100 families received free bottled water for six months following the discovery, as allowed by state law, and 16 families so far have had their wells replaced with deeper wells under a special appropriation from state legislators to DNR's well compensation program.

The recent spinach scare in California's Salinas Valley may be attributed to similar widespread runoff pollution. That health concern "marked the 20th time since 1995 that the dangerous *E. coli* strain has been linked to lettuce or spinach," according to the *Los Angeles Times*. The low-lying vegetable region is surrounded by intensive upland cattle raising and surface water contamina-

tion from upland areas is under investigation as a potential source of that *E. coli* contamination.

A matter of timing

Unless manure spreading causes an immediate health concern or a fish kill, it's unlikely that communities can accurately say how and where landspread manure threatens streams, groundwater and drinking water. Only a small fraction of contamination cases are noticed by the public and subsequently reported to environmental and health officials, says Gordon Stevenson, chief of DNR's Runoff Management Section. However, we can see trends in the cases that are investigated. We find many more problems where manure is spread on sloping lands when the ground is snow-covered or frozen, Stevenson said. Rain and melting snow carry both the nutrients and contaminants in manure a lot farther in winter.

"We need to better control manure runoff to protect human health and environmental health," said Stevenson. He noted that between July 2004-June 2005, 52 manure spills had been documented statewide that contaminated drinking water, caused fish kills or polluted lakes and streams.

Stevenson believes that number may reflect a better awareness among the general public of manure-related problems and a willingness to report them. But he also thinks the number reflects an increase in manure-related problems that trace to weather patterns and changes in farming practices.

Weather patterns in recent years have brought mild winter weather with periodic warm ups and rain that have increased the risk of manure applied to frozen fields running off into lakes and rivers. More farmers are managing manure as a liquid rather than a solid without building the storage they need to avoid applying manure to fields during times of the year when the risk of runoff is high, Stevenson says. The liquid form more easily runs off into state waters. Even changes in the cows' diets may play a role in making manure spills or manure-related incidents a bigger threat to human health. Greater reliance on grain diets allows better survival of the virulent O157:H7 strain of *E. coli* in cows and in their manure.

ROBERT QUEEN

The manure rules used the concept of "animal units" to compare the pollution potential from farms that raise different livestock species.

Animal feed, genetics and manure handling have made technological advances in recent decades, while disposing of the manure has not. New technologies are needed, Stevenson says.

Landspreading manure can remain a practical and beneficial way to use the nutrients that animals don't turn into milk and meat, he says. Applying the phosphorus and nitrogen from manure on fields in appropriate amounts can build both soil fertility and tilth, but there's an art and a science to doing it well. Manure on the land is a fertilizer; in water, it's a pollutant. These days "nutrient management" on farms of any size takes a more scientific approach that includes identifying the manure's nutrient content, levels of nutrients in the soil, and the needs of the crops to determine application rates. Timing and location of applications are also critical: when manure should be applied to soils, how often a given field can be treated and how close it is to water are key decisions for growing crops while minimizing environmental risks to groundwater, wells and streams.

"We all want clean streams, safe drinking water, good fishing and prosperous farms," Stevenson says. "Providing that protection gets more challenging when managing the manure from larger farms."

Attending to larger farms first

One way to judge the relative size of farming operations is to measure the number of "animal units" on a given farm. When it comes to manure, all animals are not created equal. Cows, pigs and poultry produce varying amounts of manure with varying amounts of phosphorus and nitrogen that can potentially pollute Wisconsin waters. The concept of "animal units" provides a way to equalize and compare manure production. For instance, the output of 1,000 beef cattle is roughly equivalent to that from 700 dairy cows, 2,500 pigs, 55,000 turkeys or about 100,000 laying hens.

Concentrated sources of manure are among the most serious potential pollution problems in Wisconsin. Recently proposed rules revising manure management focus on the small number of larger farms where at least 1,000 animal units of cattle, dairy cows, pigs or poultry are housed. These operations, also called Concentrated Animal Feeding Operations (CAFOs), represent half of one percent of Wisconsin's 30,000 livestock operations, but the sheer amount of manure from these large farms could threaten public health and the environment if it's not managed properly, Stevenson says. Animals at each of these large farms produce at least 6.5 million gallons of manure a year, as much organic pollution potential as people in a city of 18,000 would generate. Unlike a city, the livestock operations can spread their manure on land with no treatment required.

Federal and Wisconsin environmental laws require that CAFOs must apply for Wisconsin Pollutant Discharge Elimination System (WPDES) permits to pro-

tect water quality from both manure and "process" wastewater — which includes wastewater from cleaning milking parlors, egg wash water, leachates from stored feed, and the like. The WPDES permit program does not have authority to address other concerns the public has raised about large-scale farms, including dust, odors, traffic and noise.

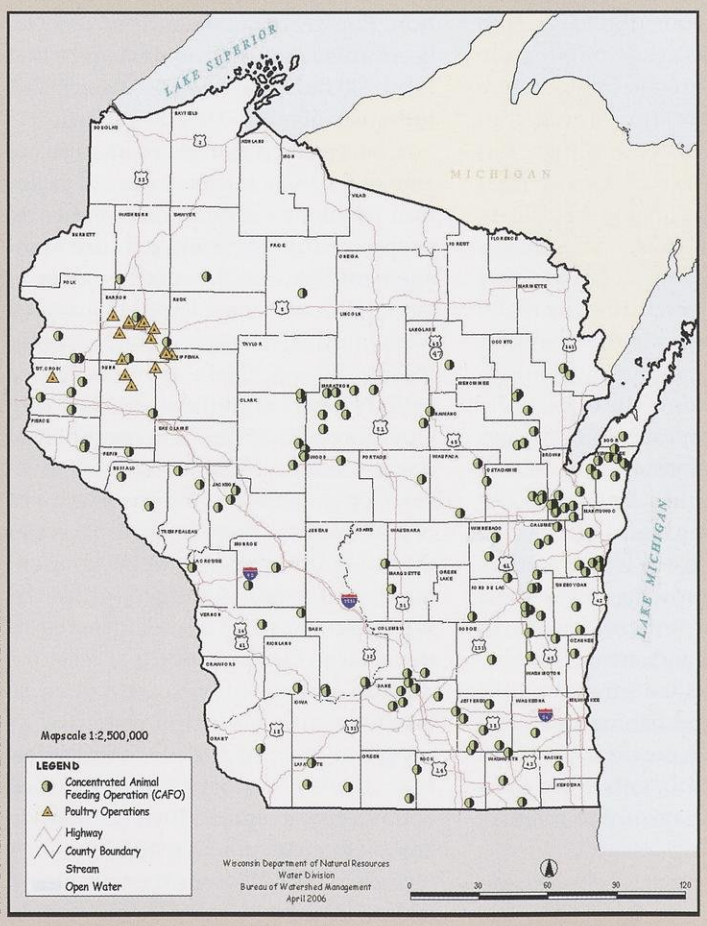
In response to changes in federal regulations, Wisconsin initiated revisions to Wisconsin's CAFO rule, NR 243. From summer 2003 through 2005, an internal workgroup as well as an external Technical Advisory Committee worked on the issue. The external group included representatives of farm organizations, land conservation officials, environmental groups, manure haulers, anglers and water resources. A round of public hearings and other opportunities to comment followed.

