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WISCONSIN NATURAL RESOURCES

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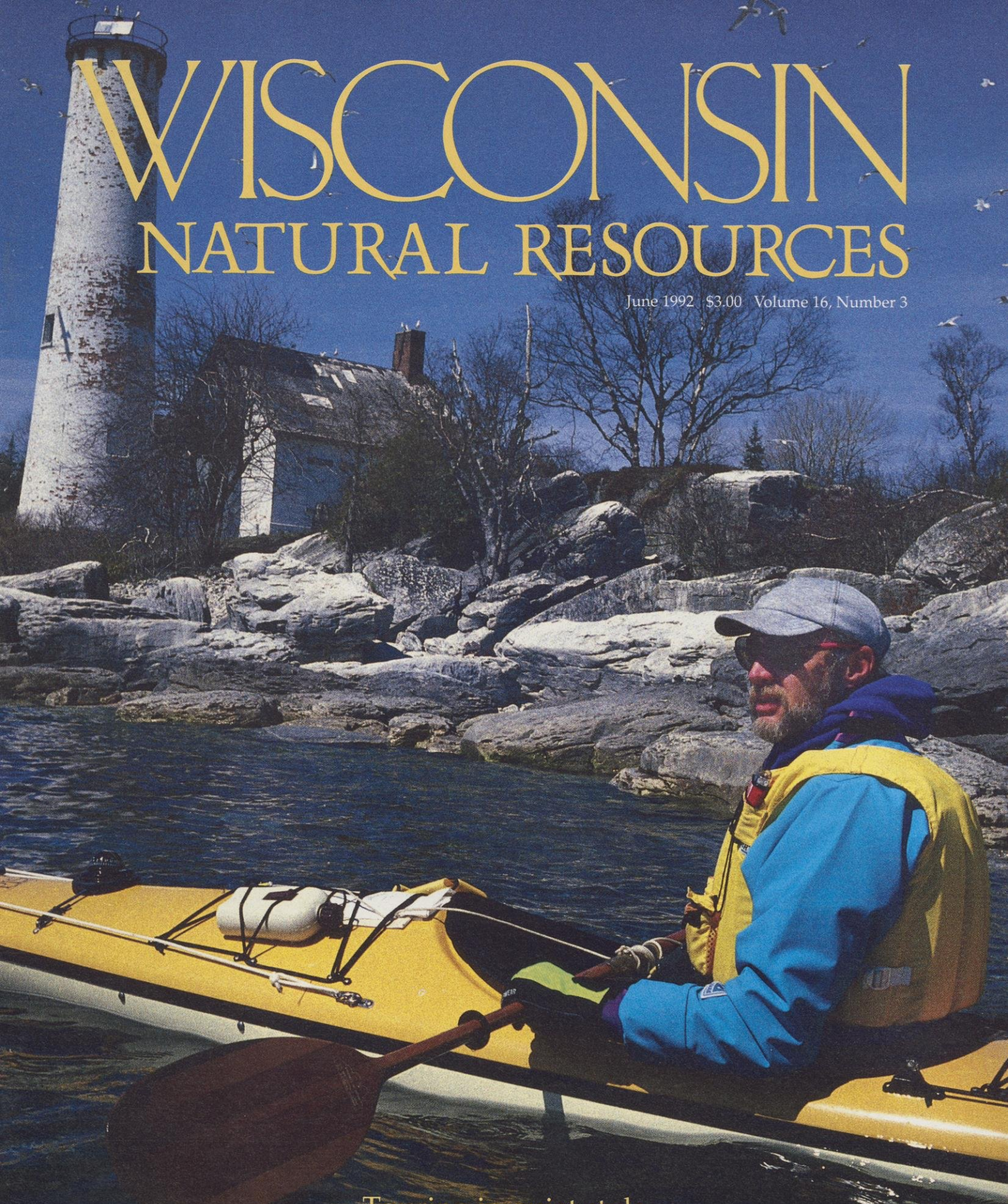

Touring in quiet style

Be dam careful • Wisconsin fishing: business or pleasure?

On the prowl

Lawrence E. Vine
Illustrations by Jim McEvoy

The bare earth was moist under his feet as he ran along his tunnel. A brief shower had stopped nearly an hour ago, and the soggy tree leaves smelled musty above him. It had been over two hours since he last munched a small beetle. He desperately searched for more food. Given his extremely fast heartbeat and respiration rate, he was quickly burning up the last of his energy reserves.

Earthworms were just beginning to make their short migration to the surface of the forest floor from deep protective winter burrows. Instinctively he headed for a rich patch of soil under a fallen log that might contain a few juicy worms. As one of the smallest predators at Horicon Marsh, this short-tailed shrew was again on the prowl.

