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# WISCONSIN NATURAL RESOURCES

February 1992 $3.00 Volume 16, Number 1

Adventure on the great white desert

Appreciating our cold-blooded nature

Opening the door to the outdoors a little wider

# An Icy Encounter

*When muskrat and fox meet on a wintery marsh.*


*Lawrence E. Vine*

*Illustrations by Jim McEvoy*

*The late afternoon sun was slowly descending in the west, casting long shadows from each snow-covered clump of cattails.*

A northern blast of icy wind awoke the sleeping muskrat in her dark, cozy house. The wind swirled south through Horicon Marsh and ruffled the fur of a red fox dozing at the base of a red-osier dogwood bush. The late afternoon sun was slowly descending in the west, casting long shadows from each snow-covered clump of cattails. Pangs of hunger gnawed at both animals, and although separated by over a mile, both became restless.

The female muskrat moved slightly and felt one of her six babies raise its head and snuggle closer to her warm body. This rustling woke the rest of the litter, and they began to wiggle in search of their afternoon meal of milk. In the inky darkness of their house, each youngster, only six days old, fed quietly and soon fell asleep.

Unwilling at first to leave his warm bed, the fox peered over the long furry tail that covered his nose.

*continued on page 30*

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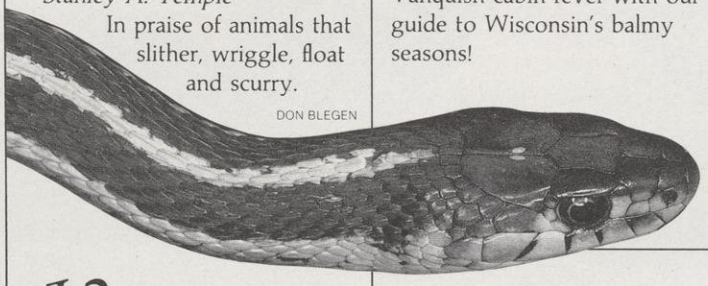

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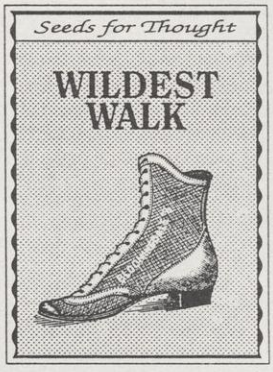





JAMES C. BISHOP



DAVID DRAKE



FRONT COVER:
Gray tree frog *(Hyla versicolor)* in exquisite harmony with its niche. See our page 4 story.

DON BLEGEN, Spring Valley, Wis.

BACK COVER:
Lichens add a splash of color to a winter walk.

BARBARA MULVANEY, Maple Grove, Minn.

# Appreciating our Cold-blooded nature

## A diverse mix of reptiles, amphibians, fish, mussels and insects deserve favor and respect.

*Stanley A. Temple*

Last February, I testified in support of a bill (now law) which provides state funds to match donations to the endangered resources checkoff on state income tax forms. As the discussion of funding for endangered species projects unfolded, one legislator asked what kinds of animals the money would support.

"I certainly hope that it won't be spent on things like bugs and snakes. Especially not rattlesnakes!" the legislator stated. "We should probably sponsor legislation to eradicate rattlesnakes in Wisconsin."

I suppose the legislator truly represented his constituents, because attitudes like this unfortunately pervade the general public. Negative feelings toward cold-blooded animals have obviously impeded efforts to conserve them.

Only recently have people started viewing lower animals as worthy of the types of conservation efforts we direct toward warm-blooded birds and mammals. Many fish, mollusks, amphibians, reptiles and insects were first protected when the federal government passed the Endangered Species Act in 1973. As a result of such enlightened legislation, these species can now hold their ground like other animals more favored by society. We all recall the snail darter's conflict with the Tellico Dam project on the Little Tennessee River. By and large, despite an improving public climate, strong social biases still devalue these cold-blooded animals.

When Stephen Kellert of Yale University surveyed Americans' attitudes toward wildlife, he developed questions to help quantify their feelings. Kellert asked if those interviewed would favor holding up a hypothetical dam project to protect a threatened or endangered species found at the construction site. A full 90 percent of those surveyed said they'd stop the project if the animal was a wolf. Some 85 percent would hold up the project if the species was a bird, like a bald eagle. All of the species having less than 50 percent approval, with the exception of a rat, were cold-blooded animals. At the bottom of the list, only 18 percent of the American public would hold up a project to protect an endangered spider. As we run the gamut of species, Americans clearly favor furry and feathered, warm-blooded animals.

Yet, when viewed with an impartial biologist's eye, the cold-blooded animals really shine. Each simple invertebrate can be just as valuable a contributor to its ecosystem as a sophisticated mammal: It's "one species-one vote" in matters of biological diversity.

### Little things that rule the earth

Traditionally, conservation programs have focused on highly-valued species like game animals and sport fish that draw public attention. As we develop programs that address the needs of a wider diversity of organisms, cold-blooded species must receive the attention they deserve.

DON BLEGEN

A wolf spider with her egg sac. Members of the wolf spider family have adapted to many environments. Some are burrowing spiders that forage for food on the ground. Others can escape enemies by running down a stem and remaining underwater for ten hours! They breathe from an air bubble that forms around their hairy bodies.

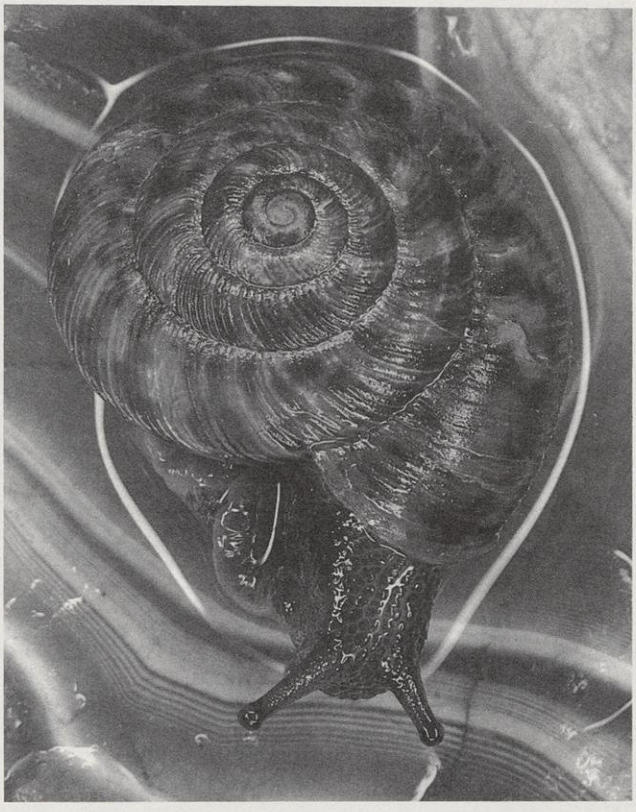
Although species should be viewed as equally valuable when making conservation decisions, they do not function equally in a given environment. Some animals are considered "keystone" species whose population fluctuations have greater consequences for the ecosystem. Many of these key species are cold-blooded, but people tend to take them for granted. Some ecologists note that many ecosystems could continue to function without any vertebrates. On the other hand, removing invertebrates would collapse most ecosystems rapidly. They are vital members of the food chain, critical for pollination, decomposition and a host of other ecological services.

By sheer numbers, cold-blooded species outnumber the higher animals. We can tally about 4,000 species of mammals and 9,000 birds, so warm-blooded animals account for only about 13,000 species. By comparison, we know of about 6,300 reptiles, 4,000 amphibians, 19,000 species of fish, 750,000 insects, 125,000 other arthropods, 50,000 mollusks and a variety of other invertebrates totaling more than a million species.

Most biologists who study the diversity of life suggest we have only scratched the surface of the earth's invertebrate richness. Perhaps as many as 10 million invertebrates may live on earth. When you put that into per-

spective, the warm-blooded vertebrates we think of as being "dominant" species may constitute less than one percent of the animal life forms on the planet. The other 99 percent deserve some respect; they are clearly in the majority.

If you measure success by weight rather than numbers, the cold-blooded animals again are the heavy favorites. They are small individually, but collectively, their organic mass tips the scales hundreds, if not thousands of times more than higher vertebrates. For instance, most people are surprised to learn that eastern deciduous forests, impressive for their wide variety of birds, squirrels, mice and other mammals, actually contain far more cold-blooded species that are rarely seen. Salamanders alone account for twice as much biomass as birds.



DON BLEGEN

A wood's snail on a piece of agate. Most snails develop a clockwise spiral form that they maintain for life. Snails have adapted well to a wide variety of land and water habitats. Their most plentiful and colorful members are marine dwellers.

Cold-blooded animals are often inconspicuous, but they are plentiful and obviously very important to the forest ecosystem. Densities of some of these species are truly astounding. For instance, the red-backed salamander, a common amphibian in deciduous forests, reaches densities as high as 1,200 per acre. Few people are aware of salamanders on a forest walk, but these amphibians are important in their ecological community.

Other aspects of their biology and evolutionary history also make the lower animals special. They've been here a long time. Some invertebrates first appeared more than 700 million years ago. They've adapted well and have diversified to fill many ecological niches. By comparison, the higher vertebrates are relative newcomers. We date the first fossil remains of mammals from about 225 million years ago; birds have been around about 185 million years. None of these warm-blooded animals are as diversified and refined as many cold-blooded creatures.

Most cold-blooded species have very different strategies for survival than warm-blooded animals. Birds and mammals typically have few offspring, on which the parents lavish a fair amount of attention. They consequently have a fairly long lifespan. Most cold-blooded animals are at the other extreme. They produce huge numbers of offspring. They don't tend to live long or spend time parenting. So, they have very different ways of coping with environmental changes. Setbacks can quickly be recouped by these fast-breeding animals.