Based on the advisory group feedback and public hearings comments, DNR staff proposed changes to its CAFO rules that would:

- Require all CAFO operators to have six months of storage for liquid manure so they would have the flexibility to avoid spreading on days when runoff is more likely. Ninety percent of CAFOs already have that capacity.
- Ban spreading solid manure on frozen or snow-covered ground throughout the winter unless it is immediately worked into the ground. Research has shown that the risk of runoff to groundwater, streams and lakes in Wisconsin is greatest in February and March from manure applied to frozen fields.
- Require that manure spread on land meet minimum distances from private and public drinking water wells, sinkholes and fractured bedrock. Additional restrictions would apply to manure and process wastewater spread on areas with shallow soils.
- Require farms to follow nutrient management plans to assure they are applying only the right amount of phosphorus to the soil. This nutrient decreases water quality and fuels algae growth when it flows into streams, rivers and lakes.
- Require farms applying manure near lakes and streams to limit spreading amounts and leave crop residue or create vegetated buffers between fields and surface waters. The provision aims to reduce the likelihood that manure and associated nutrients might reach waterways.
- Require CAFOs to develop emergency response plans to address manure spills or discharges.

Following a public hearing in

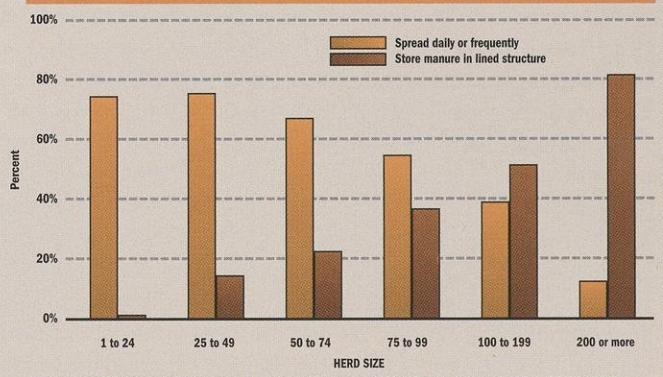
Wisconsin's WPDES Permitted Concentrated Animal Feeding Operations



DNR BUREAU OF WATERSHED MANAGEMENT

Circles and triangles show the locations of the largest feedlot operations each of which generates several million gallons of manure each year.

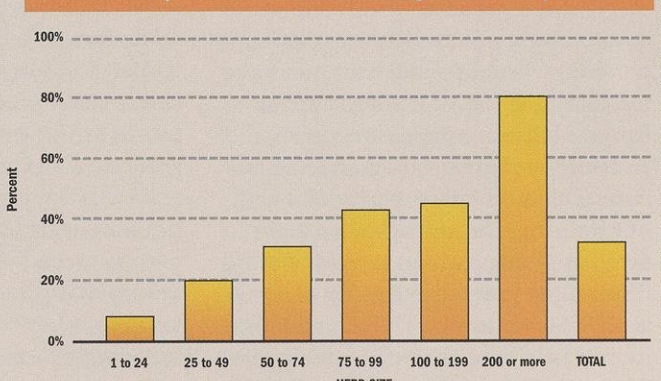
Manure Spreading and Storage Practices by Herd Size



FROM "MANURE MANAGEMENT ON WISCONSIN FARMS" UWEX AND UW-MADISON

Smaller farms still spread animal manure daily or frequently. Note that more than 90 percent of the large CAFOs already have the capacity to store manure when the ground is frozen.

Percent of Dairy Farmers With Manure Management Plans by Herd Size



FROM "MANURE MANAGEMENT ON WISCONSIN FARMS" UWEX AND UW-MADISON

As herd size increases, so do the number of farms that must carry out manure management plans to meet recommended practices. Revisions to state CAFO rules would require all large farms to meet these practices to protect health.

BOB NICHOLS, NRCS

August, the Senate and Assembly agriculture committees sent the rule package back to the Department of Natural Resources seeking more changes. The earliest any revisions could go into effect would be late winter or early spring 2007.

Among the most contentious issues was the provision that would prohibit spreading based on weather forecasts. Spreading would be prohibited when forecasts called for at least a 50 percent chance of a quarter-inch of rain during winter months and a 70 percent chance of a half-inch rain the rest of the year. Some farmers testifying before the legislators felt these provisions made it too difficult to plan manure applications. Others objected to the six-month storage requirement.

Laurie Fischer, executive director of the Dairy Business Association, asked for modifications. Her organization supports the rule, but felt that manure could be safely spread on some winter days. She also noted that six months of storage would leave a very short window of time in April to apply manure after the spring thaw but before the time that crops must be planted.

Environmental and conservation groups counter that storage and winter spreading restrictions are critical for preventing water quality problems. "Frankly, it is our position that the DNR may have gone too far in drafting these rules to meet the request of the agricultural community," George Meyer, executive director of the Wisconsin Wildlife Federation said in testimony to lawmakers. But WWF went on record supporting the "rapid" adoption of the changes, saying that the absence of the regulations " is jeopardizing citizen health and valuable public natural resources."

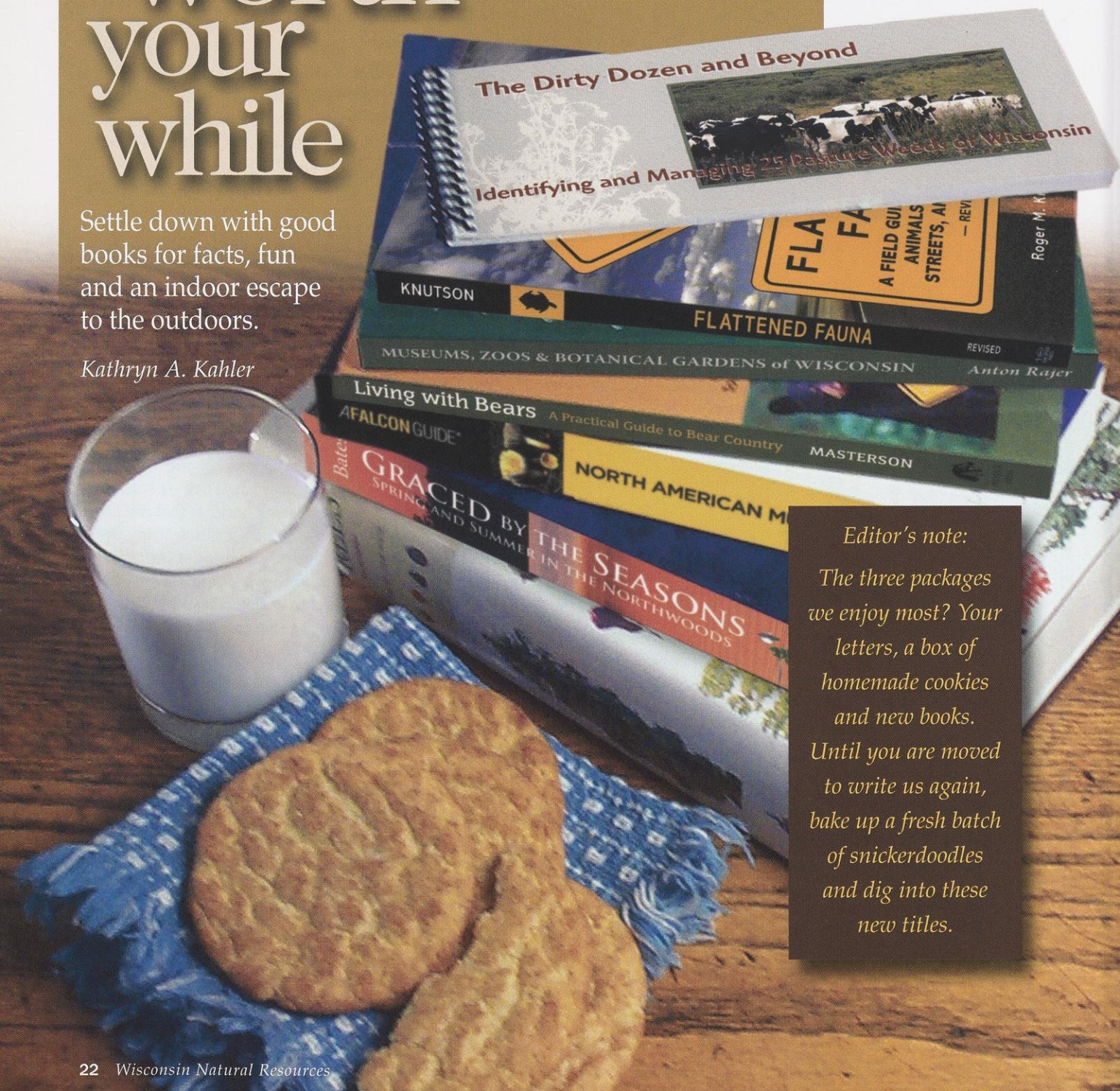
Whatever emerges as the manure handling requirements are formed, farmers, other rural residents, stream users, health professionals, agribusiness and Wisconsin citizens want practical regulations that keep the farm economy, communities and the land and water healthy.

