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WISCONSIN NATURAL RESOURCES

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A smoky
Asian
journal

"Greener" Christmas trees

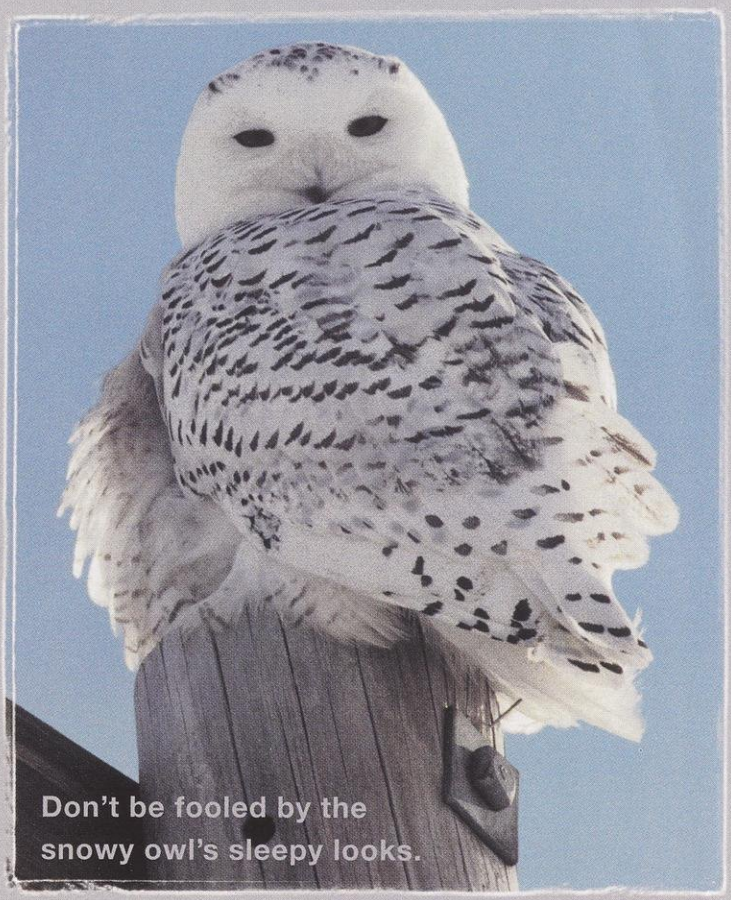
How the beasties
broke in

http://www.wnrmag.com

A hunter in Winter white

Anita Carpenter

And so we approach my favorite season, where winter blankets field and forest, wrapping the northern landscape in a tranquil snowy coating. Soon the long-tailed weasel *(Mustela frenata)* will scurry about in a white fur coat. The fleet-footed white snowshoe hare *(Lepus americanus)* will bound through the deep Northwoods powder. And a favorite stand of white birch will arch over a gurgling creek silhouetted against a clear cerulean winter sky. As winter deepens, a majestic white visitor will arrive on silent wings from the arctic, the sleepy-eyed snowy owl (*Nyctea scandiaca).*



GERARD FUEHRER

Snowy owls fly down from the tundra in a winter search for food. They perch in open country on utility poles, fence posts or low hills hunting for rabbits, rats and carrion.

A few snowy owls spend each winter in Wisconsin, usually arriving in mid-November and staying as late as April. They take up temporary residence in areas similar to the treeless expanse of their arctic home. The Superior harbor, bay of Green Bay, the Lake Michigan coast, the Lake Winnebago area, and extensive flat, open fields and marshes are likely places to find these elusive wanderers.

Some years bring more snowies than others. The snowy owls are well-equipped with layers of soft, downy feathers and long hair-like plumage that covers and protects their legs and feet against the icy blasts. It isn't cold weather that brings them south to Wisconsin. Rather, inadequate food supplies as lemming populations dip on the tundra will drive more birds south in these so-called "irruptive" years.

Unlike our resident owls, snowy owls are diurnal, that is, they are active during the day. They generally perch on or near the ground in a hunched-over position unlike the proud upright stance of the more familiar great horned owl *(Bubo virginianus).* Given their white plumage, snowy owls blend in very well with the wintery background. As you walk near owl country, any basketball-sized white lump on the ground is worth a second look. Sometimes the big birds sit conspicuously on treetops, television antennas or utility poles (which can be dangerous lookouts, indeed).

continued on page 29

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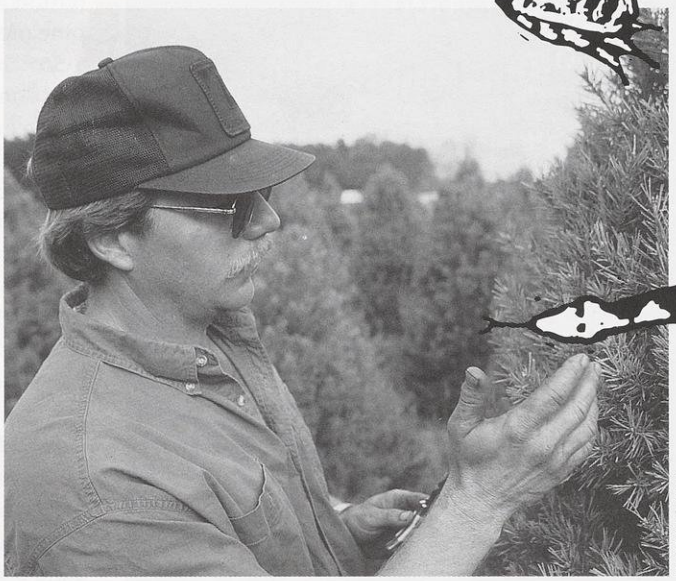
WISCONSIN NATURAL RESOURCES

December 1997 Volume 21, Number 6



ROBERT QUEEN

ROBERT QUEEN

ROBERT QUEEN

FRONT COVER: The red squirrel *(Tamiasciurus hudsonicus)* wins the prize for the most curious port of entry into your homes. Enjoy readers' stories on p.17–23.
SCOTT NIELSEN, Superior, Wis.

BACK COVER: Demon's Anvil at Stand Rock landing. Some of the Dells SNA is privately leased and closed in winter. Other features can be explored on public trails.
THOMAS A. MEYER, Mount Horeb, Wis.

That *perfect* tree

Christmas trees can be grown "greener" if growers find the buying public will accept them or seek them out.

Katherine Esposito

On a cloudy summer day in a sandy 40-acre field covered with thousands of closely manicured Christmas trees, an emerald-green frog the size of a quarter jumped off a stalk of tall grass.

Within seconds the creature leapt again, determined to avoid the fingers of a curious visitor. It succeeded.

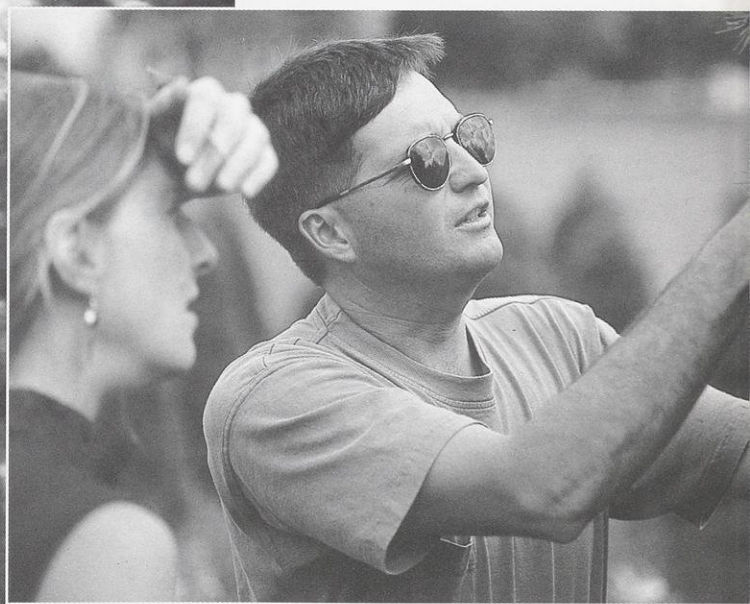
To Ken Appel, a hard-charging field supervisor for the Wautoma-based Campbell Tree and Land Co., the tiny frog was a distraction. Appel was busy seeking dried rivulets of pine pitch, the telltale sign of a well-fed Zimmerman pine moth, on the trunk and branches of a Scotch pine. It didn't take too long to find some.

He grabbed a branch from a different tree. Yellowed needles began to fall, not unlike the way they do after a Christmas tree has been in a heated home for a month and slowly begins to die. Appel's tree, with roots still firm in the ground, was dying, too. But not in the manner he had planned.

What had been a great summer for tree growth, with nary a week without rain, proved to be a banner year for pests as well, especially in the giant Scotch and white pine plantations in the Central Sands region, home to the state's largest concentration of Christmas trees. Many of the Campbell's

GREG GENT

(left) It's risky raising a crop that grows 7–10 years before producing financial return.
(below) Ken Appel scouts and inspects trees for signs of disease.



fields were plagued by the Zimmerman pine moth. Not far away, fields belonging to the Kirk Company were menaced by spittlebugs. Both growers, two of the country's largest providers of holiday trees, expect some losses.

The entire 90 acres of infested Campbell land, was soaked in early spring with the insecticide dimethoate, applied by a machine capable of blasting ten rows at a time with powerful horizontal sprayers. Apparently, the chemicals didn't work. So in fall the company harvested as many uninfested trees as it could, for sale to retailers, and this month will chop down the rest. Next year, a different chemical will probably be tried on fields with smaller infestations.

Farther north, in Price County near Timm's Hill, the highest spot in Wisconsin, the same wet weather meddled with Don Carney's hopes for his Christmas tree harvest. His problems were of a different sort: a few of his 15 acres of balsams had been badly scourged by balsam twig aphids, and he faced the likely loss of a quarter of his planting. Carney had noticed the pest in 1996, but had chosen an alternative to synthetic insecticides — a homemade brew of tobacco tea, Listerine, and dish soap — sprayed on individual trees several times over the summer. It had worked well enough that year, but when the bugs were encouraged by rainy skies in 1997, Carney gave up. He and his son, Jim, strapped on backpack sprayers and walloped the bugs with diazinon.

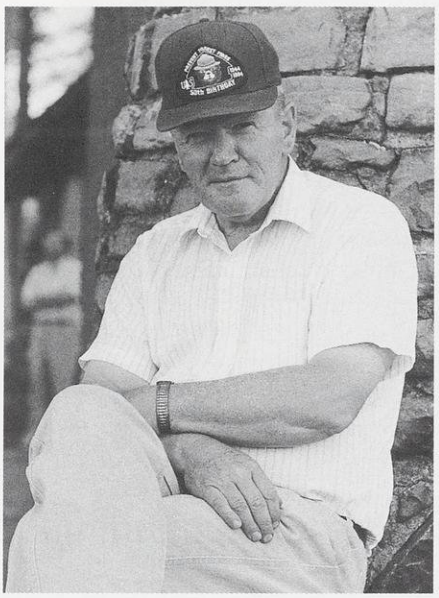
ROBERT QUEEN

It was a disappointing moment for the retired National Park Service naturalist and historian, who celebrates the return of eagles, fishers and frogs to this land where he was raised.

"I've never seen so many frogs as this year," Carney says.

"None of us like that chemical business," he continues, referring to his wife and Jim, who work alongside managing their 6,000 trees. He doesn't call himself a strict environmentalist — "I'm not a believer in global warming," he comments, but he has read stories of deformed frogs in the newspapers, and he worries that using strong chemicals on his land will harm frogs, other wildlife, and reduce the good insects that eat the tree pests.

"If you use diazinon or other toxic pesticides, there's always a chance it will get into the food chain, and kill birds and other beneficial insects," he says.



GORDON GERLAND

None of us likes using chemicals, says Don Carney. Spraying trees kills "good bugs" and "pests" alike.

ROBERT QUEEN

Christmas trees need regular attention and trimming to grow full and straight.

Weaning from pesticides

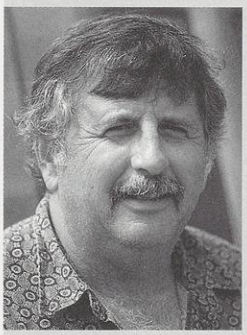
Carney's attempt at alternative pest control is not common. But there is a tiny trend among tree farmers, encouraged both by basic economics and a dollop of environmental fervor, in favor of reducing chemical use. Moneywise, after all the debits and credits are tallied — labor, chemicals, equipment costs and depreciation, plus the return on trees sold — farmers are thinking it doesn't make sense to try to kill every insect and cure every disease on every tree. Some trees will recover on their own, perhaps helped along by predatory birds and bugs. Some won't, and the grower must calculate if the few dollars lost on those trees is less than the cost of attempted cures. Some branch and needle damage may simply not be severe enough for shoppers to notice.

Unfortunately, once insecticides are applied, farmers can't stop using them. The unwanted bugs may disappear for a season, but treatment also destroys desirable insects that would feed on them or the next pest waiting to swoop down. And it can take three years of totally pesticide-free farming before those good insects return. Many farmers find it difficult to ignore pests feasting on even a small patch of trees.

Bill Kearby, a retired DNR entomologist with a 70-acre tree farm near Sheldon, spent his career advising farmers of the proper time to spray for a particular insect. But when it comes to his own trees, Kearby just watches and waits. "Nature seems to be very effective," Kearby says, as he described his own skirmishes with the balsam gall midge, balsam twig aphid, and white pine blister rust, a fungal disease. His techniques are simple: limited weed mowing, to give ladybugs, parasitic wasps, flower flies, and green lacewings some hiding places; and no insecticides. Any outbreaks have almost always cleared up by the next year, he says, and when they haven't, Kearby has cut down the infected trees and burned them. Lesser damage can usually be sheared off, he adds. "So many people today want to

produce a perfect product. That's sort of ridiculous, I think."

Across the state, every method imaginable of growing Christmas trees can be found. Some growers are huge, with hundreds of thousands of trees sold throughout the country. Some are tiny, like Don Carney, with perhaps a few hundred harvested each year. But for 20 years now, all of them have been hearing the same message, often given the moniker "IPM," for Integrated Pest Management: that monitoring fields for pests and diseases, and paying more attention to a tree's culture, is economically and environmentally smarter than wholesale preventative chemical spraying. And while most growers don't have quite the love affair Carney has with his trees, most agree their attitudes have changed over that time period.



ROBERT QUEEN

"The theory before was that everyone went ahead and sprayed, regardless of whether there was a problem or not."

Peter Grimm, Campbell Co. general manager

Changing attitudes, changing markets

Gary Nelson has grown trees on the Kirk Co.'s 7,000 acres for 19 years, the last six as district manager. In the 1970s and before, he says, no one waited until a problem was detected before aiming a fusillade of chemicals at a field. "Preventative spraying was done, routinely," he says. "It's easy to go out, and throw a bunch of spray on."

Peter Grimm, Campbell Co. general manager, with 20 years experience working the firm's 5,500 acres, agreed with Nelson. "The theory before was that everyone went ahead and sprayed, regardless of whether there was a problem or not," he says. And for a while, it probably made sense with Scotch pines, for many years the pearl of Christmas trees.

Those pines, which accounted for 60 percent of the holiday tree market only six to eight years ago, are down to about 29 percent today. They grow like Topsy in the sandiest soils without ever crying out for fertilizer. Unfortunately, they are also especially buggy and disease-prone: a December 1995 pesticide manual jointly produced by Michigan State University Extension and Wisconsin DNR lists 20 insects and six diseases known to afflict Scotch pines, compared with nine insects and one disease for balsam firs. But as long as they were the hottest trees around, and before groundwater protection became a big issue, the extra expense of controlling all those problems didn't much matter.

ROBERT QUEEN

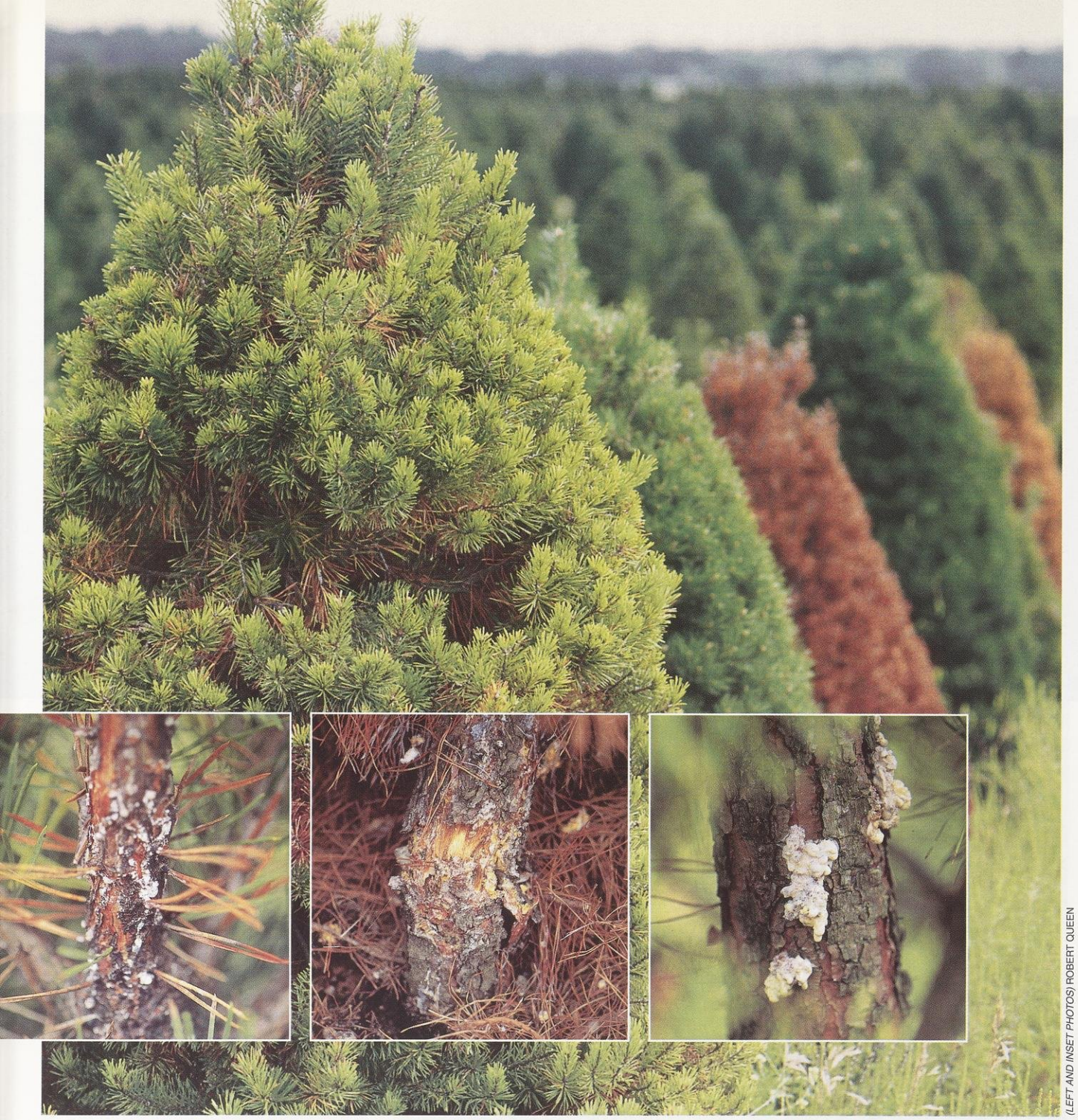
Big jobs take big equipment. On large plantations, applicators spray up to ten rows of trees at a time.

