March–April 1983 · The Minnesota

VOLUNTEER

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Front Cover. "Baltimore Oriole," detail from a watercolor by Michele Kessler, New Hope. The male songbird's orange, black, and white plumage contrasts with the fresh green of new spring leaves.

Inside Front Cover. Spring fishing scenes: two acrylics by George Overlie, Minneapolis. Top: Fishing for steelhead in the Knife River as it flows into Lake Superior. Bottom: Fishing for brook trout, South Branch Creek, Root River, Forestville State Park.


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The Minnesota
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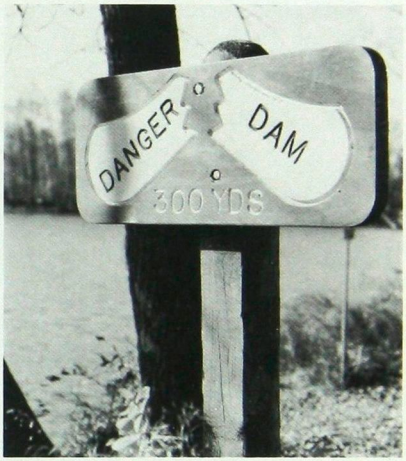
Warning! Lowhead Dams Claim Lives!



Boaters and rescuers caught in the roiling spillway below lowhead dams testify to the effectiveness of these structures to claim victims

Kim Elverum

In late September 1975, a tragic chain of events in Binghamton, New York, taught river users and rescue teams valuable lessons in dam safety. By the time the episode ended a day later, three persons were dead and four had been injured.

An early fall storm had made the Susquehanna River unusually high. One evening, two rafters were swept over the Rockbottom Dam and trapped in the current below the structure. Witnesses to the accident summoned help, and a rescue boat was launched with three firemen on board. In the turbulent water, the craft capsized. All three were thrown into the river. One fireman drowned; the other two, along with the two rafters, were eventually pulled from the water.

The next day, on a body recovery operation for the lost fireman, the fire chief and two firemen approached the dam from down-

Berning Mill Dam on Crow River near St. Michael is typical lowhead dam. Water flowing over dam creates recirculating current which draws objects toward face of dam. Above: Sign at portage above dam warns boaters.

stream. As their outboard-powered boat reached the base of the dam, the current caught it and the boat turned over in the roiling water. Desperate attempts to rescue the trio failed, including a try with the fire department's extension ladder.

Twenty minutes later, a rescue boat carrying two sheriff's deputies arrived on the scene. By this time, two of the firemen had disappeared, the third was bobbing in the maelstrom.

As if to add horror to horror, this attempt once again ended in tragedy as the third rescue craft overturned in the turbulent water. Luckily, the two deputies and the remaining fireman were swept clear of the dam and eventually rescued.

Why did this tragedy occur? Are these small dams that dangerous? Was this just a freak accident or could it happen in other places, including Minnesota? What can be done to prevent these tragedies?

Drowning Machine. Dams come in many sizes and shapes, everything from huge lock-and-dam structures on the Mississippi River to small, "lowhead" dams. Although there are safety problems with larger dams, their size and design do not present the type of threat involved in the seemingly harmless lowhead dams.

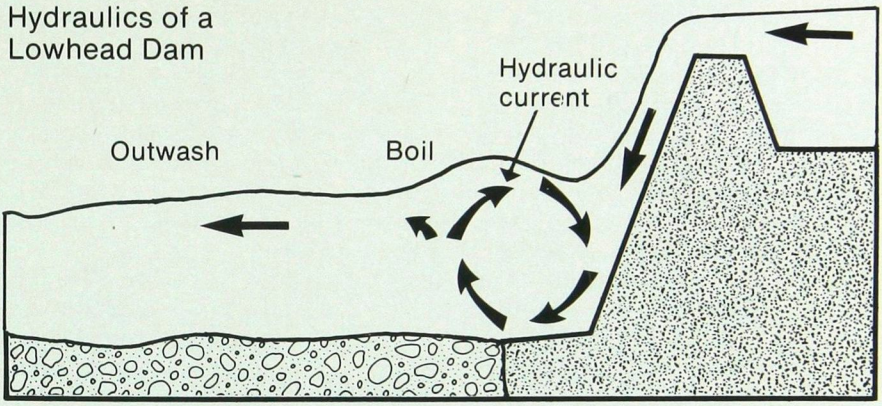
Lowhead dams are generally small structures usually no more than 10 feet high, although some are as low as six inches. They have no gates or water-control devices; water flows constantly over them. Most were built during the late 1800s and early 1900s to provide water for grain mills and early hydroelectric generators and to control lake levels.

Because of their small size, they do not appear to be dangerous, especially when viewed from a boat or canoe upstream. They can be pleasant places in the summer when water drops over them and gently flows downstream.

In the spring and during other periods of high runoff, however, the dams become very dangerous. Torrents of water pouring over the dam create a churning backwash or current. This "hydraulic," as it is often called, is really a recirculating current. The roiling water takes any object — including a person — down to the bottom of the stream, releases it to the surface, sucks it back to the face of the dam, and pushes it back to the bottom again. This cycle can continue indefinitely.

In addition to the current, other hazards are inherent in most lowhead dams:

- Both faces of the dam usually consist of a vertical concrete abutment. Even if a victim struggles to the edge of the structure, chances are poor that he or she will have enough strength to climb the wall.
- Branches and other debris trapped in the hydraulic pose an additional hazard to the victim.
- Temperature of the water at times of high runoff is usually cold,



The boil is the point at which water flows in two directions, downstream and back toward dam. Objects caught in recirculating current are held against dam.

which decreases survival time.

• Finally, air bubbles mixing in the water decrease its buoyancy by one-third. The victim has a hard time staying afloat, even with a Personal Flotation Device (life preserver).

In sum, these factors combined with the hydraulic current create a nearly-perfect drowning machine.

Our Lowhead Dams. Problems with these dams are not confined to New York. Deaths of victims and rescuers have occurred in nearly every state, including our own. Most of the several hundred lowhead dams in Minnesota were built during the late 1800s and early 1900s. Many have been abandoned or are no longer used.

One such dam is located on the Crow River, which forms the boundary between Hennepin and Wright counties. In July 1979, events nearly as tragic as the Binghamton incident began with what was alleged to have been a dare.

A 25-year-old man wearing a boat cushion on his back plunged over the Berning Mill Dam on an air mattress. The river was unusually high for the summer and the man was trapped in the hydraulic.

Occupants of two canoes below the dam attempted to rescue him, only to become victims of the current themselves. The first canoe capsized. Fortunately, the canoeist was washed clear of the dam and reached shore safely. The second canoe with two men and a woman was pulled into the spillway. It broke in two throwing all three occupants into the river.

A state trooper arrived on the scene, but was unable to rescue the man wearing the boat cushion trap-

ped below the dam. Instead, the trooper turned his efforts to the woman from the second canoe who had been brought ashore by two fishermen. He and two bystanders managed to keep her breathing until more help arrived. That evening she died at the hospital.

Two days later, the bodies of the man who had plunged over the dam and one of the rescuers were recovered. The final toll: three deaths.

As tragic as these deaths were, however, they were not unique. Over the past eight years, deaths have occurred below dams on the Buffalo, Cannon, Chippewa, Mississippi, Rum, Red, Red Lake, and Straight rivers. The dam which has claimed the most lives is the Red River's Drayton Dam located on the Minnesota-North Dakota border 40 miles north of Grand Forks. Since it was built in 1964, 11 persons have died in its spillway. The latest fatality occurred in September 1982. Despite warning signs, ordinances, and city and state police officers patrolling the site, fishermen and canoeists continue to press their luck at the base of the dam.

Rescue. In 1980, officials of the Ohio Department of Natural Resources were dismayed to learn that, in the past two years, nine firemen and police officers in that state had lost their lives, and others had been injured, in fast-water or dam-rescue attempts. Additional checking revealed the same type of deaths and injuries had occurred in other states.

These accidents involved rescue personnel who were injured or killed in what had been considered routine water emergencies. Typically, the rescue personnel, like adventuring river users, were confident of their skills, equipment, knowledge, and experience.

Only a few fortunate rescuers have survived a trip through the current below a lowhead dam. Dennis Lutz, a Miamisburg, Ohio, fireman, described his experience attempting to rescue a teenager:

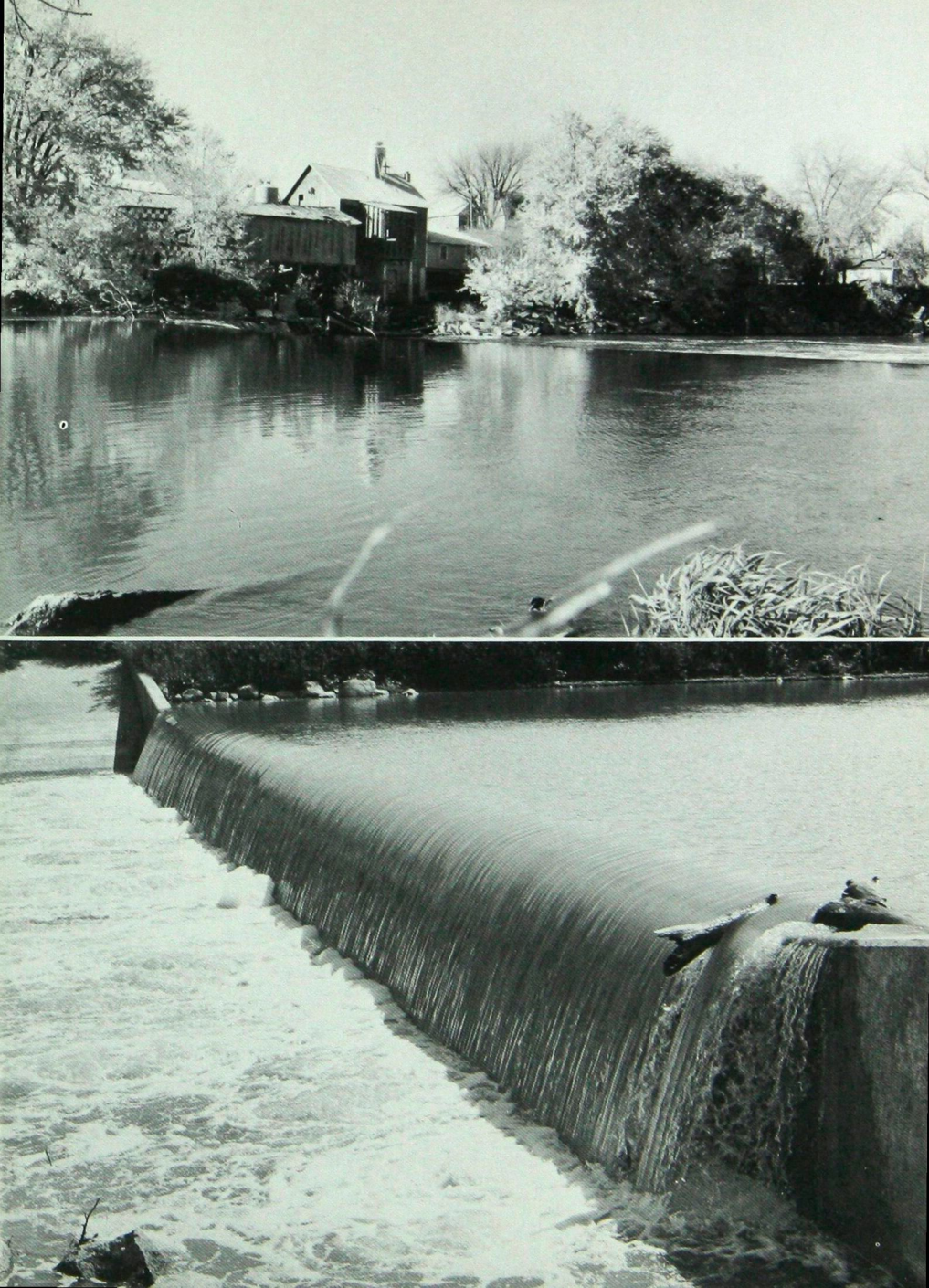
"You can't believe how powerful the current is. As my buddy and I approached the dam, the boat seemed to rise and move rapidly forward. It's like being caught by a monster. It just won't let you go."

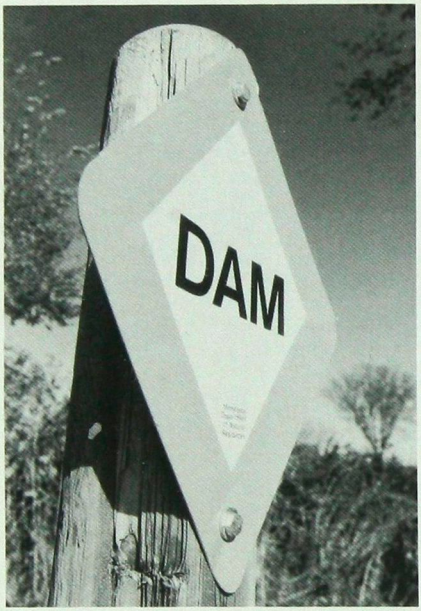
The rescue boat filled with water and capsized as the strong current sucked it into the dam. Lutz was dragged down into the hydraulic, battered along the bottom, caught in a submerged tree, wrenched free, and pushed to the surface, only to have the cycle repeated. Lutz was finally rescued, but his companion and the teenager drowned.

In response to these tragedies, the Ohio DNR Division of Watercraft, with the assistance of firemen, the Red Cross, and canoeists, developed techniques that can help anyone faced with a fast-water rescue problem.

"In any rescue operation, we first reassure the victims," says James French, Ohio DNR. "Next we try

Top: Placid water above Berning Mill Dam — unused mill at left — suggests no threat to boaters. Bottom: Boil below Drayton Dam on Red River north of Grand Forks on Minnesota-North Dakota border has claimed 11 lives since 1964.





rescue from shore. As a last resort, we attempt direct rescue from a boat. But we would never take the boat into the hydraulic of a dam. The risk is simply too high."

The techniques that Ohio devised have been put into practice across the U.S. During the last five years, the Minnesota Department of Natural Resources has briefed fire departments, DNR Conservation Officers, sheriff's deputies, and state troopers on the rescue methods developed by Ohio.

Lowhead dam rescues are either shore-or boat-based. Shore-based rescues are used on dams up to 300 feet wide which have accesses at both ends. If rescue by throw-line is not possible, a line with a rescue buoy in the center is placed across the river. This can be done with a line gun, or by using a boat downstream from the dam. Rescuers on both sides of the river then work the line up to the victim and pull him to the nearest shore.

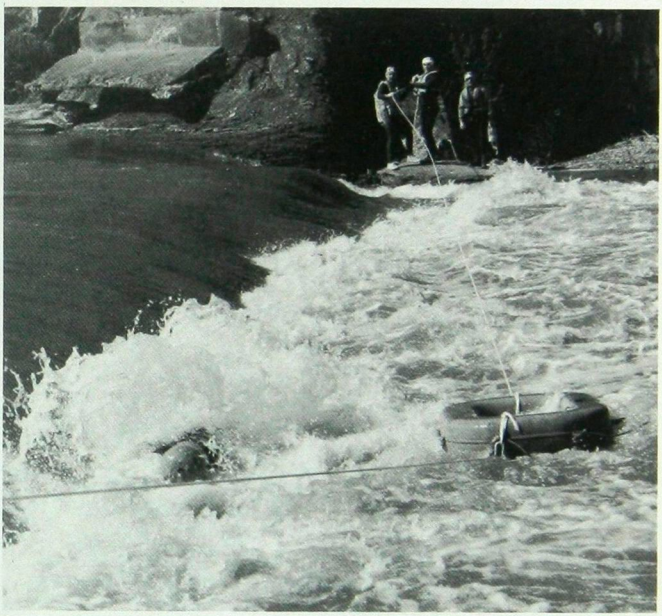
Dams where access to both ends is not possible, or dams that are wider than 300 feet, generally require a boat-based rescue. This method requires two boats which are connected by a safety line.

The first boat approaches the dam from downstream, being careful not to enter the hydraulic. A flotation device on a line is then cast to the trapped person. The second boat remains 100–150 feet downstream. Its purpose is to assist in the rescue and keep the first craft from being pulled into the dam.

Other techniques have also been used successfully, including specialized watercraft and a coupling which allows an ordinary fire hose to be inflated with compressed air and pushed out to a victim.

The basic premise of the Ohio approach, however, is that rescue techniques must be realistic and simple. In addition, they emphasize that rescue agencies know the dams in their area, take measures to prevent accidents, and plan and practice rescue methods.