Communicators from DNR's Education, Information and Water programs contributed to this piece.

Words worth your while

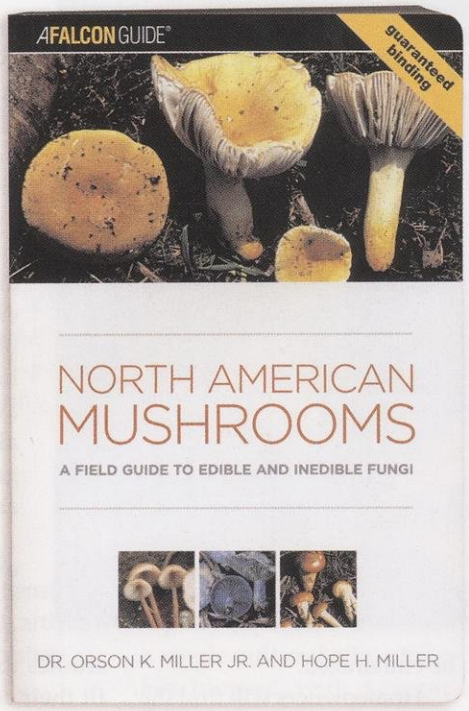
Settle down with good books for facts, fun and an indoor escape to the outdoors.

Kathryn A. Kahler



Editor's note:

The three packages we enjoy most? Your letters, a box of homemade cookies and new books. Until you are moved to write us again, bake up a fresh batch of snickerdoodles and dig into these new titles.



North American Mushrooms: A field guide to edible and inedible fungi
by Dr. Orson K. Miller, Jr., and Hope H. Miller, The Globe Pequot Press, Guilford, CT, 540 pages, $24.95.

Any book that comes with a disclaimer absolving the authors of responsibility for readers' death should be taken seriously. The first entry describes a deadly poisonous mushroom (the "Death Angel") which in an early stage can be confused with two types of edible mushrooms. It was enough to reaffirm my habit of sticking with cultivated varieties, at least for culinary purposes.

Students of mycology, mushroom fanciers and cooks with a higher sense of adventure will find this Falcon field guide as authoritative as they come. It features almost 600 species, with color photos of each. Narratives include measurements, color, shape, structure, odor, habit and distribution, spore description and comments comparing similar species, toxins present and any other notable characteristics. For example, *Amanita polypyramis* or *A. ravenelii*, have "an odor of old ham bones or old tennis shoes."

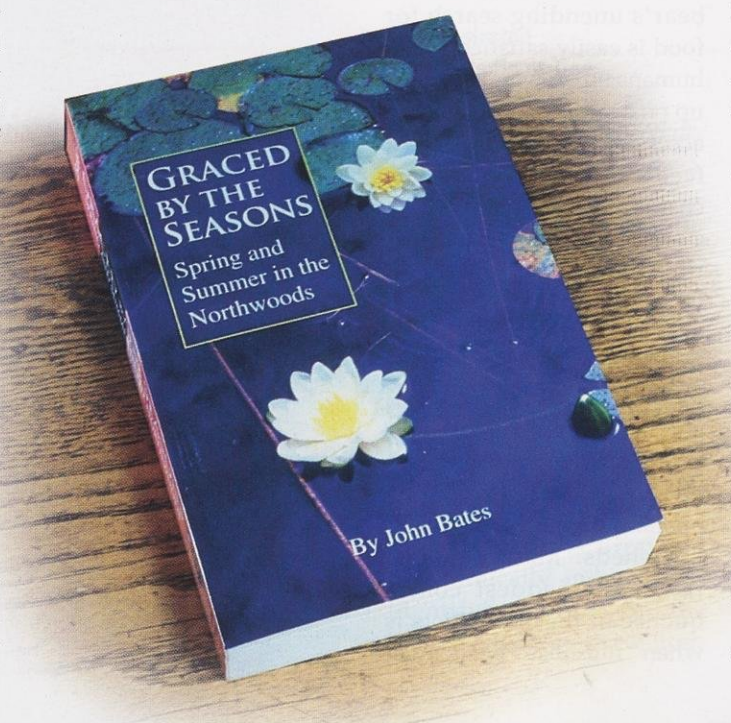
Each entry is followed by a succinct description telling which species are deadly poisonous, poisonous, edibility unknown, nonpoisonous, inedible or edible, for those who might need to make a quick judgment. It is interesting to note that only a handful of wild mushrooms are considered "deadly poisonous" and an equal number are considered really choice and edible. A comment section explains why some varieties are "edible with caution" and others "not recommended." Most often they are easily confused with poisonous varieties.

The guide contains an abundance of keys to help distinguish among the major groups — agarics, chanterelles, boletes, polypores, fungi with spines, coral fungi, puffballs, earthstars, bird's nest fungi, stinkhorns, jelly fungi, cup fungi, earth tongues and true and false morels — and then down to the species level. A visual key of the major groups, an illustrated glossary and a glossary of terms help readers navigate the keys.

A section on toxins offers a sobering review of eight toxin types ranging from amatoxins, responsible for the majority of fatalities in adult humans, through toxins producing a host of symptoms like heavy perspiration, blurred vision, diarrhea, lowered blood pressure, delirium, muscle spasms, hallucinations, nausea, extreme thirst and intestinal cramps. The guide states, "Most toxic species are not fatal to man. They usually produce only nausea, act as a laxative, or induce mild to strong hallucinations. Unfortunately, a small number of mushrooms have toxins that are fatally poisonous while others affect the central nervous system and are very debilitating." Words to heed and live by.

In addition to the superb photography and keys, the guide includes a ruler on the back cover, to measure 'shrooms in both inches and centimeters, and boasts a guaranteed binding and durable, reinforced cover.

The best advice, stated several times throughout the guide, cautions mushroom collectors to consult field guides before picking. In judging edibility, "we advise that if one is still in doubt, throw it out!"



Graced by the Seasons: Spring and Summer in the Northwoods
by John Bates, Manitowish River Press, Mercer, 385 pages, $14.95.