It finally began to matter around the late 1980s, after hundreds of people who had planted Scotch pines, hoping to cash in on the trend, began to offer them for sale. Around the same time, holiday buyers simultaneously started to prefer balsams and their Southern cousin, the fragrant Fraser fir, and a glut of Scotch pines was the result.

Today, fields containing more dead pines than live ones are evident in Waushara County and places nearby, left to fend for themselves by independent farmers who couldn't get a good enough price for them, and who couldn't afford to maintain them either. Now, the dying stands frequently host a variety of bugs and diseases, which can concern other growers with healthier fields nearby. As he motors along 20th Drive in Wautoma, Ken Appel spies one such stand. He points to trees left unshorn, weeds chest high, yellowed needles from the Zimmerman moth and trees rusty from bottom to top, dead from another common pine cancer, the root collar weevil.

"That field is saying, 'Help me,'" Appel says. "There's so many insects in there — that's where they thrive. Somebody thought they would make money in trees — that God takes care of them." But God doesn't, as successful farmers have realized. Even growers blessed with healthy trees tell stories of long hours spent in their fields, observing, mowing, culling, and, more or less, spraying.

Though Grimm and Nelson cut their teeth on older methods of controlling pests, they have adapted somewhat to the new tenets of IPM. The two men and their dozens of employees spend more time in the fields now, trying to avoid any noxious surprises. Using IPM sometimes results in a more measured



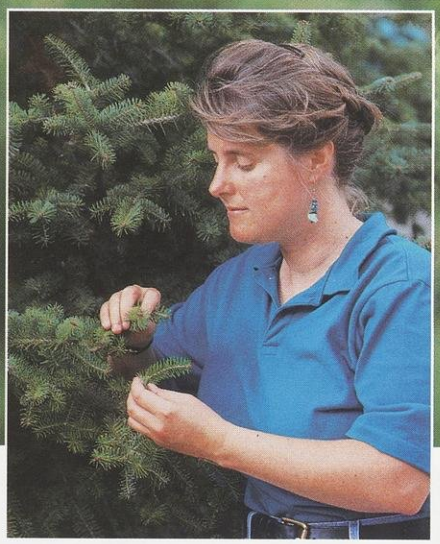
(LEFT AND INSET PHOTOS) ROBERT QUEEN

Too hot, too dry, too windy, too wet, poor trimming — all take a toll over the years to devalue trees. Then there is disease. *(inset)* Growers inspect for telltale signs of beetles, moths and microbes that can damage trees. Some growers routinely treat with pesticides. Others only spot spray when infestations get bad. A few growers encourage natural bug predators and plant several tree species to minimize disease spread.

response than in years past, as in 1996, when Grimm decided not to go after a mild infestation of spittlebugs with the insecticide diazinon. Last June, however, Grimm went ahead and sprayed. "Sometimes you can live with damage, until it gets to the point where, economically, it's not feasible," he says.

Grimm isn't sure that his company has actually managed to reduce their use of chemicals, however. And Appel says he doesn't hesitate in the slightest to protect his trees in any way necessary. State entomologists may recommend waiting to see how bad an infestation gets before spraying, "but when I see a disease, I go ahead and use [chemicals], and not wait," he says.

Of course, there are several clear reasons why some pine species in the Central Sands region have developed so many problems, factors Nelson and Grimm appreciate. Many varieties of Christmas trees are considered exotic, hailing originally from Europe, but the natural ways to control pests and diseases weren't imported with them. These trees have been grown on the poorest soils, on which farmers couldn't beg anything but a Scotch to grow. They never are fertilized, which doesn't curtail their height but might deprive them of health-affirming nutrients. And they



You have to inspect your trees regularly to curb problems when they are small, says DNR Entomologist Andrea Diss *(right)*. Once you rely heavily on pesticides, you are on a treadmill, says Paula Kleintjes, UW-Eau Claire forest entomologist. The damage to the pests' natural enemies makes it hard to bring the system back in balance.

are usually grown in huge tracts of 50,000 trees or more.

That practice, commonly called monoculture, is known for resulting in serious pest and disease outbreaks in all kinds of crops. In an effort to break the infestation cycle, Nelson has planted corn on newly clear-cut tree fields, and believes it has helped.

Farther south, in Waunakee, Joe CaPaul and his son, Joe, Jr., are deliberately avoiding the monoculture trap on their 35-acre choose & cut tree farm on River Road. On their site, shoppers can saw down a fresh tree and pet a couple of reindeer afterwards. It's easier, of course, when you don't fancy yourself getting to be as big as the Kirk or Campbell operations. Joe, Sr. now relies on a state pension as a retired University of Wisconsin-Extension computer manager, while Joe, Jr. is a DeForest High teacher. When you're small, you can pay more attention to the details.

One of those details includes the farm layout. At CaPaul's, different species, including balsam and Fraser firs, Scotch and white pines, and blue spruce, are planted every five or 10 rows. That keeps insects that prefer one kind of tree from infesting more than a small number. Another detail is constant monitoring for new outbreaks and trying to time any pesticide applications to a very few days, when the bugs are most vulnerable. And when he and his son do spray, they use a backpack sprayer and cover each tree individually, a practice they also employ when killing weeds.

"I don't want to put down more spray than I have to. It really matters," says Joe, Sr. "If I started out spraying hard, I'd lose my angle worms." Garden worms, a mark of good, porous soil, were impossible for the elder CaPaul to find when he bought the property in 1960 and began growing Christmas trees instead of corn on most of the acreage. Now, after reducing chemical use and limiting the weighty tread of heavy machinery, CaPaul finds the worms returning and the soil improving. And better dirt makes for healthier trees, he believes.

Stay in touch with the trees

The Christmas tree farmers who can innovate most in defending against common scourges are those who live near their plantations, and have the time and interest to constantly putter in their fields, says Andrea Diss, a DNR entomologist. "Monitoring is more than half the battle," She says. "You've got to be around and observing trees regularly, so you catch problems when they're small. If you're living next to your plot, you're going to be more attentive. If your business is nothing but growing Christmas trees, you're going to be out there every day."

And there are quite a number of tree farmers like that in the Wisconsin fold. It turns out that three-quarters of the 400 members in the Wisconsin Christmas Tree Producers Association cultivate fewer than 250 acres of trees. They yearly harvest about **half** the state's three million Christmas trees, most of which are shipped out of state. Only five percent of the association's members till over 500 acres.

HONKING GEESE · MOONLIT SNOWFLAKES · ICE FISHERS · PINE CONES · RABBIT TRACKS · RUNNING DEER · CANDLELIGHT SKIERS · SCULPTED DRIFTS · SLEEPING BEAR · FROSTED JUNIPERS · FROZEN RIVERS ·

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Many of those farmers are retired, or partly so. Some thought that growing Christmas trees might be an undemanding way to make some extra money ("Boy, was I mistaken," says Joe CaPaul, Sr. "This is the most labor intensive job I've ever done.") and some did abandon their efforts, occasionally leaving fields of Scotch pine to grow sicker and sicker. Others let their white pine and spruce grow up, ostensibly for timber harvest.

Not all principles of IPM work for every farmer, however. It depends on circumstances unique to each situation: the age of trees and size of the farm, soil types, the weather, land contours, proximity to other tree stands, the grower's gardening style, and just how many bugs or diseased needles he or she can bear. Both the CaPauls and Norma Swan, a spry 72-year-old widow who continues her late husband's balsam tree habit on 200 acres in Ogema, in Price County, had limited success with using imported ladybugs to gobble up the balsam twig aphid. On the other hand, Bill Kearby swears by them. The aphids feed on new growth, and the tree's needles end up gnarled as a result. "Some years it can be real bad," Kearby says.

Kearby just lets naturally occurring ladybugs munch away, then he shears off any twisted needles in July and sells his trees as they are, shipping them to Minneapolis and other cities. He's never heard any complaints from customers about the damage. "They're not looking for that. They're looking for a nice, full tree, with good color," he says.

Swan and her husband Dave used to regularly import ladybugs from the East Coast for aphid control. They resorted to a round of diazinon one year when the ladybug shipment was delayed. "It just broke my husband's heart," she says. He was committed to natural methods of pest control. "When you spray diazinon, you kill the ladybugs, too. That's what's so disheartening," she says. "Aphids curl the needles and make the trees unsalable. I just don't know the answer to the problem." Swan has practically abandoned the use of ladybugs as a dependable aphid check.

Down in Waunakee, Joe CaPaul, Sr., has found getting the ladybugs to the aphids on exactly the right day just as troubling. "The problem is, you can purchase them, but if the aphids aren't there when you turn them out, they [the ladybugs] leave. That is a problem," he says. CaPaul uses malathion to kill the aphids.

Growing and marketing green trees takes time and commitment

Neither grower may get a second chance with ladybugs. Paula Kleintjes, a professor of forest entomology at UW-Eau Claire, says she is frustrated by how many well-meaning Christmas tree farmers intend to avoid pesticide use, but buckle after feeling the pressure of competition from others in the business. Even those who are more comfortable using the chemicals use too much, she says. Instead of targeting one tree or a small patch, they cover the entire plantation. And that really eliminates any future chance of going back to natural controls.

"You get on this treadmill. You rely more and more on insecticides, and because of the damage to natural enemies, it's hard to bring the system back in balance," she says. Kleintjes faults the prac-

Mature Christmas trees are often dyed in summer to ensure uniform, bright green color by the winter harvest.

ROBERT QUEEN

tice of Christmas tree monoculture — "growing trees like corn" — for creating so many problems. Out West, in indigenous conifer stands, natural diversity in species and ages of trees keep bad bugs in check. "If you have an aphid, it has a harder time finding a host. It doesn't just go three feet [to the next tree]."

Given that they sink a good 10 years of labor and money into an ornamental crop before ever realizing a penny, Christmas tree farmers face challenges different from their corn and timber growing brethren. The answer to the bug wars may lie more in a change in the buying public's attitudes than anything else. It may be true, as growers attest, that the majority of shoppers find it hard to accept less than the storybook Christmas tree. It may also be true that shoppers have no idea how many chemicals have been sprayed on their purchase. Perhaps a segment of the Christmas tree purchasers would settle for a less perfect tree or the green marketing of "organic" trees given the option.

Kleintjes once did a study. On a choose & cut balsam farm with aphid damage, shoppers had come in November to pick out a tree they planned to buy toward Christmastime. Kleintjes randomly selected a tree close to the one the shopper had tagged. She measured its height and diameter, its density and curled shoots. What she found was surprising. While preferred trees were taller and fuller, insect damage wasn't a factor. "I found there was no difference in damage between the chosen tree and the unchosen tree," even though 40 percent of the shoots had been gnawed by the bugs, she says.

Kleintjes believes that choose & cut farmers can grow and sell their trees without using pesticides. It might be harder for growers who cut early and ship trees long distances as damage might be more apparent over time, she says.

There are farmers who sell injured trees for less, assuming that the public seeks perfection. Don Carney, who has refused to use herbicides, is one, and calls his balsams "somewhat rougher" as a result of denser weeds and the closer mowing necessary. In Sturgeon Bay, retired forester Harry Porter hasn't treated his white and Black Hills spruce for the Eastern spruce gall aphid, and will let some of them grow to timber height instead, he says. Other, smaller trees will be sold for about 75 percent of the normal asking price. Porter finds that buyers are usually very choosy about their Christmas trees.

DAVID L. SPERLING

Would customers pay more for organic trees or accept imperfections on trees that were grown using fewer pesticides?

"The person who wants an organic tree is in the minority," he says. "So practically, you've got to consider the average consumer. You will cover 80 percent of the customers with a dense, sheared, colored Christmas tree. These things are what the average person is looking for."

On a cloudy day, late last summer, Ken Appel spent ten minutes trying to explain exactly why one Scotch pine was superior to another. The first tree, I thought, was beautiful — one of the few that hadn't been bothered by the Zimmerman moth. It was dark green, about seven feet tall, and displayed that fluffy Scotch pine fullness. But to Appel's eyes, it was defective.

He pointed out an ever so slight indentation on its right side, a sign of poor shearing. He showed me a couple of small openings toward the tree's bottom, which interfered with the uniform shape. For those reasons only, it was a Number 2, an inferior specimen, and would fetch a smaller price.

Nearby stood another pine, almost identical to the first, which had been shorn perfectly into a completely symmetrical cone. In the parlance of Christmas tree growers, its foliage was dense and its pockets were tight, meaning it had no holes. Its leader, the top stalk on which angels perch, was smack in the middle. This one, Appel says, will be a Number 1.

"Retailers tell you, 'I don't want any trees with holes in them,'" Appel says. "And it's critical to them when they're selling a couple hundred trees on a retail lot. They're competing with some huge Christmas tree sellers."

But getting to the point where most trees are perfect Number 1's exacts a toll.

Pesticides and the equipment needed to spray them, helicopters sometimes included, are very pricey. Many farmers haven't even analyzed the true long- and short-term costs and benefits of chemicals versus natural control before they spray, Kleintjes has found.

And then there are the environmental issues, like changes in groundwater quality or change in native animal and insect populations which may be even harder to measure. On a sandy pine field regularly treated with pesticides over the years, with the prospect of more to come, it is encouraging to see a frog jumping high in the air. But, the professor wonders, if nobody had sprayed, would there have been more? □

Staff writer Katherine Esposito delves into current environmental issues from our Madison office.

Uncertain danger

ROBERT QUEEN *(BELOW)* DON BLEGEN

DNR Toxicologist Kathy Patnode places turtle eggs an incubator to test if exposure to pollutants affects their sexual development and subsequent growth. *(below)* The baby snapping turtles will be periodically tested to determine if pollutants their mother was exposed to during gestation have long-lasting effects for her offspring.

The delicate workings of the body's internal messengers may be disrupted by chemical exposure, but scientists are unsure if changes in animals signal problems for people.

Lisa Gaumnitz

If Mother Nature has her way, the snapping turtle eggs in the incubator to Kathy Patnode's right will hatch as males, those on the left will hatch as females.

"Temperature determines their sex," says Patnode, a DNR wildlife toxicologist. "A nest temperature of 73.5 degrees would develop males. If it heats up to 83.5, hormones would trigger changes causing the embryonic cells to differentiate as females." She carefully digs a nest for each egg in a small jar before arranging it on a tray destined for the incubator.

But Patnode suspects Mother Nature has been fooled.

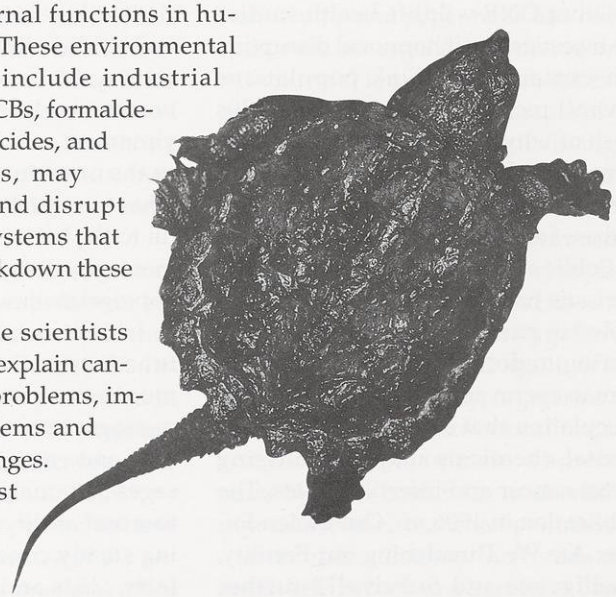
She hypothesizes that the mother turtle that laid these eggs along a contaminated river was likely exposed to environmental pollutants. These contaminants may have scrambled the natural chemical messages directing embryo cells to develop male or female sex organs. As a result, Patnode expects the hatchlings could exist in a state of sexual limbo.

"If the PCB contaminants act like an estrogen, turtles incubated at the male temperature may develop abnormal testes that contain female ovary cells," Patnode said. "If they act like a male hormone, turtles incubated at the female temperature might develop abnormal ovaries."