Unlike some mobile birds and mammals, many lower animals are relatively sedentary. They don't migrate or travel long distances. Consequently, they have difficulty expanding their ranges and moving into new regions with suitable habitat. It's interesting to speculate how species like freshwater sponges manage to get from lake to lake. Certainly, they aren't walking!

The sedentary nature and high densities of some cold-blooded species may confine them to a single body of water, a cave, a spring, a watershed, or other small areas. Unlike higher vertebrates, they are often in a good position to persist in large numbers in small places for incredibly long periods of time. In Wisconsin, several of the vertigo snails — Pleistocene relicts that lived in the cool climate of the Ice Age — still thrive on cold, moist talus slopes. Perpetual ice at the base of cliffs and in rocky cracks provides continual air conditioning and a very cold microclimate. One could not expect a bird or mammal to similarly tough it out for so long in such a small habitat. Warm-blooded vertebrates need more space.

Then there is the fact that cold-blooded animals are subject to the whims of their thermal and physical environment. They can't regulate their body temperature very well, and many have trouble coping with temperature extremes. People fail to appreciate that climate changes which warm-blooded animals view as relatively benign can be catastrophic to some of the cold-blooded species. In Wisconsin, reptile and amphibian populations often fluctuate predictably, depending on drought cycles and winter severity.

During the last 10 years, I've monitored snakes overwintering in a hibernaculum nestled in the rocky bluffs behind my house. The number of snakes surviving to springtime is affected by winter severity. The colder the winter and the deeper the frost penetrates, the fewer snakes

Red-backed salamander *(Plethodon cinereus cinereus)* and an IO moth *(Automeris io)* — Two species that add local color. Cold-blooded animals constitute 99 percent of all animals on earth but get short shrift from people.

emerge in the spring. The same is true for several amphibians hibernating in my cattail marsh.

## Wisconsin's remarkable biodiversity

The diversity of organisms here is enhanced by our geographical location. The state is strategically located where three major ecological regions — deciduous forest, prairie and coniferous forest — meet. Consequently, many animals reach the northern, eastern or western limit of their geographic distribution in the state. We have virtually no species that are truly endemic to the state; there are few species that we can call our own. Neither are we a global repository for rare species, with the possible exception of some freshwater mussels that are found in small numbers and are largely endangered in our rivers.

Despite this, Wisconsin habitats support a remarkable diversity of species. In the state, we've identified 72 species of mammals, 252 breeding species of birds, 35 reptiles, 20 amphibians, 157 species of fish and about 19,000-20,000 insects. That's a remarkable job of recolonization when one considers that two-thirds

DON BLEGEN

G.O. TRYGGESETH

Blanding's turtle *(Emydoidea blandingi)*. This threatened turtle lives in wetlands for 18-20 years before it matures. It's high-domed back speckled with white or yellowish spots helps the turtle blend into duckweed and other aquatic plants.

of the state was covered with glacial ice as recently as 10,000 years ago. The mobile species recolonized quickly as the glaciers receded. The smaller number of amphibians, reptiles and, to some extent, fish reflects the fact that these species reoccupied Wisconsin more slowly.

Most of the amphibians and reptiles found in the state reach the fringes of their ranges in the upper Midwest. The few exceptions, for which Wisconsin is near the heart of their distribution, include the Blanding's turtle, massasauga, fox snake and the blue-spotted salamander. Most reptiles and amphibians have the center of their range farther east or south. Many of the rarest cold-blooded species in Wisconsin came from the southwest during periods of warming climates. Species like ornate box turtles, slender glass lizards and prairie skinks reach their northern limits as relict populations in Wisconsin. They only survive in a few pockets of sand prairies where they can burrow deeply to hibernate through our long, cold winters.

Fish recolonizing Wisconsin after the Ice Age largely came up the Mississippi River. Of our 157 fish, 137 are associated with the Mississippi River drainage basin. The further north you go from the Mississippi River tributaries, the fewer fish species you find. For instance, Lake Superior has only 74 fish species, while Lake Michigan has more than 131 species.

## A cold-blooded life in Wisconsin

Winter weather is physiologically stressful for many cold-blooded animals. Under the best of circumstances, some species are barely holding on in the Badger State, and they are especially vulnerable to any additional stresses. Human changes to the environment can very quickly create situations in which cold-blooded species can no longer maintain their numbers. The impressive biodiversity that survives here is easily threatened because so many of these species are living on the ragged edge of their natural range.

Among the factors that threaten the survival of cold-blooded animals, we find a familiar litany of environmental problems. Habitat alteration — whether caused by fragmentation, isolation or outright destruction — is very important. Changes in riverine ecosystems, wetland drainage, channeled streams and dredged harbors all take their toll.

Amphibians and aquatic invertebrates are exquisitely sensitive to environmental pollutants. Many cold-blooded animals have highly permeable skin that freely exchanges ions, nutrients and chemicals in contaminated water. These organisms are also sensitive to atmospheric and thermal pollution, and pesticide exposure. Many species, like the darters and water fleas, are so sensitive to changing aquatic conditions that they are viewed as indicator species — their very presence in an area is a measure of good water quality.

Exotic species introduced in Wisconsin by people pose other problems for cold-blooded animals. We tend to pay attention to exotics like zebra mussels, rusty crayfish, Japanese beetles and the like that cause

DON BLEGEN

Six-lined racerunner *(Cnemidophorus sexlineatus sexlineatus)*. It's a resident of the hot, dry prairie remnants along the Mississippi, Wisconsin and Chippewa rivers. The racerunner dashes between bushes and scrambles into rocky crevices in search of food and shelter.

DON BLEGEN

DON BLEGEN

*(above)* American toad *(Bufo americanus).*
*(right)* Luna moth *(Actias luna).*

some hardship for human beings. We are much less aware of the arrival of exotic cold-blooded species that may not directly affect human recreation or commerce. Clearly, human activities have turned Wisconsin into a melting pot of species that would not occur together naturally. We haven't assessed how these exotic organisms change the population dynamics of cold-blooded species.

Overexploitation can decimate some species. Historically, excess clamming, overfishing, and zealous collecting of turtles, frogs and rare butterflies dramatically reduced their populations. We have to be careful to curb desires to commercialize species that may be rare.

The loss of one species, particularly a keystone species, may trigger a cascading effect that devastates other species in the community. When the upper Mississippi River was dammed, the skipjack herring was extirpated in Wisconsin. Several other species relied on this herring for food, and rare mussels relied on the herring to spread their young to new breeding grounds. Juvenile forms of the ebony shell and elephant ear mussel formerly attached to the gills and gill rakers of skipjack herring. Remnant populations of these rare mussels survive in the upper Midwest as pockets of old mussels that show little evidence of reproducing, certainly not enough to allow these species to hold their own.

Rare aquatic insects, butterflies and moths are also of special concern, but no group is as threatened as our native reptiles. Eight of 35 reptiles found here are threatened or endangered; all are near the northern periphery of their range.

## Helping cold-blooded animals

What do we do to stem the problems cold-blooded animals face? They have serious needs:

**Conduct basic research** — We don't know very much about these animals compared to the higher vertebrates. Consequently, we are in a very poor position to know what to do to help them. Volunteer surveys to track the abundance and distribution patterns of these organisms will help build a foundation for future decisions. We need much more inventory work to determine their true status and assess their problems.

**Protect special habitat** — We need to be particularly careful about the small pockets of habitat that can be very important for cold-blooded species: an individual mussel bar on a river, a small talus slope, a small pond, a wetland, or a hibernaculum site could be crucial. If we can identify these critical places, then small, local protection projects can make an enormous difference for some species.

**Continue pollution controls** — Obviously we need to control pollution and improve water quality. Some species can only survive in the most pristine aquatic environments.

**Stem the spread of exotic species** — We need to be more careful about the spread of exotic organisms and consider how exotic introductions affect all species, not merely humans.

**Apply proven restoration techniques to cold-blooded species** — We need to consider reintroducing species to areas where the habitat may be suitable for them. Local catastrophes like fires, floods or freezing weather may have wiped out cold-blooded animal populations at some time in the past. Little is being done to consider reintroducing species even though it ought to be possible to quickly rebuild populations of species that have high reproductive potential.

DON BLEGEN

Western fox snake *(Elaphe vulpina vulpina).* One of the few reptiles near the center of its range in Wisconsin. Our cold winters mark the northern and western edge where many snakes, lizards and amphibians can survive.

**Foster education and enthusiasm for cold-blooded animals** — The last thing we need to do is certainly the most important. We need to do a lot of educating. People have built-in biases against these species. Most people are not impressed by the kinds of facts I've presented here. Our approach should include not only sharing facts, but sharing experiences and enthusiasm. Conservationists must let other people know how excited we are about these species. We need to be advocates for cold-blooded animals and break through the prejudices against them by showing we are fond of them and care for them.

We've hidden our enthusiasm for these creatures for too long. Few organizations represent the interests of cold-blooded creatures. Herpetological societies and groups like The Xerces Society, dedicated to protecting invertebrates, are as inconspicuous as the animals they represent. They need to make their presence better known and their outreach wider.

Moreover, it's very important to create an appreciation and curiosity about cold-blooded animals when children are very young. Edward Wilson, noted spokesman for the conservation of biological diversity, talks about "biophilia" — the love of other living things. A close bonding takes place between some young people and wild creatures. Those childhood experiences leave important impressions that affect adult actions. There is a period in a child's life when the mind is fresh, unburdened by societal prejudices and very open to establishing positive feelings toward cold-blooded animals. It was that way for me. I became fond of turtles and snakes by keeping them as pets, and an insect collection stimulated my curiosity about invertebrates. I know those early experiences influenced my career choice.