The setting sun cast beautiful shadows through his acre of woodland territory, but he never noticed. His subterranean world was almost completely dark, even on the brightest days. He rarely came to the surface, preferring to stay hidden among the runways, leaves, rocks, roots and logs of his forest home.

He was a beautiful, powerful adult male nearly one year old. The short gray fur covering his sleek four-inch frame rippled as he scurried along. His bullet-shaped body tapered to a pointed whiskered nose at one end and a short half-inch tail at the other. His stubby legs and

Continued on page 31

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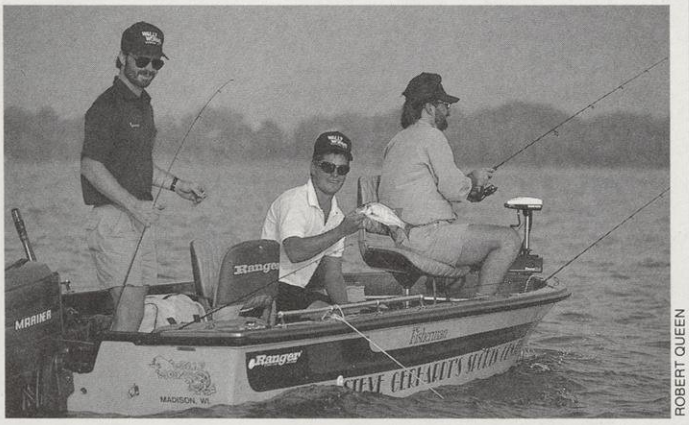
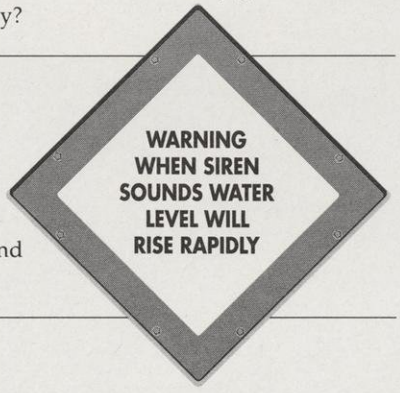


ROBERT QUEEN



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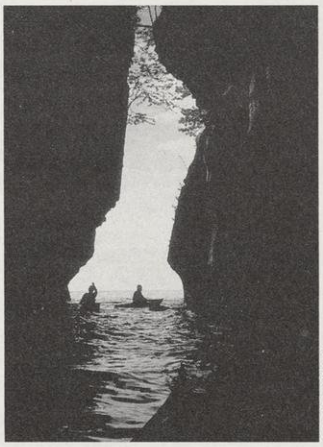


GREG SWEVAL

FRONT COVER: The Great Lakes rugged coast is becoming one of the world's most popular spots for sea kayak touring. See our story page 20.

KEN POBLOSKE, *Trek & Trail*

BACK COVER: Kjersti Lynn Beth catches her first fish. Enjoy Free Fishing Day on Sunday, June 7. Also enjoy our page 4 story exploring the competitive and contemplative nature of fishing.

JOHN BETH, Reedsburg, Wis.

WISCONSIN FISHING

BUSINESS OR PLEASURE?

Dave Crehore

Fishing contests are not new in Wisconsin. Interest in large tournaments raises questions about protecting resources as different kinds of anglers are accommodated.

DEAN TVEDT

A walleye tournament on Lake Winnebago in 1977. Some anglers thrive on competition...

Wisconsin hasn't made up its mind about competitive fishing.

There are hundreds — maybe thousands — of large and small fishing contests in Wisconsin each year, but we're still not certain where they fit in.

Competitive fishers and recreational anglers are basically just people who like to fish, and they use the same lakes and rivers. But they approach the sport from different directions and have different expectations. At this point, the two kinds of anglers aren't sure how to live together. One thing is sure: as a newcomer that is coming on strong, competitive fishing has raised

hackles and stirred up some muddy water, from Lake Michigan to the Mississippi.

What kind of conflicts are we talking about? For example, the kind that boiled over on a stuffy, humid night last July.

The place was a town hall west of Oshkosh; the occasion, a public meeting called by the Department of Natural Resources. The room was jammed to capacity with people, mostly anglers of one kind or another, who had sorted themselves into rooting sections like fans at the fights.

In one corner were local folks opposed to tournament fishing or at least uncertain about it. They wore ordinary clothes and caps with the names of tractors and brands of chewing tobacco.

In the other were tournament fishermen in hats and shirts stiff with embroidered patches bearing the logos and brand names of outboard motor manufacturers, boat builders and tackle companies.

The meeting lasted more than three hours and offered all the thrills of an old-fashioned, bare-knuckle prizefight. Except that there was no knockout — and no decision.