Patnode is among a growing number of researchers investigating whether environmental pollutants are interfering with the hormonal, or endocrine, systems that orchestrate growth, sexual development and regulate other internal functions in humans and wildlife. These environmental pollutants, which include industrial chemicals such as PCBs, formaldehyde, mercury, pesticides, and even some plastics, may mimic hormones and disrupt the body's subtle systems that produce, use or breakdown these chemical signals.

The results, some scientists hypothesize, might explain cancers, reproductive problems, immune system problems and even behavioral changes.

DNR toxicologist Mike Meyer has been trapping and taking blood sam-



MARK S. WERNER

During the last 20 years, wild mink populations have dropped precipitously. Are hormonal changes caused by environmental contaminants contributing to the downfall?

ples from 400 loons on northern lakes where fish contain the highest recorded levels of mercury. He marks the birds and monitors their nest every year to compare their reproduction rates with loons from lakes where fish have lower mercury levels.

Candy Schrank, DNR fisheries toxicologist, is similarly sampling yellow perch from Lake Michigan and examining sex organs, hormone levels and other reproductive measures as part of a broader study to identify possible causes of a mysterious, precipitous crash in the perch population since the late 1980s.

Other DNR wildlife health studies are investigating if hormonal disruption can explain why mink populations haven't recovered since a mid-1970s crash or why contaminated stretches of some rivers have no mudpuppies while nearby rivers support healthy numbers of these freshwater salamanders.

Public and Congressional interest in the issue has exploded in recent years, fueled in part by sensational, but conflicting, reports of dramatic drops in human sperm counts, and by scientific speculation that exposure to environmental chemicals may cause rising breast cancer and infertility rates. The publication in 1996 of "Our Stolen Future: Are We Threatening our Fertility, Intelligence and Survival?" further fanned the flames. The book, by Theo Colborn, senior scientist with the World Wildlife Fund who received her zoology doctorate from University of Wisconsin-Madison, galvanized some environmental groups and politicians. Vice President Al Gore wrote the foreword likening the book to Rachel Carson's "Silent Spring," but some scientists and reviewers criticized it as long on theories and short on proof.

Tracking down the endocrine system's mysterious paths

The endocrine system is one of two chemical messenger systems in humans and wildlife. The other, the central nervous system, serves as the communications network linking the senses, the environment, and other parts of the body to the outside world. Eyes, ears, and other senses relay news of outside stimuli to the brain, which sends rapid-fire messages along neural paths to tell the appropriate tissues how to respond.

In contrast, the endocrine system functions as the body's internal communications network and releases its messages over seconds, minutes, hours, days and years. Within cells, these messages help maintain constant temperature and acidity levels, as well as keeping steady concentrations of glucose, fatty acids and other dissolved substances. More broadly, these chemical messages regulate growth, maturation, sex differentiation, reproduction, pigmentation, and behavior.

The pituitary, the thyroid, the pancreas, the testes in males and the ovaries in females all contain endocrine glands which produce and release hormones to the bloodstream. Hormones find their way to intended receptors on cell surfaces or within cells, bind to them and trigger specific responses in these target cells.

Ovaries, for instance, produce estrogen which travels in the bloodstream to the uterus, where it binds to a receptor and triggers tissue that lines the womb to grow and prepare for a possible pregnancy. Estrogen levels also trigger the developing female reproductive tract, secondary sexual characteristics, spur bone growth and maintain a healthy heart. The system also has a negative feedback loop which monitors hormone levels and signals the ovaries — and other glands producing hormones — to slow down, speed up or stop. In this way, the system protects the body from too much of a good thing: a woman's lifetime exposure to estrogen, for instance, is the most well-charted risk factor for breast cancer and endometrial cancer.

Such feedback loops protect adults from modest fluctuations in natural hormones. Some scientists believe the endocrine system has evolved over time to handle natural estrogen-like substances produced in plants such as wheat, soybeans, beets, cherries, clover and apples. Synthetic chemicals were introduced too recently and too rapidly for the body to adapt, they say.

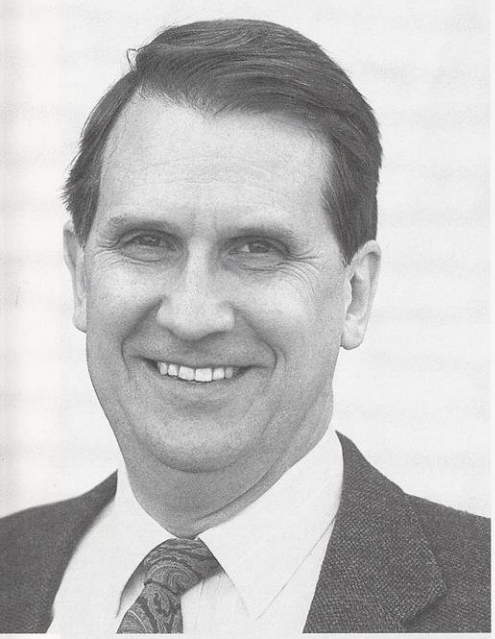
Although wildlife and humans ingest infinitesimally small amounts of these chemicals, some contaminants build up in fatty tissues. The contaminant may beat the real hormone to its receptor, preventing normal chemical signals in the body. Once in the womb or at the breast, the critical amount of a hormone-mimicking chemical at a critical time may throw a biological curveball to a developing fetus or newborn. The results — some of which may not surface until the child has reached adolescence — can be profound. Problems

in sexual development and reproduction, the immune system, behavior changes, or neurological development may be attributed to endocrine disruption in the formative years.

Old problem, new understanding

Endocrine disruption is not a new problem, but scientists are only now unraveling its secrets, says Dr. Henry Anderson, Chief of the State Division of Public Health.

The Greeks described diabetes, an endocrine system disease, but they didn't understand how it occurred. Understanding more about endocrine mechanisms has beneficial uses. For example, birth control pills adjust hormone levels to prevent pregnancies. For the most part, scientists and government regulators examining endocrine disruption have focused their studies on preventing cancer.



ROBERT QUEEN

"Now we've advanced the understanding that the endocrine system is vulnerable. It can be altered from exposure to chemicals at levels below the traditional limits we set to protect people from cancer and gross reproductive effects."

Dr. Henry Anderson, Chief of the State Division of Public Health

"Now we've advanced the understanding that the endocrine system is vulnerable," Anderson said. "It can be altered from exposure to chemicals at levels below the traditional limits we set to protect people from cancer and gross reproductive effects."

Another new wrinkle, Anderson said, is concern about thousands of chemical compounds that have not been tested for adverse effects.

"There are 70,000 chemicals out there in the environment, and 20,000 of them are still being manufactured," he said. "Pesticides receive more rigorous testing before they are marketed, But at best, fewer than 100 other chemicals have been fully tested, so it is a realistic hypothesis that some of the other compounds have endocrine-disrupting effects."

He serves on an Environmental Protection Agency committee that is developing screening and testing guidelines for endocrine-disrupting chemicals. The group's recommendations are due in January.

Scientists who believe endocrine disruption is more than theory build their case on a handful of human studies in which people were exposed to large amounts of chemicals in prescribed drugs or as a consequence of an environmental spill or accident. Other fieldwork provides what EPA describes as "compelling evidence" that endocrine disruption has occurred in snails, oysters, alligators, other reptiles, and birds such as gulls and eagles.

The strongest proof that hormone-like compounds can disrupt human endocrine systems lies in the experience hundreds of families had with DES. Diethylstilbestrol used to be prescribed in the 1940s, 1950s and 1960s for pregnant women with a history of miscarriages to help them carry babies to full term.

The drug eventually proved to have the opposite effect on many of the expectant mothers. By the time that proof was conclusive, daughters born to these mothers had developed higher rates of a rare vaginal cancer, various genital tract abnormalities, and abnormal pregnancies.

Another key finding was UW-Madison researcher Richard Peterson's discovery in the early 1990s that the male offspring of pregnant laboratory rats exposed to low doses of dioxin developed reproductive problems.

In her book, "Our Stolen Future," Colborn writes that Petersen's work "hit with the shock of an unanticipated asteroid" because it illustrated that low levels of contaminants — similar to those found in the environment rather than the large doses often used in lab experiments — had adverse effects. Dioxin was not just a potential cancer-causer, but could also disrupt the endocrine system and cause development and reproduction problems.

In its February 1997 review of scientific literature, the Environmental Protection Agency found no conclusive evidence that levels of pollutants commonly found in the environment are disrupting human hormone systems. However, there was an ample list of harmful effects observed in aquatic life and wildlife that may be attributed to such exposure.

Female marine snails, for example, are now commonly found with male genitalia, an effect linked to exposure to chemicals used in marine paints on ship hulls. Female fish downstream from Florida pulp and paper mills had developed male sex organs and tried to mate with normal females or each other. In perhaps the best known example of endocrine disruption, alligators living in Lake Apopka, Florida's fourth largest lake, had significantly lower sperm counts and poorer reproductive success after exposure to organochlorine pesticides. The EPA report cites case after case of birds and fish suffering thyroid problems; mammals and shellfish suffering decreased fertility; organisms developing the opposite sexual organs, and birds and mammals whose immune systems have been weakened by exposure to environmental pollutants.

Evidence linking such adverse health effects back to a particular chem-

ical has been more elusive. Many chemical and non-chemical factors like parasites, viruses and habitat destruction could contribute to the findings.

In addition, researchers often don't know if the number and nature of deformities they observe in wildlife are unusual because their understanding of the endocrine system's workings are so recent, notes DNR's Patnode.

"We're asked to judge whether the changes in hormone balances we are seeing are 'abnormal' when we're still trying to elucidate all the normal structures and conditions of the endocrine system," she said.

Patnode will run a series of tests on the turtle hatchlings during the next few years to assess their overall health and development. After the turtles hatch, she and technician Barb Bodenstein will nestle the turtles onto a bed of wet sphagnum moss for a few weeks, then transfer them to water trays, and finally to a winter home at the Poynette Game Farm.

The scientists will euthanize some of the turtles, analyze their tissues for pathogens and bacteria, check blood for abnormal hormone levels, analyze enzyme levels in turtle livers, and examine reproductive tissues for abnormalities. They'll release the rest of the turtles to the wild in the spring after implanting a microchip the size of a rice grain in their legs. Patnode will track the turtles in coming years and monitor their health and PCB exposure. It's a long process — turtles don't start reproducing until they are eight years old and can live up to 50 years.

The battery of tests and the monitoring will help Patnode gauge the turtles' overall health and test her hypothesis — that endocrine disruption has occurred affecting the hatchlings' sexual development and reproductive ability.

She'll still have to answer the big question.

"Even if we find six ovarian cells in a turtle's testes, what does that mean to the turtle?" Patnode says rhetorically. "Will he be unable to produce functioning sperm? And what does that mean to the turtle population's ability to survive if 10 percent of the male turtles have these abnormal testes?"

Results from regional hot spots are inconclusive

Such studies have been common in Wisconsin and other Great Lakes states in recent years because the region has documented a number of cases of dead and deformed fish and wildlife in the 1960s and 1970s, before PCBs and DDT were banned, says DNR toxicologist Mike Meyer.

The Environmental Information Center, a Washington D.C.-based advocacy group, issued a report last June contending that the Great Lakes region legally released to the environment more "endocrine-disrupting" chemicals than any other region in the nation — 17 million pounds in 1995. And most of these chemicals likely remained in the area. Many DNR scientists following the issue said the group's list includes chemicals which scientists don't agree are endocrine disruptors.

Meyer said that most of the wildlife populations across the state are increasing or maintaining their numbers even though some species in some areas show elevated levels of synthetic chemicals. Regionwide, chemical use and release to the environment continues to drop. "We do have some hot spots — Green Bay, the Sheboygan River area, Superior — and I'm still concerned about the industrial Wisconsin River," he said.

In his seven-year study, Meyer has found that bald eagles living on highly industrialized stretches of a handful of rivers — the middle stretch of the Wisconsin River, the Fox, the Menominee and the Mississippi — had elevated PCB levels in their blood, yet reproduced normally. Only six pairs of eagles near Green Bay, which analysis showed had high PCB and DDE levels in their eggs, reproduced at lower rates than eagles living elsewhere in the state.

Also, eggs taken from the nests of osprey with elevated dioxin levels in their blood hatched in non-contaminated nests at the same rate as eggs removed from clean sites and subsequently hatched in contaminated nests.

"It's plausible that endocrine disruption could be occurring," said Meyer, who represents the Department of Natural Resources on an EPA work group investigating the issue, "but [the work group believes] it's a phenomenon found primarily in highly contaminated areas. There's no widespread phenomenon in the Great Lakes region or nationally. The hypothesis is plausible, and perhaps the right measurements have just not been made."

Uncertainty over the controversy.

The endocrine disruption theory — and how regulatory agencies such as the DNR and EPA should respond to it — has scientists and policymakers choosing sides in recent years. They agree that much more research is needed, but that's about the only thing they agree on. The debate and the evidence haven't spurred changes in the way we regulate pollutants.

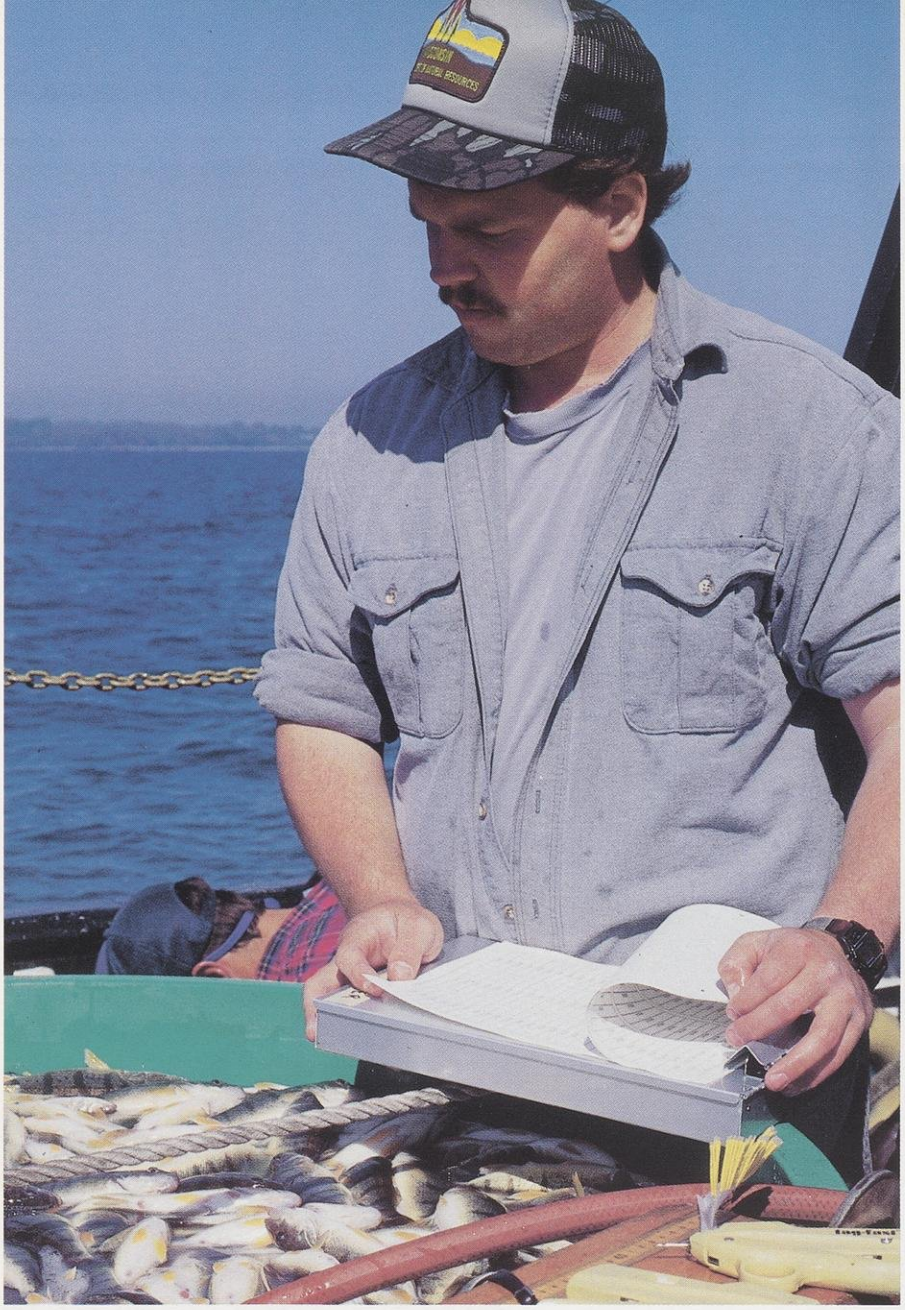
Colborn calls for worldwide negotiations and agreements to stop producing and using compounds like DDT and PCBs that persist in the environment and act as endocrine disruptors. She also advocates pulling other chemicals from the marketplace which have been shown to change hormonal levels until those effects are proven to be trivial. She stresses changing manufacturing processes to avoid using these chemicals or developing less hazardous synthetic substitutes.

Scientists at the other end of the spectrum argue that we shouldn't worry. Humans are exposed to such large amount of natural hormones in the foods we eat — wheat, oats, soybeans, potatoes and coffee, just to name a few — that manmade chemicals that mimic substances like estrogen are hardly cause for concern.

Patnode for one, falls in between. She thinks there are compounds regulators need to be concerned about because they are causing the most serious problems and are most difficult for humans and wildlife to eliminate from their bodies. Many compounds, like

Water contaminants accumulate in the food chain. Blood samples from loons and other fish-eating animals may show gradual changes in behavior or development from lifelong exposure to chemicals.

STEPHEN J. LANG



CANDY S. SCHRANK

Endocrine disruption is one factor researchers are investigating to explain a dramatic drop in yellow perch populations in Lake Michigan.

PCBs and DDT have known consequences and are banned in the United States, but they are still produced and used elsewhere and persist in the global environment. Patnode believes any broadbrush ban on synthetic chemicals is premature and may backfire. If research reveals certain chemicals have been wrongly implicated, then industry and the public, will be increasingly skeptical and less cooperative, she says.