Films. Although this article is by no means a complete guide to lowhead dam safety and rescue, it does



Ohio DNR teaches rescue techniques at Fast Water Rescue School. In drill, shore-based rescue team pulls float through boil. Person caught in boil could hang onto float, be pulled free. Far left: New sign required by Uniform Waterway Marking System is being erected along rivers across U.S. To boaters, sign's diamond shape indicates danger in stream ahead.

provide some basics. Persons interested in more information on dam rescue are urged to contact the Department of Natural Resources, Boat and Water Safety Section, Box 46, Centennial Bldg., St. Paul, MN 55155.

The DNR also has two 16mm films for free loan which review fast-water and lowhead dams: *The Uncalculated Risk* and *Water: The Timeless Compound*. For information on borrowing these films, contact the DNR Film Library at the above address. □

Kim Elverum is DNR Boat and Water Safety Coordinator. The Ohio DNR Division of Watercraft and Wilmer Pich, North Dakota Department of Game and Fish, provided valuable help to the author in his preparation of this article.

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Before a Fish, All Men are Equal

"FISHING IS A CHANCE to wash one's soul with pure air, with the rush of a brook, or with the shimmer of the sun on the blue water. It brings meekness and inspiration from the scenery of nature, patience toward a fish, and a quieting of hate. And it is discipline in the equality of men — for all men are equal before a fish." — *Herbert Hoover*

Planning the Future of Superior National Forest

The next 50 years will be crucial in the management of 2,048,937 acres of forest in northeastern Minnesota. Public meetings will begin in April to review proposed changes in timber harvesting and recreation in the Forest • Ann L. Schimpf

THE SUPERIOR National Forest staff has spent four years compiling an innovative management plan for the next 50 years that proposes to slash the Forest's budget by 25 percent.

"That kind of in-house budget cutting is unheard of in bureaucracies," said Jim Beattie, a land use planner on the Forest. "But we really believe our data supports that maverick philosophy."

The plan represents the culmination of months of public meetings, thousands of hours of staff time, and hundreds of thousands of dollars worth of sophisticated computer analysis. Reason for the plan: The Renewable Resources Planning Act of 1974 mandates that all national forests devise long-term management plans by 1985.

"We expect the plan to be controversial," said Deputy Forest Supervisor Richard Ross. "We are the first forest in the eastern region to produce a plan. The leading edge of anything is uncertainty."

Possible controversial components of the plan include:

- A de-emphasis on conifer reforestation
- A phasing out of some campgrounds
- A change in some quotas within the BWCA
- No plans for future wilderness additions to the BWCA

• What was left out of the plan — an update on the acid rain situation, for example.

A summary of the plan will be mailed in April to all people who participated in public meetings. Copies of that summary will also be available from the Forest Supervisor, U.S. Forest Service, Box 338, Duluth, MN 55801, 218-727-6692, and from ranger district offices in Aurora, Cook, Ely, Grand Marais, Isabella, Tofte, and Virginia.

Those wishing to read a draft of the plan and a draft of the Environmental Impact Statement that accompanies it may do so at the aforementioned offices. The plan is the implementation document; the EIS displays five alternatives and details the assumptions and consequences of each.

Timber Harvest. The plan proposes to shift emphasis from conifer (primarily red and jack pine and white spruce) to hardwood (aspen) harvesting and reforestation. The Forest can easily meet future demands for both conifers and hardwoods, the plan states, if the shift to hardwood is made. If it is not, the plan predicts serious hardwood shortages within 30 years.

"I agree with the Forest Service regarding the need for more emphasis on hardwood management. However, reducing softwood planting to almost nothing doesn't make sense to me," said Ed Jankowski, recently retired Potlatch senior staff forester. "I'd like to see them reforesting at least three or four thousand acres a year."

"Last year we sold just under 70 million board feet of timber," said Sue Lawson, Forest timber specialist. "We are selling far below what we have available. Even with the move away from conifer regeneration, we will be able to meet the demands of the timber industry."

The Superior now supplies about 10 to 15 percent of the total demand for timber in the state. About 58 percent of the Forest, 1.16 million acres, is available for timber production.

Reforestation of conifers is very expensive. Reforestation of aspens is not. Aspen reproduce via suckers when old aspen is cut. At most, regeneration of new aspen trees requires some brush removal. But conifer regeneration is another story. The site must be cleaned of downed wood and brush, which may involve herbicide spraying, bulldozing, and often burning. Then the seedlings must be hand-planted and monitored for survival.

One reason the plan calls for a 25 percent budget reduction — from an annual budget of $14 million to one of $10.8 million — is the switch to hardwood regeneration. According to John Ramquist, resource specialist on the planning team, the following are representative figures for a typical softwood reforestation project in 1978 dollars: $87 per acre for site preparation, $55 per acre for re-

lease (herbicide spraying), $100 per acre for planting and sale preparation, and $55 per acre for administration. Total cost: $297 per acre. Multiplying this cost by the 9,000 acres that were reforested in 1982 comes to $2.7 million.

Recreational Areas. Another budget-cutting proposal that may create controversy: phasing out campgrounds, picnic sites, and swimming areas.

The Forest's current capacity for these uses exceeds projected demands. The plan's best estimate of future campground use shows a maximum of 304,300 Recreation Visitor Days per year. A RVD is defined as use by one person for 12 hours. The Forest's present campground capacity is 500,000 RVDs. Supervisory Land Use Planner Arthur Laneve explained that the problem is one of distribution: some campgrounds are never full, others are always full.

Swimming and picnic areas in the Forest also experience different kinds of use. Their present capacity is 73,000 RVDs. The plan's projections for swimming and picnic use combined call for demand to remain below 57,800 RVDs over the next 50 years. For all three types of recreation areas, which sites to close will depend on careful field analysis.

Another of the plan's proposed changes is distribution of primitive and semi-primitive areas within the Boundary Waters Canoe Area. (Primitive sites have no man-made structures; semi-primitive recreation sites have grates and latrines.) The plan predicts growth in the demand for primitive and semi-primitive use in the BWCA. Each of the EIS's five alternatives anticipates this growth in a different fashion.

- Alternative 1, a continuation of current management policy, calls for 48,000 acres of primitive and 744,500 acres of semi-primitive recreation
- Alternatives 2 and 3 both emphasize economic efficiency and propose no primitive acres and 792,500 acres of semi-primitive recreation
- Alternative 4, which emphasizes non-market resources like diversity of wildlife and scenic quality, calls for 270,000 acres of primitive and 522,500 acres of semi-primitive recreation
- Alternative 5, the preferred alternative, calls for 73,000 acres of primitive and 719,500 acres of semi-primitive recreation.

"Changing the acres allotted to the two different types of BWCA recreation will undoubtedly call for some adjustment in the location of the 2,000 or so existing campsites," said Laneve. "But we're not sure where they'll be."

Jan Green of Duluth, member of both the National Audubon Society and Sierra Club, expressed concern about altering campsite locations. "If they would increase the number of campsites, it would very much affect

the aesthetic experience within the BWCA. However, I don't think the primitive, semi-primitive definition of the Forest is that relevant. Most people accommodate to latrines and grates and recognize them as necessary in the heavily-used canoe country."

Public Meetings. Between 1978 and 1980, 2,400 comments from people who attended meetings in Grand Marais, Two Harbors, Ely, Virginia, Duluth, and St. Paul were recorded. In those meetings, the audience was asked to identify issues and concerns, to rank the issues, to identify optional solutions for each issue, and to establish decision criteria. The last public comment period ended March 15, 1980. Since then, much Forest in-house analysis has occurred.

Forest and public input data were fed into the agency computer in Fort Collins, Colorado. Forest data included: grouping land areas within the Superior by road density, site productivity, timber type, age group of vegetation, and wilderness potential. Dollar values were assigned to Forest resources like fishing and wilderness use.

After the "number crunching" was completed, hours of staff analysis followed. Steve Hoecker, the "computer wizard" of the planning team, said, "The computer just added credibility to the plan. It did not give answers. All the interpretation was human."

Three Goals. The Forest's planning team takes particular pride in the product they spent four years and several million dollars compiling. They point out that the 1979 National Environmental Policy Act directed them, as a federal agency, to accomplish three things in their plan: reduce paperwork, reduce delays in decision-making, and produce better decisions.

Ironically, the Plan has been criticized for taking the NEPA directives too seriously, that is, being too short. Arthur Laneve said that when the plan was sent to the U.S. Forest Service last fall, one official said there must be something wrong with it — it didn't feel heavy enough.

Some members of the planning team feel that the plan's brevity will also cause problems in the public review process. Jim Beattie said, "The biggest debate will come over what we left out, not what we put in."

John Ramquist gave acid rain as an example of a topic that could have been covered in detail in the plan, but wasn't.

"The plan says little about it, because nothing our management proposals do will affect it one way or the other," he said. "So why go on for pages just to prove you're aware of the problem?"

Another concern the planning team sees arising during this spring's public meetings is the lack of specific management suggestions for given areas. The plan divides the Forest into a number of management areas.

For each area, precise figures are given on everything from the expected white spruce harvest to the proposed miles of trail construction. However, the management areas are large; one can't pinpoint where within their boundaries such things as clearcuts and road construction will take place. The vagueness, says the planning team, constitutes a realistic management strategy.

"If we're going to deliver what we promise over the long run, we need flexibility," said Beattie. "The plan is not going to be cast in stone. There will be a five-year review process and each year people can examine our project proposals."

Most members of the Forest's planning team are convinced that the upcoming 90-day comment period will produce significant changes in the plan. "The final alternative selected may not be one we have proposed," said Beattie. "We want to emphasize our openness to change."

Beginning in April, public meetings in many communities will be held to discuss the plan. Laneve said the format for the meetings will include a formal presentation, small non-structured group discussions with Forest officers, and directions for submitting written comments. The comment period is 90 days.

"We hope that people will take an interest in the plan, review it carefully, and provide meaningful comment," said Laneve. "We want this to be the best possible management document for the Superior National Forest. The next 50 years are crucial to its long term well-being."

Ann L. Schimpf, Duluth, is a freelance writer. She wrote "On Skis and Snowshoes in the BWCA" for the November-December 1982 issue of the *Volunteer*.

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Two Benefactions of Angling

"THERE IS CERTAINLY something in angling that tends to produce a gentleness of spirit, and a pure serenity of mind." — *Washington Irving*

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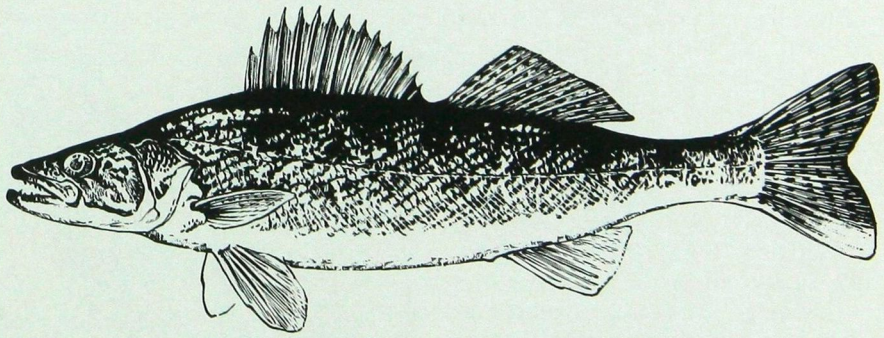
Migrant Ducks and Geese Borne on the Winds of Spring

"WHEN SPRING ARRIVES, the gulf airstream surges northward with ever-increasing strength. Migrant ducks and geese are borne along on its boisterous current. Its warm winds melt away the snow and ice. Travel-weary waterfowl find open waters where they can rest and feed. Aquatic insects, crustaceans, and other organisms become active as water temperatures rise. Many ducks seek out these burgeoning sources of animal proteins, to be in peak condition for egg laying." — *John J. Lynch,* Waterfowl Tomorrow

Minnesota leads other states in the production of walleye fry and in the number of walleye lakes. Vital to the state's walleye fishery is the spring spawning run of the popular game fish and the DNR's fry-and fingerling-raising operation • A Volunteer Report

SPRING RUN of the WALLEYES



THE TREES are still barren of leaves, but the water in the Pine River near Jenkins has begun to warm, time for walleyes to begin their annual spawning run and for Department of Natural Resources Fisheries crews to harvest a spring bounty of walleye eggs.

In these mid-to late-April days, the scene is the same at 15 sites around Minnesota where Fisheries crews gather walleye eggs for hatching and rearing and, later, for stocking some 700 walleye lakes in the state each year.

What makes a lake a candidate for stocking? Some lakes offer the necessary forage base for walleyes (chiefly yellow perch) and habitat (gravel and rock shoals), but other

conditions then prevent natural reproduction of Minnesota's most sought after game fish.

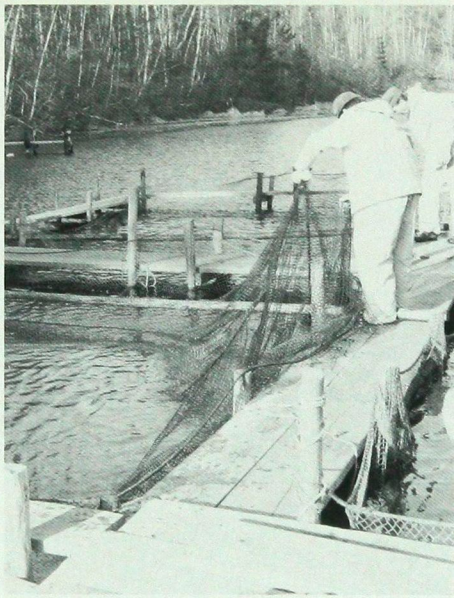
These conditions may include high silt loads — from erosion or drainage — which smother eggs; pollution; water level fluctuations that expose eggs; or shoals too deep or too near a lee shore. To ensure survival, the eggs require the aeration that gentle wave action provides and which also cleans the gravel of debris and wastes.

Statewide, Fisheries crews harvest 500 million eggs each spring. A single female, depending on size and age, provides an average of 85,000 eggs — or about 35,000 eggs per pound of weight.

But chances for fertilized eggs in a river to reach fry size — 1/32″ in length — are slim indeed; only one in 20 make it. By contrast, the success rate in a hatchery, where water flow and temperature can be carefully regulated and predators are absent, soars to 70 or more per 100.

Fry one-to three-days old are either stocked in protected rearing ponds or go directly into lakes that offer a plentiful supply of plankton. Fry in rearing ponds are held until fall. Then, as three-to six-inch fingerlings able to fend for themselves, they are harvested and stocked in lakes throughout Minnesota.

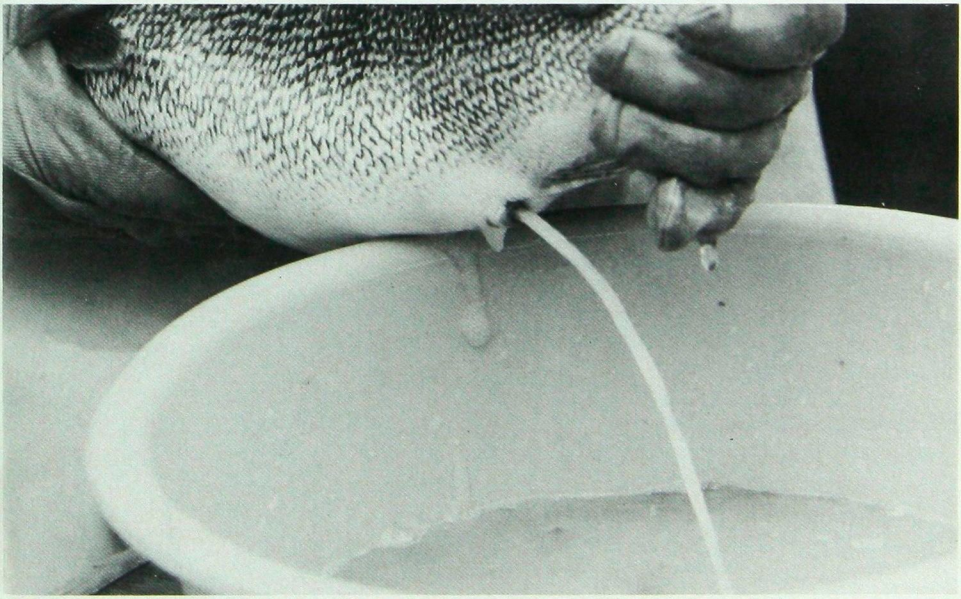
The following pages show the spring spawning harvest on the Pine River and hatchery procedures at the Brainerd Area Fisheries Office.