How do we establish these feelings among youngsters? One place to start is in the classroom. Most classroom "pets" expose children to animals that they already have lots of exposure to at home — warm, cuddly creatures. We could encourage schools to have cold-blooded animals in the classroom — displays with insects, snakes, reptiles, amphibians and fish — as part of their programs. Our work has to spread outside the classroom as well. Kids need to be exposed to cold-blooded animals in their natural settings. We can't afford to wait for a few people to take an interest in studying ecology during their college years.

DON BLEGEN

Teach children respect for cold-blooded animals and they remain curious instead of fearful of snakes, lizards, salamanders and insects. Kari Jo and Kelly Blegen share their Dad's enthusiasm for a DeKay's or brown snake *(Storeria dekayi)*.

JEAN TEMPLE

The author at age 8 with box turtles.

If we are successful, Wisconsin can continue to hold its place as a state rich in biological diversity. If we fail, many of the state's 62 threatened and endangered cold-blooded species are not likely to survive. We need to create both social and natural environments that are hospitable to these types of animals. We need warm-hearted approaches to convince people that the natural world includes more than fur and feathers. □

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*Stanley A. Temple, ecologist and Beers-Bascom Professor in Conservation teaches and directs research in UW-Madison's Department of Wildlife Ecology. The above article is an edited version of the keynote address he delivered at a symposium on conserving Wisconsin's cold-blooded animals held last March in Madison.*

ROBERT QUEEN COURTESY OF RICK BILKEY AND HENRY VILAS ZOO

Johanna Fabke holds a garter snake in Henry Vilas Zoo's new herpetarium in Madison.

# Warm feelings for cold critters

## A slithering back porch visitor and a kindly sign painter helped a young mother overcome snake fright.

*Johanna Fabke*

It shocked me to see snakebite kits next to the drugstore cash registers that first spring I lived in Corning, New York. As a southern Wisconsin native, I was used to nothing more exotic than garter snakes that lived in the meadows and stone walls near our home. The druggist explained that the kits were for farmers who were likely to encounter rattlesnakes in their fields during the haying season.

Not long after this revelation in the drugstore, I heard a call-in program on the local radio station featuring Walter Young. He had a sign-painting business in Corning, but his passion in life was herpetology. Mr. Young responded to a lot of listeners with common-sense answers about what to look for when rattlesnakes were most likely to be active and how to distinguish them from non-threatening species. He also spoke about his school programs in which he introduced children to some of the peaceful snakes living in cages in the back room of his sign shop. He clearly believed part of his mission in life was informing the public about the often mistreated and misunderstood creatures that interested him so deeply.

I telephoned him at the sign shop the next spring when an impressively large snake crawled onto the back terrace of our apartment. My husband and I were showing off our new baby daughter to my parents, who were just in from Wisconsin. From my description, Mr. Young identified it as a milk snake, a benign and attractively marked species. This particular snake met its end just a few days later. It crawled into the basement hallway of the apartment complex where it was found and killed by the janitor. The incident bothered me, for the snake wasn't a nuisance and it hadn't annoyed anybody; it was only going about its snake business. It wouldn't have taken the janitor much effort to scoop the snake into a box and carry it a few steps across the back yard to the edge of the woods.

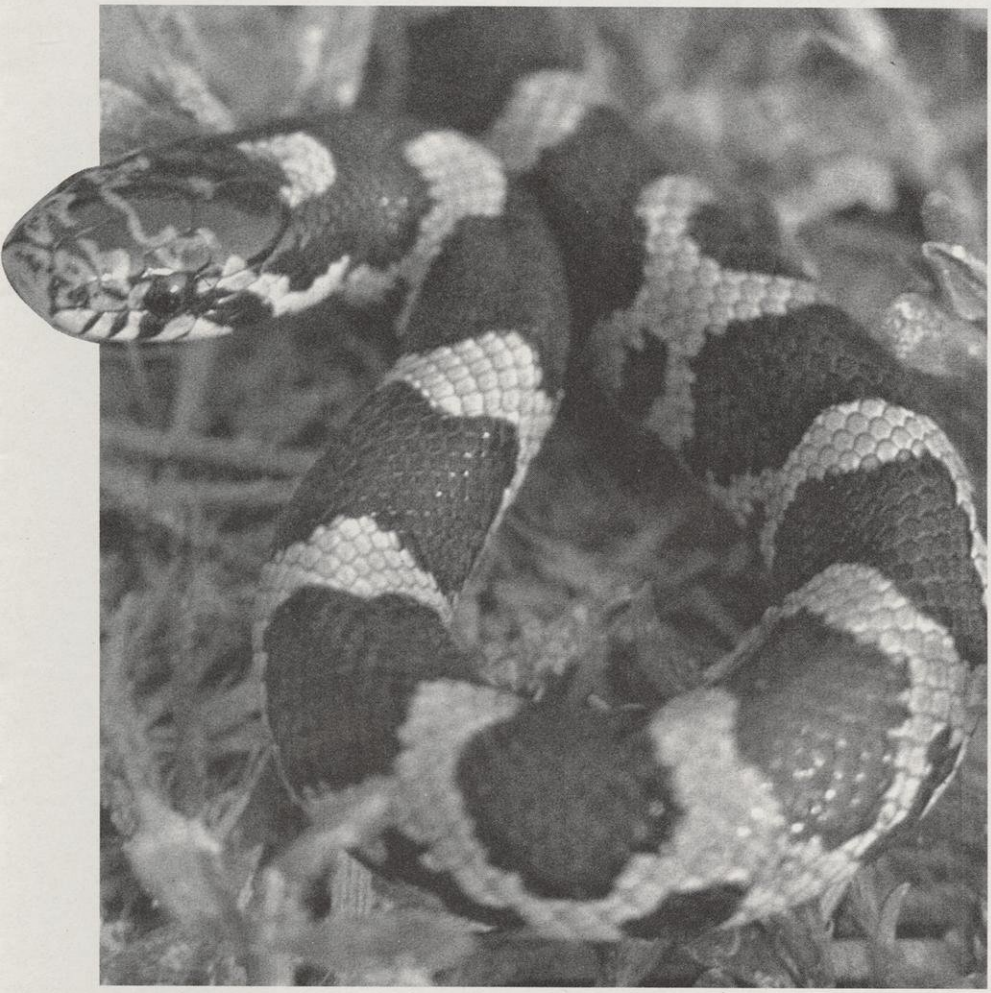
Later that summer, I decided to act on the invitation Walter Young had extended during our conversation about the milk snake to come and see the collection of snakes he kept in the sign shop. I had to wait for just the right day, for I had spent all of my life until then thinking snakes were most threatening creatures. I even used to avoid reptile houses in zoos. One warm, sunny afternoon when I had engaged a babysitter for some other

errand, I made my way to Mr. Young's unassuming shop at the east end of Market Street.

He greeted me kindly. When I explained the reason for my visit, he took me around the divider into the back room. There, in a variety of cages, were timber rattlers he had caught in the immediate area, and copperheads from across the border in the mountains of northern Pennsylvania. He showed me some other specimens which had been sent to him by Marlin Perkins, director of the St. Louis Zoo, in exchange for specimens from southern New York that Young had collected and sent to St. Louis. He explained, chuckling, that the Corning Post Office always called him when a parcel arrived from St. Louis — the postal employees were eager to have these packages picked up as soon as possible! He also told me about the time the Corning police had called him in the wee hours of the morning to come down and lock the back door of his shop. The noise the officers had made trying the door on a routine patrol of the alley had stirred up all the resident rattlesnakes. The rattlers reacted to the possible intrusion on their territory. Mr. Young also told me about an older woman who had come for a tour of his collection. She nearly fainted when he encouraged the rattlesnakes to sound off. She had been in the habit of going every spring to a certain sunny hillside to pick dandelion greens at their choicest, and had never before identified the noise she usually heard while she was there.

Among the most prized specimens in his collection was a spectacled cobra who lived in a large glass enclosure on the floor. As I watched in astonishment, Mr. Young gestured outside its enclosure until the snake was sufficiently irritated to display its hood.

Eastern milk snake *(Lampropeltis triangulum triangulum).* Milk snakes are sometimes mistaken for copperheads, but the milk snakes are nonpoisonous and should be protected.



DON BLEGEN

Mr. Young must have sensed that his blend of humor and instruction had engaged my interest to the degree that he could attempt a personal introduction to Blue Boy, the large indigo snake who accompanied him on most of his school programs. Indigo snakes, he explained, are even-tempered, nonvenomous natives of Florida swampland and can grow to be several feet long. Blue Boy's girth was impressive, three inches or so as I recall, and the iridescent blue-black of his scales reminded me of the shiny stripe on tuxedo trousers. Mr. Young gently took my hand and invited me to feel the snake's smooth, cool body, something which, only a few moments before, I would never have thought I could do. I was amazed at the snake, Mr. Young's charismatic ability as a teacher, and my own reaction to both.

Without this experience some 25 years ago, it wouldn't have been possible for me to appreciate an encounter this spring. My son and I found two water snakes basking on some sunny rocks at water's edge in Madison's Cherokee Marsh. It appeared they had just emerged from their winter den — both were motionless on the rocks, except for slow rhythmic breathing. Their true colors were obscured by milky scales they would soon shed. We sat for some time, enjoying the sight of these creatures against their light-colored background and appreciating that this rest was a vital stage in their preparation for the summer to come.