"The Chicken Little approach doesn't work," she said. "You need to have well-substantiated evidence that compound X or mixture XY has this effect at levels present in the environment, and that the disruption harms the individual and the population. We don't have that information now for many environmental contaminants."

Already, a backlash seems to be building against endocrine disruption hypotheses; "Another Enviro-Scare Debunked" screamed a headline in the August 20, 1997, *Wall Street Journal*. "Forget the Frenzy" said the *Milwaukee Journal Sentinel* about the same time. The stories detailed retractions in July of a study printed in the magazine *Science* that purported to show that chemicals which had weak estrogenic effects on their own were up to 1,600 times more active when combined. The Tulane researchers withdrew that study after they — and a host of other scientists who had rushed out to test the compounds — were unable to replicate the results.

But that too, illustrates an extreme position.

There are concerted efforts to provide some solid scientific answers.

EPA's Office of Research and Development includes endocrine disruptors as a high priority research issue, and President Clinton's National Science and Technology Council is coordinating research efforts by the EPA and other government agencies. The National Academy of Sciences is conducting a more extensive review of the scientific literature. And last September, the EPA and U.S. Dept. of Health and Human Services announced they were creating a federal research center dedicated to protecting children's health from environmental threats.

In the face of the uncertainty, Anderson and Patnode recommend that the public follow some simple steps to minimize the environmental risks we are aware of as the research continues: use chemicals sparingly and carefully, wash fruits and vegetables before preparing them, follow advice offered in fish consumption advisories and eat a variety of foods so no one food group forms too large a part of one's diet. Like handling so many of life's unknowns, minimizing problems from endocrine disruptors may include heeding a bit of your mother's advice: all things in moderation.

Patnode will continue her work, tracking turtles and examining how chemical contaminants may affect animals.

"We've done a good job giving people warnings and information to judge whether they want to eat fish and wildlife that may be contaminated," Patnode said. "It's time to concentrate on how these contaminants may affect wildlife itself. If we can determine what level of contamination causes subtle health effects, then we can give better guidance on how clean the environment needs to be to protect animals as well as people." □

Lisa Gaumnitz tracks environmental trends and events as DNR's public affairs manager for the Division of Enforcement and Science programs.

Preserving the Good Life

How the Department of Natural Resources works with you to better Wisconsin.

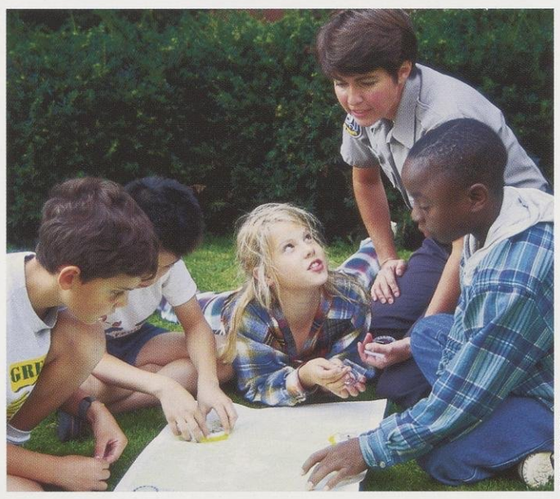
State of Wisconsin
Department of Natural Resources
P.O. Box 7921
Madison, Wisconsin 53707-7921

If you fish, hunt, hike, swim, boat, or enjoy Wisconsin's scenery…
drink water, breathe air, flush waste, recycle or dispose of trash…
manufacture goods, produce electric power, cut timber, grow crops, repair autos …
are in fifth grade, sit on the town board or belong to a conservation group…

you have a relationship with the Wisconsin Department of Natural Resources.

(cover) *It takes professional attention to buy, design and maintain the places where we play.*
(right) *DNR wardens enforce laws and visit classrooms to instill outdoor appreciation and ethics.*
(far right) *Wild things are sustained by wild places. DNR staff and partners restore native habitats like this prairie project.*
(inset) *We build partnerships to build the boardwalks that open the outdoors to people of all ages and abilities.*

(COVER PHOTO) ROBERT QUEEN



ROBERT QUEEN

Our purpose and mission

The Department of Natural Resources (DNR) is Wisconsin's lead agency for protecting and improving natural resources and the environment for enjoyment today and tomorrow.

DNR employees:

- protect Wisconsin's air, land and water; its fisheries, wildlife and forests;
- prevent and control pollution;
- enforce conservation and environmental laws;
- restore and protect habitat for fish, wildlife, plants, forests and native ecosystems; and
- maintain parks, trails, hunting grounds and other recreation areas for your enjoyment.

We want to keep you informed, give you a chance to get involved in agency activities and encourage you to take your own actions to protect Wisconsin's natural resources.

Why have a DNR?

As early Wisconsin residents found out in the previous century, natural resources have limits. DNR's duties today reflect the laws Wisconsin citizens sought over many decades to protect the state's natural resources while allowing the economy to flourish.

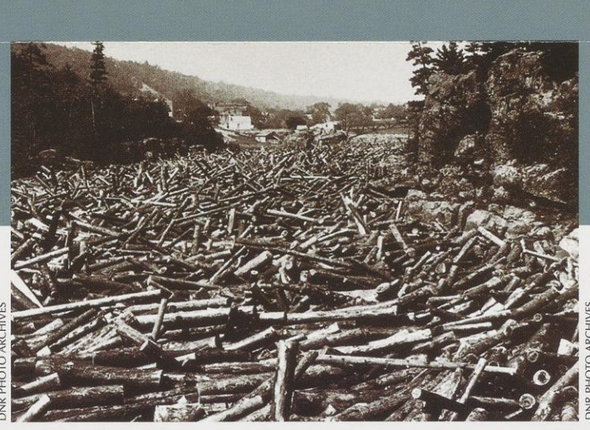
It is the DNR's job to balance conflicting uses today so quality natural resources are available tomorrow.

That seems like a powerful role. But in reality, you're in charge. DNR's authority comes from decisions your representatives make on the Natural Resources Board, in the Legislature, Governor's office and the courts. Your elected officials allot the tax revenue and set the user fees to support DNR programs that benefit you.

(LEFT AND INSET) ROBERT QUEEN

DNR PHOTO ARCHIVES

A day's duck hunt in 1910. Wisconsin's bounty seemed endless and bottomless for decades.



DNR PHOTO ARCHIVES

Logjam at the Dalles of the St. Croix River in 1886, estimated 60 million board feet of lumber. Pressures from growing populations and booming business ventures outstripped nature's ability to recover.

DNR PHOTO ARCHIVES

Stocking fish in Lake Michigan. In reclaiming the environment and the economy, public support grew to manage finite resources.

The past shaped DNR's role today

WISCONSIN'S HISTORY IS BUILT ON NATURAL RESOURCES

The wood, water, fish, wildlife, plants, soil and minerals of the region that is now Wisconsin sustained Native Americans for thousands of years before Europeans began arriving in 1600s to tap those resources. For two centuries, Wisconsin remained a wild territory inhabited by native tribes and foreign fur traders based at forts on major riverways.

SETTLEMENT RAPIDLY ALTERED WISCONSIN'S LANDSCAPE

As the United States pushed west in the mid-1800s, newcomers from eastern states and other countries settled in Wisconsin. Minerals were mined, forests felled, grasslands plowed, homes built and crops grown. Rivers became major transportation routes, and fish and wildlife were heavily harvested. Trails became roads, river mouths became harbors, streams were dammed for mills, new towns sprang up and older settlements expanded, increasing the need for sanitary waste disposal and safe drinking water supplies.

From 1870 to 1890, lumbering prospered in northern Wisconsin. A thriving heavy machinery industry was forged in southeastern Wisconsin. By the turn of the century, wheat farming gave way to dairying, and tanning, brewing and papermaking were established.

The strain on the region's resources was inevitable at a time when laws were few and the finite nature of then-abundant natural resources was not well understood. Many forms of wildlife dwindled or disappeared altogether. Millions of acres of wetlands were drained, forests were reduced to acres of stumps, and native prairies disappeared. Rivers filled with soil washed from cropped land, and waste from industries and communities.

CONCERNED PUBLIC CALLED FOR GOVERNMENT INTERVENTION

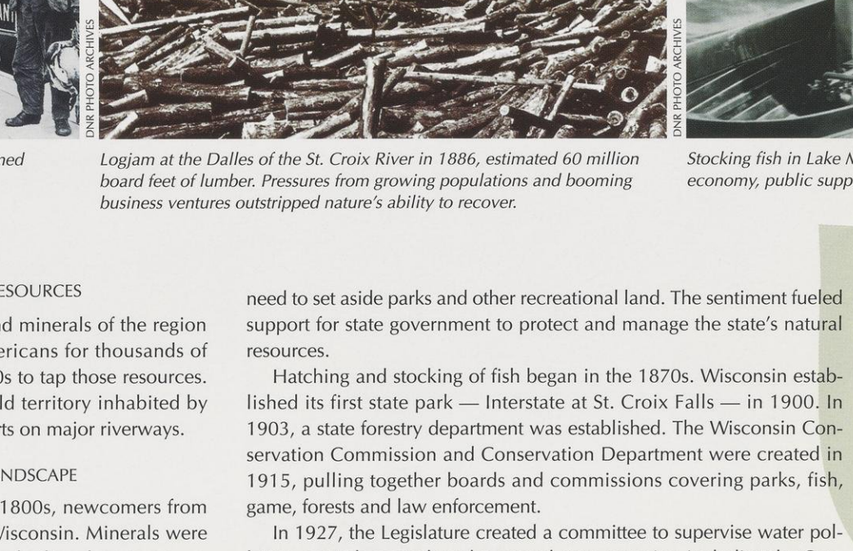
By the turn of the century, Wisconsin residents began to express concern about the sharp decline in fisheries and wildlife, the loss of forests, and the need to set aside parks and other recreational land. The sentiment fueled support for state government to protect and manage the state's natural resources.

Hatching and stocking of fish began in the 1870s. Wisconsin established its first state park — Interstate at St. Croix Falls — in 1900. In 1903, a state forestry department was established. The Wisconsin Conservation Commission and Conservation Department were created in 1915, pulling together boards and commissions covering parks, fish, game, forests and law enforcement.

In 1927, the Legislature created a committee to supervise water pollution controls carried out by several state agencies, including the Conservation Commission. A private well code to protect drinking water — the nation's first — was established here in 1936.

From 1961 through 1992, Wisconsin's Outdoor Recreation Act Program acquired almost 556,000 acres of recreational lands for $171 million. Since then, the Stewardship Fund has purchased more than 146,000 acres of scenic gems for approximately $118 million.

Periodic field inventories show how our efforts measure up to preserve quality habitat and protect rare species, like the endangered ornate box turtle.



ROBERT QUEEN

LATE 1960S USHERED IN ENVIRONMENTAL ERA

The need for a comprehensive approach to complex environmental problems led lawmakers to create the Department of Natural Resources in 1967. They merged conservation, recreation, wastewater and drinking water protection functions under one agency. This allowed staff to apply more cohesive, thorough strategies to reduce air pollution and hazardous wastes, protect groundwater, provide drinking water, encourage waste reduction and recycling, protect nongame and endangered species, and acquire lands for public use.

The DNR assumed further responsibilities as the federal government passed national environmental laws in the 1970s, '80s and '90s.

DNR's job changes with the times

DNR employees continue to develop new approaches to solve emerging and unresolved environmental issues. We emphasize the interdependence of plants, animals, humans and the environment.

Political leaders also decided that natural resources should be managed with the same leadership structures governing health care, transportation and other societal institutions. These trends prompted a reorganization of the DNR in 1996 to prepare the agency for the 21st century.

DNR's structure

The Natural Resources Board has legal authority to set agency policy, recommend regulations for legislative approval, approve property purchases and accept donations. The Board's monthly meetings are open to the public.

DNR's staff in downtown Madison works with the Natural Resources Board to establish department policies and programs, administer state laws and rules, distribute community grants and loans, interact with the Governor, Legislature and other agencies, work with many interest groups, support DNR field responsibilities, and evaluate progress toward agency goals.

More than two-thirds of the DNR's workforce is assigned to field offices in five regions. Their work is further subdivided into 23 geographic management units (GMU) whose boundaries roughly match the state's natural river basins and large waterways.

Staff in each GMU and region are responsible for defining the area's natural ecology and identifying threats to natural resources and the environment. Work teams draw expertise from many DNR disciplines and combine their efforts with county, city and town leaders; business owners; private homeowners and landowners; outdoor enthusiasts; young people and other state residents to manage public resources.

DNR Regions and Geographic Management Units

DNR Customer Service Centers

Several DNR Customer Service Centers are located in each region. If you need to purchase a license or have a question about a natural resource or environmental matter, call the DNR service center nearest you. Customer service specialists will get you the answers you need or put you in touch with a staff person who can help.

Service Centers also offer environmental regulatory assistance, provide information on state parks, trails, forests and recreation areas, handle boat, snowmobile and all-terrain vehicle registrations; and offer helpful publications and other information.

Where DNR gets its funding

The department's largest source of funding is the Fish and Wildlife Account, derived from license fees, federal aid, hunting stamps, and excise taxes on sporting goods.

Other important funding sources include state tax revenue; fees for environmental permits, trails and campgrounds; park entrance fees; court fines; portions of the state gasoline tax; auto registration fees and tire fees.

Bonds fund public works projects and land purchases. The state Stewardship Fund has invested more than $118 million purchasing more than 146,000 acres including the Turtle-Flambeau Flowage, the Chippewa Flowage, the Dells of the Wisconsin River property and the Willow Flowage.

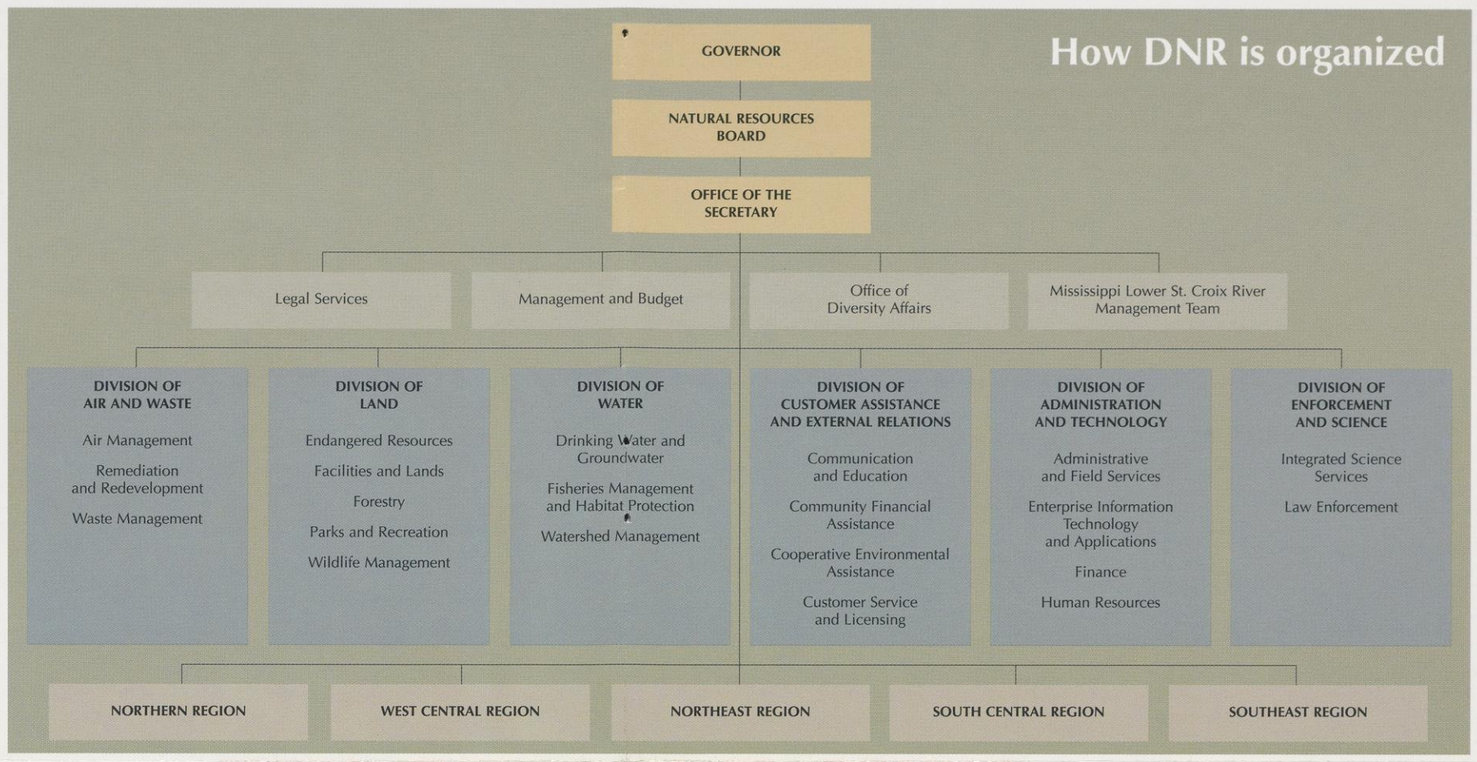
Donations to the Endangered Resources check-off and license plates, DNR properties and programs round out the mix of funding sources.

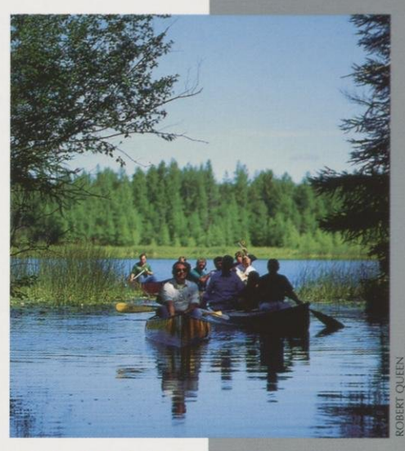
The strength behind our strength

Natural resources remain a driving force in Wisconsin's economy and culture. Wisconsin's 5.2 million residents need safe water to drink, clean air to breathe, sanitary waste disposal, enjoyable outdoor experiences, and the spiritual renewal scenic landscapes provide.