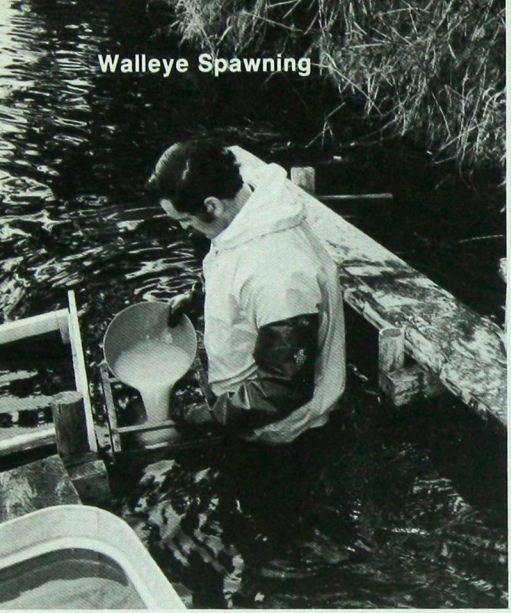
In spring, Fisheries workers erect temporary structure to trap spawning walleyes.

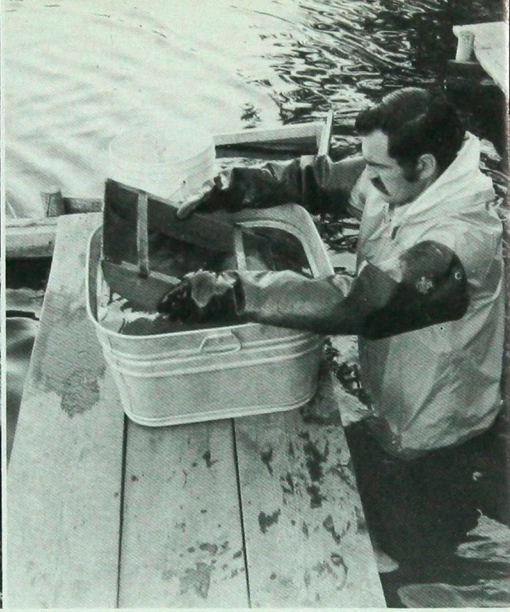
Workers haul walleyes from water. Spawning run occurs in late April, early May.

Left: Worker sorts male and female walleyes. Right: Stroking underside of female causes release of eggs, about 35,000 for each pound of fish's weight.



Pressure to rear of male's abdomen causes release of milt. Workers add sperm of two or three males to eggs of one female for optimum genetic pool.

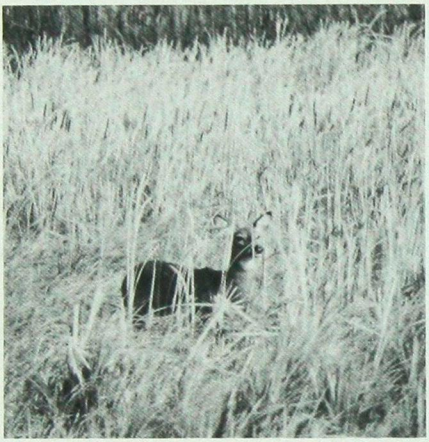




Left: Worker pours fertilized eggs into screened tray. Clay in tray adheres to eggs, prevents them from sticking together. Right: Placing eggs in tub, ready for hatchery.

Left: After 14 days incubation in hatchery, eyes are visible in eggs. Right: Worker siphons dead eggs from hatching jar. Dead eggs float; live eggs cluster at bottom.

First day after hatching from egg, fry survive on food in yolk sac. Fry are now ready for stocking in lakes or in walleye rearing ponds. Those placed in rearing ponds will be ready for harvesting in fall as four-to seven-inch fingerlings ready for transfer to lakes. Pencil tip shows relative size of day-old fry.



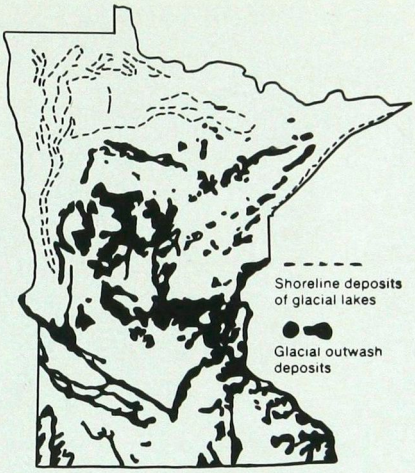
That Old Gravel Pit: Living Space for Wildlife?

Some states now develop depleted gravel pits for wildlife. Is there a possibility that Minnesota might do the same? Wildlife biologists are now studying the question • Morris Eng

OUR DEMAND for increased food production, housing, and recreation has had a devastating effect on wildlife habitat in Minnesota. This is particularly true in urban areas and in southern and western Minnesota farm country where, after fall plowing, little cover remains for wildlife. Most winter cover in these regions consists of overgrown rights-of-way for roads and railroads, fence lines, ditches, stands of trees, a few established Wildlife Management Areas, and old gravel pits.

We don't usually think of abandoned gravel pits as habitat for wildlife, but many of these old pits now provide local oases for birds and mammals.

How many pits do we have in Minnesota? Nobody knowns for certain. The Minnesota Department of Transportation has records on over 5,400 gravel pits tested for road construction materials. In addition, there is probably an equal number of unrecorded gravel pits that were excavated at one time by landowners or local governments and then abandoned. This suggests a figure of 10,000 gravel pits in the state ranging from a few acres to over 80 acres of which 50 percent may be abandoned or inactive.



Map shows gravel deposits in Minnesota. Far left: Deer in willow marsh in former gravel pit, Red River Valley.

Although scattered throughout the state, many pits are located in farming areas where wildlife habitat needs are critical.

The distribution of gravel pits in Minnesota is directly associated with periods of continental glaciation that occurred during the Great Ice Age. Nearly all glacial landforms in Minnesota were deposited by individual ice lobes that advanced and retreated during the Wisconsin Ice Stage. In its last phase, the Wisconsin may have been active as recently as 15,000 to 12,000 years ago.

The advance and retreat of these glaciers resulted in the discharge of enormous amounts of meltwater which sorted glacial till — clay, sand, gravel, boulders — into stratified deposits. These meltwater streams discharging from the ice concentrated gravel deposits around the outer margins of moraines — hills of glacial debris — and on low ground miles beyond the glacier. Some streams merged and deposited enormous loads of sand and gravel into broad "outwash plains." This explains why extensive outwash gravel deposits are found in some parts of the state — as in central Minnesota — but not in other parts.

Besides creating gravel deposits, water is probably the most important factor in creating wildlife habitat in an abandoned pit. Pits are classified into wet pits and dry pits depending on the availability of water.

Wet and Dry Pits. Wet gravel pits are usually associated with glacial outwash plains having stratified gravel below the ground water table.

Often the unweathered material under water is of better quality than gravel on the surface. It is frequently mined to upgrade the dry material.

To mine a wet pit in an outwash plain, the water is temporarily lowered by digging wells around the pit, then pumping out ground water that seeps into them from the pit. The deposit may also be mined wet by using a floating dredge or a dragline.

After the gravel is removed, ground water fills the excavation and a permanent pond or lake is formed. This creates a water-oriented gravel pit. It offers a more diversified wildlife habitat than does a dry pit.

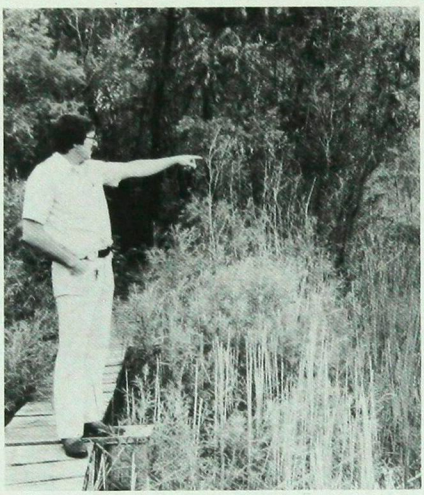
Gravel Pits

In addition to under water pits, Minnesota has many water-oriented pits in beach ridge and off-shore bar deposits of sand and gravel on the former shoreline of Glacial Lake Agassiz. Although this enormous lake has long since disappeared, long beach ridges and off-shore bars formed by its powerful currents and clearly marking the former stages of the lake still remain. Gravel pits opened in shoreline deposits are typically long and narrow. Many are filled with water because of under water mining or high water tables.

The type of wildlife habitat resulting from wet mining depends on the depth of the excavation below the water table and the angle of the slope around the pit. A mix of shallow water and deep water, with islands surrounded by water, creates a diverse environment for waterfowl, shorebirds, and other aquatic plants and animals. Outwash pits usually have beneficial minerals and salts deposited by prehistoric water tables that attract many species of wildlife. Another benefit: Low-angle slopes around a pit allow those using it a broad view of approaching predators.

Moraine deposits are represented by kames, isolated cone-shaped hills of sand and gravel and crevasse fillings that form irregular hills. Pits excavated in these deposits have an irregular bottom and are surrounded by long, steep slopes.

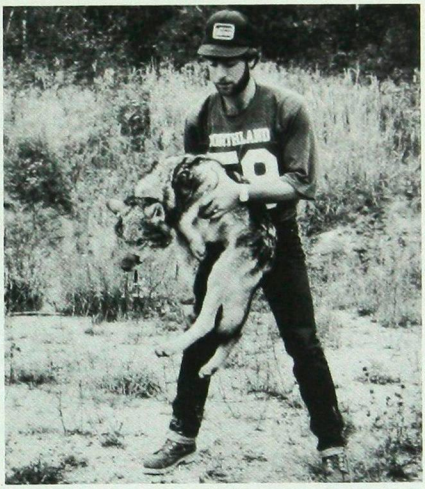
The wildlife potential of a dry-pit habitat is more limited because of the lack of permanent water holes. The varied topography also restricts the view of oncoming danger. Wildlife using the pit are possibly more vulnerable to predators. The irregular, steep, gravelly slopes on the pit bottom and sidewalls are used year around by many species of animals for sunning, dusting, nesting, burrowing, and as a refuge in storms.



Dr. Dan Svedarsky on footbridge in one-time gravel pit, now a willow marsh.

Gravel-pit Habitat. A symposium on "The Wildlife Values of Gravel Pits" sponsored by the Minnesota Chapter of The Wildlife Society convened in June 1982 at the University of Minnesota, Northwest Experiment Station, Crookston, Minn.

Professor B. E. Youngquist, superintendent, and Dr. Dan Svedarsky, assistant professor of natural resources, UM-Crookston, hosted and



Wolf captured in gravel pit near Togo in Itasca County, tranquilized, and let go.

coordinated the symposium. Representatives of 14 states, Canada, and England attended.

In his keynote address, "Gravel Pits as Wildlife Habitats in Britain," Dr. Chris Tydeman, staff ecologist, World Wildlife Fund, stated that public interest in old gravel pits in England goes through four phases: ignorance, awareness, conflict, and cooperation. Surprisingly, experts found that two rare species of birds, the great crested grebe and little ringed plover, were some of the first to use the sites. They began nesting on the raw gravel of mined-out pits during the ignorance and awareness stages before any organized attempt at reclamation had begun. In Tydeman's opinion, the wide diversity of habitat created by the raw gravel surfaces immediately following abandonment of a gravel pit was the most beneficial phase for rare species.

The conflict and cooperation phases occurred later when groups with interests other than wildlife have to be accommodated. Unfortunately, land is so valuable in England that most depleted gravel pits cannot be preserved for wildlife; instead they are converted to public parks, housing, or ponds for fish farming.

Closer to home, John Mathisen, wildlife biologist, Chippewa National Forest, in his paper on "Wildlife Values and Management of Gravel Pits in Forest Ecosystems," made some interesting comments about the value of gravel pit openings in heavily forested areas. One would think that gravel pits in forested areas would have less attraction for wildlife; however, this is not true.

Mathisen reported that wildlife biologists find the irregular bare slopes and openings created by gravel pit excavations attractive to many species of wildlife. The excavations are also favorite gathering sites for timber wolves.

In fact, William Berg, DNR wildlife biologist, claims wolves are so curious about old gravel pits that wildlife biologists use them as sites for live-trapping specimens for radio telemetry research. Loose, granular soil for digging and the presence of natural salts in the deposit may be some reasons why gravel pits appeal to wolves and other mammals.

Mathisen concluded that, in a forest environment, a portion of the pit should be maintained in its raw, unvegetated state to attract the largest variety of species.

Dr. Dan Svedarsky spoke about Minnesota's Red River Valley Natural History Area, a pioneer wildlife habitat project situated in a former gravel pit complex located on land owned by the University of Minnesota-Crookston. This 85-acre tract is now managed for wildlife and environmental education. Thirty species of mammals and 154 species of birds have used the reclaimed gravel pit habitat since observations began in 1970. Svedarsky established that, in depleted pits, an orderly cycle of ecosystems accompanied by transitions in wildlife gradually develops over a period of many years.

The symposium also heard members of the gravel industry and wildlife managers and researchers from 14 other states, Canada, and England talk about successful wildlife management projects in reclaimed gravel pits.

Landowner's Consent. In Minnesota, wildlife managers have not as yet determined if a gravel-pits-for-wildlife program should be initiated at this time. The purpose of the UM-Crookston symposium was to create interest, gather experiences of other states and countries on such projects, and assemble a bibliography of studies so a course of action can be determined.

One problem confronting a gravel-pits-for-wildlife program is related to land ownership. The majority of gravel pit excavations in Minnesota that would be most beneficial to wildlife are located on private lands. Gaining the landowner's cooperation is the key factor in creating a successful program. This seems to be an ideal opportunity for local organizations and volunteer groups to work with these landowners.

It should be emphasized, however, that improvements can be overdone. Many abandoned gravel pits provide good wildlife habitat in their natural state. If undertaken, improvements should be kept at a minimum so as not to destroy the man-made diversity of ecosystems present in many abandoned pits. □

Morris Eng, DNR Minerals Division, is Hydro-geology Unit Supervisor who specializes in studies of the state's gravel resource.

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New State Record for Wild Turkey

ON APRIL 23 LAST YEAR, John Anderson, Eitsen, Minn., bagged a wild turkey weighing 28½ pounds near Winnebago Creek in the southeastern part of the state. The previous record for a wild turkey in Minnesota was 27¾ pounds. — *DNR Section of Wildlife*

Our Search for Minnesota's Unwritten Story

A new organization is dedicated to discovering, preserving, and studying archaeological sites and artifacts in our state that go back thousands of years before the birth of Christ • Douglas A. Birk

In 1978, a young man came to my office with some old things he had dug up on his uncle's farm as a boy. The things were in a shoe box. The box, now dusty and battered, had long been a source of irritation to his mother. "I don't know how many times I've had to rescue this stuff from the trash can," he offered. "Mom has tried to throw it out every cleaning day since 1966!"

I admired his tenacity. As an archaeologist, I knew the value of archaeological materials was not always apparent. Sites and artifacts do not automatically yield their secrets; even trained scholars have trouble explaining things that lack context.

Artifacts, as products of human industry, are best understood in the setting in which they were made, used, exchanged, or discarded. The kinds and arrangements of things found on sites — including plant and animal remains — offer clues about the cultural and natural systems of the past. Careful study has allowed archaeologists to define a rich and continuous cultural history in Minnesota that began several thousand years before the birth of Christ.

As the young man opened the

Found in northern Minnesota, brass "Jesuit" finger rings were among inexpensive goods offered by French traders before 1765. Rings are evidence of early trade routes in historical accounts.

shoe box, I had few expectations about what might be inside. Seldom did a week go by that someone did not visit the office with something to identify. Archaeologists tend to specialize. My interest was the archaeology of Minnesota's pre-settlement history. My position with the Minnesota Historical Society had taken me to such places as Frontenac, Grand Portage, and the Lake of the Woods to investigate a variety of early sites. Nothing, however, prepared me for the excitement that followed.

At the bottom of the box was a quantity of burned animal bone and some handmade iron nails like others found on historic sites occupied before the 1860s. There was also a gunflint that could easily have been made before 1800. But what caught my eye were the ceramics. They were much older than the kinds typically found on British or American sites.

A quick assessment revealed several pieces of a broken faience bowl and some heavy shards of a salt-glazed stoneware. The faience (earthenware) had a distinctive hand-painted, blue-on-white exterior that copied a popular 18th-century Chinese design. Such materials in the western Great Lakes were most commonly associated with French-related sites.