Thank you, Walter Young, and to all the other naturalists and teachers whose efforts make these experiences possible for their once-fearful students. □

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*Musician and nature enthusiast Johanna Fabke handles questions and office correspondence for* Wisconsin Natural Resources.

# Adventure on the GREAT WHITE DESERT

*James C. Bishop, Jr.*

We arrived at the jump-off point. Ready to push off on my skis, I took a second look at the broad expanse in front of me and hesitated. Behind me lay the security of the Bayfield Peninsula. In front stretched endless miles of lonely whiteness. Nothing in my traveling experience had prepared me for this.

Interspersed within this vastness were dark, distant humps of land, oases in this great white desert. Overhead in a clear blue sky the wind roared across the treetops.

This was the snow-covered ice of Lake Superior locked solid with the Apostle Islands. We had come to taste the adventure of a cross-country ski trip to Oak Island, two and a half miles out from our departure point. My partners were Dave Carlson, a television reporter from Eau Claire, and Neil Howk, a National Park Service forest ranger. Like myself, they were veteran winter campers.

Carlson and I carried backpacks. Around our waists we wore belts, which were connected to poles attached to small cargo sleds. Howk carried one large backpack.

With a stiff westerly wind at our backs, we pushed off for the island, onto the desert-like floor of Lake Superior. Snow cover on the ice was only three to four inches deep and the going easy. On land, I could hear the hiss of my skis. Once we got away from the shoreline, the wind dominated all sight and sound.

Wind blew the snow about in a steady undulating rhythm — wave-like motions on the Big Lake, even in winter! Patterns of miniature canyons and ridges were sculpted smoothly through the whiteness. Occasionally a gust would roar and pick up the drifting snow. Like dust devils of a sand desert, whirling white dervishes arose and danced across the ice. Some looked 20- to 30-feet high. At times, we halted our progress and watched the big ones waltz away until they were lost behind an island or drifted too far to see in the blinding white snow.

Then there were the snow devils that found us.

When a whirl catches you, the coarse, frigid snow whips your face and stings cheeks red raw.

When winter forms a land bridge between the Lake Superior shore and the Apostle Islands, hardy campers traverse the icy span.

JAMES C. BISHOP

Even quality sunglasses with wind shields are of little help. The snow fills every open crevice. In an instant, the chaotic swirling is gone. Time to catch your breath, blink the snow from your eyes and get moving.

Had the snow devils blown in more frequently or the temperatures been a little colder, we would have donned face masks. I carry two in my pack in case conditions get really rough. Both cover my entire head like a sock with holes cut for the eyes and mouth. They also come in handy as a night cap when temperatures dip below zero. My masks are made of fleeced synthetic materials. Wool is warm but a little uncomfortable to wear next to the skin.

Unlike skiing on land, where the terrain is seldom on the level for more than 100 feet, one can ski the flat lake surface for miles. There are no guideposts. Howk pointed out a dark spot on the island as our destination and we navigated toward it. Pressure ridges and cracks in the icy sheet were noticeably absent. I've encountered ridges on previous ice fishing trips that rose two to three feet from the surface.

We made it to the island in about 40 minutes. Removing our skis and unhooking our sleds, we trudged inland to find a place to camp. While the winds kept the snow on the ice to just a few inches, we struggled through nearly waist-deep snow on the island; common depths for this time of year. Without snowshoes, we abandoned the idea of moving our gear to one of the designated campsites on the island. We opted for a sheltered area of beach out of the wind, yet exposed to the sun.

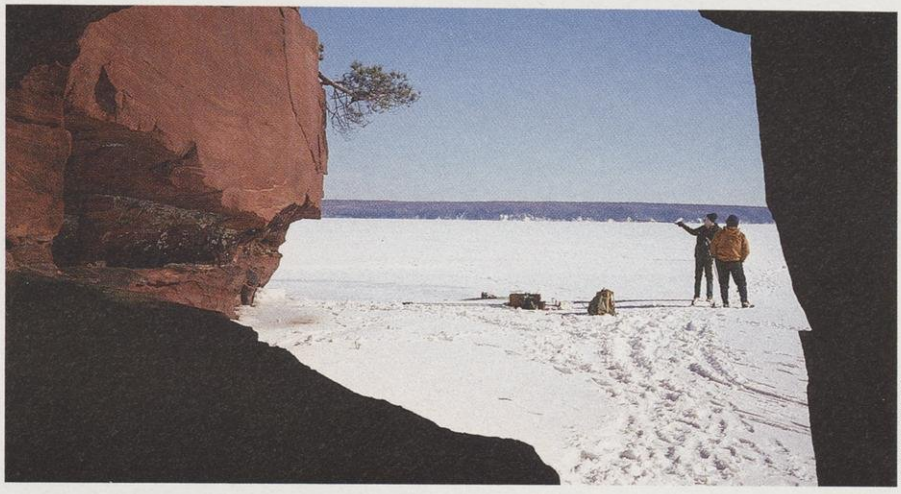
The camping area was covered with 20 inches of hard-packed snow. We used a snow shovel to dig out spots for our beds and a fire pit. We dug out a rectangle about nine feet wide, seven feet long and 15 inches deep, just enough to give the three of us sleeping room. We left about five inches of snow for insulation. We laid a sheet of plastic over the snow for a ground cloth. On top of this we laid insulated pads and our sleeping bags. Weather forecasts predicted clear skies, so there was no need for an overhead tarp. On past winter expeditions I've used tents. They help prevent some heat loss but are really not

*continued on page 17*


JAMES C. BISHOP

*(left)* Wind-sculpted drifts etched in Lake Superior snows.
*(middle)* The author and Dave Carlson try their luck bobbing for lake trout in a sheltered bay.
*(bottom)* Looking out from an Oak Island cave.


JAMES C. BISHOP


JAMES C. BISHOP

*continued from page 16*

necessary if you don't expect snow.

The fire pit was a more elaborate affair. In the center we dug down to the sand. A few feet away from the center, in a circular pattern, we carved seats out of the hard-packed snow. A sheet of plastic about the size of a garbage bag kept one's backside from picking up snow and getting wet. Finally, I took a homemade wind shield and put it on the upwind side of the pit. The shield, built for my ice fishing sled, is covered with aluminized cloth. This made an effective reflector radiating the heat back toward us.

Once the usual camp chores of getting firewood and unloading the packs were completed, Carlson and I grabbed our sleds and walked out into the channel between the island and the mainland. We poked a hole through the ten-inch ice and tried bobbing for lake trout in 90 feet of water. With only an hour to fish, we had randomly picked a spot and hoped for the best.

The bait shop owner in Ashland had suggested we might have some luck in the channel, but most of the lake trout action was taking place six miles out in much deeper water. The trout, he said, move around and it would be hard to pinpoint where they might be.

We used heavy, one-ounce beetle jigs. A special wire harness holds a cut piece of smelt to the jig tail. Jigged lightly a few inches up and down off the bottom, the bobbing action and smell of the oily smelt can induce hungry trout to bite. I use a 40-pound test braided dropline coated with plastic.

Should a fish bite at these depths, all you feel is an almost imperceptible bump. When you get a bite, you have to give the line a long, hard jerk straight upward to set the hook. Plastic-coated line does not freeze, but it stretches a little more than uncoated line. A pronounced yank imbeds the hook firmly in the fish. Then it is a matter of pulling in 90 to 100 feet of line, hand over hand. The line must be somewhat neatly piled off to one side. In theory, once a fish is brought in and unhooked, the jig is rebaited and dunked back into the water. Line slowly falls about a foot a second off the pile back into the inky depths. I say "in theory" because, unfortunately, we didn't have to deal

with rebaiting our hooks. No bites!

As the sun set, so did the temperature. The sky filled with crimson reds and pale yellows. We pulled in our lines and headed back to camp. Tomorrow we'd tour the northern side of the island, find deeper water, and try our luck again. It was nearly dark when we took off our gloves to warm stiff fingers in front of the fire.

The dryness of the desert-like air made us thirsty. Unlike a sand desert, here we could melt snow over the fire for hot cocoa, tea and coffee. My gallon pot was filled with snow and placed on the grill. Once the snow melted and the water began to warm, we kept adding snow until we had enough to meet our needs. Canteens and plastic water bottles placed a few feet from the fire kept the water from freezing. At night, with the cap on securely, I placed a water bottle in my sleeping bag. The hot water provides cozy warmth at night and drinking water in the morning.

Under the last light of day, we prepared dinner. We'd done most of the work ahead of time at home. Thin slices of beef steak, onions, green pepper and bacon, all wrapped in tin foil, were laid on the coals. These meat packets were nestled next to foil-wrapped potatoes. When cooked through, the only utensil you need is a spoon. You can eat right out of the foil packets and there's little waste.

By 7 p.m., the icy desert was a world of gray shades and dark skies accented by a million diamonds of starry light. Cold, clean air made the stars shine so thick they seemed to

Winter vista from Big Bay Point on Madeline Island. Winter campers on the nationally-managed Apostle Islands should pre-register at the National Park Service office in Bayfield. Those wishing to camp at Big Bay State Park register at the DNR's Bayfield office.

press in upon us. The broad band of the Milky Way stretched from horizon to horizon in an endless infinity of space.

This night was without moonlight or northern lights so common this time of year. Even the wind quieted down. The islands were mere patches of darkness. All sights, all sounds of civilization were lost here. Occasionally, as the temperature dropped, the ice would expand with a noisy, heaving shudder, as if Lake Superior were shivering from the cold.

In silent awe, we gazed into this strange world before us. Like nomads huddled around an ancient fire, we soon drifted into quiet conversation. Four hours later at five degrees below zero, we crawled into mummy type sleeping bags. When it's this cold, I don my face mask and snuggle into the bag to expose as little skin as possible to the elements.