You, your family and friends, and your community are the primary stewards of Wisconsin's natural riches. The DNR lends a hand by offering expertise and assistance, preventing and addressing conflicts as resources are used, and making sure people understand and comply with laws designed to protect resources from misuse.

How DNR is organized

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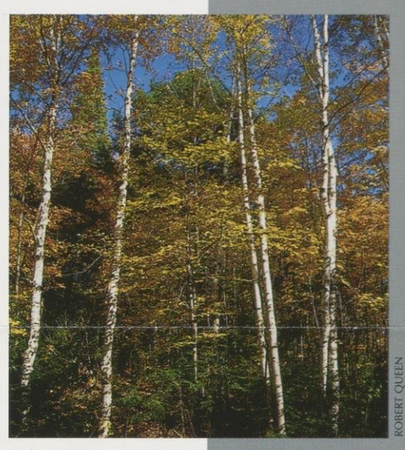
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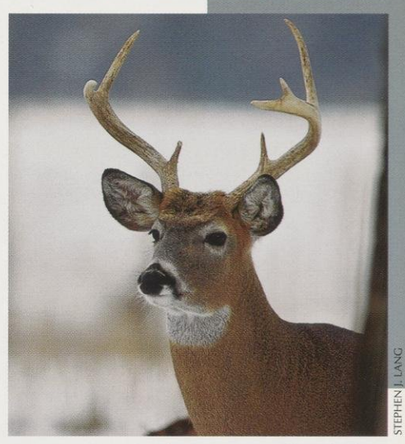
STEPHEN J. LANG

Outdoor recreation, forestlands and abundant wild resources are key pleasures in Wisconsin.

Wisconsin's landscape and climate

Wisconsin has four distinct seasons, beautiful scenery and abundant recreational opportunities.

Except for a portion of southwestern Wisconsin, with its steep, wooded hills, narrow valleys and rushing creeks, the state's landscape has been shaped by glaciers. The last one retreated about 11,000 years ago, leaving behind many rock and soil formations.

The state is water-rich, with the Mississippi River bordering on the west, and 563 miles of Great Lakes shoreline along the state's northwest and east coasts. About 15,000 lakes mark the state's interior.

Several North American ecological zones converge in Wisconsin — the eastern hardwood forests, Midwestern oak-savanna prairies and the northern boreal (evergreen) forest — making Wisconsin a rich biological crossroads of diverse species.

Wisconsin's upper Midwest location is on the path of a major continental flyway for songbirds, waterfowl and other species that migrate each year to and from South America, Central America and the Gulf of Mexico.


ROBERT QUEEN

Kayaking competition in downtown Wausau. Clean water is a must for drinking supplies and recreation.

Written by Wendy K. Weisensel and David L. Sperling

Design by Moonlit Ink

The Wisconsin Department of Natural Resources provides equal opportunity in its employment, programs, services and functions under an Affirmative Action Plan. Questions? Write Equal Opportunity Office, Department of the Interior, Washington DC 20240

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PUBL CE-230-97


STEPHEN J. LANG

Research and environmental monitoring — helped bring back bald eagles, improves the quality of stocked fish, helps assess the risk past pollution poses today.


ROBERT QUEEN

Wisconsin Statistics

LAND

Total acreage: 35.7 million
Acres in public ownership: 5,370,353
Highest spot: Timm's Hill (Price County) 1,952 feet

WATER

Miles of Lake Superior shoreline: 156
Miles of Lake Michigan shoreline: 407
Acres of surface waters in the Great Lakes: 6.4 million
Inland lakes: More than 15,000, covering a million-plus acres
Largest: Lake Winnebago (137,708 acres)
Deepest: Big Green Lake (236 feet)
Rivers & streams: More than 33,000 miles, of which 9,561 miles are coldwater trout streams

WEATHER

Average mean temperature: 42.9° F
Average precipitation: 31.79 inches

ECONOMY

Top income-producing activities: agriculture, forestry and forest products, tourism, manufacturing

RECREATION

State Parks: 55
Visitors: 13 million annually
Largest: Devil's Lake (8,864 acres)
Smallest: Copper Culture (42 acres)
State Forests: 10 (491,970 acres)
Visitors: 4.5 million annually
State Recreation Areas: 4 (8,668 acres)
State Trails: 25
Trail Pass Holders: 47,198 annually
Miles surfaced for bicycling: 503
Campsites: 4,552
Acres of hunting and fishing land: 6 million

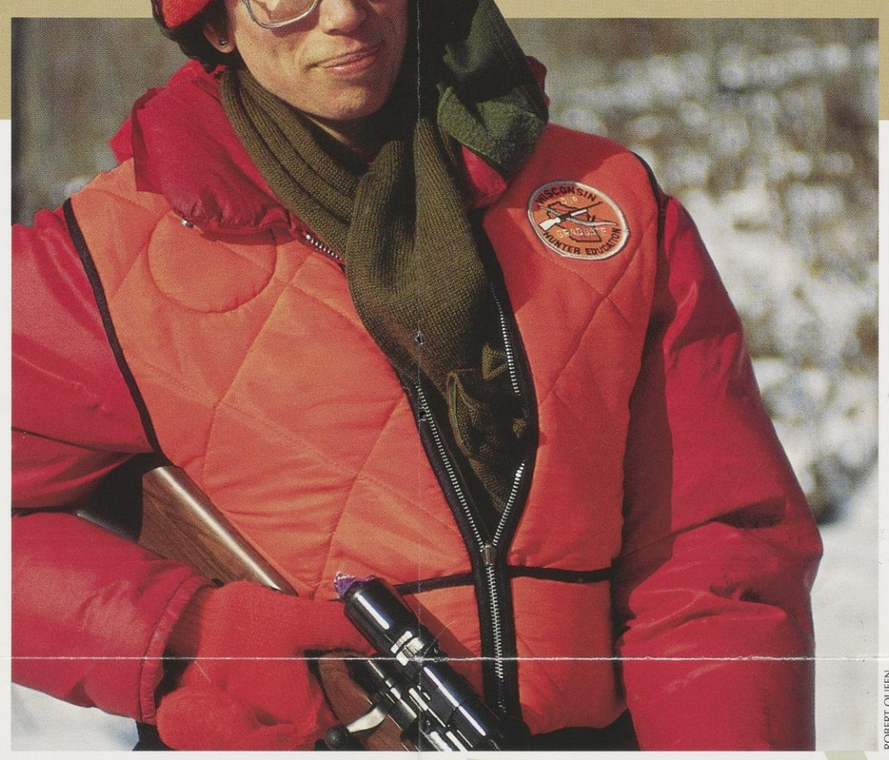

ROBERT QUEEN

DNR Statistics

Boats registered in 1996: 540,845
Warmwater fish produced and stocked in 1996: 33,534,000
Warmwater fish fry and fingerlings distributed to clubs in 1996: 308,000
Coldwater fish produced and stocked in 1996: 6,202,500
Top three animals harvested in 1996: squirrels (571,669); deer (461,732); ducks (399,252 — 1995 figure)
Top furbearers harvested in 1996: muskrats (297,096); raccoon (215,112)

THE DEPARTMENT OF NATURAL RESOURCES:

- manages 530 public hunting and fishing grounds totaling 560,000 acres
- provides technical assistance to owners of about 20 million acres of private land
- administers hunter education for 30,000 students a year
- operates and maintains 14 fish hatcheries
- responds to 2,000+ tips regarding fishing, hunting and habitat violations each year
- annually distributes 21 million trees and shrubs from state nurseries
- publishes and distributes 3.3 million fishing and hunting regulation booklets annually
- publishes *Wisconsin Natural Resources* magazine, with 93,000 subscribers
- received $43.8 million from the Forest Mill Tax and $52.8 million from fishing and hunting fees in 1996–97
- spent in millions: $68.5 on environmental quality, $26.8 on forestry, $22.6 on resource acquisition and development, $16.8 on fish management, $12.4 on parks and $11.4 on wildlife in 1995–96


ROBERT QUEEN

DNR sponsors courses that encourage more people to safely enjoy traditional outdoor sports.

You've got our number

Air quality recording for southeastern Wisconsin: 1-800- 242-4727; in Milwaukee: 263-8582
Poacher's hotline to report fish and game violations : 1-800 TIP-WDNR (1-800-847-9367)
Outdoor Report Conditions: (608) 266-2277
Information Desk at DNR Headquarters, Madison: (608) 266-2621; TDD: (608) 267-6897
Regional offices:
North (Spooner): (715) 635-2101
North (Rhinelander): (715) 365-8900
Northeast: (920) 492-5800
South Central: (608) 275-3266
Southeast: (414) 263-8500
West Central: (715) 839-3700
DNR Web address: www.dnr.state.wi.us
Wisconsin Natural Resources magazine: www.wnrmag.com

Badger pride in badger accomplishments

- First state program to acquire and manage natural areas to preserve rare plant and animal communities (1951)
- First state to ban the pesticide DDT to protect birds and other wildlife (1970)
- First state to meet fishable and swimmable water quality standards (1983)
- First acid rain control law in the nation (1986)
- Among the first groundwater protection laws (1984)
- Second largest bald eagle population in the lower 48 states
- Largest concentration of lake sturgeon in the world
- First wild and scenic river in the nation (the St. Croix/Namekagon) (1968)
- Oldest Soil and Water Conservation District in the nation (Coon Valley) (1931)
- Pulp and paper mills reduced oxygen-demanding water pollutants 91 percent between 1972–82 and reduced suspended solids by 84 percent
- One of the nation's strongest recycling programs — 97 percent of state households participate
- A proud tradition of buying unique parcels to preserve outdoor recreation through the ORAP and Stewardship programs
- Consistently ranked among the finest places to hunt deer and fish.

ROBERT QUEEN

Creature Comforts

Enjoy your stories of the beasties, bats and bugs that crawled their way into your hearth, if not heart.

Editor's note: We sent out the call, and 97 of you answered. Last February we asked for short tales about wild animals that got into your house and your exploits to remove them. We enjoyed reading all the stories and appreciated the overwhelming response. Here are 16 of the finest.

Grounded venison

Back in 1979, my first job with DNR was working with Wildlife Manager Dan Olson and Wildlife Tech Mark Opgenorth. Late one Friday afternoon, Mark and I were returning from a busy day of field work when our office secretary excitedly told us a deer was trapped in the basement of a new house under construction on the east edge of town. We sped to the scene and found several construction workers peering into a newly-poured concrete foundation. Eight feet below ground level was an obviously excited deer running repeatedly into cement walls in a vain effort to jump out.

The deer was bleeding slightly from its nose and was bruised up a bit. Still, there was no time to get a dart gun and tranquilize the frantic animal. Exercising his supervisory skills, Mark stared at the deer, then at me and said "Ishmael, go down there and catch that deer."

I swallowed hard and climbed down a muddy plank into the basement only to be knocked immediately to the ground by the charging, excited deer. The next few moments were a blur, but I managed to corner and tackle the deer in a slippery pool of mud. I sprawled across the deer trying to keep its sharp hooves from denting my skull. I looked up to see Mark and the workers peering over the wall.

"Need a rope?" Mark calmly asked. I suggested he join me and we both tie up the deer and hoist it out of the basement to the hands of workers waiting to conclude this exciting end to the work week.

Despite a few bruises to me and the deer, we managed to load it up in the pickup, drove a few miles out of town, and released it.

Bill Ishmael
DNR Wildlife Manager
Spring Green

The spring chorus

Nearly every fall after the ground is frozen, just as winter settles in, we rescue one or two tiny chorus frogs from under the metal grate in our floor drain. Sometimes they are nearly dead from dehydration and lack of food. We always find it a challenge to revive them and keep them alive all winter in a terrarium.

On warm sunny days, we go all around the house checking between the windows and the storm windows for flies. I hate to admit it, but we pull off their wings and put them into the terrarium. The flies are always eaten within a few days. On occasion, my husband holds a frog in his hand and feeds it a bit of ground beef. We also bring jars of snow into the house to melt so our frogs never need to soak in chlorinated tap water.

For our labors, we are rewarded with three, four or five frog croaking sounds most evenings. We have fun asking our guests "What do you think that sound is?" before showing our winter visitors. As soon as spring is here and the drainage ditch to Cherokee Marsh opens up, we take "our" frogs down to the marsh and release them.

Eunice Holtz
Madison

Animals and insects are quick to point out where you've made it easy for them to enjoy the shelter and comfort of your home. Most slip in through large openings or make their own holes. To thwart unwanted B&E (that's burrowing and entering!), inspect your house and surroundings periodically. To close off common ports of entry and protect your borders:

Install and inspect chimney caps.
Inspect caps on stack vents, wood stoves.
Consider screening in power fans.
Remove or seal up old rooftop vents when you install a new furnace or exhaust fan.
Check for loose mortar and flashing around chimneys.
Replace worn shingles.
Look for holes in attic ventilation vents.
Check for holes and cracks in overhangs and soffits.
Replace or repair broken screens and windows.
Check that storm windows and storm doors close securely.
Check for nests behind shutters and outdoor lights.
Inspect window frames for tight fit and repair rotted areas.
Check that doors close tightly and seals are still flexible.
Periodically scrape, then paint or stain siding to dissuade insect damage and rot.
Replace worn weather stripping on garage doors.
Check that garage doors close completely.
Fill foundation cracks and inspect the sill plate where the house meets the foundation.
Keep pet doors in working order.
Inspect behind shrubs, bushes and other plantings that are close to your house.
Inspect decks, patios and porches for signs of burrows or gnawing.
Plant new plantings so they will not grow against the house.
Trim back trees and branches that touch or hang over your roof.
Repair leaky outdoor hoses that can drip near the foundation promoting rot.
Don't store wood piles in your garage or against your house. These harbor animals and insects. Keep wood piles covered and dry.
Fill in gaps where pipes, wires and cables enter your home.
Store birdseed and pet food in sealed containers. Inspect for signs of break-ins.
Once you start feeding birds or animals, continue feeding throughout the cold weather season. Only set up feeding stations at a weekend home or cabin if you can attend them and keep them full. Clean up spilt seed if you see signs of rodents.

Mighty Mice

For several weeks that fall, I had noticed the dog food supply dwindling faster than usual from the bag in the corner of the mudroom. Now and then I'd find a chunk of Purina's finest chow on the floor or the basement step. I figured it had fallen out of the bag when we filled the dog dishes.

One morning, I was surprised to find a trail of food chunks clearly leading downstairs. I followed the trail and reached a dead end. It seemed the pieces were far too large to have been moved by mice, so I concluded it must be a larger mammal, perhaps a squirrel, raccoon or a rat.

Some days later I was at my workbench when I removed some magazines from a deep shelf under the bench. Pieces of dog food spilled out. I discovered a whole cache of pellets and scooped nearly a half gallon of food into a pail. Then I noticed a musky odor and small black objects the size of rice grains mixed in with the dusty pellets. Closer examination confirmed they were mice scats.

I couldn't believe pellets that size had been stored by mice. I set a number of traps baited with peanut butter. In the morning I found three white-footed mice. I couldn't believe that a mouse weighing 30 grams was capable of climbing the sides of a food sack, hefting a pellet, carrying it down the steps, across 10 feet of basement and up 18 inches of bench onto a shelf.

I subsequently trapped 15 more white-footed mice. They probably came under the garage doors which at the time had poor weather stripping on the bottom. After trapping all the mice and replacing the weather strip, the raids on the dog food ceased. I also purchased a metal can with a strong, tight lid for the dog food. Whether the storage operation was carried out by one mouse or a collective of several mice, I'll never know.

Donald W. Carter
Muskego

Scary visit

The single propane lamp in the fishing cabin cast just enough of a glow to outline our shapes in the sleeping loft — a perfect situation for the kids to tell ghost stories and conjure up monsters, which was exactly what was going on when 12-year-old Tyler found the real thing.

Our cabin, charitably described as "rustic," had always had mice and the occasional bat. We simply accepted them. So when Tyler whispered, "There's something moving under my sleeping bag," I suggested he ignore it and go to sleep. I sure didn't expect his next pronouncement, "No. It's bigger than a mouse...IT'S A SNAAAYYK!" Sure enough, even in the dim light from downstairs I could see a big snake slithering from between his sleeping bag and the mattress...and it kept coming and coming and coming.

Matt leapt from his bed, grabbed a boat cushion and held it in front of himself like a shield. Joe, for reasons I've yet to fathom, reached for a spinning rod. Tyler and I let out screams that could be heard in downtown Wabeno. In a few seconds, I was able to calmly squeak, "Ha, ha...don't be afraid, boys. It's just a bull snake and as soon as I can pry my fingers and toes loose from this rafter, I'll deal with it."

It required fireplace gloves, but I evicted the several-foot-long snake, which in cabin lore is now approaching python status. I carried the snake a few hundred yards and let it go with a stern warning.

The next morning we bought and used most of the available hardware cloth and caulk north of Highway 8 on the gaps between the logs. Since that day, no one crawls into their bed without doing a quick check.