The local folks threw punches like these:

"Up on Poygan we're sick and tired of you tournament guys tearing all over the place with big boats and hundred-horse motors. I was afraid to take the kids fishing for fear we'd get run down or swamped. And you ran your boats right into the cane beds and wrecked habitat. Fishing is supposed to be fun — you've got no business making money off our fish and I wish you'd stay off our lake!"

The "tournament guys" didn't just lie against the ropes. They fought back with stuff like this:

"What's wrong with competition and making money? It's what our country is all about. The spirit of competition is why our boys in Vietnam would leave their foxholes to save a wounded buddy. And anyway, we release our catch and most of them survive — how many fish do you release? And where do you get off talking about *your* fish and *your* lake? It's *everybody's* lake!"

There was plenty more in that vein, but those quotes pretty well sum up the debate. Luckily, both sides punched themselves out early; toward the end of the bout, exhaustion and common sense began to set in and God and the American Way were invoked less often. At the end, there were some gestures of understanding, some agreements to disagree, but the conflicts were still there.

What in the world, you may ask, was all the fuss about?

The meeting had been called by the DNR's Oshkosh Area fish manager Ron Bruch to talk over the issues raised by two professional walleye tournaments held in the Winnebago system on back-to-back weekends a month earlier.

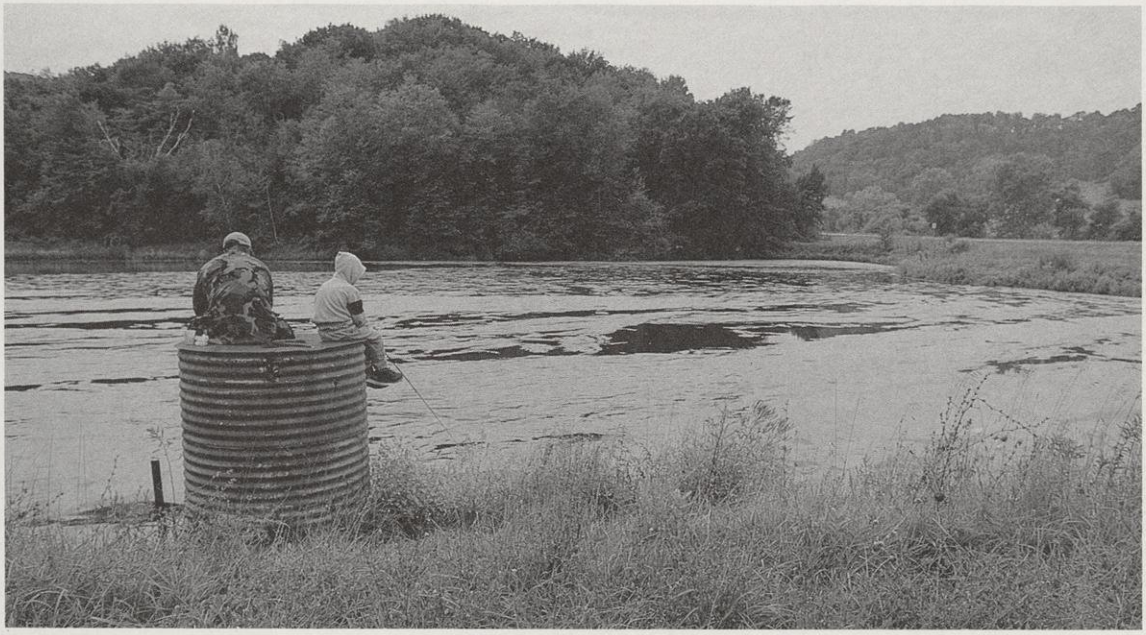
The tournaments had caused some problems, or at least concerns, depending on how you define them.

The main difficulty was dead walleye and sauger. During the two tournaments, competitors caught 1,951 walleye and sauger, but only 881, or 45 percent, survived the stresses of live wells and holding tanks.

When these figures got around, angry non-competitive anglers talked of little else. The lake had been raped, they said. Those already disposed to dislike fishing tournaments had all the ammunition they needed.

But they were missing the point, or at least part of it. The survival rate of fish caught in tournaments is usually much better than 45 percent. Most important, if recreational fishers had caught all of those fish, would 881 of them have survived? The result could well have been 1,951 dead fish in the frying pan. And it would have been called excellent fishing, not rape.

The problem was really one of perception and reputation. The fishing tournament promoters had emphasized that their contests were "catch and release." They touted the economic benefits tournaments would bring to the area with little or no harm to the fishery. As far as the anti-tournament forces were concerned, the eco-



BUREAU OF FISHERIES MANAGEMENT

... others are looking for a quiet place and some quiet time to talk and, perhaps, catch a few fish.

nomic benefits were irrelevant because they had come at the expense of the fish.