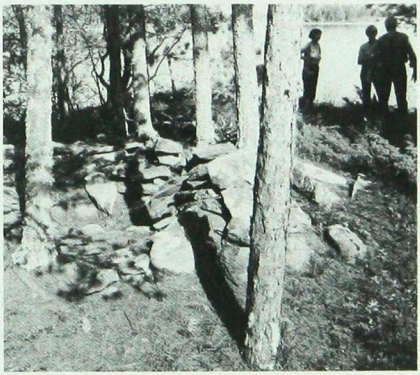
Though less familiar, the stoneware shards were part of a narrow-necked pitcher reminiscent of an early-1700's Rhenish style. Such a vessel in Minnesota was a clear signal of French presence and probably belonged to a trader of considerable economic and social status.

There could be little doubt that, as a boy, my visitor had dug into one of the earliest European habitation sites yet found west of Lake Superior! The site's location suggested it might be that of Fort Duquesne, a little-known outpost built by the French trader-diplomat Joseph Marin in the early 1750s.

History Underfoot. The historic period in Minnesota began in the mid-1600s with the appearance of French traders and the keeping of written records. But few of the first traders were educated and many who could write traded illegally and thought it best to remain silent. Countless papers were later lost, scattered, or discarded. Some that survived are now considered biased or unreliable.

The unevenness of these records reveal that much of what happened in the past cannot be documented from written sources alone. Fort Duquesne, for example, is known only from brief entries in Marin's journal and letters. All that can be said with certainty is that the fort was built somewhere in central Minnesota in 1752 and abandoned in 1753–54. Beyond that the available records are mute.

Very few early (pre-1820) historic archaeological sites have been studied in Minnesota, so the level of use-



Top: Prehistoric Indians built over 10,-000 burial mounds in Minnesota between 200 B.C. and 1700 A.D. Most were razed before 1960. Bottom: Who built this piled-rock "Thunderbird Nest" in the Border Lakes area? Site awaits study to reveal identity of builder.

ful information from these deposits remains low. Until the shoe-box episode of 1978, only two French-period fort sites had been relocated and only one was identified by name. Unfortunately, both these sites suffered irreversible damage before World War I, *before* their archaeological potential could be realized.

The minor supportive role played by material studies is also linked to attitudes and abilities. Prior to the 1960s, historical archaeology in Minnesota was considered a recreational pursuit, an opportunity to create jobs, or a means of supplementing facts taken from written records. Archaeologists tended to lavish attention on architectural features and used artifacts as guides to furnish restorations. Sites were valued as places, not *sources*, of history.

Today's approach is different. The material record now enjoys status as a primary and independent source of information about the past. Like other researchers, historical archaeologists have learned to ask questions and then attempted to find answers in their data. They dig not only to relocate buildings, but to discover how people lived, thought, and adapted to circumstances and change in their past. New discoveries — both historic and prehistoric — are expanding our knowledge and reshaping our notions of our heritage and ourselves.

Ups and Downs. Since 1900, most archaeological research in Minnesota has been sponsored by institutions like The Science Museum of Minnesota, the University of Minnesota, or the MHS. In the 1960s and early 1970s, a strong economy and new cultural-environmental legislation

Newsletter Available to Friends of the IMA

The Institute for Minnesota Archaeology, Inc., is a non-profit organization devoted to the study and preservation of Minnesota's archaeological record.

To support its efforts, the IMA is presently seeking donations from the public and private sectors. Prospective donors may wish to contribute to on-going research projects, The Endowment for Minnesota Archaeology, or the IMA's Radiocarbon Dating Fund.

Friends of the IMA will receive a subscription to the *Minnesota Archaeological Newsletter* and special notices of IMA news.

If you wish to contribute to the IMA's work or would like more information about the new organization, please write: The Institute for Minnesota Archaeology, Box 11116, Minneapolis, MN 55411.

All contributions made to the IMA are tax deductible.

spurred the rapid growth of archaeological programs and staffs. Archaeologists made sweeping assessments of their data base and dozens of surveys were conducted in every area of the state to look for new sites.

The results were alarming. Urban sprawl, lakeshore development, cultivation, and erosion had claimed sites at a tremendous and unanticipated rate.

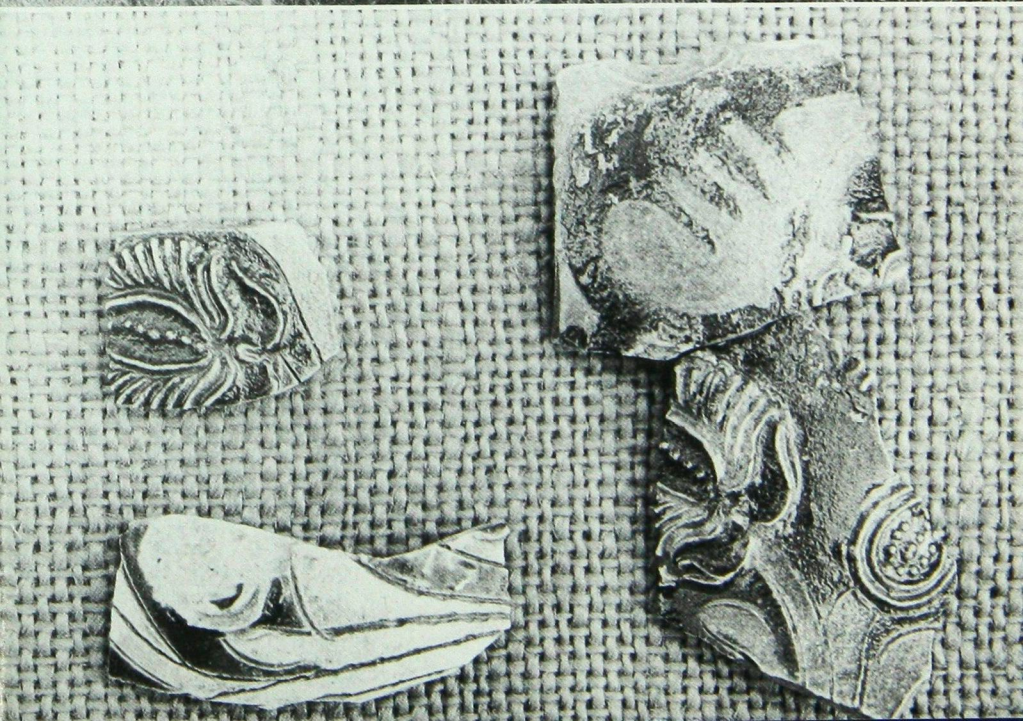
Other sites, many on public land, had fallen victim to pot hunters. Of 500 prehistoric mounds once recorded on the shores of Lake Minnetonka, fewer than six percent survived. In rural areas like Sherburne County, as many as half the recorded prehistoric sites had been razed. The destruction extended to historic fur posts, missions, logging camps, abandoned towns, mills, military forts, Indian agencies, and an array of other important and irreplaceable deposits.

More bad news was on the way. The souring economy of the late 1970s meant cutbacks in the 1980s. As public funds dried up, the University's budget was slashed, museums postponed or canceled programs, and the MHS eliminated its Archaeology Department just three months before the staff was to move into facilities they had helped design in the new $3 million Fort Snelling History Center.

New Directions. Archaeologists are used to "digging in" and, with sites and careers on the line, there seemed little time to lose. Beginning with informal talks in January a small number of professionals began to explore new directions for the future.

The priorites were clear. There was a pressing need for an organization that could meet the challenge of designing and implementing new *statewide* programs in archaeological research and education.

Top: In 1982, IMA archaeologists tested the "shoe box" site, the only French winter post yet found in North America. Excavation will begin this year. Bottom: Mid-18th century stoneware shards, possibly French, found at the site.



Land development is rapidly erasing the material record of the past. Unaltered archaeological sites are becoming rare in resort, farming, and urban areas of Minnesota. Archaeologists scramble to salvage what survives in buried or remnant deposits. This prehistoric Oneota bowl from southern Minnesota gives clues to the society in which the builder lived. Style of decoration suggests the period in which it was built.

As winter slipped into spring, the casual talks became formal and the formal meetings more frequent. Finally, in July, the papers of incorporation were signed and a new organization emerged with a structure, a purpose, a slate of officers, and a name: The Institute for Minnesota Archaeology, Inc.

The IMA is a non-profit, research-oriented corporation with offices in the Twin Cities. The Board of Directors conducts the IMA's business with counsel from a Professional Advisory Committee. Field, archival, and laboratory studies are done by Research Associates and interns.

Though less than a year old, the IMA has:

- Started a Radiocarbon Dating Fund to assist Minnesota archaeologists in dating cultural materials
- Provided paid internships for undergraduates in anthropology
- Sponsored courses in laboratory procedures for amateurs from the Minnesota Archaeological Society
- Nominated Fort St. Charles (Minnesota's only *identified* French fort site) to the National Register of Historic Places
- Begun plans for a major archaeological conference in the spring of 1983.

The IMA Board has also established an Endowment for Minnesota Archaeology that will serve as a permanent source of funding for archaeological research. The Endowment will help support the kinds of long-term field programs needed to recover and interpret archaeological information on a statewide basis.

Some of the IMA's most impressive work is being done by Research Associate Clark Dobbs. Dobbs is studying sites and site distributions near Red Wing and Winnebago to

learn more about the prehistory and history of southern Minnesota. His innovative approach includes the use of computers to detect and measure variations in prehistoric ceramic vessels through time.

One of Dobbs' major interests is learning how the introduction and development of farming influenced population dynamics and diets of prehistoric Oneota peoples. Dobbs has asked the citizens of Winnebago for help in establishing experimental garden plots that might reveal how terrain, soil, and moisture conditions affected early Indian corn crops. His studies may eventually allow him to assign ecological and political boundaries and tribal affiliations to several prehistoric archaeological complexes. Such advances would be major milestones in Minnesota archaeology.

A second emphasis of IMA research has been to locate, study, and preserve early historic sites in Minnesota. During the 1982 field season, I searched for a "lost" French fort site on Prairie Island, investigated the remains of an American fur trading post near Sandy Lake, and tested the "shoe-box" site, the suspected remains of Joseph Marin's Fort Duquesne.

After lengthy negotiations with the landowner in 1982, the IMA decided the shoe-box site should be purchased and placed in the control of the local county historical society for future use as a cultural and natural preserve.

With the assistance of IMA cofounders Ted Lofstrom and Tom Trow, I am now preparing to organize and direct a major five-year excavation that will uncover these remains and reveal their significance as a repository of unwritten historical information.

The young man who brought the shoe box to my office — and now even his mother — can hardly wait for the work to begin. Those precious artifacts now reside in *her* safe-deposit box. □

Douglas A. Birk was an archaeologist with the Minnesota Historical Society from 1970–1981. He is currently Chair of The Institute for Minnesota Archaeology and Vice President of the state's professional forum, the Council for Minnesota Archaeology.

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Minnesota's Vanishing Surface Waters

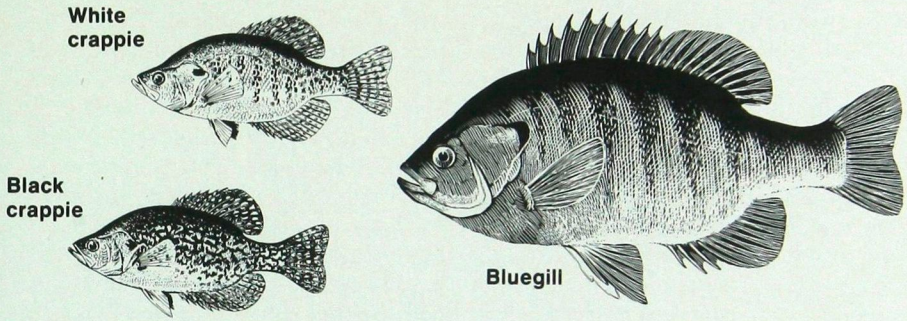
NO ACCURATE FIGURES are available on Minnesota's lakes and wetlands at the time pioneers arrived, reports the DNR Division of Waters. However, best estimates place the extent of surface waters at 12 to 15 million acres.

Currently, the state's lakes and wetlands comprise slightly over 2¼ million acres, a decrease of eight of every 10 acres of surface water since the mid-1800s.

The Birds of Minnesota's Spring

Above: Singing meadowlark by Jim Brandenburg, Edina. Opposite page: Herring gull by Lynn Rogers, Ely. Center pages: Scarlet tanager (top left), killdeer (top right), green heron (bottom right), and American bittern (centerspread) by Henry Kartarik, White Bear Lake.

We call them "our birds" — those birds that occur in Minnesota — but ornithologists are beginning to question this assumption. More than half the birds that breed in North America head south each year. Of 209 species that breed and raise young in Minnesota, 27 are permanent residents and 182 go south in winter. □ These migrants stay with us eight-to-20 weeks before heading to where the food is abundant. Counting the month or two they spend commuting, migrant birds are gone longer than they're with us. □ Henry Kartarik, White Bear Lake, took the photos of the migrants on our center pages. The American bittern spends five months with us, then winters in the southern U.S., Mexico, and Central America. Same for the killdeer. The scarlet tanager visits us three-to-four months, then it's off to South America. The northern green heron, four-to-five months in Minnesota, then on to the Gulf Coast and South America. □ The herring gull on the page opposite, however, fits no migratory pattern. It nests here in summer, but in winter, some gulls leave, others stay, especially along the North Shore. □ Lynn Rogers, Ely, found this stately specimen on the Kawashiwi River in April just as the last ice went out. "Four days later, on April 25, loons were back," he recalls. □ Migrants or winter residents 'our birds' may be, but how fortunate we are that the North Star State plays host each year to such a splendid variety of avian lodgers. □



Make Mine Panfish!

Walleyes and northerns may get the publicity, but more panfish are caught in Minnesota than fish in any other group. A dedicated panfish angler, the author pays tribute to our state's thriving panfish fishery • Jack Skrypek

REMEMBER THAT FIRST fish you caught on your first fishing trip? I bet it wasn't a walleye. My first fish was a small bluegill caught on a dropline and worm-baited hook while sitting in a rowboat with my father.

I suspect most anglers started their love affair with fishing by catching a bluegill or some other species of panfish. They seem especially designed for youngsters who want to go fishing. On second thought, they seem especially designed for all fishermen. Easy to catch, they possess excellent eating qualities, and are present in most waters. Even though Minnesota is known as the walleye state, panfish are actually more important in terms of harvest on a statewide basis than walleyes.

I'm not sure of the origin of the word "panfish." The dictionary defines a panfish as "any fish small enough to be fried whole in a pan." I don't like this definition. I've seen many panfish fill a frying pan better than small walleyes caught in hard-fished waters. I do acknowledge, however, that panfish tend to be small in size and are generally thought of as lesser fishes. In Minnesota when we speak of panfish, we are usually talking about sunfish and crappies, and I also include yellow perch.

The dictionary states that panfish

Found in 65 percent of Minnesota's fishing lakes, the bluegill is probably the state's most popular panfish. These plump specimens were photographed in an exhibition tank by *Volunteer* photographer Tim Smalley.

are primarily table fare. There is good reason for this. The fine eating qualities of panfish, especially bluegill and yellow perch, are one reason for their popularity. Catching fish to eat is either an "important" or "most important" part of a fishing trip to 85 percent of Minnesota anglers based on an angler attitude survey the Department of Natural Resources Fisheries Section conducted several years ago. As an avid panfish angler, I can attest to their sporting qualities, too, especially when fishing for trophy sizes with light tackle.

Most Popular. The bluegill is perhaps the most popular panfish in Minnesota. It gets its name from the blue color on the lower parts of its gill covers and chin. It tends to be greenish in color on the back and upper sides and yellow on the lower sides and belly. The dorsal fin has a dark spot near the back margin. Variations in color depend on sex, age, and other factors. Look for an all-black ear flap as a positive identifying characteristic.

It occurs in about 65 percent of our fishing lakes, especially the fertile, warm ones in the southern half of the state. It feeds primarily on insects, but also eats other small aquatic animals and even a certain amount of plant material. Large, older bluegills will often eat small fish, snails, and crayfish.

They spawn in late spring and summer in shallow, quiet water where the bottom is firm. They often prefer sites in and around bulrush beds. The male builds a dish-shaped nest and, after enticing a female to deposit eggs, fertilizes and guards them till hatching. There are usually groupings of nests in favored sites.

The male is very vulnerable to being caught during the nest-guarding period; he will strike at anything coming near his territory. Many wading anglers have had their hip boots butted or nipped by a pugnacious male.