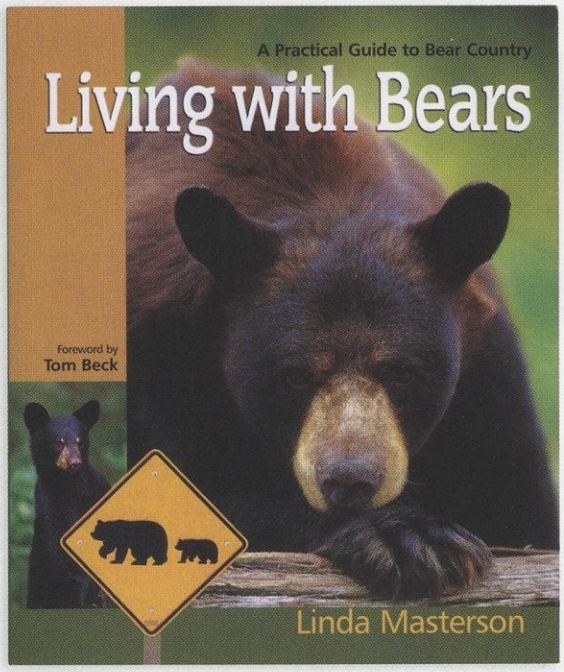
A naturalist with an inquisitive mind, keen observation skills and unbounded enthusiasm for the outdoors, John Bates inspires his audience to relish the change of seasons in the Northwoods. His latest volume is a phenological collection of nature notes that leads readers through northern Wisconsin from March ice-out, through the height of the avian concert season in late May, on to peak berry time in August.

Bates' previous works include *Trailside Botany* and the

two-volume *A Northwoods Companion: Spring and Summer* and *Fall and Winter*. This book and its companion *Graced by the Seasons: Fall and Winter in the Northwoods* provide a benchmark to note which periodic events happen when in today's climate.

Most of the one- to two-page pieces come from columns Bates wrote for *The Lakeland Times*. Some are personal observations, others he collected from Northwoods neighbors. Page after page, the reader wonders with him how hatchling turtles can survive their first eight months of life without eating, or half their lives without breathing. Bates often has answers to his questions, like how high migrating birds can fly (37,000 feet, as reported by the crew of a jet that collided with a vulture) and how they breathe at those heights (via air sacs). Yet he just as easily admits that some things in nature defy human reason, such as why a sharp-shinned hawk would choose to lunch on a tiny hummingbird — "hardly enough meat for one chew."

His exhaustive research answers the why's and how's of nature balanced by his simple philosophy, like this explanation of how humans fit into the puzzle of nature: "Maybe the most important thing to do is to remember that we are members of a biological community, and when we sign our names on our properties with chainsaws, lawnmowers, and the like, we are demonstrating what that membership means to us. Of all the membership cards we carry in our wallet, possibly none is more important than our God-given membership in the natural world."



Living with Bears: A Practical Guide to Bear Country
by Linda Masterson, PixyJack Press, Masonville, CO, 233 pages, $20

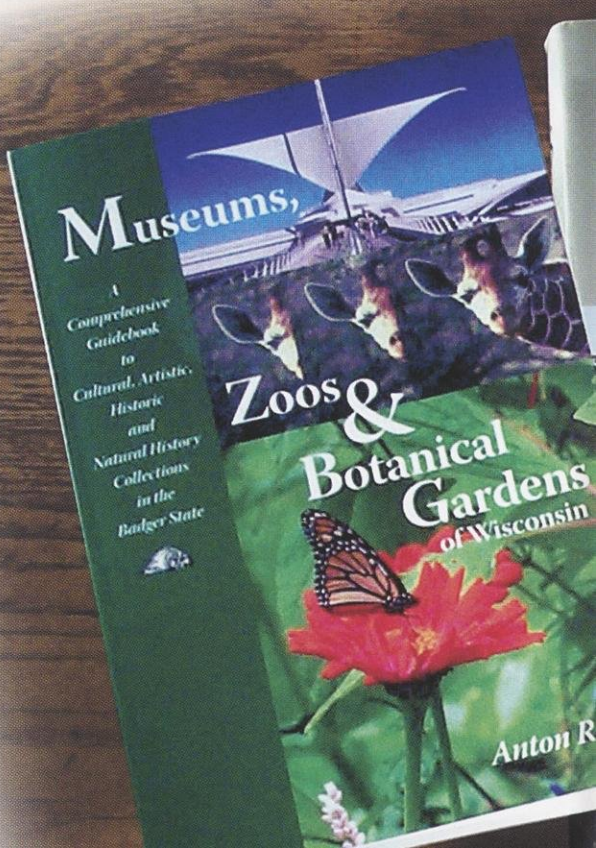
Accounts of human/wildlife encounters, some with tragic consequences, point out the need to find ways to peacefully coexist with critters that share our living space. Linda Masterson, outdoor enthusiast and member of the Colorado Division of Wildlife's Bear Aware team, has authored an easy-to-read handbook devoted to bears.

It's a must-read for urban wildlife specialists, community leaders and homeowners looking to protect their property from ursine neighbors. Masterson uses wit and a wealth of wisdom to convince readers that most human/bear conflicts come when a bear's unending search for food is easily satisfied when humans unknowingly serve it up on a silver platter in easily accessible garbage cans, bird feeders, camp coolers, orchards and gardens.

Masterson paints a sometimes shocking picture of what happens when people in bear country offer up easy meals for their big, furry neighbors. Bears are adaptable, smart and will do whatever it takes to get to food, including breaking doors, opening windows or crunching sheds. Masterson believes the saddest consequence of these conflicts is when "nuisance" bears must be euthanized.

Homeowners will find the chapter "Home, Bear-Proof Home" the best for finding ways to keep bears out of their houses. Closing and locking ground-floor windows, replacing lever-style door handles with round knobs, locking cellar doors and securing storage sheds all help. The chapter "Cleaning Up Your Act" advises how to store trash to save bears. The discussion opens with this eye-opening assertion: "Ask almost any bear behavior expert what's the biggest cause of human-bear conflicts and the answer is always the same: garbage, one way or another, kills bears."

Community leaders struggling with human/bear conflicts will find 14 case studies to tailor programs to fit their community's needs. There's one about Hemlock Farms, Pennsylvania, where a combination of public education and regulations against feeding bears keeps human/bear conflicts to a minimum. Another focuses on Durango, Colorado's Bear



Smart program that features a website, brochure and advertising campaign.

One of the most instructive pages in the book, the "Bear Calorie Counter" makes it clear why bears find homes so inviting. When they can get 12,180 calories from seven pounds of birdseed, or 42,425 calories from an unprotected 25-pound bag of dog food, why look for berries?