Undercurrents of other issues also surfaced at the Oshkosh meeting. It was obvious for instance, that some of the ordinary Joe Average anglers resented "the pros", their commercial sponsorships, their expensive boats, and the way they seemed to "take over" the lakes during tournaments. The meeting on that sticky night in July did not solve any of these problems. But for those who were listening and observing, it did a pretty good job of sorting out the unanswered questions about competitive fishing in the state:

- What is sport fishing supposed to be? Should it be strictly an amateur pastime, or can it also be a competition or commercial enterprise? Is it work, or play, or both?
- Is fishing becoming more competitive? If so, how will the future of the sport be affected? Can the resource accommodate both competitive and "traditional" fishing?
- Will tournament fishing harm the state's fisheries?
- Should tournament fishing in Wisconsin be regulated? If so, how much? And by whom?

Wisconsin anglers and the DNR are now trying to find answers to those questions.

What is this tournament fishing business, anyway? Who wants it, and where did it come from?

Competitive fishing isn't completely new to Wisconsin. In a small-time way it's been around for a long time in the form of club tournaments, contests sponsored by local taverns, and ice fishing derbies.

Serious competition, however, invaded the state from the South, where bass tournaments with big-money prizes became a spectator sport — and a major merchandizing and public relations medium — in the 1970s. Bass tournament "pro" fishermen became folklore heroes among anglers, and capitalized on their tournament wins by becoming successful corporate spokesmen and TV personalities.

Although their commercial tie-ins and sponsorships were always obvious, to their credit, these heroes almost single-handedly popularized the concept of catch-and-release fishing and made it part of the average angler's ethics. They also created an appetite for competitive fishing, and it wasn't long before Wisconsin tournaments began to be held for bass as well as "northern" fish like walleye and musky.

Today, a growing number of Wisconsin anglers feel that competition is the spice that makes fishing worth doing. Vying with others to win anything from a cash prize to the simple status of "winner" is the main reason they fish.

And Wisconsin isn't alone. A study of the Canadian provinces and the lower 48 states indicates that almost all have fishing tournaments of one kind or another — an estimated 31,000 contests in 1989. The prizes offered range from small trophies to a $500,000 top award in one bass tournament. In a rough estimate, the number of "angler-days" devoted to competitive fishing may total 1.5 million per year. There's no doubt that competitive fishing is already big and still growing.

But many other anglers — perhaps a majority — still prefer fishing precisely because it offers relief from the pressures and competitive stress of their workday lives. As they see it, competition spoils fishing. Still others would come down somewhere between the extremes.

Obviously, the way one chooses to fish is a matter of individual taste and personality. Competition turns some people on, and others off. There is no evidence that competition is "human nature," as those who argue in favor of competition often say; on the other hand, competition in itself isn't evil. The problems arise when anglers on both sides of the issue allow their emotions and personal taste to interfere with a logical examination of the issues.

As Iowa DNR fish manager Tom Boland put it recently in an *Iowa Conservationist* article, "...non-contest anglers...claim tournament anglers are not fishing for the 'right reasons.' They argue that money and fame are not the reasons anglers should be fishing and that the money brought into an area goes to motels, gas stations and bait dealers, not to the fishery resource. They also complain that contest fishing does nothing more than overcrowd an area which may lead to overharvest of a fishery. Who is right?"

In Wisconsin, we're not sure who is right, either. We don't as yet know enough about the economic and biological effects of tournament fishing in our state to make the judgement. Competition is here to stay; it's up to DNR managers, anglers and other other interests to decide how to manage it.

For example, existing state policy, laid down in the Natural Resources Code NR 1.01(9) states that sport fishing "...should remain a true amateur sport which combines the pleasures and skills of angling with wildlife and scenic enjoyment, contemplation, and other subtle pleasures, not competition. Recent trends toward commercialization of sport fishing through contests and tournaments will be closely monitored. Appropriate action ... will be taken to control excesses."