The pumpkinseed enjoys much the same popularity as the bluegill in Minnesota. Lakes that have bluegills usually have pumpkinseeds, too. It is slightly less common, however, and occurs in about 60 percent of our fishing lakes. The pumpkinseed is one of our prettiest fish and rivals the brook trout for sheer beauty. It is usually grayish green on top, yellow on the belly, mottled green on the sides with vertical bars and scattered orange spots. The pumpkinseed can be distinguished from the bluegill by the orange spot on the tip of the ear flap.

Spawning habits, life history, and food habits are very similar to the bluegill. In summer, much of the pumpkinseed's food consists of snails. The fish tends to be smaller than a bluegill, but often will interbreed with it. The offspring look like bluegills, but the ear flap will have an orange spot. They will also cross with green sunfish. These offspring have characteristics intermediate

between parents.

The green sunfish is less important to anglers than the bluegill and pumpkinseed. It seldom exceeds five or six inches and occurs in only about 12 percent of our fishing lakes. Tolerance to low oxygen levels often allows it to become abundant in shallow, weedy lakes where winterkill occurs. Its main characteristics are a large, almost bass-like mouth, white-edged fins, and a bluish-green color. In my opinion, the green sunfish does not rank as high as the bluegill and pumpkinseed in eating qualities. The ones I've tried tended to be musty in flavor.

The green sunfish is notorious for crossing with the pumpkinseed and bluegill. Females will deposit eggs in more than one nest even though the male on the nest may be another species. The hybrids that result will attain a larger size than a pure-strain green sunfish and may be more tolerant of low oxygen levels than bluegills and pumpkinseeds.

Like the green sunfish, the rock bass is less important to anglers than the bluegill, crappie, or pumpkinseed. It can be recognized by its red eye and dark side markings. It has the interesting ability to change its pigmentation rapidly to blend with its surroundings.

The rock bass is common in many lakes in northern Minnesota and is often associated with walleyes. It occurs in about 37 percent of our lakes. Feeding and spawning habits are similar to other members of the sunfish family. It probably eats more small fish than do bluegills and pumpkinseeds. It also tends to get fairly abundant in warm water streams.

Two kinds of crappies are present in Minnesota. The black crappie occurs in about 65 percent of our fishing lakes and the white crappie in seven percent. The white crappie is apparently at the northern extremity of its natural range which probably accounts for its reduced occurrence.

Anglers sometimes have difficulty distinguishing the white crappie from the black. In general, the white is more slender than the black, paler in color, and has dark vertical bars on its side rather than mottled spots. Also the dorsal fin in the white crappie has a shorter base, front to back, than the black.

But spawning and food habits of the black and white crappie are similar. Both spawn earlier in the season than do bluegills and usually in slightly deeper water. Males do most of the work; they clear a dish-shaped nest and guard the eggs until hatching. They eat small aquatic animals and have a greater preference for small fishes than do other members of the sunfish family. At times, they also feed on small planktonic crustaceans like water fleas.

Perch Family. The most commonly-occurring fish species in our lakes is the northern pike. It occurs in 84 percent of our fishing lakes. The

How to Catch the Big Ones

A common complaint of panfishermen is: Panfish run too small in size. This isn't a law of nature, however. Knowing how to fish for the big ones — a half-pound and up — increases your chances of landing them.

First and foremost, it's essential to select the right lake. Certain lakes don't produce large panfish. Excess competition for food may result in stunting and slow growth, or fish run small because heavy fishing pressure has removed old, large fish leaving only small ones.

Large panfish seem to be produced under conditions where there is an ample food supply and some control over population numbers. Large sunfish and crappies are often caught in lakes that have limited natural reproduction. Therefore, the size of year-classes tends to be small — or there are occasional missing year-classes. This allows individual fish to attain a larger size. Check the results of fishing contests. Certain lakes consistently produce trophy fish.

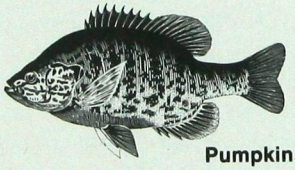
After selecting the right lake, it's important to fish for big fish rather than small. Certain things you can do will improve your chances for large fish.

During spawning periods for members of the sunfish family, slowly cruise the shallows and look for nesting concentrations. Often you can spot a fish you want.

Look in areas sheltered from wave action, like protected coves and bulrush beds. When you sight panfish, back off a little. Cause the least disturbance possible.

Use light tackle, about four-pound test line. If you use natural bait, give the fish a mouthful. Small fish will usually not bite on a worm, leech, or minnow that is too large for their mouths.

More panfish are caught on worms, minnows, and leeches than on artificial lures, but don't overlook them. In recent years, I've caught most of my larger panfish on a 1/32-ounce jig with a soft rubber body and tail. A variety of flies and small spinners is excellent.



Pumpkinseed

In midsummer, look for larger fish in deep water near the edges of weed beds, and be sure to fish early or late in the day. Look for places where you can see the tops of scattered aquatic plants that have large leaves. I like the last two hours of daylight for bluegills and pumpkinseeds and an additional hour or two for crappies.

Whatever you do, though, don't go out at mid-day, anchor in shallow water, thread a worm on a hook attached to a heavy snap-and-steel leader and 20-pound test line and expect to catch nice fish! Remember, you're after the big ones now.

— Jack Skrypek

next most commonly-occurring fish is the yellow perch. It occurs in 83 percent of our fishing lakes.

The yellow is a member of the family which includes the famous walleye. It is becoming more important in the catch on some Minnesota lakes and provides an essential forage base for walleye and northern pike populations. Identification is easy; there is no other species to which it bears a close resemblance. Perch can be distinguished from small walleyes by the absence of sharp, pointed canine teeth.

Yellow perch tend to be more predatory than sunfish and crappies, but they also will eat aquatic insects, snails, crayfish, and leeches. They usually travel in schools composed of members of the same size and age. They spawn usually in May and lay their eggs in gelatinous, ribbon-like masses that are often draped over water weeds or sunken debris. They tend to be most abundant, and reach sizes desirable to anglers, in larger lakes, such as Leech, Mille Lacs, and Winnibigoshish. Sometimes they become abundant and reach large sizes in winterkill-type lakes. They tolerate low oxygen levels much better than do walleyes.

State Harvest. How important are panfish in the total catch of fish in Minnesota?

We have data that shows they are the most important species in some areas. For example, the bluegill is first in numbers and pounds of fish caught in the seven-county Metro Area.

We don't have exact figures on the total catch of fish in Minnesota, but based on the type of lakes present in our state and a large number of creel surveys (angler-catch surveys), we estimate that about 60 million fish of all species weighing about 30 million pounds are caught each year.

In total weight, the northern pike probably ranks first in anglers' catch. In terms of numbers of fish caught, however, sunfish are most likely first in numbers and second in total weight. If we add in the catch of our other important panfish species like crappies and perch, it is clear how important they are in our total state fishery. On the average, we can expect a lake having suitable habitat to produce about 50 to 60 panfish per acre per year for anglers to catch.

Among fisherfolk, the trend seems to be towards greater interest in panfish — important because it takes fishing pressure off walleyes. For example, on Lake Winnibigoshish in the summer of 1939, an estimated 3,085 perch weighing 2,613 pounds were caught. By 1957, the harvest had climbed to 35,437 fish weighing 21,139 pounds. In 1975–77, the summer perch catch averaged 159,138 fish weighing 69,305 pounds.

But in 1977, the spring ice-fishing catch of perch on Winnibigoshish exceeded the summer catch: 228,324 fish weighing 99,775 pounds. During 1975–77, the average summer

catch of yellow perch on Lake Winnibigoshish almost equaled the walleye in numbers and exceeded the northern pike by four times.

Eating Panfish. The walleye is often heralded as our best eating fish. I certainly like to eat walleyes, but in my opinion, they are rather bland-tasting. My personal favorite is either the bluegill or perch.

Many people dislike eating panfish because of their bones. You can get around this by filleting them. I fillet all my panfish, even the quarter pounders. Use the same technique as for walleyes. It's a little extra work, but it improves the eating.

During cleaning, people often notice that panfish flesh sometimes contains tiny black spots or small yellow-colored cysts. These are harmless fish parasites. They are killed in the cooking process and will not infect humans even if ingested raw. The black spots are immature flatworms that, in the adult stage, live in the intestinal tract of the belted kingfisher. The yellow cysts are the larval form of flatworms that live in the mouth of the great blue heron and other fish-eating birds.

Minnesota's Panfish Family

Species	Percent of fish lakes having species	State record weight	Usual age at half-pound weight	Adult food habits
Sunfish Family				
Bluegill	65	2 lb., 13 oz.	5–8 yrs.	Mostly insects, some plants
Pumpkinseed	61	none recorded	6–8 yrs.	Insects, snails, plants
Green sunfish	12	14 oz.	—	Mostly insects
Rock bass	37	1 lb., 15 oz.	5–6 yrs.	Fish, insects
Black crappie	65	5 lb., 0 oz.	4–5 yrs.	Fish, insects, water fleas
White crappie	7	none recorded	4–5 yrs.	Fish, insects, water fleas
Perch Family				
Yellow perch	83	3 lb., 4 oz.	5–6 yrs.	Insects, fish, water fleas

Spawning habits. The sunfish family nests May through July. The male cares for the nest. Yellow perch lay eggs in bands on weeds during April and May.

Management. Our Minnesota panfish species tend to take care of themselves. It's rarely necessary to stock them except when they're being introduced to new waters or when they have been eliminated by winterkill or chemical eradication. Achieving large numbers of panfish through natural reproduction is the rule rather than the exception. Achieving large sizes desired by anglers is often not the rule with members of the sunfish family.

A number of techniques have been tried to provide larger-sized panfish in Minnesota and in other states. These include population thinning through use of a selective toxicant, mechanical removal by netting, liberalized angling regulations, development of fast-growing hybrid fish, supplemental feeding, stocking fish of one sex only, fertilization to expand the food chain base, predator stocking, and aquatic vegetation control to increase predator harvest of panfish. All probably work in the right waters, but none has been applied on a broad scale.

Many more answers are needed, but it appears a main key to larger panfish may be the elimination of year-classes — all fish hatched during one spawning season. In lakes with consistently large panfish, there are often missing year-classes. In lakes with small panfish, however, there seems to be stable production of year-classes year after year.

It is also important to note that, if we are to have panfish at all, we must preserve habitat. Our most important panfish, the bluegill, is especially sensitive to low oxygen levels and a variety of pollutants. We need clean lakes with reasonably clear water, adequate aquatic vegetation beds, and suitable spawning areas.

We're lucky. In many of our lakes, nature is still providing us with panfish. Also, through the efforts of the DNR Section of Fisheries, nice-sized fish are available in chemically reclaimed lakes and in some winterkill lakes.

Next time you get the urge to go walleye fishing, consider panfish. They'll rarely let you down. □

Jack Skrypek is Manager, DNR Ecological Services.

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The Countryside Reveals the Return of Spring

"AT LENGTH the sun's rays have attained the right angle, and warm winds blow up mist and rain and melt the snow banks, and the sun dispersing the mist smiles on a checkered landscape of russet and white smoking with incense, through which the traveler picks his way from islet to islet, cheered by the music of a thousand tinkling rills and rivulets whose veins are filled with the blood of winter which they are bearing off."

— *Henry David Thoreau*

Creating a Pond Fishery

It's possible, but not easy, to establish steady fishing in a pond. Many landowners try, some are successful, all learn about habitat required to support fish. Tips on establishing your own pond fishery

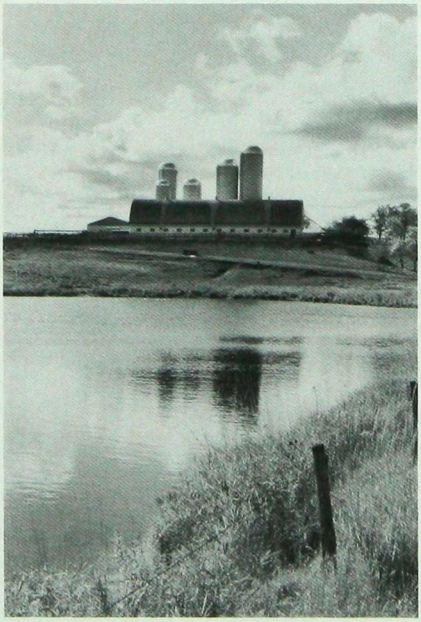
James Schneider

TAKE ANOTHER look at that pond on the 'back-forty.' Quiet, lovely to watch in the changing seasons of the year, and just likely — along with tens of thousands of other ponds like it in Minnesota — to sustain a small, but productive fishery.

Most ponds in Minnesota are located on private land and go unnoticed in the state's abundance of 12,000 lakes 10 acres and larger and 25,000 miles of rivers and streams. Many states, however, are very aware of small ponds. In some, they provide the only water recreation in miles of cropland. In Iowa, for example, over 40,000 farm ponds are vigorously managed for public and private fishing. A healthy industry exists in these states to provide consulting service and fish for stocking.

In Minnesota over the past 40 years, the U.S. Soil Conservation Service has provided expertise and shared the cost of constructing over 20,000 farm ponds. Many hold fish, but few are being managed for fish production. There are also thousands of natural ponds on private land with only casual fisheries management.

With travel becoming more expensive and fishing pressure growing on fish lakes, many landowners



are wondering if that pond on the back-forty might be turned into a quiet fishing spot. It's possible, but a lot of work — and luck — is involved in making a pond produce more than a bucket-full of fish every year.

A pond is similar to a sheep pasture. The pasture will raise just so many pounds of mutton and wool per year. Fertilizing, irrigating, and resting the land, and luck with weather will all increase the yield, but there is always an upper limit to production. So it is with water and fish.

Questions. What, then, can pond owners do to provide a reasonable fishery? To answer that question, we must ask other questions: How big is the pond? What kind of water supply does it have? How deep is it? Is it a new or an old pond? Does it have fish in it?

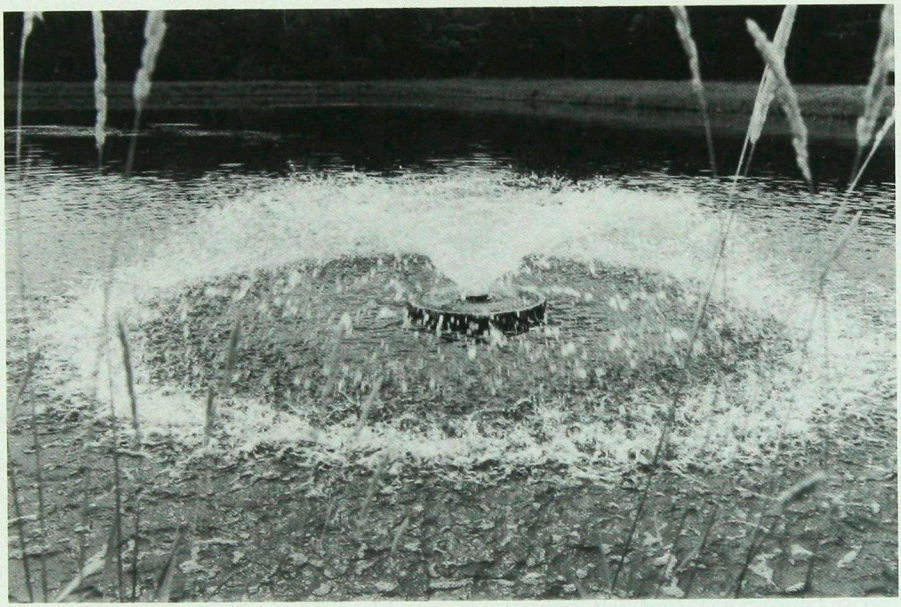
Let's begin with the pond's dimensions and work from there.

In northern latitudes where several inches of ice covered with snow seal a pond for weeks or months, pond depth is very important. Some shallow ponds literally freeze solid; no fish can live through that experience. Others may not freeze solid, but will seal tight with ice and snow. Oxygen in these ponds will not last or renew itself; pond dwellers quickly perish. Deeper water will hold oxygen longer. The SCS fish-pond construction guidelines for Minnesota, arrived at through consultation with fisheries biologists, call for a depth of at least 14 feet over at least 25 percent of the pond.

Depth is only part of the requirements for a pond fishery. Water quality also affects oxygen in a pond ecosystem. If water is over-rich with fertilizer or animal waste, oxygen can become depleted even during summer months. Successful farm-pond owners avoid this problem by keeping runoff draining into their pond as free from additional nutrients as possible. Even runoff containing lawn fertilizer has been known to ruin the water of a fish pond for years.