Museums, Zoos and Botanical Gardens of Wisconsin: A comprehensive guidebook to cultural, artistic, historic and natural history collections in the Badger State

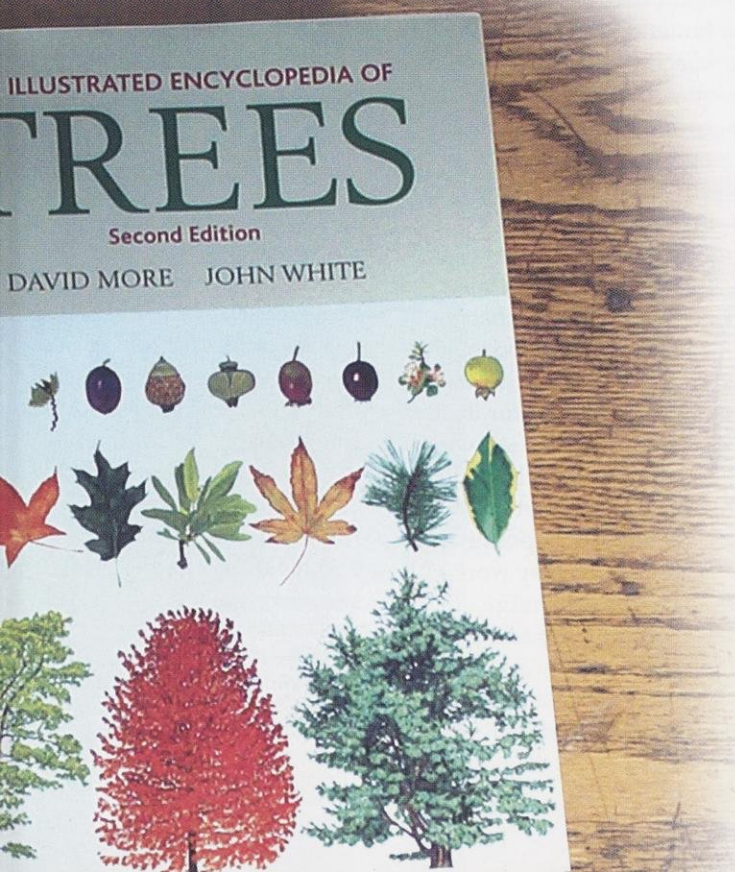
by Anton Rajer, Fine Arts Publishing, Madison, 278 pages, $17.95

Make a New Year's resolution to visit one place each week from this book and it will take you 10 years! It's hard for the average Wisconsinite to believe that our state is home to over 500 art museums, historical museums and societies, zoos and nature centers, botanical gardens, house museums and historic buildings, heritage farms, spiritual sites, sculpture parks and halls of fame.

Rajer is an avid art historian, professional conservator and heritage preservation specialist with childhood memories of family trips around the state. His guide is divided into four geographic regions, with alphabetic listings by city. Some cities host a single cultural site, others are blessed with several. Each listing provides essentials such as the site name, address, phone number and a contact, hours and admission fees, followed by lively descriptions of what visitors will find.

Aside from more well-known institutions, notable listings include the Knox Creek Heritage Center in Brantwood, a farmstead of historic buildings moved to the site and featuring a century-old Waahto Sauna, made of hand-hewn logs in dovetailed construction; the Museum of Fraternal Studies in Berlin, revealing the mysteries of handshakes, rituals and ceremonies of the Odd Fellows and Knights of Pythias; the Badger Mine and Museum in Shullsburg, where visitors descend into a mine beneath the city, or view early farm tools, medical equipment, general store, drugstore, tobacco shop, and turn-of-the-20th century kitchen; and the Green Meadows Farm in Waterford, where people of all ages can interact with over 300 farm animals, and enjoy pony and tractor rides.

Sprinkled among the listings are "Tony's Tips," of personal dining recommendations to find the best piece of walnut or cherry pie, or advice to Illinois visitors for avoiding speeding tickets.



The Illustrated Encyclopedia of Trees, Second Edition

by David More and John White, Timber Press, Portland, OR, 832 pages, $79.95

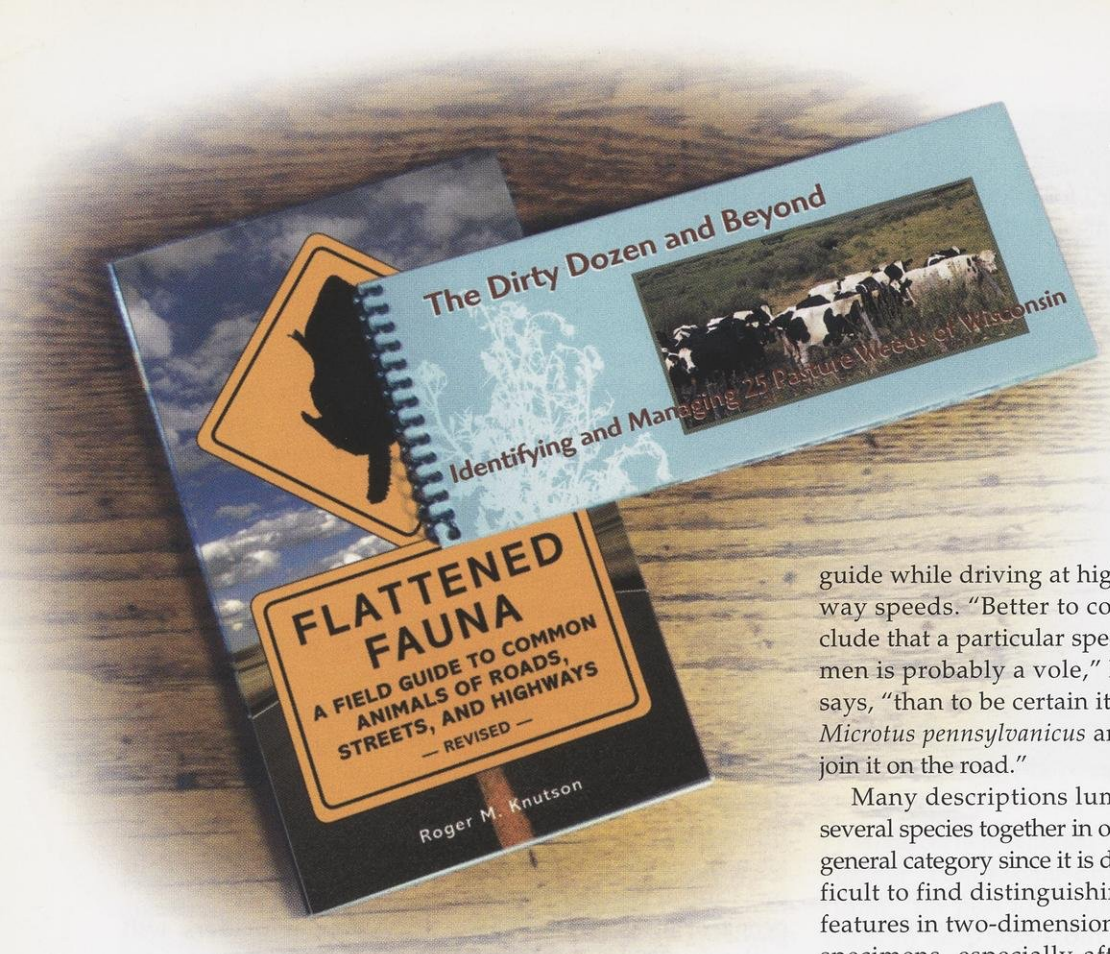
This exhaustive, breathtaking work lives up to its title claim. It is the culmination of years of work by British artist David More who painted more than 5,000 color illustrations of nearly 2,000 species of natives and cultivars from Europe and North America.

Each entry is arranged taxonomically and includes identifying details, but the book reads more like a literary work than a dry scientific guide or key. The text by John White mixes descriptions of foliage, bark, flowers and seeds with the history of species, cultivars, and points of general interest.

This is not a field guide to Wisconsin or even North American trees, but Wisconsin tree fanciers should not be put off by the need to pore through 50 pages of maples to find the few that are native to our state. The sugar maple pages are worth the search, showing meticulous drawings of leaves, from spring to autumn, bark, seeds, and full trees with and without leaves. Every two-page spread contains about a dozen such illustrations, balanced by a half-page of text.

Wisconsin readers will also find a few discrepancies in names. Our majestic eastern white pine, for example, is known as the Weymouth pine in Britain, because it was brought from Maine to Britain in 1605 by Captain George Weymouth. The book gives this interesting European perspective on one of our most important forest trees: "Unfortunately the enthusiastic use of this valuable forest tree in Europe in the nineteenth century encouraged the spread of white pine blister rust, a fatal disease from Asia. This has destroyed any plantation potential the tree might have once had. The disease spreads by way of an alternative host, *Ribes* species (currants). Nowhere that provides suitable growing conditions for the pine is far enough away from a currant bush to be safe."