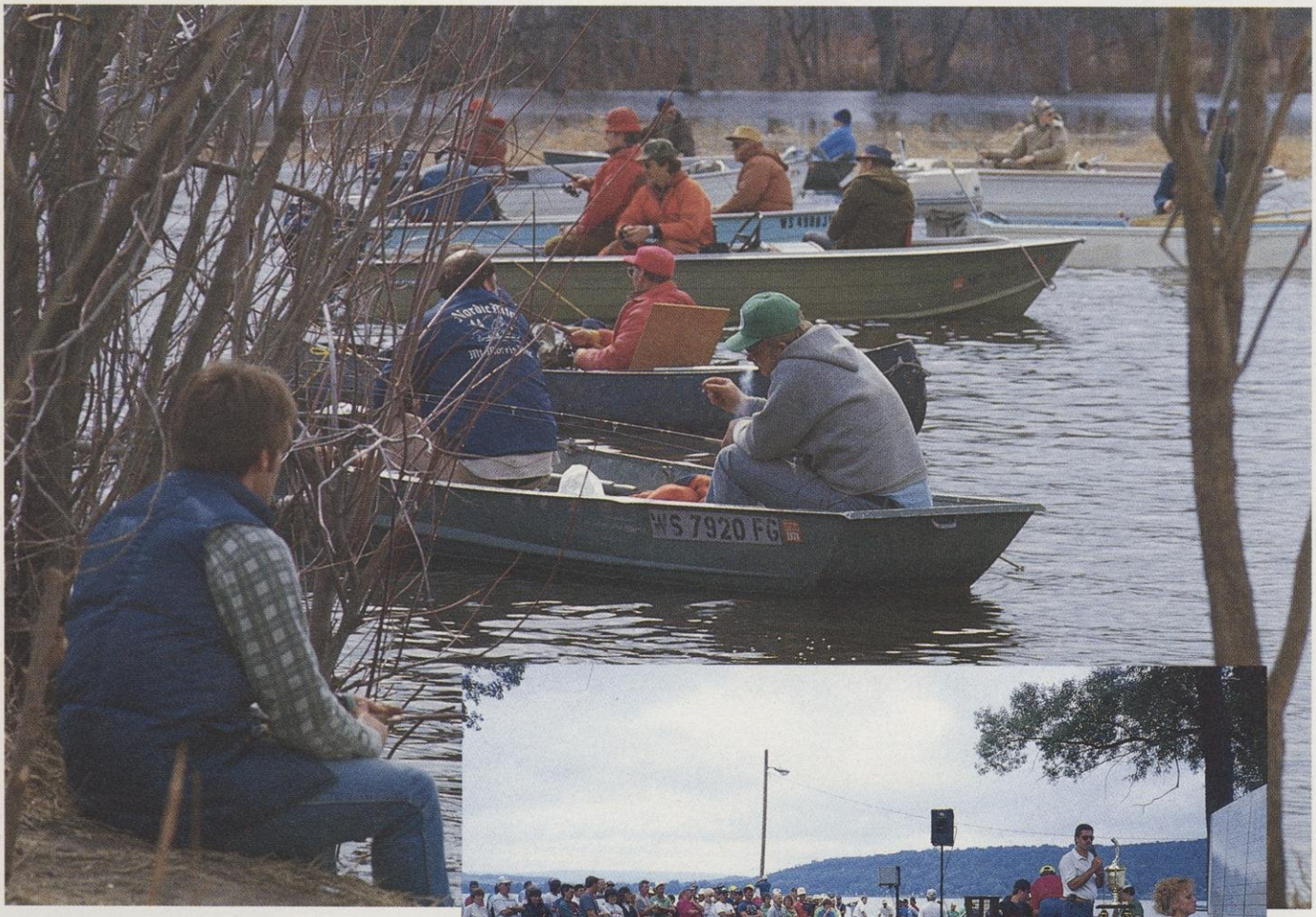
As the Oshkosh slugfest made clear, NR 1.01(9) can be fightin' words. For every angler who says, "Yeah — that's what fishing is all about!" there may be a competitive fisher who snickers at "contemplation and other subtle pleasures."

There aren't any moral "shoulds" or "oughts" here, just practical ones.

Last May, the Natural Resources Board directed DNR staff to convene a study committee comprised of fisheries staff and tournament anglers. The committee's charge was to consider a permit system for tournaments and identify other significant competitive fishing issues.

The committee met twice in the fall of 1991 at day-long sessions, where the members discussed pros and cons, brainstormed — and argued. The upshot was a report that fleshed out the issues and supported basic regulation of competitive fishing.

The Board accepted the committee's report in December 1991 and directed



DEAN TVEDT

LEE KERNEN

(*above*) Fishing the spring walleye run near the Eureka Dam on the Fox River in Winnebago County. Most anglers would rather just fish with a buddy. However, when the fishing is hot, many anglers adjust to crowded conditions.

(*right*) Watching the final tally at a bass tournament last September. For tournament anglers, crowds seem festive. They add drama and good-natured excitement as competitors anticipate the awards and prize ceremonies to come.

DNR staff to:

- Develop a permit system to gather information on fishing tournaments in the state.
- Define the biological impact of fishing tournaments.
- Require tournament sponsors to minimize adverse environmental impacts.
- Assess the workload of a tournament permit system.
- Work with chambers of commerce, fishing groups and tournament sponsors to develop a sanctioning system that would encourage as much self-regulation as possible.
- Study permit fees, the use of bait, tagged fish contests, tournaments on holidays, holding of fish in live wells and tanks, in-boat monitoring of tournament catches, the effects of multiple tournaments on individual bodies of water, and other issues.
- And report back in December 1992 with specific proposals.

Since then, the fisheries staff has continued its study of competitive fishing and has begun to draft suggested administrative rules for the Board's consideration.