The next morning, after a hot breakfast of oatmeal and bacon, we left camp and skied to the north side of the island. With only fishing gear, a few seat cushions and a light lunch in our sled, we made good time cruising along the shoreline.

Oak Island, like the others that dot the area, has a number of caves along its sandstone shore. We explored several of them. One cave went back in from the shore about 30 feet. Although damp and dark, the cave was a brief respite from the bright sun and constant wind.

In other places, we stopped to view frozen waterfalls. Warm afternoons had started melting some of the snow. As it melted, water refroze on the sandstone outcroppings, temporarily halting its inevitable journey back to the Big Lake. These frozen masses of crystals and icicles, some 20-30 feet long, were common along the shoreline.

High noon sun brought welcome 20-degree temperatures. Even the wind seemed a little kinder. The desert now however, was a sheet of pure whiteness. Magnified by the unbroken expanse of snow, the sun took on an intensity that I had never experienced before. Except for an occasional view of distant islands, it was hard to see where the sky and lake met. I was grateful for my sunglasses.

On the northeast side of the island we punched holes and again tried fishing. Looking at my lake map, I guessed we were fishing in 120 feet of water, but our lines knew better. We pulled up from 90 feet and moved a quarter mile out. We found deeper water, but we never did find the lake trout. Three hours and a dozen holes later, we called it quits and made our way back to camp. The fish, we concluded, must be somewhere else on the great white desert.

We poled our way on past postcard scenes of caves, frozen waterfalls and rugged shoreline.

An hour and a half before sunset, we broke camp and braced ourselves for the trip back. Now we had to face into the wind on our journey to the mainland. We put on our face masks. Slowly, at more of a walk than a gliding ski pace, we made our way back. Several times we rested and turned our backs to the whirling bands of snow. We finally skied into the long shadows of a big white pine on the peninsula. It had taken nearly 70 minutes to make the crossing.

On the Bayfield shoreline, I paused once again. A whirling white mass of snow careened between Raspberry and Oak islands. Both islands were now painted in sunset reds. The scene etched in my memory. Although cold, dry, and generally inhospitable, this seasonal white desert has immense beauty and character. The snow devil was soon lost between the islands and we found the trail back to our car.

## Helpful hints for planning your trip

The Apostle Islands are managed by the National Park Service. According to Howk, unlike summer, the area gets little use during the winter months. Perhaps as few as 30 people camp on the islands after the ice forms hard enough for foot travel. Generally the ice is safe from the last week in January until mid-March. Unfortunately, this is also the time when temperatures can plummet to 30° below zero.

JAMES C. BISHOP

A simple, but warm meal was prepared at home and cooked in foil over the coals at the Oak Island campsite. Note the aluminized cloth used as a windbreak and radiant heat reflector.

One other danger is moving ice. When the winds blow hard and constantly from the south, the ice can break and form large leads or gaps between the floes. No one can predict when this will happen, so ice travelers should check with local bait shops before a trip. Even if you're not going to fish, bait shops hear daily from anglers who travel on the ice.

Maps of the islands and lake survey charts are available at the National Park Service office in Bayfield. Howk said that anyone planning to camp on the islands must obtain a free camping permit required all year. The permit must be picked up in person during regular office hours — Monday through Friday, 8 am until 4:30 pm. Howk recommends checking with Park Service staff regarding weather and ice conditions before venturing out. The Park Service can also suggest departure points from

STEVE BADE

the mainland to the islands one intends to visit. One can get information about the area by writing to the National Park Service Office, Apostle Islands National Lakeshore, Route 1 Box 4, Bayfield, WI 54814, or by calling (715) 779-3397.

Enjoying winter camping means preparing with the right gear to survive. This includes a sleeping bag rated for cold temperatures, warm footwear and clothing, a lightweight snow shovel and equally important, a good compass. Winter storms often cause white-out conditions. Visibility on the ice can be reduced to a few feet. Howk relates a story of two people who got turned around in a storm on a day hike to the islands a few years ago. They ended up spending an unexpected overnight stay on Oak Island. Searchers found them the next day cold and weary, but unharmed. They were darned lucky.

JAMES C. BISHOP

Special tools for winter camping include a broad snow shovel to carve out a sleeping area, plastic liners and thermal sleeping pads.

Layering is the byword when it comes to clothing. A goose down vest covered with a windbreaker and wool or fleeced pants may be enough when cross-country skiing, snowshoeing, or hiking with a pack, but carry extra clothes for rest stops and camping. When one slows down and stops for lunch or making camp, add an insulated goose down or Thinsulate jacket and wind pants. Skiers should also bring along a pair of insulated pack boots. Gaiters to keep the boots free from snow and ice are also a good idea. Wool or fleeced mittens with a nylon or leather overmitt can be used on the trail and in camp. Bring along a couple of extra pair of wool socks. Those dampened by sweat or snow are useless on a cool morning. An insulated hat with sides that fold down to protect the face, like the old trooper's hat, will keep the head warm under most wind, cold and snow conditions. And remember a ski mask and sunglasses. Active outdoor enthusiasts have found new synthetic underwear made of thermax or polypropylene to be much better than the standard cotton type. The synthetics allow better transfer of body perspiration into outer clothing than cotton. This prevents chilling during stop-and-go activities.

Winter activity burns up calories that must be replaced. Foods high in fats and carbohydrates should be part of the menu. There is little need to worry about food spoilage: Meals with meats and fat can be made at home and simply carried along in the pack. Wrapped in tin foil, they can be tossed right onto hot fire coals. Some winter campers precook pasta dishes and put them in boiling bags. These are then frozen and pulled out as needed. In camp they are simply dropped in boiling water until hot. Again, keep it simple to minimize dirty dishes.

The desert-like air of the lake quietly robs body moisture. Carry water and drink it frequently. An inside pouch on my jacket keeps water ice-free until needed. Lake water should not be consumed unless it's boiled or purified.

For those a little less adventuresome who would still like a winter camping adventure on Lake Superior, try Big Bay State Park on Madeline Island. One can drive from the City of Bayfield across the ice road to the town of La Pointe on the Island. A road leading to the park is kept open.

Park Superintendent Steve Bade says access roads to individual campsites are not plowed, but it's only a several hundred yard walk from the road to the camping area. Campers can park cars alongside the road and walk into the campground. A picnic table and campfire grill mark each site.

Big Bay is located on the east side of Madeline Island, the largest of the Apostle Island chain. Winter adventurists can hike or ski along miles of beach. Like the other islands, ice caves can be explored here. Ice formations and crystalline structure will vary with weather conditions.

Even though the park is not maintained during the winter, a camping permit is required and must be picked up at the park headquarters in Bayfield. The camping permit fee is $6.00 and campers may self-register at the campground. For information about weather and ice conditions or camping permits at Big Bay State Park write: Steve Bade, DNR Bayfield Office, 141 South Third, PO Box 589, Bayfield, WI 54801 or call (715) 779-3346.

One last point. Whether venturing out for a day or two nights, let someone on the mainland know where you are going and when you are expected back. Stick to your itinerary. Should the need arise, emergency help will know where to look for you. Lake Superior, the north's great white desert, provides a unique adventure for those who learn how to get along in winter. It is also an area that must be given its due respect. □

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*James C. Bishop, Jr. is DNR's public information specialist for the Northwest District. He lives in Spooner, Wis.*

# Opening the door to the outdoors a little wider

Making parks accessible to people with disabilities also gives a wider variety of visitors—families, children, the elderly and those recovering from illness or injury—the means to enjoy outdoor recreation.

*Don Davenport*

At some point in life, nearly everyone is likely to have some type of disability. Whether it be short-term, such as a broken limb, lack of endurance following surgery or illness, a chronic health condition, or simply growing older, mobility and access are almost certain to become issues for all of us.

There are an estimated 43 million people with disabilities in this country. As all people expect reasonable access to goods and services throughout their lifetime, society needs to keep adjusting. The Department of Natural Resources' commitment to keep Wisconsin state parks, recreation areas, state trails, forests, and historic sites accessible to everyone remains challenging.

The Americans With Disabilities Act (ADA) of 1990 broadly defines "individuals with disabilities" to include people with vision and hearing impairments, mental retardation, cerebral palsy, multiple sclerosis, cardiac and chronic health conditions, and a variety of other disabilities.

"Meeting the needs and requirements for people with a wide variety of disabilities is very, very difficult," says Ron Ellingson, Unit Leader, DNR Bureau of Parks and Recreation Development and Accessibility Program. "The immediate challenge is to find out what steps we need right now, then try to project that into the future so we're not continually retrofitting every few years."

As a first step, park superintendents recently evaluated whether the contact stations, offices, parking lots, drinking fountains, public telephones and toilets were accessible and safe for all park visitors.

"We're looking at the most urgent, basic needs here," says Ellingson. "Every park visitor needs a place to park a vehicle, use a restroom, get a drink of water, use a telephone in an emergency and get into the park office. We'll spend $250,000 to revamp some of our older parks to meet these basic needs for all visitors."

From next July through June 1995, DNR recreational managers will examine the accessibility of such park facilities as trails, amphitheaters, bath houses, shelter buildings and other high-use areas. "We'll spend considerably more money to correct the problems we identify there," says Ellingson.

"These first two phases only address existing facilities," he said. "Once they're taken care of, we'll

look at new facilities — trails, shelters, amphitheaters — making certain that all new facilities are accessible to everyone." That work is to be funded and accomplished during 1995-97.

Add to the challenge the fact that people with disabilities don't always agree on what constitutes adequate access. For example, a person who uses a wheelchair wants guard rails on a fishing pier to be low enough to fish over; people who uses walkers want rails high enough to lean against. Providing access for some can inadvertently create barriers or difficulties for others. Tradeoffs must be made.