The heft and price of this comprehensive volume may dissuade the casual tree enthusiast, but it would make a fine addition to any personal, school or public library.



Flattened Fauna: A Field Guide to Common Animals of Roads, Streets and Highways
by Roger M. Knutson, Ten Speed Press, Berkeley, CA, 89 pages, $9.95

A tongue-in-cheek guide to all manner of road kill, this little book is the perfect gift for that hard-to-please dead animal aficionado on your list. As the author describes it, it's about animals that "like the Wicked Witch of the East in *The Wizard of Oz*, are not just merely dead but really most sincerely dead.... In becoming part of the road fauna celebrated in this book, an animal loses not only its life but also its third dimension."

The section "The Road as Habitat" maintains that since the road fauna has only come to exist in the past 100 years, it represents less than "an eye blink of evolutionary time." Because of its very low reproductive capacity, insufficient time has elapsed for the development of adaptive behavior or traits. Knutson speculates that "when roads have been a dominant feature of the natural environment for centuries, we might expect turtles with very sturdy, nearly flat shells to emerge by the normal processes of natural selection."

In "Mimicry and Protective Coloration in the Road Fauna," Knutson does an admirable job with the subject despite his admission that "analysis of mimicry [among the animals of the road] is difficult at best, since neither the mimic nor the object of mimicry will blow its cover by moving."

The bulk of the book is a dichotomous key and field guide to the categories of road fauna — road snakes, legged reptiles and amphibians, road birds and road mammals. Knutson cautions beginning "students" of road fauna to work in pairs rather than attempting to use the guide while driving at highway speeds. "Better to conclude that a particular specimen is probably a vole," he says, "than to be certain it is *Microtus pennsylvanicus* and join it on the road."

Many descriptions lump several species together in one general category since it is difficult to find distinguishing features in two-dimensional specimens, especially after several days on the road. The descriptions include size, habits and abundance, field marks and range, an outline of a standard 4 1/2 inch lane marker to show scale of the specimen, along with the silhouette of a typical flattened specimen. Here's how Knutson describes one of the most common of road fauna, the opossum:

> "Contrary to popular southern opinion, opossums are not born dead by the side of the road... In their off-road habitat, opossums are too tough to kill easily, and many a dog has left for dead an opossum that went on its way once the dog departed. But on the road the opossum's toughness may work to its disadvantage. Becoming limp and lying there with an open mouth after a near miss by the first car may serve to put off a dog or coyote, but stands little chance against even compact cars. Such behavior is surely fatal on the road, where lying down quickly becomes a permanent condition."

The Dirty Dozen and Beyond: Identifying and Managing 25 Pasture Weeds of Wisconsin
UW-Extension Publication GWQ042, 60 pages

The vast majority of pastureland acres in Wisconsin suffer from poor fertility, coupled with weed and erosion problems. This handy pocket-sized guide helps landowners identify 25 of the most common weeds and offers tips on how to control them. Species descriptions include clear photos of the plants in their habitat, whole plants, plant parts (roots, leaves, stems, flowers, fruits, seeds), and what an infested field looks like.

Suggested management techniques range from mechanical controls (such as mowing, digging or cutting), to improving drainage patterns and applying herbicides, and specify when each technique will be most effective.

The publication is available through county UW-Extension offices, USDA Natural Resources Conservation Service offices, by calling Cooperative Extension Publications (1-877-947-7827), or online at http://cecommerce.uwex.edu. It is free to Wisconsin residents and $1 for nonresidents, with postage and handling charges added to each order.

Kathryn A. Kahler writes from Madison and is the circulation and production manager for Wisconsin Natural Resources *magazine.*

Window stickers

continued from page 2

A mucous secretion in their toe pads creates surface tension that allows treefrogs to climb and cling to smooth surfaces, branches and bark.

RJ AND LINDA MILLER

Two look-alike species call Wisconsin home: the eastern gray treefrog (*Hyla versicolor*) and Cope's gray treefrog (*Hyla chrysoscelis*). Distinguishing the two is difficult and definitive identifications are left for the gurus in a genetics lab. The eastern treefrog is slightly larger (2 1/4 inches) with slightly warty skin and seems to prefer wetter habitats like swamps. The Cope's has smoother skin and outside of the breeding season has a solid lime green back. It prefers drier hardwoods and brush, but still near water. It is somewhat easier to distinguish in spring when the eastern's love song sounds like a loud musical trill lasting up to three seconds. The Cope's song is faster and harsher with a nasal quality. Whichever species is in the mood, a chorus of singing treefrogs can be deafening on a warm May night.

Males claim territories on the breeding ponds when the water warms up to 50 degrees. The most desirable perches hang horizontally over the water where their calls can be heard far away. They trill incessantly to impress and lure in a female. After amplexus, she will lay 1,000-2,000 eggs in small 10- to 40-egg clusters attached to pond vegetation. Then she leaves the pond and the frisky male advertises for another mate. The breeding season can last from May through mid-July. Thereafter, the males return to life in the trees.

Tadpoles hatch in three to seven days and by six to eight weeks, they've changed into bright green treefrogs that leave the water to begin a life on land. By early August, I often find young treefrogs hugging milkweed stems or resting on their boat-shaped leaves.

Gray treefrogs are expert tree climbers and confident jumpers. Large rounded toe pads enable them to move effortlessly through the trees. Frequently, you may find treefrogs clinging to cabin windows. How do they hold onto such a smooth surface? Do they have little suction cups on their feet or can they grip irregularities on the glass? Neither hypothesis is correct. The adhesive force is surface tension between the two flat surfaces. An electron microscope image would reveal that the toe pad is composed of many flat-topped hexagonal-shaped cells surrounded by minute openings. These openings allow each cell to move independently and adhere to the window with the flattest possible angle. The cells secrete a mucous-like fluid that flows between and over the flat-topped cells creating surface tension. However, the adhesive force is not so strong that it can't be broken by muscular action as the frog walks across or leaps from the window.

After a summer of feeding on insects and avoiding becoming a meal for hungry birds, snakes and small mammals, the frogs look for a safe spot to overwinter. As the days shorten and temperatures drop, gray treefrogs seek shelter on the ground in leaf litter, under logs, loose bark or in an animal burrow. Insulating snow cover provides a protective layer during the prolonged cold.

Treefrogs also undergo a biochemical change, another adaptation to increase their chances of cold-weather survival. They increase the glycerol levels in their tissues and fluids which acts as a sort of antifreeze or cryoprotectant (*cryo* meaning "cold"). The remaining free water in their bodies can freeze. These remarkable animals can freeze solid as their hearts stop pumping and still revive in the spring.

As you hike or cross-country ski through the woods this winter, think of gray treefrogs that may be buried under the snow, oblivious to the goings-on overhead. In a few months with the arrival of spring's life-reviving warmth, they will reappear to trill again as active participants in the springtime chorus.

Anita Carpenter is in no hurry to warm up her pipes for the spring sing near her home in Oshkosh. Winter is her favorite season.

2006 index

WISCONSIN NATURAL RESOURCES

Each December we publish an annual index of our stories. A searchable cumulative index of our stories 1977-2006 is also available from our website: www.wnrmag.com.

COMMENT ON A STORY?