The proposed administrative rules developed so far combine ideas from the tournament fishing study committee and the fisheries staff:

1. Permits issued by the local DNR fish manager would be required for fishing contests involving more than 40 individuals or 20 boats on all waters of the state and at any time of year. These permits would allow the local manager to consider individual fish populations as part of the decision to grant or deny a permit. The permits would also provide a way to keep track of the number and size of contests.

2. The permits would prescribe areas where competitive fishing can-

not take place in order to protect habitat or provide for safety. Permits would also subscribe methods for holding and releasing fish. Local areas of sensitive habitat, heavily used boating areas, navigational channels, refuges and swimming areas could be placed off-limits to reduce conflicts between water users.

3. The committee agreed that some limits should be set on the number of consecutive hours per day, and the number of consecutive days, that a tournament could last on a body of water. For discussion, the DNR staff is proposing limits of no more than six consecutive hours each day, for no more than two consecutive days, to reduce user conflicts.

4. No more than one competition would be permitted on any lake or commonly recognized reach of a stream on a single day, to further reduce conflicts.

5. The use of pre-tagged fish as "targets" for fishing contests would not be allowed, unless specifically permitted by the local fish manager.

6. Tournament sponsors would be required to report the results of the competition within 30 days.

7. Failure to comply with provisions of a tournament permit or other rules relating to competitive fishing would result in the denial of additional permits for two years.

Rules proposing these steps are slated for discussion by the Natural Resources Board at its December 1992 meeting. If the Board decides regulations on tournament fishing are warranted, public hearings on proposals will be held in 1993 before the matter is forwarded to the Legislature. No decisions on tournament fishing will precede these dates and additional suggestions are welcome.

As a companion step, the Bureau of Fisheries Management is gathering information on fishing tournaments planned in Wisconsin during 1992. All tournament sponsors, even local civic groups, are asked to complete an eight-question survey describing which waters will be fished, numbers of participants, dates and entry fees. Survey forms have been distributed to all known individuals and organizations who sponsored past tournaments. Other tournament sponsors are asked to contact Ron Poff, DNR Bureau of FisheriesManagement at (608) 266-2176 or write him asking for the Tournament Fishing Survey, DNR Fisheries Management, P.O. Box 7921, Madison, WI 53707.

In the meantime, those on both sides of the competitive fishing issue can relax a bit, knowing that a reasonable management approach, thought through by tournament anglers, professional fisheries managers and the Natural Resources Board, is under consideration.

While we're waiting, let's see if we can scare up some bass, just for the fun of it. I'll bet you a six-pack of purple plastic worms I'll get the first one. □

DEAN TVEDT

These days, tournament anglers are more concerned about sustaining the fisheries that support competition. At weigh-ins like this one at a 1977 walleye tournament, fish were kept on stringers or baskets and brought in at the end of the day. Few, if any fish, survived.

LEE KERNEN

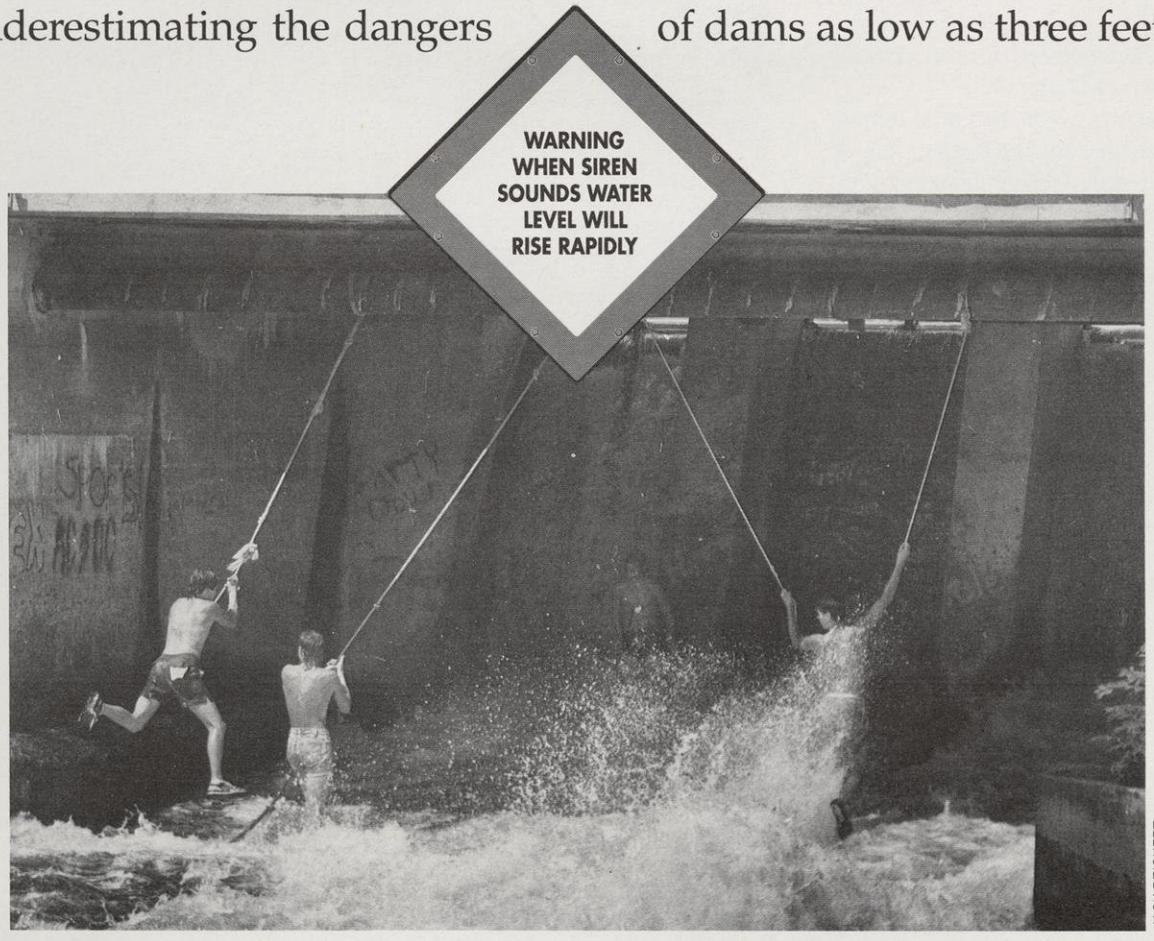
Today, fish are typically kept in aerated live wells, carefully handled in bags, quickly weighed and released. Hardy fish like bass survive this careful handling better than other fish species.