"Our goal is providing visitors with the opportunity for similar experiences or reasonable alternatives to enjoy the outdoors," says Anthonette Gilpatrick, DNR Bureau of Parks and Recreation Accessibility Specialist. "People with disabilities want the same programs and recreational opportunities as nondisabled people."

Ironically, the rugged beauty for which many parks and recreation areas are noted often limits access to people with disabilities. Providing access for everyone without destroying the wilderness experience for anyone is balanced with protecting wild resources and fragile environments.

"Most people with disabilities don't want to destroy the natural beauty of an area," says Gilpatrick. "They realize that some places are not going to be paved and planked to make them as accessible as other sites."

Ellingson agrees. "Most people with disabilities would rather not see 300 feet of elaborate ramps to reach a 20-foot observation deck," he said. "They'd rather see the view from a park overlook than wheel or walk long switchbacks to enjoy a vista from a higher vantage point."

DNR must be creative in finding other ways to share the natural beauty of parks with people who can't experience it firsthand, noted Gilpatrick. Similar outdoor experiences may be available at other state parks or nearby facilities. For instance,

ROBERT QUEEN

Equal access to drinking fountains, parking, phones, restrooms and offices is a starting point for park renovations.

while some parks have waterfalls that are difficult for people with mobility impairments to reach, nearby parks may have waterfalls that are accessible to everyone. Other alternatives include captioned slide or video programs and old standbys like bulletin board displays and dioramas. "Dioramas are an older technique that have new twists," says Ellingson. "Now, dioramas can depict the view from places that are difficult to reach, say the top of bluffs. They're an acceptable alternative."

Dave Weizenicker, Director, Bureau of Parks and Recreation, points out that a recent nationwide survey of state park managers indicates that Wisconsin state parks are far ahead of others in providing recreational access to people with disabilities. Of 48 states responding to the survey, only three had full-time staff positions similar to Gilpatrick's. Less than half offered publications describing accessible facilities, and only seven states provided captioned videotapes or films. Fifty percent of those responding indicated they marked and held campsites for people with disabilities, as we do in Wisconsin.

Not all services to improve access to recreation are highly visible. Telephone systems for people with hearing impairments have been installed at the DNR Bureau of Parks and Recreation Information Center in Madison and at three popular state parks. Special deer hunts are offered to hunters with disabilities, who may also apply for permits to hunt with a crossbow or shoot from a stationary vehicle. Anglers with disabilities can receive permission to troll with electric motors on lakes where motors are prohibited. At many parks, people with disabilities can arrange to drive to areas generally accessible only by foot.

We've all admired the many facilities marked as wheelchair-accessible, including fishing piers built in parks and recreation areas around the state and the lift at Blue Mound State Park's swimming pool. A growing number of parks offer toilet/shower facilities with wheel-in showers, fold-down benches, and hand-held shower heads.

The showpieces of recreational facilities for people with disabilities are the Paradise Springs Nature Area and a campground cabin at Mirror Lake State Park.

Paradise Springs, in the Kettle Moraine State Forest-Southern Unit, built with the help of the local Lion's Club, has a picnic area, old spring house, trout pond and fishing pier, all accessible by a paved nature trail with accompanying guide cable. Tape recorders and cassettes are available to people with visual impairments. A "barrier-free" cabin at Mirror Lake State Park was built by the Telephone Pioneers of America, Wisconsin Chapter #4 for exclusive use by people with disabilities.

Volunteers made major contributions in time and money to both projects, Ellingson said. We're fortunate that many other volunteers and friends groups work in partnership with the state park system, providing time, talent, and labor to help accomplish worthwhile projects that benefit all park users.

Many park managers have already made improvements that increase accessibility throughout the state park system, and many more are scheduled during the next few years. Paved paths and boardwalks help bring drinking fountains, beaches, picnic facilities, nature and scenic areas within easier reach. Level campsites, lower telephones, wheelchair-accessible


ROBERT QUEEN

Volunteers widened, smoothed and filled in Tumbled Rocks Trail along the western edge of Devil's Lake. Now it's easier hiking for everyone.

DAVID DRAKE

*(above)* Groundbreaking ceremonies at the Cabin in the Woods at Mirror Lake State Park, April 6, 1991.

*(below)* By August, the cabin was ready for use. Reservations were quickly booked for the season by campers with disabilities.

ROBERT QUEEN

restrooms, and access to park offices and contact stations make parks and recreation areas available to more visitors.

The needs of individual visitors vary greatly and meeting these will challenge park administrators to constantly weigh potential accommodations against potential harm to fragile properties. Providing access without overwhelming outdoor experiences with technology, making the disabled visitor with disabilities feel singled-out or damaging the environment is an ongoing concern. Clearly, every facility cannot be as accessible as Paradise Springs or the Mirror Lake cabin, but a wider range of sites should be open for visitors with disabilities to explore and enjoy.

We have many options to blend access points and technological assistance in ways that seem natural in outdoor environments, but how many can we afford to install? How do we construct facilities for people with divergent needs?

The job doesn't end with physical accommodations for people with mobility impairments. It will be equally challenging to develop programs and services that recognize other disabilities people live with — Braille signs, large-sized print and taped audio guides for people with visual impairments; TDD communications and captioning for the people with hearing impairments; interpretive nature programs that appeal to many senses; multilingual presentations and signs to overcome language barriers; and programs for people with learning disabilities would open up parks and trails for even wider audiences. As we interest a variety of clients in outdoor experiences, we create greater demand and expectations from people who want to reshape, redesign and rebuild the nature of recreation in state parks and trails. How we include these diverse interests while maintaining the wild character of our recreational gems will test our flexibility and creativity. □

*Don Davenport is a free-lance writer living in Verona, Wis.*

# *New paths*

## TO A CLEANER ENVIRONMENT,

# *New strategies*

## FOR TOUGHER TIMES

DNR PHOTO

**THE DAYS OF HUGE FEDERAL GRANTS TO STEM POLLUTION ARE OVER. A LOW-INTEREST LOAN PROGRAM FOR TREATING WASTEWATER IS MORE TYPICAL OF THE KIND OF HELPING HAND OFFERED TO COMMUNITIES.**

*Dick Kalnicky and David L. Sperling*

It's not especially glamorous work. Underwriting loans to build and maintain wastewater treatment plants doesn't stir our green spirit compared to saving swans, catching poachers or preserving park lands.

Nevertheless, the investments we make pay big environmental dividends. They give communities the means to eliminate human health hazards by replacing ponded septic systems with sewerage systems. A new plant can stem the flow of untreated sewage into rivers and streams. Adequate treatment protects drinking water, fishing quality, clean water for swimming; clean water for all the fish, fowl and organisms that thrive in healthy conditions.

Planning waste treatment services is also a key tool communities use to

control development, promote certain kinds of businesses or entice new industries. It can set the tone for the community's quality of life, business climate and future growth: Pretty powerful stuff for a mixture of pipes, pumps, biology and engineering that are on the receiving end of toilet flushes, industrial drainpipes and storm sewers!

Moreover, renovating treatment plants and extending services are not decisions that communities make lightly. New sewerage systems often cost millions of dollars. They add to property taxes and sewage bills for 20 years or more.

Each community's wastewater plans have to take into account community welfare, the environment and public health. Loans for assessing community needs, designing treatment systems, building plants and burying pipelines were largely underwritten by the federal government in the 1970s and early '80s to meet water quality goals. The Clean Water Act amendments of 1972 pumped billions of dollars into renovating wastewater plants and collection systems. However, federal aid started to dry up and taper off in the '80s as federal budget deficits skyrocketed and community demand for funds far outstripped available money.

State officials in Wisconsin saw the handwriting on the wall in the late 1970s — federal aids would be insufficient to get the job done and the major overhaul of sewerage systems in Milwaukee would require a lion's share of federal aids in the future. Taxpayers, through the Legislature, approved the Wisconsin Fund and floated state bonds to bolster water quality improvements that better wastewater treatment would bring.

The combination of federal aid and self-help state grants helped hundreds of Wisconsin communities meet clean water goals and improve the quality of life statewide. The results were dramatic. In 1975, prior to federal and state grants, almost 20 percent of streams where water quality is monitored were degraded by wastes from municipal sewage treatment plants. By 1990, water quality in fewer than two percent of these streams was harmed by sewage outfalls. In 1979, when Wisconsin Fund grants began, only 45 percent of community sewage treatment plants met clean water goals; by the late 1980s, almost 300 communities had received grants and more than 95 percent met clean water goals. Without state grants, planners estimate that fewer than 50 percent of towns and cities would be adequately treating sewage.

Counting the dollar commitment behind those environmental improvements is equally impressive. The federal government, through the Environmental Protection Agency, invested a little over a billion dollars to improve Wisconsin waste treatment works from 1973 to date. The Wisconsin Fund financed $966 million between 1980-90. Special grants to separate storm sewers from sanitary sewers (so-called combined sewer overflow projects) added almost $195 million between 1984-91. In less than 20 years, almost $2.2 billion in state and federal funds have been pumped into improving sewage treatment in Wisconsin communities.

Local success stories are more visible than impressive statewide statistics. Thanks to the Wisconsin Fund, tadpoles are again hatching in Swan Creek downstream of the Orfordville sewage treatment plant in Rock County. The popular tubing water, the Apple River in St. Croix County, is cleaner for recreation thanks to improvements in the Somerset sewage treatment works. Septic system wastes that formerly drained directly into Pigeon Lake are being collected and piped to the Liberty Sanitary District plant in Manitowoc County.