Richard Hess
Milwaukee

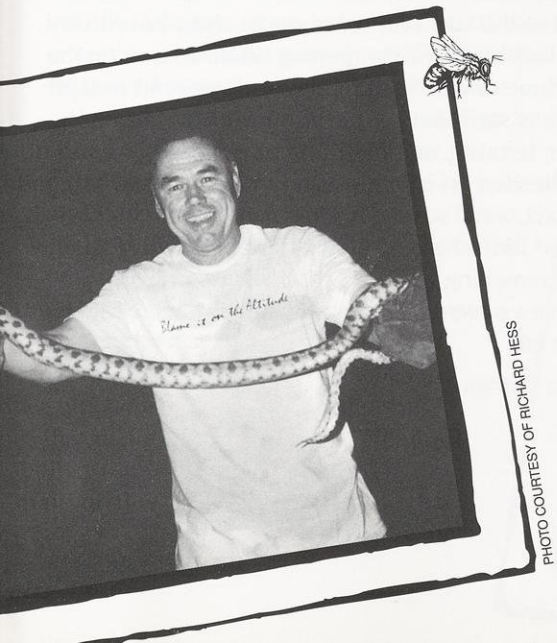


PHOTO COURTESY OF RICHARD HESS

The scientific approach

We were awakened by an incessant banging emanating from the basement of our rented house in rural Star Prairie. We cautiously investigated on tiptoes. Our flashlight illuminated the sinister form of a white-footed mouse frantically trying to squeeze a walnut (pilfered from the living room nut bowl) underneath the laundry room door. Even our appearance didn't deter the brazen burglar. It simply pushed and banged the nut all the harder. Curious about its destination, I graciously opened the door and we watched with wondered amusement as the mouse rolled the nut barrel-like across the concrete floor to its haven behind the furnace. It was cute, but I knew I would have to evict the squatter and all of its friends and relatives.

Drawing on wildlife management skills learned at college, I decided to use the mice, themselves, to locate the points of entry into our home. I baited small live-traps with peanut butter and began the task of capturing our freeloading guests. Once caught, each was marked with a dab of paint, taken outside and released near the foundation. As each rodent raced to regain the warmth, safety and booty within, I followed closely and sealed each revealed crack and hole with filler. After about two weeks of capture, release and recapture, I knew I'd been successful when the mice could no longer find entry and scurried into the surrounding woodlot. The final count of this operation was 53 mice of two species. The midnight raids were over and the live-traps remained unsprung for the rest of the fall/winter season.

Kurt Sroka
Somerset

Swarm sucker

In 1938, we lived on the east end of the village of Knowles, Wis. Mother was visiting and occupied the upstairs guest room. One morning, she called out all excited, "I can't get out of bed!"

I dashed up and stopped at the door. There was a whole swarm of bees on the droplight in the middle of the room. What to do? I went back downstairs for my small tank vacuum cleaner and sucked up every one of those bees. The problem was a double-hung window that was only screened on the lower half. The top half had dropped an inch affording an easy entrance. The window was quickly closed.

Marion J. Thomas
Santa Monica, Calif.

Skunk in the feed mill

After a busy week as a DNR wildlife manager, I was looking forward to sleeping in on that Saturday morning in July. The 6 a.m. call from the sheriff's office ended that notion. The dispatcher said there was a skunk in the grinder of the town feed mill and the mill operator was desperate to evict the critter before the usual flow of farmers arrived to get a week's worth of cow feed ground up.

The skunk had wandered onto the unloading area and slipped into the funnel-shaped chute through which corn and oats are shoveled. It was a good six feet below ground and securely held in the confines of that metal hopper.

Shooting the skunk was out of the question. It had already disappeared between the grinder's rollers and only the tip of its tail was visible as we gazed down the hopper. We also didn't want to damage the equipment or contaminate the mill. Aside from dismantling the rollers from the bottom, there seemed no way to extricate the skunk.

By now farmers and pickup loads were beginning to pile up and everyone had his own opinion on how to solve this one.

In a flash of inspiration, I drove back to the nearby DNR Ranger Station and came back with two 20-pound carbon dioxide fire extinguishers. I emptied both of them down the hopper and instructed the mill operator to slowly roll the mill's flywheel back by hand. Up rolled one very stiff skunk, so cold he could barely twitch.

I carefully reached down into the hopper with a heavily-gloved hand, pulled out the skunk, and shuttled it across the road. It revived in a few minutes and high-tailed it down the railroad tracks out of town.

Tom Howard
DNR Wildlife Manager
Dodgeville

Intruder

"There was a bear in the cottage basement, when I arrived last weekend," my son-in-law Eddie said matter-of-factly on our Monday morning phone call. Grouse hunting had opened the previous weekend, so Eddie and his lab, Blackie, had headed up to the Park Falls cottage for a weekend hunt.

Eddie bought the cottage three years ago and remodeled it, except for the rotted doors that covered the cellar entrance. He had torn out the old boards and covered the opening with a sheet of plywood topped by a concrete block.

When they arrived at the cottage, Blackie began to whine and Eddie saw that the block and plywood had fallen down the stairs. The basement windows were covered, so the space was real dark. Taking a flashlight and a three-foot 2x4, Eddie proceeded down the steps and shined the light on the bear curled up in the corner.

Eddie and dog exited quickly, went upstairs, turned on the radio as loud as possible and jumped up and down on the floor while banging an iron pan with a hammer.

Soon the intruder emerged, yawned, shook himself and ambled into the Chequamegon National Forest just across the road.

Now there's a metal door covering the basement entry.

Gordon Janecek
Adams

Why we close the lid

Red squirrels are not on our list of beloved animals! We have barely tolerated their sassy chattering and destructiveness to the Northwoods seasonal cottage we've owned for 36 years. One such varmint didn't fare so well.

We arrived at the lake after a seven- to eight-hour drive and proceeded with our spring opening ritual. To turn on the water, I must climb down a ladder to an underground well pit while my wife is stationed in the cottage attending to the faucets. After turning on the valves, I heard hysterical screaming, "There's a rat in the toilet!"

It was, in fact, a red squirrel, perfectly embalmed in antifreeze, shaped like a half-circle and hard as a rock. I had a devil of a time removing it.

We now have a screen over the roof vent pipe and close the toilet lid in the fall.

Gary & Marilyn Ostrom
Rock Island, Ill.

Pop-up surprise

I yanked up a potted geranium that was half-buried in the flower garden to save it from a predicted frost. I was startled to hear a small, distinct shrill scream coming from the pot, and I stood frozen. A toad jumped out of the pot and jumped behind the recycling cupboard before I came to my senses.

I decided to wait until morning to play hide-and-seek with a terrified toad, so I put out a shallow pan of soil and another of water.

The next morning, I found the toad in the soil pot. As I approached, it jumped into the water dish. I quickly placed the newspaper over the dish and carried it to freedom. I hope it ate a lot of bugs.

Fern T. Moe
Whitehall

Puddles from heaven

At 5 a.m. following a full day of hard work, the only thing on my mind should have been another hour or two of sleep. But somewhere there was water running, and at "The Condo," in Hawkins, we don't have running water.

I knew my reasoning skills wouldn't be up for another two hours as I made my way half asleep to the utility room where we store five gallon jugs of water. I couldn't find any leaks, but the sound persisted. Finally I located a stream of water coming from the ceiling.

"Darn! A leak. It must be raining," but a look out the window proved otherwise. I put out my hand to capture some. I sniffed it. No odor. I was one particle of gray matter away from tasting it when I heard the patter of little feet scurrying around over head.

The sound and touch of running water first thing in the morning warranted a trip to the outhouse. So I made my way through the kitchen, cluttered porch and out the back door. On my way back in, I was three steps into the kitchen when I stopped, went back onto the porch and gazed up. There was a wide-eyed raccoon nestled up in the rafters.

I woke up my friend, Brian, and after he wiped away a few tears of laughter, we discovered the coon had at least one kit with her. We found where they entered the house. We cleaned up the porch and, later in the day, sealed up the hole.

I'm just grateful it wasn't a critter with a bigger bladder.

Jeff Krein
Burlington

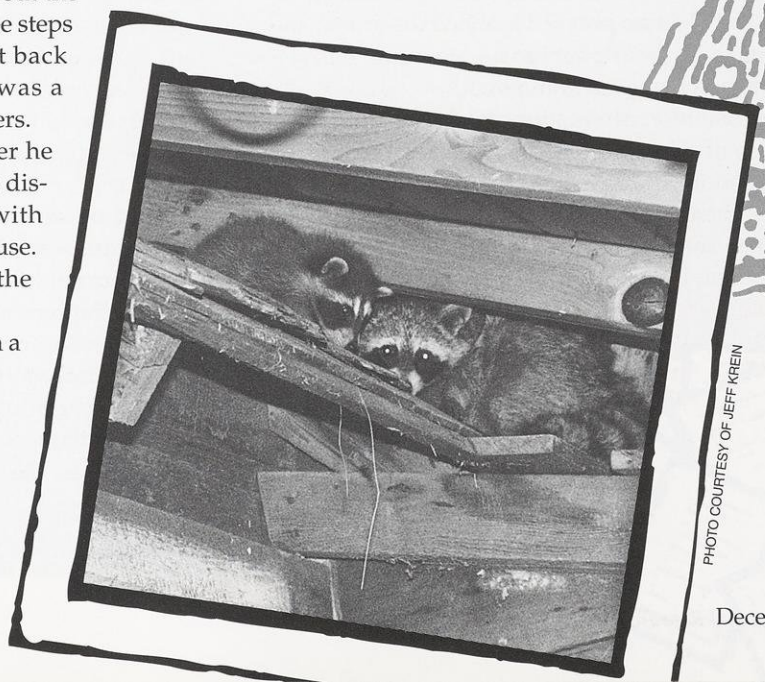


PHOTO COURTESY OF JEFF KREIN

The Xmas owl

A number of years ago, when I was about 16, I returned home about 11 p.m. from a night out with friends. Our home, in a rural area just north of Racine was quite dark as my parents were next door at a Christmas holiday party.

Our house was built in the prairie style with high, open ceilings separated by walls that went about seven feet up. As I walked into the living room, I heard a strange noise above and to my right. Sitting on the divider staring down at me was a white owl about 12–14 inches tall. I was scared.

I crept into the back bedroom and called my Dad. In about five minutes, he arrived with six other men. What with the holiday cheer, I'm not sure any of them were thinking clearly. Several strategies were implemented, but they only upset the owl which left its perch to soar around the living room. There was much ducking accompanied by expletives. It was a sobering experience (literally!) and when calmer heads prevailed, bed sheets were distributed to all. The men formed a sort of human funnel, holding up the sheets and directing the flight path to the front hall. With a lot of arm waving, the owl got the idea, soared down the funnel and out the front door to freedom. Everyone returned to partying to celebrate their victory.

There is still some debate about how the owl got in. The best explanation seems to be the Christmas tree. We had left it outside to let the limbs drop a little before bringing it in. We think the small owl found a great perch and rode the tree in earlier in the day.

Michael Shoys
Middleton

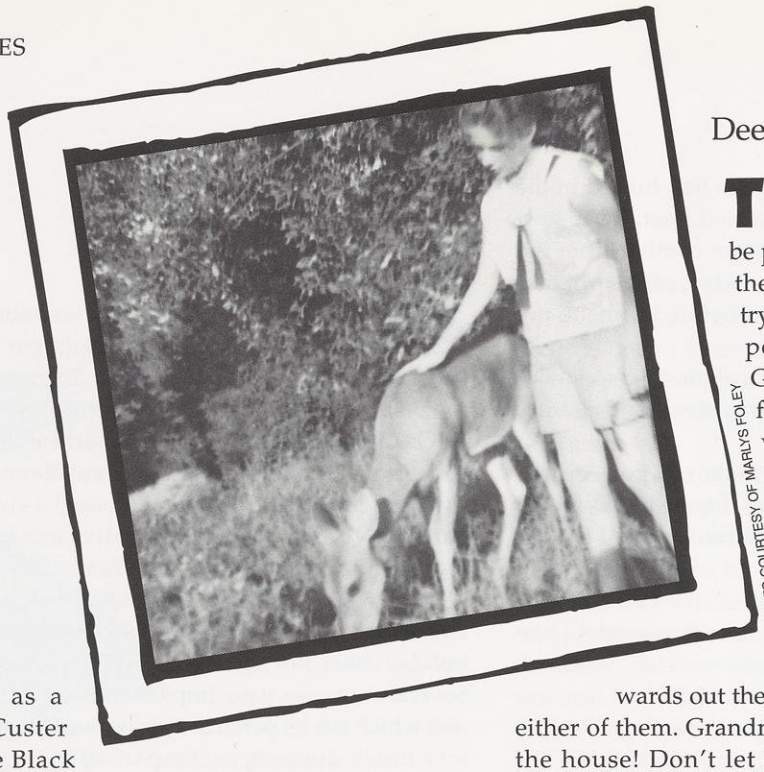


PHOTO COURTESY OF MARLYS FOLEY

Deer friend

There was a deer in New Diggings, Wis. that would walk up to anyone to be petted or fed. It followed my grandfather around the yard at different times trying to get the tobacco pouch from his pocket. The deer knew just when Gramps got the day's water supply from the pump behind the house and was often there to partake of a drink too. Grandma was a very small woman and meticulously clean. Her sister had the same small build.

One day the deer followed Grandma's sister in the south door of the house. She and Grandma tried in vain to push the deer backwards out the door. — The deer was twice as big as either of them. Grandma was yelling "Get that thing out of the house! Don't let it go to the bathroom in here! She slumped into a chair with the back of her hand to her forehead saying "I don't think I can take any more of this."

The deer headed for the bedrooms and Grandma shot out of the chair like a bullet to close the doors. When the deer tried to look out the dining room window, we heard "Don't let it touch my clean curtains. Keep it out of the KITCHEN! Don't you know how many germs that thing has on it? This thing will be the death of me yet!"

An apple from the fruit bowl coaxed the deer out the east door. It was barely outside when Grandma was rattling the buckets and mops in the house. The next three to four hours were spent scrubbing down the house with every cleanser on the market, but what excitement! How many people get to have a deer walk into the house just to take a look around?

Marlys Foley
Evansville

When nature calls

I was working as a naturalist at Custer State Park in the Black Hills of South Dakota at the time. It was a cloudy November day with a crisp chill in the air that had wildlife completing their food caches that would sustain them until spring. I was late for an appointment and had hurried into the house to change out of my uniform. Nature called, and I raced to the bathroom, dropped my drawers and sat down.

As I was sitting, I felt water splashing on my butt. I stood up and turned around to see what had caused this unusual sensation. There was a scarlet object swimming in my toilet bowl! I panicked, backed against the wall and all of a sudden, the scarlet mass exploded out of the toilet, flew past me, raced out of the bathroom, through the living room and hid in the bedroom. Still paralyzed with fear and shock, my body clung to the wall. I finally gained my composure and realized it was a red squirrel.

I had to get it out of the house and my instincts were to call the park ranger, but I had no phone. I grabbed the broom and chased it all through the house, behind the stove and refrigerator and finally swept it out the front porch.

The most humiliating confrontation was yet to come. I had to provide the maintenance foreman with every detail to get action. In fact, I had to REPEAT the story to the maintenance crew to convince them to make a repair quickly. They subsequently theorized that the squirrel had been storing nuts down the stack vent, the vent screen had fallen off and the squirrel fell in.

Cheryl M. Olson
Madison

The ol' rope trick

A bird down the chimney is one thing. Just open the damper, let it into the room and chase it out the door. But a squirrel in the fireplace is something else, especially when the chimney is made of slippery tin with no toeholds.

Solution? I went to the boat house, got a piece of 1½-inch hay rope, climbed up on the roof, and lowered the rope down the chimney. Presto! Mr. squirrel knew exactly what to do, climbed up the rope, reached the house top and jumped into a nearby birch. The chimney now has a screen over it.

Blanche E. Adams
Waupaca

Skunked again!

I remember it was springtime, because we had to go to services on Easter Sunday smelling like skunks. I was only nine and was more concerned about getting home to my Easter basket than the whispers and stares we caused at church. After mass, we went right home without even shaking Father Muldoon's hand.

As soon as we got home, Dad changed clothes and went down to the crawl space to have a look around. The dogs had been sniffing around the house all week.

My seven siblings and I were excited. In those two years when we lived in the Black Hills of South Dakota, we'd seen buffalo, wild turkey, antelope, rattlesnake and even a wild goat. Dad wasn't down there too long. When he came up, he told Mom to call the state trapper because we had a skunk.

The trapper came the next day. I was a little disappointed when an old beater pickup truck pulled into the driveway and an ordinary-looking man got out. He walked around the house a few times, set a few traps, then came to the door and explained to my mom that the skunk was getting under the house in two places — near each of the doors. He told Mom to keep us kids and the dogs away from the traps and, when the skunk was caught, to bring the dogs into the house, shut all the windows and give him a call.

We kids took turns watching the traps and fooling each other with false reports. Sometime during the night, the skunk got caught. We hauled in the dogs and called the trapper.

By the time he arrived with his little girl along for the show, the dogs were going wild trying to get out and we were all crowded around the picture window. The trapper pretended not to notice us and went about his business. He covered the trap, ran a hose from his exhaust pipe to the trap and started the pickup. He let the truck run about 15 minutes, then came over and picked up the dead skunk by the tail. He held it up so we could all get a good look and we were duly impressed.

All of a sudden the skunk's feet started wiggling. The trapper got the funniest look on his face and threw the skunk, in his haste and surprise, right at us. The skunk sprayed as it flew through the air and hit the house with a thunk. It sat dazed for a moment, then ran around back, saw its entrance way blocked by another trap and sat down on our back step with no apparent intention of leaving.

The trapper mumbled that he couldn't shoot an animal so close to the house, packed up his daughter and paraphernalia, then left.

My mom called my dad at work and even though it was the middle of the day, he came right home, threw a rock to chase it away from the house, shot it, and that was it.