Tournaments can be set up so competitors immediately take their catch to on-water judging boats equipped to weigh, measure and release fish without delay in the same areas where they are caught — a scenario that would save more fish but do away with the drama and spectacle of weigh-in ceremonies on shore.

Dave Crehore is DNR's district information officer in Green Bay.

BE DAM CAREFUL

Each year boaters and swimmers die underestimating the dangers of dams as low as three feet.



JACK REICHERT

Meg M. Galloway

On a hot, sticky, Wisconsin summer afternoon a group of 14- to 16-year-old buddies are looking for a place to cool off. They race down to the river near the south end of town and climb around the fence past a No Trespassing sign at the millpond dam. The kids tie two old water-ski ropes to a metal crossbar on the dam and take turns "surfing" on homemade boogie boards below a partially opened gate. One 14-year-old is new to the game. His turn only lasts about 10 seconds. As he falls, he forgets to let go of the rope. The boogie board hits his head and he loses his grip. The currents pull the boy under the water and drag him downstream. He climbs out of the water about 100 feet away, bruised and a bit bloodied. He vows to stay up longer next time.

In fact, he's lucky to be standing at all. One to five people lose their lives at Wisconsin dams each year in boating, fishing and swimming accidents. Many more accidents, like the near miss above, never get reported.

Wisconsin's 3,500 dams range in size from the large hydropower dams spanning the Wisconsin River to drainage ditches and small creeks dammed to create farm ponds for watering stock. Most state rivers have at least one dam impounding water. In the days before electricity, villages and towns were built around milldams that powered gristmills and sawmills. Commerce sprang up where waters met. Most of our major cities are built at the confluences of rivers or in the safety of natural harbors.

Ponded water formed by dams was often developed for community recreation and public parks bordering the shore. These scenic spots can easily become killers, especially to an increasing number of boaters.

For instance, at the end of March in 1986, a man and two girls spent one of the first warm spring days floating down a local river in their canoe. Recent snowmelt swelled the normally slow-moving river to its banks. The three attempted to heed a warning sign above a nearby dam and head back upstream. Before they could get away, fast currents pulled the canoe over the four-foot dam spilling them into the whitewater below.

The canoe flipped. The man and one girl were swept downstream but the other girl was caught with the boat in the recirculating current immediately below the dam. The man rushed back upstream and jumped into the river above the dam. He was swept over the dam again and got caught in the back-rolling water. Tumbling around and around in the frigid water, he eventually suffered hypothermia, lost consciousness and drowned. The girl on the canoe managed to hang on until she was rescued by another boater and a rescue team.

Even people who do not intend to directly challenge rivers can fall victim to being too close to a dam.