Established ponds with long-standing fish populations usually must deal with a problem or two. Most common is unwanted fish species, like bullheads, carp, and stunted panfish. The solution here is to drain the pond and let it stand over winter in a dry or near-dry condition. However, the pond outlet must be blocked to keep unwanted fish out once the spring runoff begins to leave the pond.

Where draining is impractical, rehabilitation is necessary. All fish must be killed and the pond restocked with carefully selected species. For this purpose, Department of Natural Resources Fisheries managers use a naturally-occurring toxin called rotenone which is derived from a tropical plant. Before using this substance, however, pond owners should consult a DNR Fisheries manager. A permit from the DNR is required to use rotenone.



Commercial aerators like the Otterbine Aerator, above, mix oxygen into water, come in ¼ to 5 h.p. models depending on pond size. Collar supports motor.

Fish Stocking. New or rehabilitated ponds must then be stocked with fish. The state does not provide fish for private waters, but private fish hatcheries sell and deliver small fish for stocking private waters.

Pond owners sometimes share small fish with other pond owners. Remember, though, that harvesting, transporting, and stocking fish between private waters requires a permit from a DNR Fisheries manager. If you do obtain fish from another pond, watch out for undesirable fish. Only pure-strain bluegills should be stocked when sunfish are desired. But, please, no bullheads or carp!

A new technique for aerating ponds in winter has greatly expanded the potential for raising fish in ponds. Aeration devices range in cost from a hundred to a few thousand dollars. But homemade systems using a step-like baffle and pump system also work. The volume of water to be treated, plus its nutrient load, usually dictates the cost.

For information on pond management, request a free pamphlet, "A Management Guide for Northern Prairie Farm Ponds." Write: Department of Natural Resources, Section of Fisheries, Box 12, Centennial Bldg., St. Paul, MN 55155.

What will a pond produce? Not an easy question to answer.

Assuming a healthy pond managed for bluegills and largemouth bass with no supplemental feeding, the figure for Minnesota is 40 to 60 pounds per acre per year of bluegills and maybe 10 or 15 pounds of bass. However, by applying a variety of management techniques, this figure can be raised. Among others, these techniques include hybrid sunfish stocking, supplemental feeding, aerating, and fertilizing a pond. It's possible, then, to double or even triple a pond's natural yield.

Good ponds managed intelligently can be a lot of fun and will produce plenty of good dinners for the family. But for this result careful planning is necessary. Incidentally, children find managing a pond — and fishing in it — an especially appealing adventure. □

James Schneider is DNR Region 5 Fisheries Supervisor, Rochester.

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Each Year, Millions of Seedlings for Planting

LAST YEAR, Minnesota's two state forest-tree nurseries — General Andrews in Pine County and Badoura in Hubbard County — supplied more than 21.4 million trees for planting in forests and woodlots, and on farms for windbreaks, shelterbelts, erosion control, soil and water conservation, food and cover for wildlife, and for Christmas trees.

This year, about 28 million seedlings will be available — up from 12.9 million in 1980 — mostly to provide additional trees for the Boundary Waters Canoe Area and private forests. DNR Forestry officials estimate that, over the next five years, General Andrews and Badoura will be producing 35 to 38 million seedlings each year for planting.

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With Mountains, Minnesota Had Its Day

"MINNESOTA IS SITUATED near the low-relief center of the North American continent, about equidistant from North America's two big mountain belts, the Rockies and the Appalachians. One might think it unfortunate that Minnesota has no mountains. But Minnesota had its day. Twice — 2,700 million years ago and again about 1,800 million years ago — sizable mountains were part of the Minnesota and Lake Superior scene. Spectacular volcanism was commonplace at those times and 1,100 million years ago as well. But 2,700 million years is a tremendously long expanse of time for erosion to have been at work. The 225-million-year-old Appalachians and the 60-million-year-old Rockies are still around only because they are so young."

— *Richard W. Ojakangas and Charles L. Matsch*, Minnesota's Geology

Memorable Images from Nature

Nature prints capture and preserve the subtle beauty of many objects, leaves, shells, even fish

Kathy Lundgren

EAGER TO SHOW off your favorite fish, but taxidermy is too expensive? Looking for a unique way to express your creative talents? Or perhaps you need just the right picture for your living room or den. Then you are a candidate for learning the ancient art of nature printing.

How nature printing began is obscured by time. However, examples of nature prints abound in history. Colonial botanists illustrated books with plant prints; Benjamin Franklin featured leaf prints on early U.S. paper money. In Japan, *gyotaku*, the art of fish printing, developed from the method fishermen used to count their daily catch.

There are several methods of nature printing, but American artists usually use the direct method.

Direct-method nature prints are produced by applying ink or paint to a plant, leaf, shell, fish, or other natural object, covering it with paper, rubbing the paper, and lifting off a print of the object.

Here are materials you need to make your own nature prints:

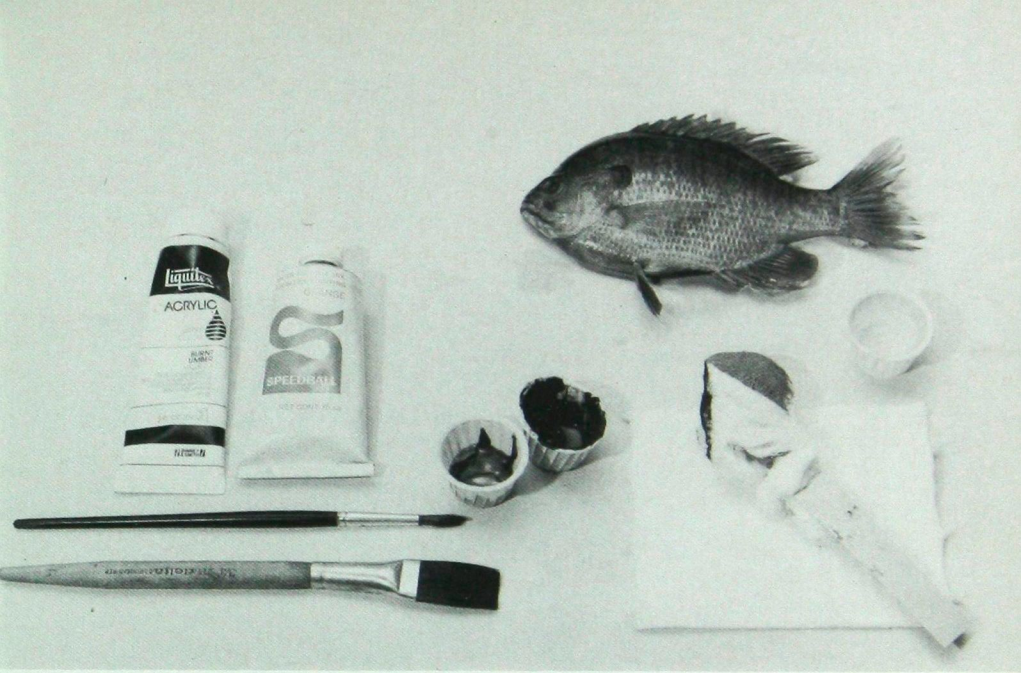
Paper. For practice — and for beginners — inexpensive paper works best: paper towels, newsprint, or bond paper. As your technique improves, move on to better quality, and more expensive paper, like block-print paper and rice paper.

Ink. Use a water-soluble medium as is or slightly thinned. Tempera paint, acrylic paint, or block-printing ink are all possibilities.

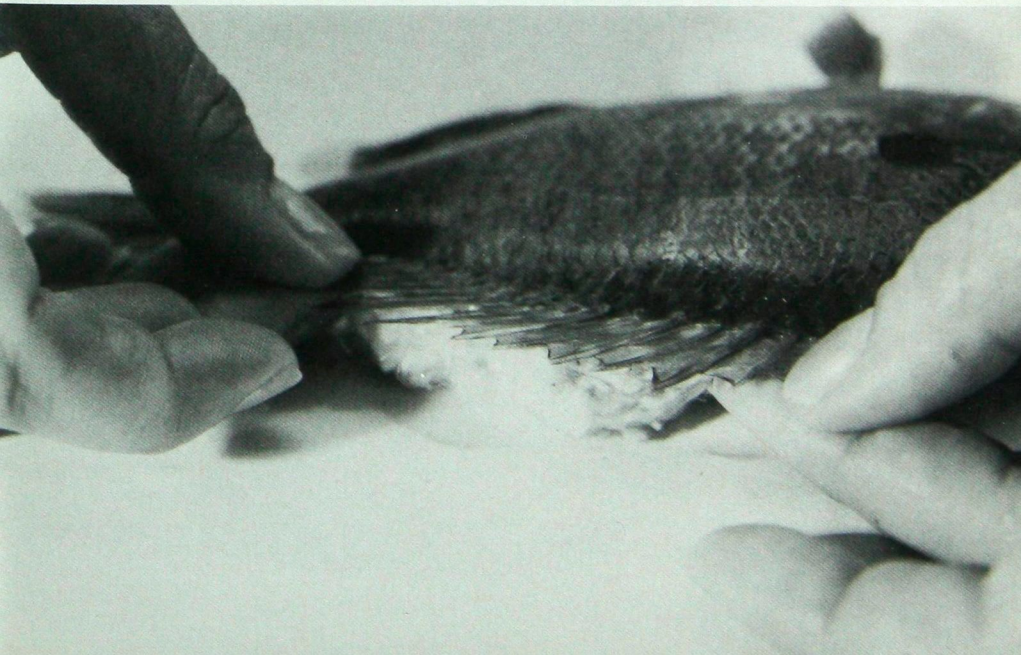
Miscellaneous. Get plenty of newspaper to cover your worktable. Use small paint brushes with good points and gauze daubers. Pins to fan fishtails and fins are optional. Incidentally, flat fish such as sunfish work best for beginners. □

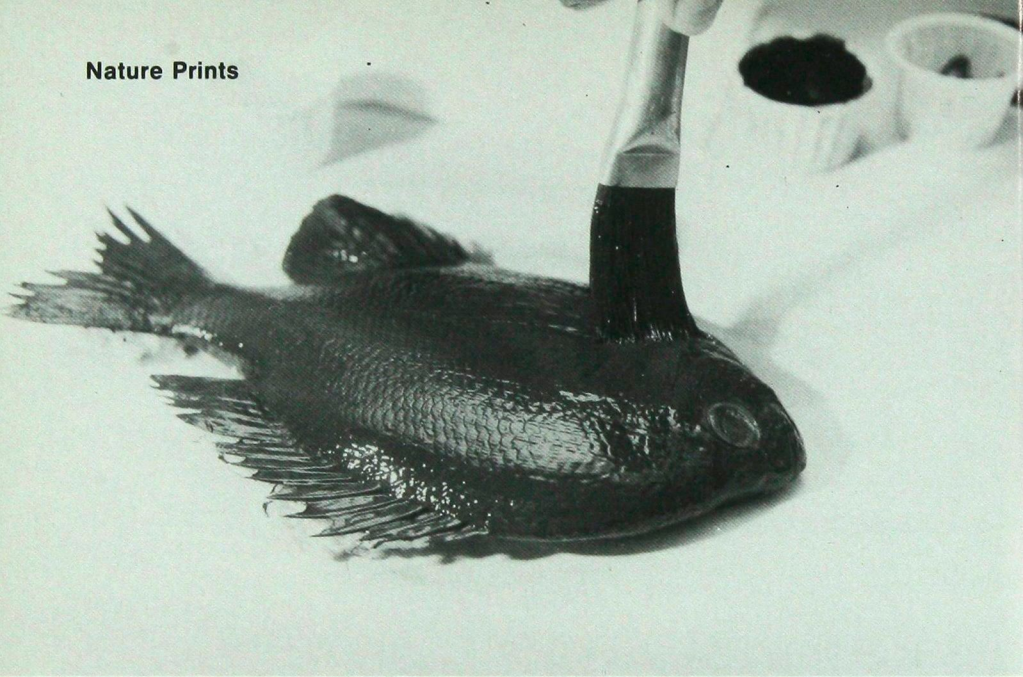
Kathy Lundgren is Curator of Education, Minnesota Zoological Garden, Apple Valley, Minn.

Above: "Blue Ling Cod Babies" by Eva B. Zbar, Vancouver, Canada. Collection of the Nature Printing Society.

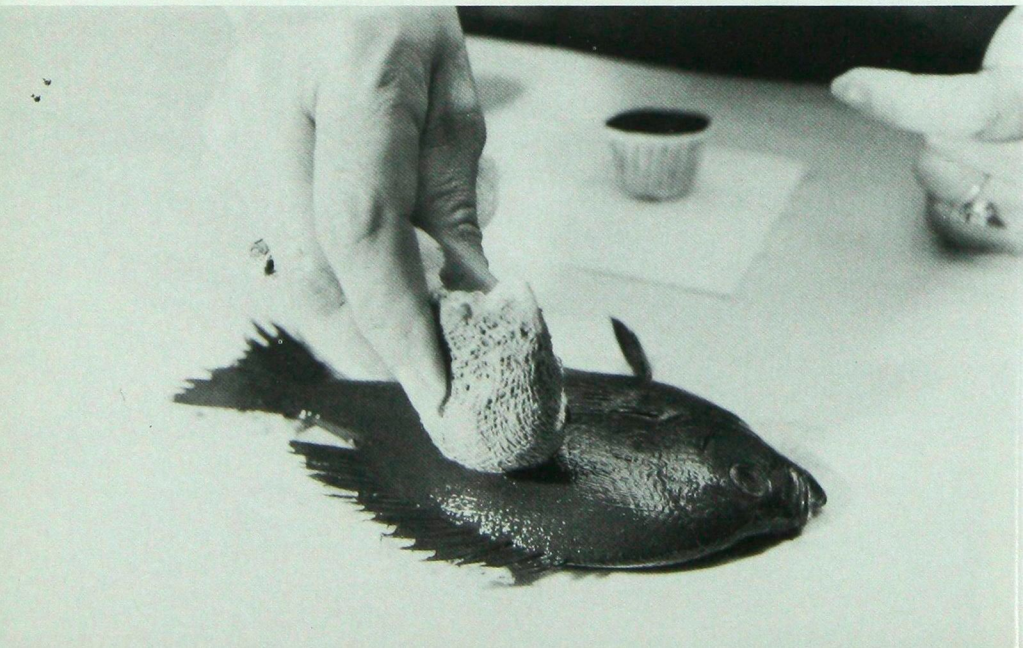


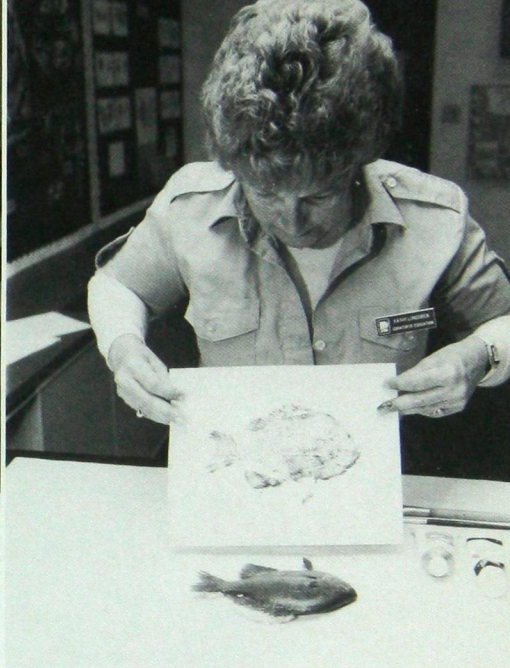
Top: Materials needed to produce nature print: acrylic paint or block-printing ink; wide and pointed brushes; cheesecloth dauber. Bottom: Author spreads fin which is supported by cloth wad to lift it off worktable.