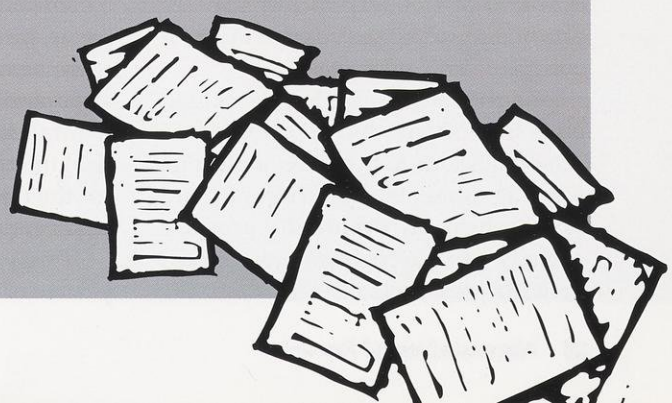
We never had any more skunk problems and never saw the state trapper again. As a matter of fact, he didn't even send a bill.

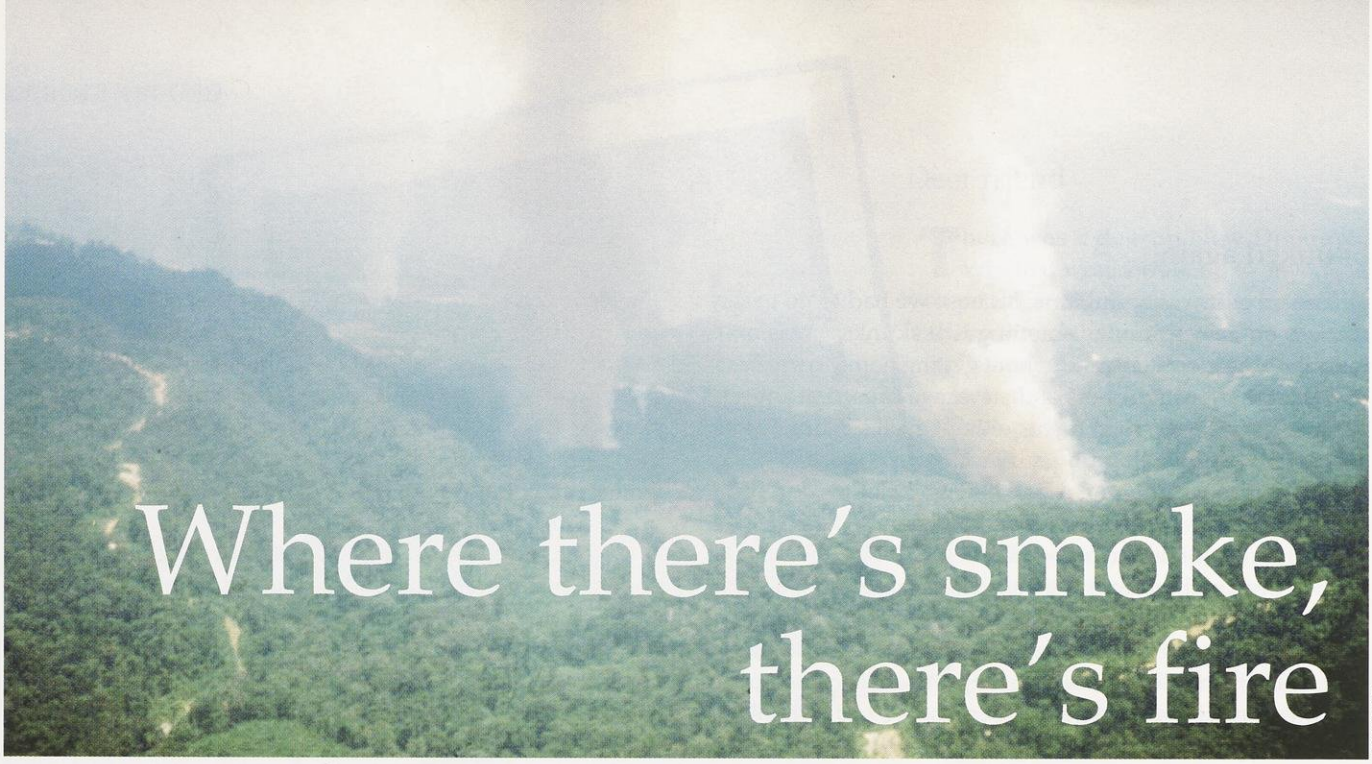
Amy Martin
Hastings, Minn.

How they got in

For those who keep count, here's a tally from your stories of how animals got into your houses. Chimneys, vents, open garages, foundation cracks and open windows provided the most typical routes of entry.

carpenter ants in basement wall (2 stories)
bats in walls, windows and chimneys (8)
bear through basement opening
bees through window
birds down chimney or stove vent (8)
chipmunk down dryer vent, stovepipe or hole (4)
deer through door
ducks in chimney (4)
mice through oven vent or foundation (5)
mink on a sailboat
owl and muskrat in pool
owl in Xmas tree
opossum through garage (4)
porcupine under crawl space
raccoon in the rafters
raccoon down chimney (3)
raccoon in basement (4)
flying squirrel down chimney (2)
red squirrel through garage
red squirrel down toilet stack vent (2)
skunk in basement
skunk in garage (3)
snake in basement (4)
snake in between cabin logs
snake in fireplace
spider in outhouse
Franklin's ground squirrel in garage
squirrel through screen
squirrels down furnace flue (2)
squirrel down fireplace (6)
toad in flower pot
weasel in a load of wood
weasel through hole in cedar siding
weasel in door (3)
woodchuck through garage (3)





Where there's smoke, there's fire

AFP PHOTO

A passion for the environment finally may be sparked as residents of Southeast Asia endure months of grey skies and choking air.

Maureen Mecozzi

October 1, 1997
Singapore

In the countries of Indonesia and Malaysia, when someone asks 'Where are you going?' it's polite to reply with the phrase: *Makan angin.* It means "eat wind" — to step out for a breath of fresh air.

For months now it has not been possible to *makan angin* in Indonesia, Malaysia, and many other parts of Southeast Asia. An area as large as the contiguous United States has been blanketed by smoke from fires raging in forests and plantations on the islands of Sumatra and Borneo. Coupled with the effects of the capricious weather phenomenon known as El Nino and the inexperience of Indonesia, a developing country hampered by corruption, it's possible the fires will burn for months, even years to come.

The choking smoke that has caused more than 500 deaths and continues to send thousands to hospitals and clinics for lung ailments, eye irritations and skin rashes may eventually produce some good: The problem has sparked genuine grassroots concern about the environment, an issue typically bulldozed aside in the path of the region's booming economies.

SEAWIFS PROJECT, NASA

(top) Smoke rises from the jungles in late September near Sibu, in the state of Sarawak, Borneo, in eastern Malaysia. Fires in remote areas created a choking haze across several countries.
(above) The Southeast Asian haze was clearly visible in satellite photos this summer and fall as forest fires and set fires raged out of control for months.

What's fanning the fires?

The "haze" — to use the local euphemism for the smoke — is not a one-time event. It's an annual occurence arising from age-old agricultural practices and modern-day economic imperatives. But it is especially bad this year, for a number of reasons.

Burning generally begins in June. The small farmers of Indonesia have long used slash-and-burn methods to clear plots in the lowland rainforests and swamps for growing bananas, papayas, rice and other staples. Although there are many "smallholders" using slash-and-burn on Sumatra and Kalimantan (the Indonesian state in Borneo) their actions alone cannot account for the magnitude of the problem this year.

It's estimated that at a minimum, 80 percent of the fires have been caused by the cultivation practices of large oil palm and pulpwood plantation owners and agricultural conglomerates. Burning is the cheapest way for companies to clear large tracts of forest and scrubland for new plantations, and to dispose of waste wood on old sites. High palm oil prices in recent years have prompted an increase in the land cleared for new plantations. The growing number of forest tracts managed for pulpwood have been intensively logged; they are now more open and drier than the dense, wet jungle, and thus more susceptible to fire.

Between 1.2 and 1.5 million acres have been burnt since mid-June, and the smoke and fire will likely continue

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UND76

AFP PHOTO

(left) A father adjusts his daughter's dust mask in Kuala Lampur, Malaysia. Such masks offer poor protection against fine particles that can embed deep in lung tissues and cause long-term health concerns.
(below) The Singapore skyline on a clear September day, 1996.
(bottom) The same skyline on October 4, 1997. The PSI was over 100.

JOHN K. MOLINE

Taoist temple, Singapore. Many religious associations in the region asked devotees to cut back on burning incense and paper offerings during the haze.

JOHN K. MOLINE

MAUREEN MECOZZI

for some time. First, the thick layer of peat that lies underneath the plantations — in some places it's as deep as 18 feet — has caught fire. Peat fires are difficult to extinguish; they can smolder for years. Exposed coal seams also are burning in some places. Also firefighting conditions are very difficult. The terrain is steep and few improved roads penetrate densely forested areas.

Second, the annual fires have been exacerbated by this year's El Nino, a weather pattern caused by exceptionally warm currents in the Pacific Ocean and the reversal of the trade winds. The trade winds usually blow from South America to Asia, but in an El Nino year, the winds are reversed: Moist warm air is blown from Asia to South America. The effect causes severe drought in parts of Asia and Australia, and heavier than normal rainfall in North and South America. Without the tempering effects of rain, the fires set in Sumatra and Borneo just keep on burning.

Third, the fires aren't going to stop if people continue to set them. Despite the foul smoke which no one can escape, landowners large and small persist in lighting new fires. They needn't fear retribution: The Indonesian government, unwilling to enforce existing laws and clamp down on well-connected plantation owners and multina-

tional conglomerates, and unable to control hundreds of small landowners, has been slow to act. Indonesia's forestry and environment ministries were aware in the spring that drought conditions would make this year's fires especially dangerous, yet a fire command post was not set up until late August. The country imposed a half-hearted ban on burning only in mid-September, prompted by complaints from neighbors Malaysia, Singapore and Brunei, all of which have been seriously harmed by the smoke.

Refusing to accept the immediate gravity of the problem, the government ministries declined offers of help from other countries, preferring instead to engage in futile bickering over who was responsible for the blazes. By the time Indonesian President Suharto decided to yell "Fire!" the damage had already been done.

Countries near and far offered assistance — Malaysia has sent firefighters, Singapore is providing satellite images, Thailand, Japan and the U.S. offered water bombers and other firefighting equipment, France has sent medical experts, and the United Nations has sent shipments of face masks for children and the elderly. Despite the aid, it appears the only thing that can bring the situation under control now will be a shift in the weather. The northeast monsoon rains, which typically arrive in mid-October, are expected to be delayed due to El Nino until late November.

Daily life in the smoke

The sun — the most imposing feature of the tropical landscape — has vanished. Once-brilliant blue skies are shrouded in dull, oppressive grey. The drenching afternoon rains that fell with such regularity are now intermittent sprinkles, and a fine soot comes in with the warm evening breeze.

The smoke has cast a pall on the vibrant street life of Southeast Asia's cities. From the city-state of Singapore to Bandar Seri Begawan, capital of the Sultanate of Brunei, from Malaysia's capital Kuala Lumpur to Indonesia's major city, Jakarta, people have been advised to close the windows and stay inside.

That's easier said than done in the tropics, where many homes and schools don't have windows, and those that do often are not air-conditioned. It's not much of a choice: Choking on the smoke outside, or sitting in a stuffy room inside while the temperature hovers in the high 80s and you breathe in the same air that's out there.

Pollution index numbers are bandied about like last week's NBA scores. Singapore uses the U.S. Environmental Protection Agency's PSI (Pollutant Standards Index, ranging from 1–500); Malaysia follows what's called the API (Air Pollution Index, ranging from 0–1000); Indonesia may use an index, but the levels have not been reported in area media. The indexes measure five major air pollutants: dust and ash, carbon dioxide, carbon monoxide, nitrogen dioxide and sulphur dioxide.

PM10 — particulate matter less than 10 microns — is the pollutant causing the most concern. Created from burning dry wood and green vegetation, PM10 at high levels causes breathing difficulties. People have been advised to wear masks when the indexes soar past 200 on the PSI and 286 on the API, but the masks that are available are surgical masks, which don't offer much protection against PM10. Industrial masks with appropriate filters would be well beyond the budgets of the people who need them most.

With air quality levels frequently in the "unhealthy" (101–200 PSI) and "very unhealthy" (201–300 PSI) range, clinics and hospitals throughout the region have been jammed with people young and old suffering from asthma, allergies and other respiratory problems inflamed by the smoke. Hospital admissions have been up 20 percent and higher in some areas.

Tribesmen from Habena Village in Indonesia's remote Irian Jaya province douse fires one water jug at a time in the Lorentz National Park. Many of the burning areas in Southeast Asia are unreachable with modern firefighting equipment.

AFP PHOTO

Those with run-of-the-mill symptoms — red, itchy eyes, stuffed-up sinuses, skin rashes, headaches and sore throats — have been told to use aspirin, eye wash and cough drops, drink plenty of water and eat cucumbers, reputed in Chinese medicine to coat and protect the mucous membranes of the nose and lungs. Barring that, the only other remedy is to leave Southeast Asia altogether, a suggestion which was seriously offered by a Malaysian lawmaker as a solution for the millions of people plagued by the foul air.

The smoke is limiting life in the region in all sorts of ways. If school is in session — it's been canceled often in Kuching, capital of the Malaysian state of Sarawak on Borneo, where at one point visibility had been reduced to an arm's length and the API hit 851 — it's likely the phys ed classes won't be held outdoors, as they normally are. Taoist and Buddhist associations have asked devotees to cut back on burning incense and paper sacrifices, to not add to the smoke. Embassies and multinational corporations are sending staff home on emergency leave. Everyone's clothes reek of smoke. And the bustling open-air hawker centers, where a cheap, tasty meal and a sweet cup of thick *kopi* (coffee) can be had most anytime of the night or day, are uncharacteristically silent.

To the dismay of businesspeople and travelers, area airports have been closed and airlines frequently have been forced to delay or cancel flights throughout the region due to low visibility. The smoke has been linked to a tragic plane crash in Sumatra, in which 234 people lost their lives, and to a collision of two ships in the Straits of Malacca that killed 29 crewmen. Driving a car or motorcycle, already hazardous in a region where the rules of the road are taken as friendly but unsolicited advice, can be pure folly when the haze is thick.

One region's misfortune is proving to be another region's bounty: While fewer travelers are making Southeast Asia a destination, more Southeast Asians are heading to Australia for fresh air. Travel agents in Singapore report bookings to "down under" have been up 60 percent.

People bear the daily unpleasantness with stoicism, even humor. The local joke is that there's no need to smoke *kretek*, the fragrant Indonesian cigarettes flavored with cloves, because breathing in the air is the equivalent of smoking a pack of cigarettes or more a day. It would be funny if it wasn't true.

How is the environment faring?

Little has been said about the fires' effect on the environment, partly because no national parks or forest preserves are burning (yet), partly because the environment is not a focal issue in the region (yet). It may very well become a major issue in the future as awareness, population pressure and increasingly intolerable pollution combine to push the environment toward the top of the political agenda in Southeast Asia.

The lowland tropical rainforests in Sumatra and Kalimantan are among the most biologically rich ecosystems on Earth. These forests are not adapted to fire; should they burn, they would be irreparably damaged, and the habitat and food web for orangutans, proboscis monkeys and scores of other endangered plant and animal species destroyed.

According to the Indonesian Association of Medicine Plants Exporters, more than 100 species of medicinal plants, some of which grow only in the wild, have been lost in the fires. Lacking adequate protection, a nation's biodiversity, economic opportunities, and culture — herbal medicine or *jamu* is an Indonesian hallmark — are going up in smoke.

In yet another sad illustration of the fact that pollution respects no national borders, migratory birds passing through the thick smoke from Indonesia's fires are dying on the western Philippine island of Palawan.

There are signs the smoke has pushed people across a threshold of silence. Pointed comments on government actions formerly spouted only by opposition leaders and dissidents are now coming from the average citizen on the street and being widely published in newspapers and magazines. Public demonstrations by nongovernmental organizations in Kuala Lumpur, especially poignant with large numbers of teenaged participants wearing masks, have nudged the government to bring environmental lawsuits to speedy resolution. Indonesian citizens, shamed that their country has lost face for bungling the crisis, are demanding accountability for the smoke; the government has promised a "total relook"of its environmental regulations.

All countries in the region have a common interest in reducing the pollution from the Indonesian fires and avoiding a recurrence next year. If the Southeast Asian countries can quench the fires together, there's hope they can find solutions to the other difficult environmental problems they can no longer ignore. It's no small task. Despite the region's rapid economic growth, some of the countries still lack the basics, like drinkable water, sanitary sewage handling, and waste collection. Exhaust from vehicles on overcrowded highways chokes the big cities, while unregulated industries pump toxins into the water and air.

Meanwhile, the greatest danger from the fires has yet to be revealed. The World Health Organization observed that the effects on people from prolonged exposure to PM10 particulates won't show up until 20 or 30 years from now.

A hundred years ago Wisconsin's northern forests were often aflame, the result of logging practices that assumed the resource was inexhaustible. Our forebears discovered it was not. Only decades of public outcry, political will, education and legal enforcement finally returned the state's forest resource to relative health. If the Southeast Asian countries avail themselves of the experiences of many nations around the globe, perhaps their environmental recovery process will not take so long. □

WNR Associate Editor Maureen Mecozzi was in the Southeast Asian country of Singapore when the smoke covered the region and captured international attention.

1997 WISCONSIN NATURAL RESOURCES INDEX

We annually publish a subject index of our stories each December. An index of our stories 1977–1997 is also available as a file you can download from our Web site; www.wnrmag.com. Please note this is a large file (more than 350,000 bytes and in excess of 100 pages), so browse before you print.

continued from page 2

The perching snowy owl seems docile and deceptively disinterested in its surroundings. Its soulful, lemon-yellow eyes seem only half open, which only enhances its peaceful image. Don't be fooled. The bird is well aware of what is happening around it and reacts very quickly in the presence of a rodent, duck or pigeon meal. These massive birds are truly powerful, fearless predators that sometimes take on prey bigger than themselves.

DAVID K. DUNSMORE

When lemming populations crash every 4–10 years, larger numbers of snowy owls head south to the Great Lake states in winter. Look for these daytime feeders in open fields and on hillsides.