Send your letters to: Readers Write, WNR magazine, P.O. Box 7921, Madison, WI 53707 or e-mail letters to david.sperling@dnr.state.wi.us

BONE TO PICK

I greatly enjoyed your recipe section in the August 2006 issue ("Come and get it!"). However, in the poached walleye recipe (which is delicious), the submitter suggested trying the recipe with perch or crappie, but not with "softer" fish, like bass and bluegill. I have caught, filleted and cooked about every species for over 60 years. I've surprised many with a meal of skinned bass fillets, when they thought they were eating walleye, and they raved about it.

Both bass and bluegill flesh is firmer than crappie. Don't get me wrong, I enjoy them all. Here is how I rate them for firmness: firm — walleye, bass, perch, bluegill and northern pike; softer — crappie, catfish, white bass, trout and bullheads.

If you learn how to fillet a northern with no "Y" bones, it is great. Melted butter for dipping seems a must!

Jim Cox
Lodi

SOMETHING FISHY ABOUT THAT SMALLMOUTH

I was born in 1934 in Rice Lake. When I was six years old my dad bought me a casting rod and reel. One day I was fishing with my father and grandfather in back of the old canning factory and caught my first fish — a four-pound northern. I was hooked, as most young kids are — fishing was in my blood. One day in 1947 I was casting for smallmouth bass below the Allen St. bridge on the Red Cedar River. After catching three or four small ones, I pulled one in that had a small white string hanging out of its mouth. It looked like a fish tapeworm so I didn't keep it or throw it back. There was a sewer pipe coming from the milk creamery into the river near there. I wonder if what I saw was a fish tapeworm.

Richard Kortsch
Milwaukee

Normally, bass tapeworm larvae stay in the flesh of the fish and adult worms develop in the intestine. But small tapeworms have been known to migrate to other locations in the fish, for reasons unknown. DNR's fish health specialist Sue Marcquenski recently examined a largemouth bass from a northern Wisconsin lake that had small tapeworms attached to the gill area and extending through the mouth. It is very possible that the worm you saw in the 1940s was a tapeworm. Eating the fillet is not a human health concern as long as the fish are cooked thoroughly. To prevent spreading this parasite or other fish diseases, infected fish or entrails should never be returned to the water and should be buried or disposed of in the garbage.

OUTREACH KEY TO WETLAND PROTECTION

As a yearly Conservation Patron, I am a regular reader and have enjoyed many articles in your magazine. Your recent article by Patricia Trochlell, "Wetter — or not!" (August 2006) was quite well done and of particular interest to me.

I am the president of an ecological consulting firm that works on a daily basis with Wisconsin DNR staff and landowners on both simple and complex wetland issues across Wisconsin and the Midwest. This article is a great example of efforts by DNR staff to educate the public on what is, and perhaps just as importantly what is not, a wetland. Too often the public is unaware of why wetlands are important, and what regulations are in place to protect wetland resources. Although the science of wetlands and the associated regulatory environment are often complex, continued education is critical to further public understanding of the importance of wetland functions and values on the landscape.

In the last 10 years I have seen an increasing number of wetland educational opportunities offered by the public and private sectors as well as conservation organizations. These efforts are beginning to bring about a change in thinking. One example? Construction projects that propose to preserve and enhance wetlands as part of the residential or commercial development. Although many accomplishments have been made, there is room for improvement. Ongoing education and outreach will be the key to public understanding of wetland resources and your recent article is one additional step in the right direction.

Scott Storlid,
Natural Resources Consulting, Inc.
Cottage Grove

GROWING A LEGACY BEGINS WITH BASICS

We subscribe to and enjoy your magazine. I applaud the articles on trees — "The forest where we live: Growing a Legacy" — in the August 2006 issue that mentions the benefits of trees and includes information about champion trees.

I have a concern about a photo on page two showing a man and a boy planting a tree whose roots are still in a wire basket. A tree in a basket will never be a champion tree. In fact, according to Dr. Laura Jull, woody ornamental specialist for UW-Extension you should NOT plant a tree in such baskets and should remove all burlap and twine as well. Trees in baskets develop girdled roots and die. My husband and I have first-hand experience.

Two years ago we purchased a home, and I noticed that several trees were planted strangely. They had mulch like a volcano around them and looked like they were just plopped in the soil. The trees had large trunks but not a lot of branches. We rented a metal detector and sure enough, the trees in decline were all in baskets. We began to dig around and remove them. The tree root balls were still bundled in the intact baskets!

It is unfortunate that people are spending a lot of money planting trees in baskets that will be doomed to a short life-span. Improperly planted trees will never be a legacy and will be in decline within a few years. I certainly do not want anyone to have the same unfortunate experience as we have had.

Mary Lou Qualler
Delafield

The first version of "The forest where we live," published in October 2002, served as more of a guide on tree care. It included a story, "Anchoring roots the right way," that provided detailed planting instructions about removing containers and cutting back burlap and baskets as you describe. That advice is still available on our website at www.wnrmag.com/supps/2002/oct02/anchor.htm, and your suggestion is well taken. The tree in the photo you described is being rolled into place but the hole isn't quite ready for

continued from page 29

planting. Also check out the "New tree planting brochure" available on DNR's website at www.dnr.state.wi.us/org/land/forestry/uf/resources/newtreeplanting.pdf.

PRAISE FOR STELLAR PUBLICATION

I absolutely loved the latest publication on urban forestry. The cover photo totally grabbed me and away I went. It was just great — well written, well designed and I especially loved the quote by Kim Sebastian about why we are drawn to parks, neighborhoods — perhaps it's because of the trees. It got me thinking about the places I love and it's absolutely true. You all should be really pleased with this work. It is stellar!

Julie Graziano
Madison

KETTLE MORAINE PINES QUESTIONED

I was reading the article "100 years of Wisconsin Forestry" (February 2004), and have a question. Does anyone know when and why the Kettle Moraine State Forest, and the Richard Bong State Recreation Area near Kenosha, were planted with pine trees? My husband and at least one of the Bong employees recall planting trees at the Bong site when they were at Burlington High School about 40 years ago. Neither of them remembers much about it but have some recollection that their high school biology teacher was instrumental in the project.

Janet Leffelman
Libertyville, Illinois

Forester Mike Sieger recalls that tree planting began in 1941on the Kettle Moraine State Forest-Southern Unit shortly after the lands were acquired. Conifers were planted on former field areas to increase the forested area of this property. Wisconsin foresters had been replanting extensively through the late 1920s and 1930s to reforest lands that were cut-over and burned in the late 1800s and early 1900s. Conifer species, especially white and red pine, were readily available from state nurseries, so they were the primary trees planted. A couple of sites were planted with jack pine, and white and Norway spruce. Hardwood planting simply wasn't being done. Most of the planting occurred in the 1950s and 1960s. Tree planting was halted in the early 1970s until a master plan could be prepared to guide further management. The master plan was finalized in 1991, and tree planting resumed on this property, following guidelines in the plan. Planting on the property is now dominated by hardwoods (red and white oak, black cherry, occasionally others) with lesser numbers of conifers mixed for wildlife benefit and aesthetic diversity.

Randy Cooper, forester at the Richard Bong Recreation Area since 1989, offered this explanation for pine plantings on that property: The spruce and pine windbreaks were planted by wildlife staff in the mid 1970s when the property was a wildlife area. The site was wide open and provided little cover. After Bong was designated as a recreation area in the late 1970s, numerous trees and shrubs, primarily hardwoods were planted through the mid 1990s in the campgrounds and picnic areas. More recently, conifer planting has been generally avoided at Bong since pine and spruce were not presettlement vegetation. A tree planting project a few years ago supported with Turkey Stamp funds included 1,000 white pines with 27,000 hardwoods (red, white, bur and swamp white oak, along with green ash and walnut) on about 30 acres.