ELEANOR JONES

Sewage treatment renovations and overhauls during the last 20 years dramatically improved water quality. The Apple River in St. Croix County is now a popular, healthier spot for a float trip in an inner tube.

## Tactics change to continue improvements

Several changes will guide public investments in community environmental projects for the foreseeable future.

First, taxpayers are getting tapped out. Federal budget deficits are bringing even leaner times for environmental assistance programs. Moreover, government assistance programs that are subsidized locally and statewide are changing to minimize costs for taxpayers. Consequently, agencies that used to give

grants will be substituting low-interest loans. That's the key concept underlying the new Clean Water Fund that replaced the Wisconsin Fund. As 20-year loans are repaid, the same funds will be loaned to other communities. Self-sustaining revolving funds will eventually ease the tax burden of grants.

Second, community needs are changing. As treatment plants have been built and gross water pollution problems have been reduced, environmental programs aim to remove different kinds of wastes. Sewage treatment systems were designed to reduce organic wastes, but sanitary sewers are capable of carrying a variety of metal wastes, toxic materials and harsh chemicals that can foul the treatment works. Treatment plant managers now spend considerable time working with business customers to keep these wastes out of the sanitary sewers. Filtering, concentrating and collecting wastes economically is one method of minimizing pollution. Keeping those materials out of the waste stream is even better. Now communities conduct environmental audits to analyze the kinds of wastes received at the plant and discharged as sludge or effluent.

Third, people better appreciate how pollution prevention can protect the public investment in sewage treatment plants. The Clean Water Fund will loan money for projects that prevent pollution rather than paying for continued pollution violations. Poor performers had more than 20 years of state and federal grants to clean up their acts. The current philosophy is to invest in those plant operators who have made a commitment to maintain and sustain clean water.

This switch from sewage treatment grants to environmental loans is phasing-in over a five-year period. In 1988, only a small percentage of the nation's $2.4 billion in federal grants was used to set up state revolving loan funds. By 1989 and 1990, half the federal money had to be used for loan programs. By 1991, all federal sewage funds had to be used for loan programs and states receiving federal funds had to agree to kick in at least 20 percent matching funds. The feds are expected to stop building up the state loan nest egg after 1994, although states are pushing to extend the funding. Thereafter, sewerage system improvements will be funded by users, rather than taxpayers. In theory, as communities apportion costs, homeowners will pay a smaller percentage of improvement costs compared with businesses and industries that discharge larger volumes of wastewater.

Wisconsin's Clean Water Fund built up the state loan fund even more rapidly than the required 20 percent match to more quickly offer loans to communities. Without extra state contributions, less than a fifth of the projects funded in the last two years would have received state aid.

Despite the relatively rosy picture, community wastewater projects still compete for limited funds. Places where wastewater threatens the health of lots of people are considered more serious contenders for state funds. In some places, toxic wastes and bacteria threaten drinking water supplies. In others, people may come into contact with ponded septic wastes outside or in backed-up basements.

Analysts also judge where treated liquid wastes are piped. Effluent that empties into trout streams and other valuable fisheries needs to stay clean. If the volume of effluent is large compared to the stream size, that's an important factor, too. If waters can't


Clean Water Fund loans will allow these communities to continue sewage treatment projects this year aimed at preventing water pollution and reducing toxicants in streams and rivers.

meet clean water standards because of upstream sewage discharges, that's also considered. Finally, in some cases treatment plants are working fine, but water quality standards have gotten more stringent for other reasons. These plants will also have to be redesigned or retrofitted to keep receiving waters clean.

The Clean Water Fund will also eventually be used to finance projects that treat stormwater and runoff from city streets rather than piping this contaminated water directly into lakes and rivers. Projected needs for sewage treatment plants, urban stormwater and runoff projects total nearly $4.3 billion for the next 20 years.

In its first two years, 70 community projects received Clean Water Fund loan commitments totaling $421.7 million. Twenty-one projects qualified for lower interest hardship loans or grants. Loans ranged in size from a $25,000 project in the Village of Winneconne to 12 project loans totalling $203 million to continue rehabilitating Milwaukee Metropolitan Sewerage District facilities. DNR estimates almost $338 million in additional loans will be requested through June, 1993.

Interest rates for environmental loans are based on the current costs of state bonds. Communities borrowing funds to maintain high-quality treatment at sewage treatment plants or revamp plants to meet new permit requirements pay 55 percent of the current revenue bond rate. Projects to collect wastes in unsewered communities, collect and treat stormwater or curb runoff in cities will pay 70 percent of the revenue bond rate. Treatment plants that regularly violate clean water requirements or want to expand sewage services to accommodate new growth will pay the full market rate for their loans. In fact, through June 1993, plants that violate clean water permits won't be eligible for state loans. Hardship cases can qualify for lower interest loans or grants of up to 90 percent of project costs.


BUREAU OF ENVIRONMENTAL LOANS

Steve Brand, proud manager of the Ashland Wastewater Treatment Plant, secured the first loan commitment from the new Clean Water Fund.

## Who can apply for loans and what's involved?

These environmental loans are offered to municipalities — cities, towns, villages and counties — as well as sanitary districts, public inland lake rehabilitation districts, metropolitan sewerage districts and federally-recognized tribal governments.

Applicants start the loan process before the end of the year by filing a Notice of Intent to Apply form with the Department of Natural Resources' Bureau of Environmental Loans. About six months later, applicants submit engineering plans and specifications, and a loan application for DNR staff review. Costs for comparing waste treatment options and preparing plans and specifications can be included in loan amounts. A list of projects eligible for funding is published each September. Plans are reviewed and loans are approved or denied during the next 2-8 months. Once funding commitments are approved, the applicant has 90 days to bid the project and return bids for review. Assuming all is well, the applicant signs the loan papers and loan payments will start from the Wisconsin Department of Administration. First payments will reimburse out-of-pocket expenditures for engineering plans, bids and any construction that started before the loan was issued. Bills are submitted, reviewed and paid monthly.

Advance planning and early investments are paying off. Wisconsin communities that bit the bullet and renovated sewage treatment works in the 1970s and '80s saved millions of dollars compared with states that are being dragged into pollution abatement programs now. We got into the act when federal grants were plentiful and construction costs were cheaper. Future federal loan programs will enable us to maintain quality treatment works for less money and to adjust to new requirements at lower cost. Our state loan program that sets priorities for preventing pollution and offers hardship loans is considered an innovative national model; so innovative that it received a 1991 Environmental Achievement Award from Renew America, a group of 30 prominent environmental groups that annually recognize environmental success stories. Moreover, our stream water quality for aquatic organisms and recreation is dramatically improved as a result of our self-help actions. And isn't that a sweet finish for a dirty job? □

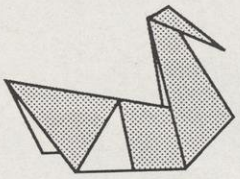
*Dick Kalnicky works in DNR's Bureau of Environmental Loans in Madison. David L. Sperling edits* Wisconsin Natural Resources.

# Readers Write

## FOLDING FAN

Maureen Mecozzi's lovely, educational and inspiring origami section, "Join the Fold," adds a fresh creativity to the already spirited changes in your magazine. Thanks. I've already sent my copy to friends in Illinois. Here's money for a replacement copy. I will certainly stay tuned.

*Carol E. Miller*
*Land O'Lakes, Wis.*



Thank you for the wonderful origami insert in December. I don't know how you do it, but each issue seems to get better and better, especially your recent inserts.

I anticipate fun times with my grandchildren folding origami paper next time I am called on to baby-sit.

*Ruth Y. Schmitz*
*Middleton, Wis.*

## WASTE-NOT WAR

Dane County may have hosted the nation's first official scrap aluminum drive, but the idea for aluminum drives during WWII came from Edward L. Morey, now deceased, of Spooner. A WWI veteran with a 100 percent service disability, Morey served as Washburn County's Veterans Service Officer for many years. He donated the first aluminum tea kettle and it is retained at the State Historical Society in Madison. His idea was recognized in the Congressional Record.

Ed Morey was extremely proud of his contribution to the war effort, and so am I; he was my father.

*Randall E. Morey*
*Mondovi, Wis.*

A thousand thank-yous to Jori Lenon for her article, "The Waste-not war." For years, I've advocated that if it was patriotic to recycle during WWII, it's patriotic now.

The article brought back a flood of memories as it was my job to flatten the cans and pack up newspapers and rags. I remember the rag men driving wagons, sometimes horse-drawn, hollering "Rags, rags, we need your rags." I also remember Mother taking coffee cans filled with grease back to the old butcher shop.

It was a little extra work, but we had good reason to do it, and we still do. The war also helped create replacements for many items we had to do without, thereby creating synthetic monsters that have wreaked havoc on our air, water and landfills. We have to learn that there are many things we can do without now to provide a cleaner environment for future generations.

Again, thanks for bringing back a truly enjoyable part of my childhood, because my mother managed to make all of the chores exciting in one way or another.

*Valerie Johnson*
*East Troy, Wis.*

What a surprise to open the December issue and see a familiar picture. I was one of Marie Carpenter's 23 pupils pictured at North Bright School 50 years ago collecting cans and paper for the war effort. I'm still recycling and I have been all my life.

*Mary Jesenovec*
*North Chicago, Ill.*

## STUCK ON STICK SHIFTS

"The Green Machine" insert in August was informative and interesting. However, one sentence didn't ring true to me: "The new automatic transmissions get better mileage than manual transmissions (stick shifts)." I asked the major car manufacturers to respond, and I've heard from them.