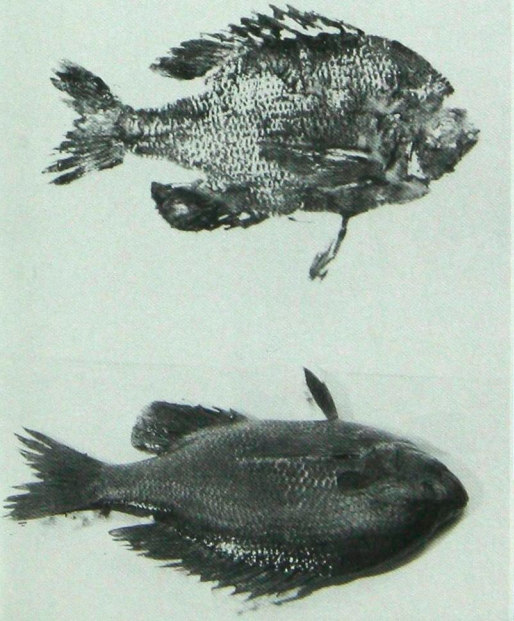


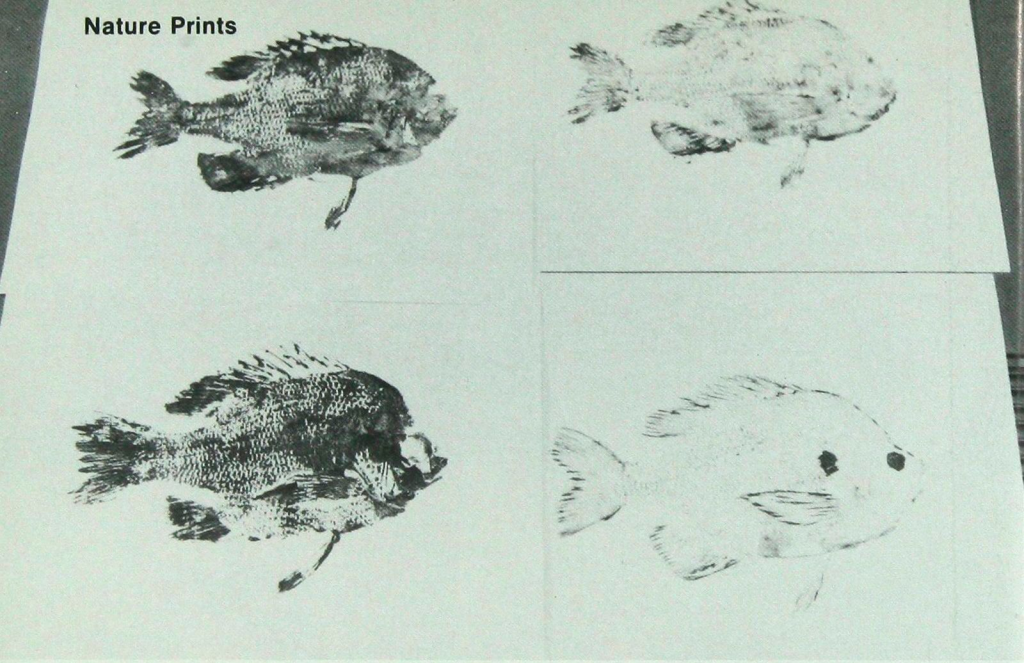
Top: Wide brush spreads ink over fish. Bottom: Cheesecloth dauber sops up excess ink (and eliminates brush marks in finished print). Washing fish in running water before applying ink helps define scales and parts.





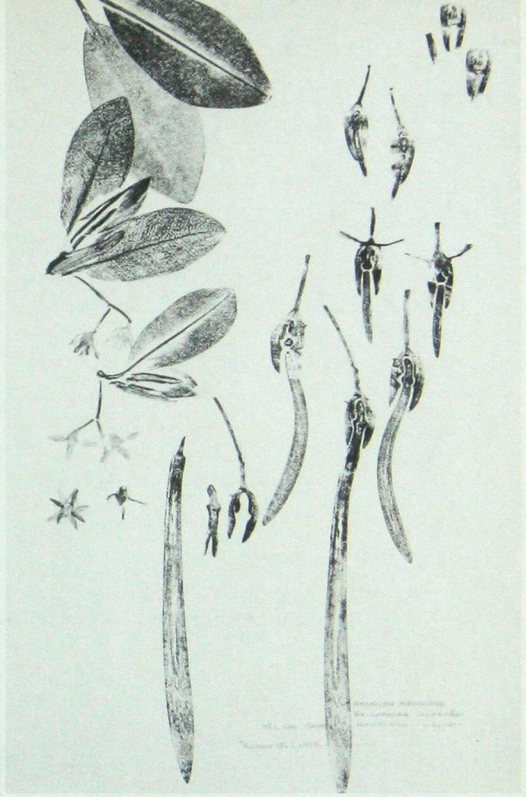
Top left: Using fingertips, author presses paper onto inked fish. Top right and bottom left: First impressions of fish. Bottom right: On another impression, author uses pointed brush to touch up details on print.





Top: Four impressions from one inking show gradual lightening of impression. First impression is at bottom left. Bottom: Author touches up last of three impressions on one sheet of paper of another Minnesota fish, a gar.

Along with fish, many objects in nature become "plates" to produce nature prints — grass, leaves, seeds, insects, even rocks. Innovations on the basic techniques shown on these pages produce striking results — inking a leaf on both sides with a brayer, for example, and pressing it between a folded sheet of paper to produce two images. Using more than one color paint or ink on different subjects on one sheet of paper is another possibility. / The print at right, "American Mangrove, Ala Wai Canal, Hawaii," was produced by Robert W. Little. Below is "Parrot Fish — Japan" by Syuko Ochiai. Both prints are from the collection of the Nature Printing Society. / Across the U.S., a growing number of people have taken up nature printing as a hobby. In recent years, the Smithsonian Institution sponsored a traveling exhibition of 73 prints by 33 nature-print artists.



Inviting the Bluebird Back to Minnesota

Editor's Note: Mid-to late March until mid-September-early October are bluebird days in Minnesota. What is the current status of the bird in our state?

"Bluebird numbers suffered a substantial decline between the 1930s and 1960s primarily because their favorite habitat — scattered clumps of trees near open fields — disappeared as agriculture expanded," reports Lee Pfannmuller, DNR Nongame Specialist.

"However, since the 1960s, bluebirds in Minnesota have been increasing, although slowly. Why? Because the bird responds so well to management efforts, to bluebird trails and nest boxes, for example.

"Central and southeastern Minnesota, but not the densely-forested north, offer the best habitat opportunities. Yards in the suburbs of small towns also attract bluebirds, especially if the yards are near open fields with stands of trees nearby."

Following are reports on two projects to attract bluebirds back to Minnesota. The first, a studied effort to create a new type of nesting structure; the second, a spontaneous — and ultimately successful — attempt to erect bluebird boxes near Brainerd.

Readers interested in establishing bluebird trails may write to the Bluebird Recovery Committee of the Minneapolis Chapter of the National Audubon Society for detailed information — see the third report in our story.

Finally, Dick Peterson, who has cared for bluebirds over 17 years, tells readers about a new bluebird house he has developed.

A New Nesting Structure for Bluebirds

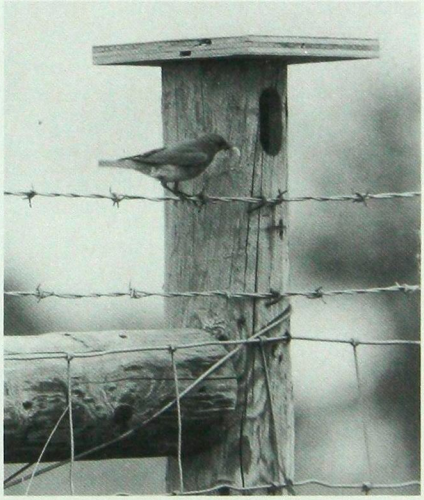
Ron Peterson

Among various plants and animals that are sensitive indicators of environmental change, few species seem to have had so many aspects of their life histories affected by man as the eastern bluebird.

The only cavity nesting thrush, bluebirds occupy the transition zone between the prairie-forest ecological community. Only where elements of this ecotone remain do bluebirds survive in significant numbers.

Bluebirds are highly specialized in their nesting and hunting habits and, thus, are very susceptible to

tampering with their surroundings. They prefer to hunt ground-dwelling insects from perches along deciduous forest edges and are dependent upon other organisms — particularly woodpeckers — to excavate cavities in which to nest. Bluebirds are not overly aggressive; they have avoided serious competition from other native birds by virtue of their relatively narrow habitat preferences.



Before entering roadside nesting structure, a bluebird waits, insect in beak.

The cumulative effects of habitat destruction, competition from foreign species, and possibly insecticides have brought bluebirds to critically low numbers in much of Minnesota. Intensive farming practices have largely eliminated wood lots and shelterbelts that were once scattered across western Minnesota. Much of the northeast, too, is now being cleared. The introduction of house sparrows and starlings from Europe has aggravated these habitat problems further by reducing the number of nest cavities.

The relatively mild-mannered bluebird is no match for these aggressive competitors; incubating female bluebirds have been killed by house sparrows and have become part of the foundation for the invader's nest. Though little is known of the impact of pesticides on bluebirds, the combined effects of fewer insects and the accumulation of toxins in the body tissue of bluebirds are undoubtedly harmful.

Nesting Structure. Eastern bluebirds are a priority species on Minnesota's list of threatened and endangered species. In 1981, the DNR Nongame Program set aside money for bluebird restoration and public education. The first bluebird restoration work is underway in a cooperative venture with the Minnesota Department of Transportation. Thus far, 92 nest structures have been placed along 16 miles of Interstate Highways 94 and 35 in Stearns and Chisago counties.

Traditional nest boxes were not used because they are easily noticed by passing motorists. Accidents could happen if motorists stopped to examine such boxes.

Instead, a new type of unobtrusive nesting structure was used to prevent accidents and minimize van-

dalism. The I-94 nest cavity trail will allow us to evaluate the ability of these structures to attract bluebirds where habitat losses have caused them to diminish. The I-35 trail was placed in some of Minnesota's best bluebird habitat; it will test the birds' affinity for the structures where the birds are more common.

The new structures were made by boring a 3⅝-inch diameter cavity nine inches into the tops of existing right-of-way fence posts. A two-inch × 1⅜-inch entrance hole was bored into the cavity, then small ventilation and drainage holes were added, and the cavity capped with ¾-inch exterior plywood.

Twelve cavities were covered with ½-inch mesh hardware cloth instead of wood. We were afraid that creosote fumes from the treated posts would affect the birds adversely if the cavities were not adequately ventilated. This turned out not to be the case, so we'll cover future nesting structures with plywood roofs.

First Counts. Early results appear favorable. As expected, the success rate has been much higher on the trail in better habitat. Of 23 cavities in Chisago County, five have been used by bluebirds. Four broods have fledged and bluebirds have renested in one cavity. One female and brood were killed by a domestic cat, but the cavity was reclaimed by another bluebird pair. In Stearns County, two successful broods have been raised.

Tree swallows appreciate the cavities — 57 active nests — but they don't seem to be causing problems yet. The tree swallow-bluebird occupancy ratio seems to correspond to their relative numbers in the surrounding countryside. But swallows seem most attracted to cavities in locations that are least suitable for bluebirds.

Starlings have been completely unsuccessful in using the cavities and house sparrows have invaded only two.

We have high hopes for the spring of 1983, both for the in-place cavities and for new trails still in the planning stage. Wildlife biologists are busily refining techniques to make construction and installation of the structures cheaper and easier. Everybody involved is hoping that, within a few years, this program will be making a significant contribution to restoring Minnesota's bluebird numbers to a healthier level.

Ron Peterson is a wildlife biologist with the Minnesota Department of Transportation, St. Paul.

Ski Group Builds Nest Boxes

Thomas Kroll

ALTHOUGH THE WINTER of 1981 was often poor for skiing in central Minnesota, the season was the start of something good for bluebirds in Todd County. Seventeen cross-country skiers from the Long Prairie

Members of Long Prairie-area ski group built 60 bluebird houses in one day. In 1982, group built 65 additional houses.

area, who try to ski together once a week, were prompted to do something about the vanishing bluebird population after reading an article about bluebirds in the January–February 1981 issue of *The Minnesota Volunteer* ("Whatever Happened to Bluebirds?").

One balmy Sunday afternoon typical of that winter — no snow, no skiing — the group began to build bluebird houses. They used rough-sawn basswood according to the *Volunteer* plan, but revised the roof by substituting old machinery belting for the metal hinges. By nightfall, they had finished 60 houses.

In 1982, the group built another 65. Members divided up the houses and each person took home and put up as many as he or she wanted to care for.

The following figures show the results of their effort:

	1981	1982
Number of houses used by bluebirds	16	25
Number of houses used by tree swallows	7	32

Many houses had two broods of bluebirds. A few wrens snuck in, too.

The group plans to build again next spring. Said one, "We really enjoy the companionship building the houses involves — and it's extra nice to see bluebirds again."

Thomas Kroll is a forester with the DNR Division of Forestry, Brainerd.

Minnesotans Aid Return of Bluebird

Dorene Scriven

The Bluebird Recovery Committee of the Minneapolis Chapter of the National Audubon Society has organized a network of people who are helping to re-establish bluebirds in Minnesota.

In 1982, the Committee received reports from 125 people in 50 counties in Minnesota who maintained 1,897 houses and recorded 539 pairs of bluebirds with 1,403 fledglings.

Among the participants: Vi and Dick Peterson, Brooklyn Center — 365 houses on 14 trails; Kurt Gunard, Roseville — 73 houses; Jon Hopper, Bloomington — 50 houses each in Isanti and Rice counties. Most members, however, maintain only a few houses, yet they have been successful in attracting

bluebirds to places where the birds have been absent for years.

It isn't necessary to own land in rural areas to establish a trail, but permission must always be obtained from landowners before placing houses. Refusal is rare and landowners, once they understand the program, have even offered to check the houses.

For information on nesting programs, establishing a bluebird trail, and a drawing of the Committee's recommended bluebird house, send $1.50 to the Bluebird Recovery Committee, Audubon Chapter of Minneapolis, P.O. Box 566, Minneapolis, MN 55440. For a full-size blueprint of a house plan, enclose an additional $1.

Each fall, a statewide directory is mailed to all participants so local "bluebirders" can be in touch with one another.

Dorene Scriven is Chairperson, Bluebird Recovery Committee, Audubon Chapter of Minneapolis.

Dick Peterson's New Bluebird House

AMONG MINNESOTA'S practicing bluebird boosters is Dick Peterson, Brooklyn Center. Dick and his wife, Violette, care for "just under 400 houses" on 15 bluebird trails, mostly in Sherburne County.

"Right from the beginning 17 years ago, I tried to come up with a better bluebird house," Peterson says. Special features of his latest house:

- The steep roof and its overhang prevent cats from reaching into the entrance hole and hooking birds or pulling out nest material
- An opening between the door and roof and holes in the side walls allow ventilation

Dick Peterson, Brooklyn Center, shows early model of new bluebird house.

- The heavy roof, door, floor, and rear wall provide "temperature control" of the summer sun and prevent heat suffocation of nesting birds
- The narrow width of the house is preferred by bluebirds
- A 3/8" hole in the floor provides for ant repellent — to discourage ants from infesting the nest box.

Plans for Dick Peterson's new bluebird house are available. Request a set from: Department of Natural Resources, Nongame Wildlife Program, Box 7, Centennial Bldg., St. Paul, MN 55155. Phone: (612) 296-3344. — *Volunteer Staff* □

Book Excerpt

Sigurd Olson's Last Book

A final statement by one of America's foremost conservation writers

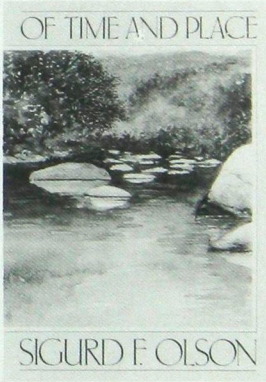
Editor's Note: In his lifetime, Sigurd Olson, Ely, Minnesota, was honored by *Audubon* magazine as "the poetic voice of the modern wilderness movement."

Canoe-country guide, biology professor, ecologist, college dean, president of both the Wilderness Society and the National Parks Association, supporter of the Quetico-Superior wilderness area, he wrote eight books (and co-authored a ninth, *The Hidden Forest*, with nature photographer Les Blacklock, Moose Lake, Minn.). Some notable titles: *The Singing Wilderness*, *Listening Point*, *The Lonely Land*, and *Reflections from the North Country*. ("Solitude," an essay from this last title, appeared in the *Volunteer*, September–October 1977 issue.)

In each book, Olson celebrated wilderness, claiming as his credo words by Henry David Thoreau he had learned as a young man: "In wilderness is the preservation of the world."

He finished his last book, *Of Time and Place*, just before his death in January 1982 while snowshoeing with his wife, Elizabeth, near their Ely home. He was 82.

Of Time and Place is a memory book. Olson called it a "collection of experiences" from his years



camping, guiding, exploring, and reflecting on what he saw and felt in his beloved wilderness. "Each experience is colored by my imagination and fantasy," he tells readers, "and grows out of an attachment to the land and a feeling for its antiquity."