The snowy owl is the second tallest North American owl at about 23 inches. The great gray owl *(Strix nebulosa)* is four inches taller, but the snowy is the owl heavyweight tipping the scale at just over 3½ pounds. It also has the longest wingspan of the North American owls — about five feet from wingtip to wingtip. The snowy owl's flight is strong, low and direct with alternating deep wingbeats and short glides. A snowy owl flying directly toward you on broad, rounded wings is a very impressive sight.

These owls are strikingly beautiful, almost elegant with their rounded heads and short necks. Adult males have whiter plumage and older males have the whitest plumage of all. The females are a bit larger. Females and immature snowies have more dark barring and spotting on their white feathers. Immature birds tend to migrate farther south than adults, so we are more likely to see the darker-colored birds in Wisconsin.

The snowy owls are silent during their winter stay. They save their calls for the May breeding season back on the tundra where their deep booming hoot *whoooo-whoooo-whooooo-whoooo* must resonate as a haunting sound in those vast, cold, wide-open spaces. □

Anita Carpenter takes her winter walks near home in Oshkosh, Wis.

Readers Write

BOOZE AND BOATING

"Alcohol and water don't mix" (June issue) should be reprinted just before each boating season. Education is the best long-term answer, just as it's helping reduce the high accident rate among personal watercraft operators.

Wisconsin, a mecca of boating, could and should join other states in requiring "driver training" for all motorized craft on the water. Drivers should at least be 16 and should have to complete a meaningful course such as Basic Boating taught by the Power Squadron, Coast Guard Auxiliary or the Dept. of Natural Resources. An additional course should be required to operate personal watercraft. Some Eastern states already have these requirements in place. Even current boat owners, regardless of age, were required to pass a safe boating class during a 2–3 year grace period.

I'm very concerned that the DNR and legislature do more to force boaters to be safer. A trip around Lake Geneva or Lake Minocqua on a Fourth of July weekend would show state leaders the need for such mandatory training.

John Bartosz
Lac du Flambeau, Wis.

MEET WOODLAND OWNERS

Thanks for "More than tending timber," the August article on Rachel and Don Jordan, the National Tree Farmers of the Year from Wisconsin. The article mentions our organization, and I want readers to know more about us.

The Wisconsin Woodland Owners Association (WWOA) is a nonprofit group that provides workshops, conferences, and field days to educate people and offer sound advice to manage private woodlands. WWOA was organized in 1979 and has more than 2,000 members in Wisconsin. Next year, we will meet in Platteville and tentatively plan to hold the Sunday field day at the Jordan's farm. For information or a free copy of our quarterly magazine, *Woodland Management*, write or call WWOA, P.O. Box 285, Stevens Point, WI 54481 or call (715) 346-4798.

Nancy C. Bozek
Executive Director
Stevens Point, Wis.

LAND USE AND ATVs

I thought your article "Awakening the Kickapoo Reserve" (April 1997) captured the marvelous opportunity to create a reserve in keeping with the beauty of the valley. Perhaps it was a blessing that the land was held in federal hands for 30 years. I believe had the land been transferred back to Wisconsin earlier, we would have lost the area's uniqueness. The '70s and '80s saw rapid, poorly-planned development in my mind in such places as the Wisconsin Dells and Door County — which has finally declared a moratorium to control development pressures. I believe Wisconsin is primed to move into a new decade creating development which provides growth for the local economy while maintaining the essence of why an area was valuable for development.

What bothered me about the article was the mention of ATVs. My heart just dropped when I read that those noisy vehicles were allowed at all. My husband and I enjoy nonmotorized recreation throughout Wisconsin — biking, hiking, canoeing, camping, snowshoeing and cross-country skiing. As we head out to enjoy the state's beauty, we especially enjoy the quietness of valleys and forests, bird songs, wind blowing through the trees and the scent of fresh pines. ATVs ruin these for us. We can hear them from miles away. We avoid those areas where we know ATV trails exist or are planned. As tourists, we take our dollars elsewhere.

The unique rare plants, birds and unspoiled beauty in the Kickapoo seems in complete contrast to ATV use. Those machines ruin the landscape through erosion, noise pollution and air pollution (dust and exhaust). I hope the Kickapoo board bans ATVs from the area. The ATV enthusiasts bring dollars to the local economy, but at what price? Will the Kickapoo become yet another area my husband and I will avoid or a mecca for those wishing to enjoy Wisconsin in its truest beauty?

Lauri Gerlach
Salem, Wis.

CATCHIN' FISHERS ON THE WEB

I'm interested that the biggest northern caught in Wisconsin last year was 42¼ inches long. I caught one bigger by half an inch this year and a 45-incher last year on a fly rod. Of course, that was up in Canada. Not bad for an old timer. I spend a lot of my retirement years these days in Florida, but I enjoyed visiting your Web pages and will visit again.

Jerry Simons
Osseo, Wis.

The fish records we listed were the largest fish registered with the Hooked on Wisconsin Anglers' Club. There's no guarantee that these were the largest fish caught here last year.

LIST OF NATURAL AREAS

I've been getting the magazine since Lester Voigt was the old Wisconsin Conservation Department head, and I think the product has really improved over the past couple of years. I also really like the Web site as it both compliments and complements the written version. I thought you had a really great article about signs on public properties (August 1997). After reading how courts interpret friendly signs that say "please," I can see why you don't dare just be polite in signage. How about going all the way like saying "Dammit, don't you dare step off these trails…please." Maybe you ought to have a contest.

By the way, I am still trying to find the list of State Natural Areas mentioned in the article "About Wisconsin naturally," which tells which natural areas can be visited.

Phil Mayer
Dodgeville, Wis.

The list of natural areas available at our Web site — (http://www.wnrmag.com/backcov/snalist.htm) — features sites best suited for public visitation. Readers can also receive a paper copy of the list and maps of the properties we highlight on our back cover by writing to: State Natural Areas Program, DNR Bureau of Endangered Resources, P.O. Box 7921, Madison, WI 53707. The Endangered Resources program is now preparing all of those maps for Web use. We are aiming to make maps available electronically for all the State Natural Areas that can handle traffic from visitors. Paper fact sheets and maps for most of these sites are available now.

BEAR UPDATE

Readers may recall our October 1996 article "A bear-raising experience" in which DNR Wildlife Manager Mike Gappa and Wildlife Technician Dan Mautz reintroduced orphaned bear cubs to the wild with mixed success. This year Gappa and Mautz decided to try again when bears cubs were abandoned after their den was accidentally tipped over by heavy equipment operators during a construction job.

Gappa and Mautz sought help to track the bears' movements. They started a partnership with a nature center at the Beaver Creek Reserve and three teachers at Augusta High School, Fall Creek High School and Altoona High School. Students were trained to find and track radio-collared bears. Moreover, when it was time to move the bears from pen to den, students got hands-on experience — lugging sedated bears from crates, weighing and measuring the sleeping yearlings, ear-tagging and collaring the bears, dragging them by sled to the new dens, preparing the den sites and lowering the bears into their new den sites.

Student and teacher commitment to the project remains strong. Throughout the school year and summer student/teacher teams have tracked the bears every day or every other day.

What happened to the bears? One sow died from natural causes (dysfunctional spleen). One boar was shot legally during the hunting season (not by anyone tracking its movements) and a third sow is doing fine. She has established a home territory and acts like any other wild bear.

The students' story continues. Their commitment to the project led wildlife managers to radio-collar two deer fawns whose habits and activities are also being monitored. Teacher support and student interest remains so strong that the high schools are considering establishing a science course including telemetry labs and field biology studies.

LIFE IN THE DESERT

It was so interesting to read "Faith in the ABCs of EE" last issue and learn what directions teachers are taking in environmental education (EE).

I taught in Bangor, Wis. at the elementary school for 10 years and really miss it, especially the opportunity to help my students understand how to walking softly on the earth.

EE is not only teaching units, subjects and using the outdoors for class experiences, it is living life differently every day. It's not just changing your curriculum; it is changing your life. It is putting the past, present and future health of our planet in perspective. It is understanding so much more than just teaching children to recycle.

I like to think that I walk the talk. We moved to La Luz, New Mexico this past July when my husband retired early due to health problems. This is an interesting part of the world between the mountains and the desert. I live on a half-acre in a little subdivision and spend my time cultivating a peaceful place in the world.

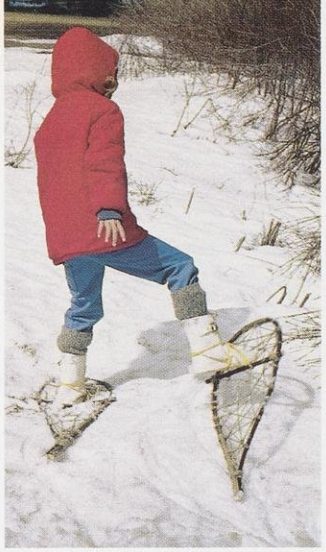
Ranching in the desert Southwest is a big issue here where they sell grazing rights on thousands of acres of Bureau of Land Management and national forest land. When I first came here, I became a staunch supporter of the environmentalists. Then I began spending time with people who had been ranchers for generations. I received a new perspective. Now I look at the situation with more balanced eyes and am working with others to help reach compromises. How do we help teachers look at the world with balanced eyes? Your article helps put that into perspective.

I have found pockets of individuals working hard to make changes, but it is an uphill climb. Life here provides some stunning examples of different attitudes. Wildlife, is viewed as expendable. The local vets meet people who keep endangered desert turtles by drilling holes in their shells and chaining them to backyard trees. You hear about the occasional person who pulls out the flight feathers of robins to keep them as house pets. Instead of eliminating weeds by getting on your hands and knees and pulling them out, some buy very potent pesticides or buy little propane tanks on little wheels with blow torches to burn out the weeds. You can always tell when someone is doing that because you hear it long before you smell it.

We like it here, but it did my heart good to read about EE in Wisconsin and remember my part of that wonderful movement.

Cathy A. Kerska
La Luz, New Mex.

GREGORY K. SCOTT

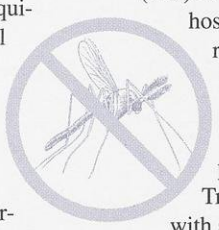


RETZER NATURE CENTER, WAUKESHA COUNTY PARKS

Chill thrills

Winter: It's one thing to endure it, another thing to enjoy it. Where you fall on that spectrum depends on how you engage the season. To develop a true passion for winter, TRAVELER recommends forgetting about all the devices we humans have created to separate ourselves from the cold — such as 500,000 BTU furnaces that turn tail when the temperature drops to 10 below, or the vehicles of every stripe that inevitably end up in a snowbank, somewhere.

Be bold! Meet winter head on, and you'll be surprised at how congenial a season it is. You might, for instance, contemplate a winter camp-out. In many ways, **winter camping** has a definite edge over the summer version. First, you'll have the woods to yourself…almost. You will have to share Wisconsin's two million acres of wild lakes and forests with bobcats, wolves, deer, rabbits, eagles and owls. (Sorry.) Second, you'll have your pick of sites: Sixteen of Wisconsin's 42 state parks and five of the 12 state and national forests offer winter camping. Third, there will be NO mosquitoes. Fourth, there will be no mosquitoes. Fifth, no mosq…you get the idea.



To your usual camping kit, add warm under- and outergarments, a sturdy pair of warm boots, perhaps a nip of brandy to fortify the hot cocoa. Leave the bug dope at home, but remember to bring along a star chart — the brilliance of the winter night sky is unmatched. You might see something above that you've never seen before. For details about winter camping locations, facilities and fees, call Wisconsin Tourism Information at 1-800-372-2737.

People 60 and older can engage the season on **Elderhostel's** 40-acre wilderness campus at Trees for Tomorrow in Eagle River. Take up cross-country skiing or snowshoeing; the organization offers programs in both. Or join in one of Elderhostel's winter walks highlighting seasonal ecology, animal adaptation and survival, meteorology and astronomy. For a schedule, call (715) 479-6456, or write Elderhostel c/o Trees for Tomorrow, P.O. Box 609, Eagle River, WI 54521.

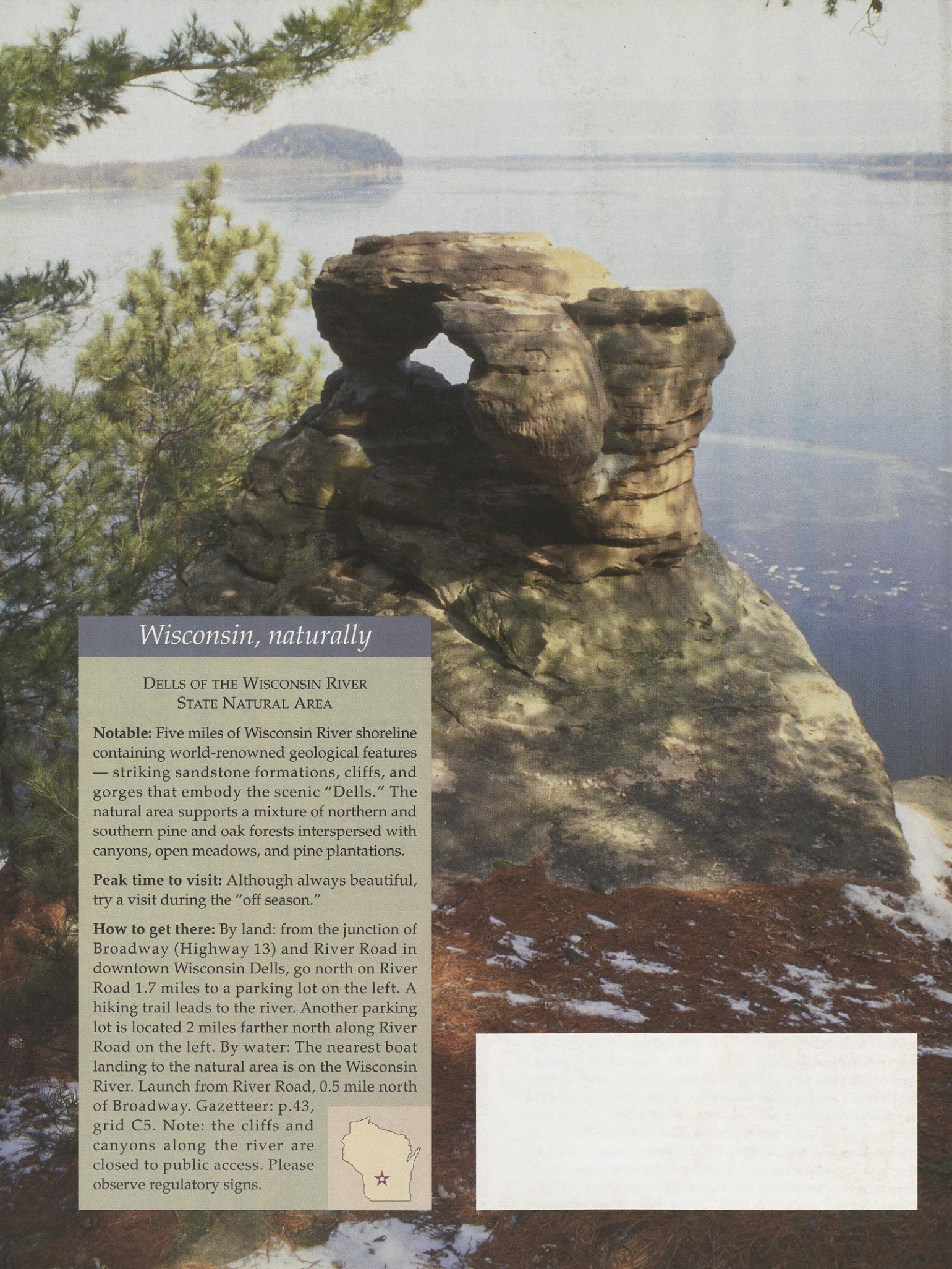
If you'd really like to get off the beaten path, try **snowshoeing**. Trails aren't necessary — with snowshoes, you can traverse terrain otherwise inaccessible in warmer seasons (e.g. your back yard). Retzer Nature Center in Waukesha offers half-day snowshoeing workshops from mid-December through February. Call (414) 896-8007 for dates and times. Many other nature centers have snowshoeing classes — try contacting the center nearest you.

As the joy of winter gets under your skin, you'll soon discover there's no anxiety like snowanxiety. When the suspense of wondering how much snow is enough becomes too much to bear, alleviate the tension with a call to the **Wisconsin Snow Conditions Hot Line** — 1-800-432-TRIP. You'll get the latest updates on cross-country and snowmobile trails, plus downhill skiing conditions statewide. The line is in operation with the first significant, sustained snowfall (no later than December 5th).

So, hoist that mug of cocoa and make a winter's toast: "May your cheeks grow ruddy, and icicles hang from your moustache!" □

Dish up a good time at a winter campsite, on your homemade snowshoes or on a cross-country ski trip with a few hardy friends whether young or young at heart.

TREES FOR TOMORROW



Wisconsin, naturally

Dells of the Wisconsin River State Natural Area

Notable: Five miles of Wisconsin River shoreline containing world-renowned geological features — striking sandstone formations, cliffs, and gorges that embody the scenic "Dells." The natural area supports a mixture of northern and southern pine and oak forests interspersed with canyons, open meadows, and pine plantations.

Peak time to visit: Although always beautiful, try a visit during the "off season."

How to get there: By land: from the junction of Broadway (Highway 13) and River Road in downtown Wisconsin Dells, go north on River Road 1.7 miles to a parking lot on the left. A hiking trail leads to the river. Another parking lot is located 2 miles farther north along River Road on the left. By water: The nearest boat landing to the natural area is on the Wisconsin River. Launch from River Road, 0.5 mile north of Broadway. Gazetteer: p.43, grid C5. Note: the cliffs and canyons along the river are closed to public access. Please observe regulatory signs.