While automatic transmissions — especially those with the latest electronic computer controls — are clearly superior to older automatic transmission designs, they are not necessarily superior to manual transmissions in fuel efficiency. Transmissions with features like computer controls, lock-up torque converters and overdrive can improve fuel economy compared with automatic transmissions that lack these features. Some of the new automatics *can* get better fuel economy than the manuals they replace. Auto makers suggest that consumers "shop and compare."

I know it seems picky to comment on an item in an otherwise well-done booklet, but I have to have a reason handy when my wife asks, "Why do we always have to get a stick shift?" She doesn't believe me when I insist that they're more fun.

*Gordon Voltz*
*Milwaukee, Wis.*

## PADDLING PRIDE

The October article and photos on building wood strip canoes was very interesting. As a former canoe builder and repairer, I greatly admire the handiwork of the three men profiled. However, I think the page 8 photo would have been nicer if the bowman had not been holding that ugly store-bought paddle. After spending many hours and much money building new canoes, surely they have the talent to build their own paddles; they cost about three dollars in materials and about three hours of time. Home-built craft and store-bought equipment do not seem to go together. At least the bowman could have put that monster paddle on the other side of the canoe so the photo would show more of his handiwork!

Otherwise, keep up the good work.

*George M. Adams*
*Waupaca, Wis.*

## OUTBOARD MOTORS

A letter in your October issue pointed out detrimental effects of large boat motors on small lakes. I was dismayed at your meek and mild editorial response. It's time all natural resources personnel recognize these motors have *very* damaging effects on smaller lakes. We should unite to stop this. It doesn't make sense to allow this destruction and later try to rehabilitate lakes.

*O.M. Jacobson*
*Rice Lake, Wis.*

## CANOE ROUTES?

I enjoy reading your magazine on the state natural resources and wonder if you have information on canoeing in Wisconsin. I have owned two canoes for over 35 years and I do all my fishing and camping from my canoes.

It is getting harder every year to find rivers and lakes without lots of boaters with very large motors. I don't find them very cooperative with canoers.

It would be nice if the lakes could be gauged for motor size based on the acres of water. I know that this would not be an easy law to pass as there are more large boat owners than lakes to put them on.

*Dick Larson*
*Greenwood, Wis.*

*DNR formerly produced "Wisconsin Water Trails" that provided on-water directions to portages, routes and campsites along canoeists favorite rivers. The publication is out of print now, but libraries may still have it in their files. Several travel books provide maps illustrating canoe routes on popular Wisconsin waters. We've found them in stores that specialize in canoes and outdoor recreation equipment.*


*After a few moments he yawned and slowly stretched his front paws.*

*continued from page 2*

After a few moments, he yawned and slowly stretched his front paws. He sat up and surveyed his white frozen domain, still caught in the grip of an early March winter.

With her hunger increasing each moment, the muskrat carefully pushed her dozing babies together in a heap and turned to leave. She ambled over to her favorite exit burrow, took a quick deep breath, and plunged into the frigid marsh waters.

After descending nearly two feet beneath her house, she left the mouth of the burrow and headed across the one-acre span of water under the ice. As she swam, gracefully slipping through the waters, her powerful hind legs and tail moved in a rhythmic, sinuous motion. Above her, a beautiful patchwork of sunlight passed through the ice in varying hues of white and blue, depending on the snow depth. She paid no heed to the complex patterns, but rose to the surface for air. Locating a small pocket of air just below the ice and above the water, she quickly exhaled and inhaled, and resumed her journey for food.

Fully alert and satisfied that no danger was present, the fox began to make his way north. According to his custom, he always headed into the wind, depending on his sensitive sense of smell to locate food. He daintily trotted through the patches of wind-blown snow in search of his next meal.

This winter had been long and cold, and the muskrat had long ago eaten her supply of cattail roots closer to home. Now she had to swim ever further to find the tasty, starchy rhizomes that meant life. She continued to swim across the clearing until she spotted movement up ahead. Another muskrat! Immediately, she charged the intruder. With a burst of speed, she quickly closed the gap, her powerful front teeth bared. Her adversary, a large male, turned just as quickly to avoid her attack, and hastily swam away. Her food supply protected, the female muskrat rose for a breath of air, descended to the nearest clump of cattail roots and began to feed.

Padding along in a zigzag pattern, the fox investigated clumps of shrubs and cattails that might contain a mouse or other prey. He came upon a set of fresh muskrat tracks heading deeper into Horicon Marsh. The fox abruptly turned to follow the tracks.

Her hunger satisfied, the muskrat tore off one more small cattail root, held it in her front paws, and quickly chewed the food. After finishing her meal, she rose for another breath of air beneath the ice. She then began to swim leisurely through the shallow ice-covered waters back to her house.

The fox followed the tracks to a stretch of patchy, snow-covered ice with a muskrat house on the north end of a clearing. Just ahead he spotted something moving! It was the female muskrat,


slowly swimming toward home. The fox crouched, muscles tensed, and he watched. Moments later he sprang into the air crashing on the ice directly above the muskrat. He frantically pawed at the ice, rapidly scratching it with his claws.

*Moments later he sprang into the air, crashing on the ice directly above the muskrat.*

Spotting motion above her, the frightened muskrat dove deeper into the water for protection. Not realizing that the ice had saved her, she hastily swam for her house without looking back.

Peering into the ice, the fox had a puzzled look on his face. His prey had simply vanished! He circled the small patch of clear ice a few times, looked again at his scratch marks, picked up the muskrat tracks again, and trailed them into the distance.

*Her adversary, a large male, turned just as quickly to avoid her attack, and hastily swam away.*

The still-frightened muskrat quickly rose through an entrance burrow to see her babies still sleeping in a pile. Comforted by familiar surroundings of her home, she shook her coat to shed the unwanted water. Her heartbeat slowed a little, and she lay down next to her litter. The brisk north wind still whistled past her house, but she soon fell asleep. □

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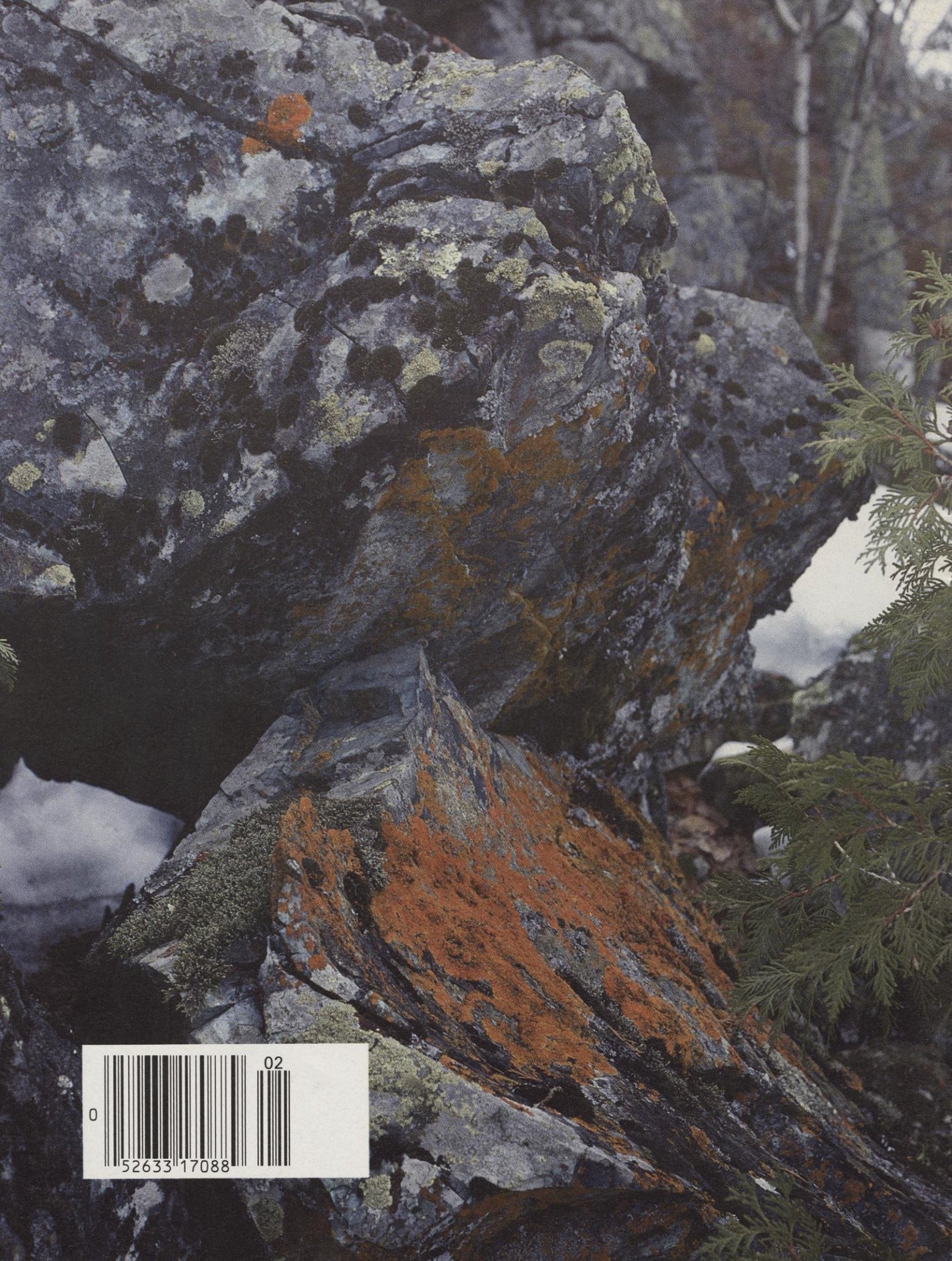
*Lawrence E. Vine is a waterfowl researcher with DNR's wildlife research unit. He is stationed in Horicon, Wis.*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