Thirty-six essays, a Preface, and an Epilogue include such "experiences" as "Golden Trout," "Boulders," "Campsites," "Friends

of the Trail," "Sounds of the Night," "El Coyote," "Sand Dunes," and "The Music of Spring."

The essay on these pages, "An Ethic for the Land," is the last piece in the book — Sigurd Olson's final statement. "One is not born with a feeling for ethics and the land," he writes. However, he believed that, as we go on in years, we must develop an ethic. To not do so is to risk our survival.

A LAND ETHIC is a philosophical point of view involved with morality and character. One is not born with a feeling for ethics and the land, nor can a child comprehend its meaning though sensitive to what he sees and absorbs of the world of nature. A youth seldom has it, but as he matures into manhood he begins to grasp a vague sense of oneness and belonging. In old age he gains perspective and wisdom and can look back into the past and forward into the future.

All the places I have written about are part of the total picture of the earth and how we feel toward it. We ask ourselves if we are doing what is right. Are we good stewards? Have we done all we could to stop ugliness, devastation, and decay in the world around us? If the answer is yes, then we have embraced what is meant by a land ethic.

I question if I have done nothing that might change the character of islands where I have camped, if I have left them as pristine and unspoiled as when I arrived, and my campsite immaculately clean with kindling and firewood waiting for the next visitor. An affirmative reply gives me a warm feeling.

Lakes pose an entirely different problem from islands. It seems anything you might do to their vast waters would never be noticed. The whole idea of ethics seems relatively unimportant in such a setting. Does it really matter if you clean your fish on the smooth glaciated ledges beside the water, leaving the rotted, maggoty remains to offend others? It may seem utterly silly not to use detergent in your dishwater. But all such practices have an impact on the purity of the water. It is the cumulative habits of many which determine what happens to the environment. You may feel that whatever you do will never be noticed, for the waves will wash your sins away leaving no signs of anyone having been there. You may now have just a slight growing consciousness of guilt about your behavior, a sign perhaps of growing maturity.

 A May freshet in the BWCA characterizes the wilderness Sigurd Olson worked to save. In the 1920s, he spoke against building roads and dams in the region. Still a wilderness advocate 50 years later, he helped pass the 1978 BWCA Act.

Some of the rivers I have traveled all over the North have been drastically altered by the impact of man. Dams have been built across them, eliminating historic portages and making huge flowages look like a succession of beaver ponds with trees once green and growing now dead and ugly above the flood. The entire ecology of the area has been destroyed and the habitats of all living things changed.

In our search for energy we have often done such things to a river because almost everyone is strongly in favor of the projects due to their impact on the economy and employment. They ask why all the potential waterpower should go to waste. Who cares if a sparkling rapids is destroyed or the thunder of a plunging waterfall is stilled forever? Are not jobs more important than free and wild flowing rivers? And who remembers Indians and voyageurs except a handful of old historians and archaeologists?

I think of what has happened to the mighty Churchill River, the major route of exploration and trade in the Northwest for over three centuries. Its history alone should have been reason enough to save it. It was the ancestral hunting and fishing grounds of the Indians. However, the construction of great multiple dams across it has resulted in lakes that have flooded those grounds, forcing the Indians to change their ancient way of life.

There are areas in the Far North, the Yukon and Kuskokwim deltas of southeastern Alaska, where millions of swans, geese, and ducks thrill us with the sound of their music and fill us with strange primeval excitement when great undulating skeins of them soar over in the spring and fall. Our ancestors must have watched them too and wondered where they were going and why.

Wildlife refuges may not seem to have a relationship with rivers, but they do have much in common, for both need to be set aside to preserve their own identity. Man can do evil things to these seemingly impenetrable swampy regions; we also ditch the prairies, where wildfowl build their nests and breed, in the Midwest, in northwestern Canada, and in Alaska. All types of use have an impact but it is the effort of everyone that determines what takes place.

THOSE WHO HUNT as well as those who simply revel at the sight of flocks against a sunset, the whisper of wings, or the booming roar of an unfettered rapids are being betrayed by the developers who care little about our heritage. What they want are greater stands of grain or more generators for waterpower. While these are vital in our attempt to feed the world or expand our energy resources, what developers do not realize is that

there is no substitute for aesthetic values or an understanding of the true meaning of ethics.

Despite the battles to save this magnificent wilderness of lakes, rivers, and forests from air pollution, it is beginning to look as though this enormous effort has been in vain and the personal sacrifices of thousands over half a century or more are for naught.

Pollution comes from other sources too, from our own industrialized cities and from Europe, and really strikes home if it occurs close by though it is only part of the larger threat affecting everyone, all over the world. A land ethic means we must change our way of life if we are to combat it.

Ethical and moral questions and how we answer them may determine whether primeval scenes will continue to be a source of joy and comfort to future generations. The decisions are ours and we have to search our minds and souls for the right answers.

We must ask ourselves how we truly feel about what we have done to the planet during our brief tenure upon it. Are we really willing to do what we should, and are we mature enough to forget selfish interests? When critical areas are being threatened, will we stand up and fight for them no matter how unpopular such stands might be? Our most important goal is preservation of the land which is our home. We must be eternally vigilant and embrace the broad concept of an environmental ethic to survive. □

☆ ☆ ☆

A Single Life-support System

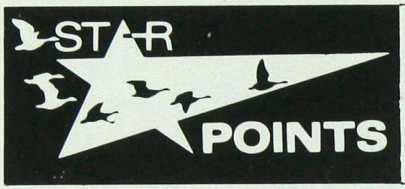
"THE ESSENTIAL LESSON most people still resist . . . is that they are all members of a single species. The species is crowded inside a single life-support system. The need to make the system livable has yet to dominate human concerns or the intellectual process."

— *Norman Cousins*, Human Options

☆ ☆ ☆

The Value of Dead Trees in a Forest

BIRDS AND MAMMALS have evolved to fit narrow and specific niches in nature, states the DNR Section of Nongame Wildlife. A hole in a dead tree, for example, means a nesting place to a redheaded woodpecker. Raccoons, nuthatches, screech owls, wrens, and other birds depend on tree cavities. For this reason, when tree stands on state lands require thinning, foresters and wildlife managers leave sufficient numbers of den trees standing. Firewood cutters should avoid cutting these trees. To do so is to risk depriving forest wildlife of homes and nest sites.



North Star State Journal . . .
Points of Interest from Near and Far

New Edition of Forestry Book Available

FOR FORESTRY students and nonprofessionals who want a better understanding of forest and wildlife management, *The Forest Management Digest* is now available. Covering all phases of tree management from planting to harvesting, the third edition has been expanded to over 400 pages and features an eight-page color centerfold showing forest cover maps for Michigan, Minnesota, and Wisconsin.

Chapter titles: "Help for the Forest Landowner," "How a Tree Grows," "Harvest," "Regeneration," "Management and Improvement," "Special Forest Products," "Wildlife," "Measurements," "Taxes," "Economics," "Fire," "Tree Problems," "Roads," "Water," "History," and "Tree Identification."

The book includes a glossary of forestry and wildlife terms, animal track identification, sample contract forms for the sale of trees, and planting and timber-stand improvement suggestions.

Cost: $15.95 plus $1.25 for shipping and handling. Order from: Forestree Farmers of Minnesota, Inc., Box 363, Park Rapids, MN 56470.

Angling Experts at Fishing Institute

THE EIGHTH annual Mankato State University Fishing Institute will be held April 16–17 on the Mankato State University campus, Mankato, Minn.

Open to everyone, the event will feature angling experts like Dave Csanda, fishing magazine editor; Dan Sura, fisherman-educator; Ken Reinicke, muskie and walleye guide in northern Wisconsin; Dick King, Mille Lacs Lake and tourney fisherman; Joe Ehrhardt, fisherman and writer; Tony Portincasco, Chicago fishing educator and author; Tony Dean, South Dakota walleye and northern pike fisherman; and Larry Bollig, tournament angler, Ham Lake.

Presentations will be on lake types, electronics, fish location, seasonal patterns, tackle, fishing techniques, equipment, taxidermy, and fish-sensory perceptions.

Enrollment deadline is April 8. Obtain registration information from Art Ollrich, Director, MSU Fishing Institute, Physical Education Dept., Mankato State Uni-

versity, Mankato, MN 56001. Phone: 507-389-6215. Fee: $20 for an adult and $25 for an adult and one youngster 10–15 years old.

Jaques: Painter of Nature and Wildlife

Francis Lee Jaques: Artist-Naturalist. Donald T. Luce and Laura Andrews. Foreword by Roger Tory Peterson. University of Minnesota Press, 2037 University Avenue S.E., Minneapolis, MN 55414. 72 pp. $25 cloth; $12.95 paper.

Francis Lee Jaques spent much of his early life in northern Minnesota and later became a painter and illustrator whose work appeared in over 30 books on wildlife and nature. He was renowned for his distinctive dioramas in natural history and science museums.

Drawing on Jaques' unpublished autobiography, Donald T. Luce and Laura Andrews follow him through his years as a lumberjack, taxidermist, and steam-locomotive fireman. In 1924, he sent sample drawings to the American Museum of Natural History, was hired, and began a long career as a painter of habitat displays.

After his retirement from the Museum in 1942, he returned to Minnesota and began to illustrate books. His special forte was meticulous scratchboard drawings in which he established grass, water, trees, and birds with a few lines or a silhouette.

Contribute to the Volunteer Fund. Feel Good *Twice*!

A *Volunteer* reader from St. Cloud sent this note with his check for the Volunteer Fund: "I set aside your appeal two years ago and felt guilty ever since. Now I feel good, kind of like meeting your yearly church contribution goal."

Several readers sent similar notes with their contributions to our current appeal for funds to offset the production costs of the *Volunteer* (*Volunteer*, November–December 1982). They missed the first appeal in 1980 and determined not to be remiss again.

Have you sent your check to the Volunteer Fund? If not, would you do so now? In the press of daily affairs, it's the kind of thing that gets set aside.

Your contribution is important. In recent months, newspapers and TV have told the story of the state's financial plight. These money problems come right down to this magazine maintaining its six-times-a-year publication schedule.

Please send your contribution today. Make your check payable to: **DNR — Minnesota Volunteer.** Mail it to: **The Minnesota Volunteer, Box 22, Centennial Bldg., St. Paul, MN 55155.**

Like the thoughtful reader from St. Cloud, you can then feel good about helping this magazine. And — something extra to feel good about — your contribution is tax deductible on your state and federal income tax returns. Be sure to watch for our report on total contributions to the Volunteer Fund in a forthcoming issue. — *Editor*

Published in association with the James Ford Bell Museum of Natural History at the University of Minnesota, the book contains 17 color and 38 black and white illustrations of Jaques' work. Donald T. Luce is Assistant Curator of Exhibits at the Bell Museum and Laura Andrews is Assistant Curator at Minnesota's University Gallery.

Luckless Beaver: Damage to Pride Only

OLIVER LIPSCY, Hill City, Minn., reported the following incident to the *Volunteer*:

A beaver successfully gnawed through an eight-inch popple, but, as the pointed bole dropped, it pinned the animal's broad tail. Lipscy, hunting ducks in a beaver flowage last fall, came upon the trapped animal. "He just sat there and looked at me."

"Okay, buddy, don't hurry on my account! Once you get your pictures taken, maybe you can help me get this tree off my tail!"

Lipscy went home and found his chainsaw and camera. Before cutting the bole and freeing the animal, however, he took the photo of the chagrined beaver that appears on this page.

"It had a small hole in its tail where the pointed tree had pinned it," he reported. "Once free, it dashed for the water, slapped its tail once, and swam away."

New Wildlife Films, Slide Show Available

TWO NEW wildlife films and a slide show are available to schools and groups.

Peregrine is a 24-minute, 16mm color film about the peregrine falcon. It features segments showing peregrines in flight and explains how the raptor became endangered and nearly extinct in the 1960s. The film also shows how conservationists are helping to restore populations of the bird. (Film #158.)

Legacy for a Loon is a 20-minute, 16mm color film about the ecology of loons. Many close-ups of the loon make this "the finest film available on Minnesota's state bird," according to Carrol Henderson, Nongame Wildlife Supervisor. The film also explains how loons are frequently threatened by people and what can be done to help them. (Film #159.)

Minnesota's Frogs and Toads is a 16-minute slide-tape show which includes close-ups of all 14 of Minnesota's frogs and toads, and their habitats and distribution within the state. Especially suitable for use in schools and nature centers, the slide program was developed with funds donated through the Nongame Wildlife Checkoff on state income tax forms. (Film #507.)

Both films and slide show are for free loan. To order, write: Film Librarian, Department of Natural Resources, Box 46, Centennial Bldg., St. Paul, MN 55155.

Minnesota Deer Classic Set

THE MINNESOTA Wildlife Heritage Foundation will sponsor the state's first annual gathering of deer hunters April 23–24, 1983, at the Minneapolis National Guard Armory.

Hundreds of trophy antlers will be judged according to the Boone & Crockett scoring method. More than a dozen awards will be made by the Heritage Foundation, a nonprofit organization which works closely with the DNR to preserve wetlands in Minnesota.

The Classic will include outdoor product displays, a taxidermy show, and free seminars by deer hunting experts.

For more information write: The Minnesota Deer Classic, Suite 308, 5701 Normandale Road, Minneapolis, MN 55424.

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Are You Moving?

Please notify us four weeks in advance of your move. Attach your latest address label below, then print your new address. If you move and we do not receive your address change, your subscription to the *Volunteer* will be cancelled. Temporary out-of-state address changes cannot be accepted. Send this form to: **Minnesota Volunteer Circulation, Dept. of Natural Resources, Box 46, Centennial Bldg., St. Paul, MN 55155-1679.**

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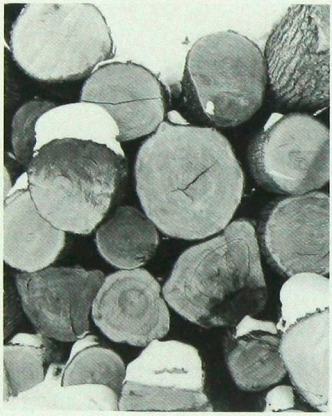

Inside Back Cover

"MASTER OF THE MUSKEG: BULL MOOSE"

John Idstrom, DNR Wildlife manager, Owatonna, sculpted the moose on the opposite page, one in a series of North American big game animals the self-taught artist is presently engaged in creating. The bronze statue stands 7½" at the shoulder, 11" from nose to tail. Top left: Detail, three-quarter rear view. Top right: Detail, profile. Bottom: Three-quarter front view. From the collection of Philip P. Economon, DNR Fish & Wildlife pathologist.

They Keep Our Forest Machine Humming

Commercial forest land in Minnesota occupies 13.7 million acres, roughly the size of Connecticut, Massachusetts, and Rhode Island combined. Keeping an eye on this vast resource is the job of the DNR Forestry Division, an occupation that takes many forms. Take the matter of replenishing trees that have been cut down. Planting trees now proceeds at three times the 1975–78 rate. In this last fiscal year alone, 13,000 acres were planted or seeded, the equivalent of 65 200-acre farms. Nursery production has doubled in the same period.

Minnesota's commercial forest is divided among four landlords — federal, state, and county governments and private landowners. To address forest management issues shared by these owners, DNR Forestry compiled the $1.4 million Minnesota Forest Resources Plan, an inventory of the state's entire stock of trees.

Among many benefits, the Plan provided our forest industry — annual impact on the state's economy of $2 billion — with factual information on which to base future production. On the basis of the Plan, companies have invested $500 million so far in plant expansion which will create 1,865 jobs. Our state-owned forests, the Plan showed, generate timber sales of $4 million annually.

Minnesota's forest industry contributes mightily to our state — jobs, salaries, taxes. Credit is due the men and women in DNR Forestry who keep this gargantuan machine humming smoothly.

Rudy Perpich, *Governor*
State of Minnesota

THE MINNESOTA VOLUNTEER
BOX 46, CENTENNIAL BLDG.
658 CEDAR STREET
ST. PAUL, MN 55155–1679

Last fall, Minneapolis nature photographer Joe Niznik saw this pink salmon heading into the mouth of the Brule River from Lake Superior. Its dark sides suggested that it was probably a female going upriver to spawn. After the female lays her eggs and the male fertilizes them, both die. In spring, their offspring, now 1½- to two-inch fingerlings, will follow the river down to the big lake to grow and mature for two years until, as 20-inch adults, their day comes to swim up the Brule and once again perpetuate their species.