Cooper believes conifers — especially white pine, white cedar and white spruce — are suitable for winter cover for wildlife, windbreak and screening purposes.

"There is no better place to find wild turkeys or deer on a cold January day," he says. "If a landowner's goal is pre-settlement vegetation, then tamarack or red cedar are probably more suitable. Most of the private land tree plantings I have been involved with in the past 10+ years have included a mix of hardwoods and conifers, especially under the CRP program."

UPDATE

SCOUTING THE BORER

State and federal crews will sacrifice nearly 6,000 ash trees in 17 counties to scout for signs of emerald ash borer moving into Wisconsin. The state has about 717 million ash trees and this destructive forest beetle is spreading westward and northward. Borer infestations claimed 15 million ash trees in Michigan since detected in 2002 and have already invaded trees in pockets of Maryland, Indiana and Ohio. They were found in northern Illinois this last summer.

Survey crews from the Wisconsin Department of Natural Resources and the state and federal departments of agriculture are marking ash trees in a grid pattern that will target about one tree every two square miles over a 17-county area of Wisconsin. The crews are marking ash trees less than 10 inches in diameter that already appear to be in declining health. Ash borers attack weakened and dying trees and these trees will be monitored for signs of infestations. Counties under the watch either neighbor infested areas or attract lots of tourists who might unintentionally bring infested firewood into the state. If emerald ash borers are found, officials would start eradicating all ash trees within a half-mile of infected trees. The borers only move up to a half-mile a year and eradicating trees would substantially slow or stop disease spread.

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Engines and art

Residents of Wisconsin and readers of this fine magazine well know that the state offers countless natural delights — great state parks and forests, thousands of enchanting lakes (containing hundreds of thousands of elusive fish), scores of wild areas safeguarding rare plants and animals...yes, we could go on. Even your average citizen south of the border in the Land of Lincoln quakes before Wisconsin's utter magnificence.

Bombast aside, there are intriguing aspects of Wisconsin that remain somewhat hidden from view. Tucked away in small museums and galleries, the state's history, art and culture await your inquiring eye. Here are several places you might have missed in the Milwaukee area. Afterward, we'll tell you how to find more gems around the state.

Betty Brinn Children's Museum — Betty Brinn spent most of her childhood in foster homes and orphanages around Wisconsin. As a successful businesswoman, she helped underprivileged women and children in Milwaukee secure health care. Today, families learn and play together at the museum created in her honor in 1995. Six permanent exhibits and several travelling programs offer exciting, hands-on fun for kids 10 and under. Open year 'round. 929 E. Wisconsin Ave. (414) 390-5437. On the web: www.bbcmkids.org

Stevens' design for the Evinrude Fisherman, 1957.

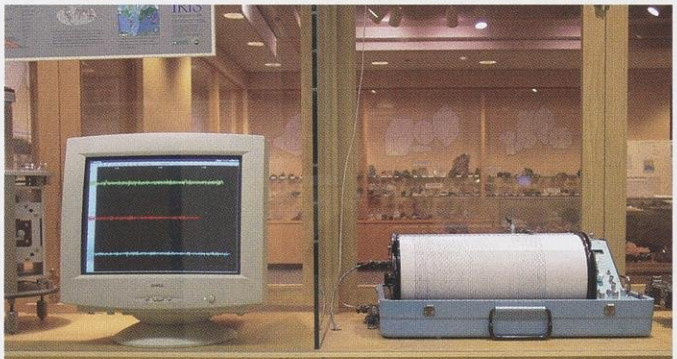
BROOKS STEVENS DESIGN

Thomas A. Green Memorial Museum — This place rocks: More than 75,000 fossils and nearly all the minerals known to humanity are housed here. Admission is free, but call ahead for viewing hours. University of Wisconsin-Milwaukee Dept. of Geology, 3209 N. Maryland Ave. (414) 229-6171.

Brooks Stevens Gallery of Industrial Design — Located in the Milwaukee Institute of Art and Design, this gallery highlights the thought, artistry and skill that go into creating the products we use every day. This is where you'll find out how your toothbrush and your lawn mower got those clean, sleek lines. Permanent exhibits feature the work of Stevens, the pioneering, innovative designer who influenced the style and function of vehicles, boats, appliances, toys, buildings and more. He also created the Oscar Mayer WienerMobile. 273 E. Erie. (414) 847-3350. On the web: www.brooksstevens history.com for more on Stevens.

Bradley Sculpture Gardens — Works by Barbara Hepworth, Henry Moore and more than 40 other noted sculptors grace the home of collectors Harry and Margaret Bradley. Please call one week in advance to make an appointment for a tour from mid-April through mid-October. 2145 W. Brown Deer Rd. (414) 276-6840.

Harley-Davidson Engine Plant — Here's your chance to find out what really goes on inside a Hog. Free hour-long tours will captivate even those who don't know a socket wrench from a screwdriver. Call for a tour time. 11700 W. Capitol Dr. (414) 535-3666.



What's shaking? A seismometer and seismograph at the Thomas A. Green Memorial Museum in the Dept. of Geology keep track of earthquake activity.

UNIVERSITY OF WISCONSIN-MILWAUKEE

The Anthony Petullo Collection of Self-Taught and Outsider Art — More than 450 works from the 1890s to the present by artists with no professional training or by artists living outside mainstream society are on display. As Petullo says: "Some works are childlike and others so sophisticated it is difficult to distinguish the work from that of a trained artist. Some are so inventive and unique that famous trained artists have been inspired by the art or even adopted a similar style." Call for an appointment. 219 N. Milwaukee St., 3rd floor. (414) 272-2525

Museum of Beer and Brewing — The MBB has had a somewhat frothy existence, relying on traveling exhibits to display a growing collection of breweriana while it sought permanent digs. Students of suds can now rejoice: The museum dedicated to Wisconsin's favorite beverage has found an interim home at the Milwaukee Brewing Company, 613 S. 2nd St. in Walkers Point. Check the website for progress updates and exhibit schedules: www.brewingmuseum.org

Brew up a party and hoist a stein!

MUSEUM OF BEER AND BREWING

For the most "complete guide to all Wisconsin has to offer," pick up a copy of Anton Rajer's *Museums, Zoos & Botanical Gardens of Wisconsin: A Comprehensive Guidebook to Cultural, Artistic, Historic and Natural History Collections in the Badger State* (2006, Fine Arts Publishing/University of Wisconsin Press). Rajer, a former Wisconsin State Capitol conservator, includes listings for the smallest local historical societies and collections to the largest and most famous of the state's museums in this 304-page paperback. See our review, p. 25.

Wisconsin, naturally

GIBRALTAR ROCK
STATE NATURAL AREA

Notable: Gibraltar Rock, one of several geological features protected within the State Natural Area system, features an outlier of the Black River escarpment with a thin cap of Platteville-Galena dolomite over St. Peter sandstone. The massive bluff rises 400 feet above Lake Wisconsin to the north and contains cliff and cedar glade communities. The site is used by migrating raptors, which catch rising air thermals formed by the warm cliff face.

How to get there: From Lodi, go north on State Highway 113 four miles, then west on County V one mile, then south on the Park Road 0.2 mile to a parking area. Walk south on the gated access lane up the hill into the site. Gibraltar Rock is owned by Columbia County. Visit *dnr.wi.gov/org/land/er/sna/sna73.htm* for a map and more information.