Three men in a small boat went fishing downstream of a hydroelectric dam. The day was cool, so they wore insulated clothing to fend off the chill. The fish were biting up near the dam, so the three motored up to the powerhouse and shut off the motor to drift downstream. A horn sounded but they failed to read a nearby sign explaining what that meant. Soon one of the dam's large floodgates opened, cascading thousands of gallons of water downstream. The fishing boat was not in the immediate path, but rushing water created new currents and pulled

ROCK COUNTY SHERIFF'S DEPARTMENT

DNR BUREAU OF WATER REGULATION AND ZONING

(*above*) Dams have awesome deadly power. Here, a pontoon boat was drawn against the upstream side of a dam and pinned against the gates. The fortunate boaters scrambled to safety by climbing from the boat to the top of the dam. One person was swept through the floodgates and miraculously survived.

(*right*) From the upstream side of a dam, alert boaters may see a thin horizontal break in the water. Stay away! That is the lip of the dam! It's much more difficult to see this break above shallower, low-head dams.

BRUCE NEEB

DNR BUREAU OF WATER REGULATION AND ZONING

(*top*) The fishing can be excellent below dams where cascading rivers aerate the water and churn up food. Think safety first. Stay behind barriers, out of currents and heed the signs, sirens and horns that warn before floodgates open, currents change and water levels rise.

(*bottom*) People can get hurt or killed ignoring the safety warnings at dams. Vandals broke through and over this restraining fence to swim, fish or "play" on the Indianford Dam on the Rock River.

the boat toward the swift water.

The boat flipped between the calm water and the swift current downstream of the gate. All three heavily-clothed men were thrown into the river. None wore life jackets and they drowned before rescuers reached them.

People in waders, swimmers, even sunbathers have similarly been caught unaware of changing conditions below dams.

How can you identify some of the dangers and avoid them?

Understanding dam hydraulics

Whenever water drops, even just a few feet, it picks up speed. Cascading water slams over the top of a dam and piles up at the bottom faster than it can flow away. If the water flows slowly enough, the cascading water forms waves at the bottom and gently flows downstream. If the drop is steeper or the water flows faster, falling water creates a vacuum-like hole at the bottom of the dam. The current flows away from the dam but a portion of the water circulates back toward the dam to fill in the hole. That back-circulating current is called a backroller, and it's a killer.

People, boats or debris caught in the backroller continually recirculate as if caught in a counter-clockwise clothes dryer. As victims tumble, they periodically reach the surface and can gasp some air, but the perpetual tumbling confuses victims. Repeated thrashing wears people down. Escape is possible (see sidebar) but doubtful and many people die before rescuers can save them. Paddlers and engineers call this vacuum-like phenomenon a "hydraulic;" safety experts call it "the drowning machine."

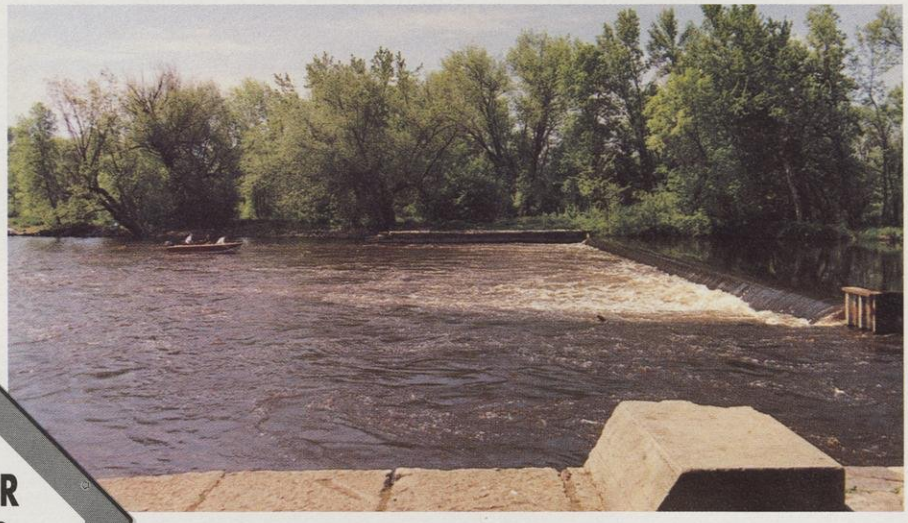
It's not hard to see where the menacing backroller ends and downstream safe water begins. If you stand on the bank just downstream of a dam you may clearly see the roller and a horizontal line just downstream where some of the water is sucked back upstream toward the dam and the rest flows downstream. This is called the transition zone or boil line. It marks the safer downstream water. Anything between the boil line and the dam will be washed into the hydraulic.

On free-running rivers, dangerous backrollers rarely form because the river's rocky, uneven surface break up these backwashing currents. However, dams built of even slabs of concrete that wear smooth over time often form these currents. Most boaters wouldn't intentionally run a 10-foot dam, but a low-head dam of as little as three feet can create a deadly roller. Since the backroller effect varies with water speed, some low-head dams may be safely navigated at certain times of the year and can be very dangerous at other times.

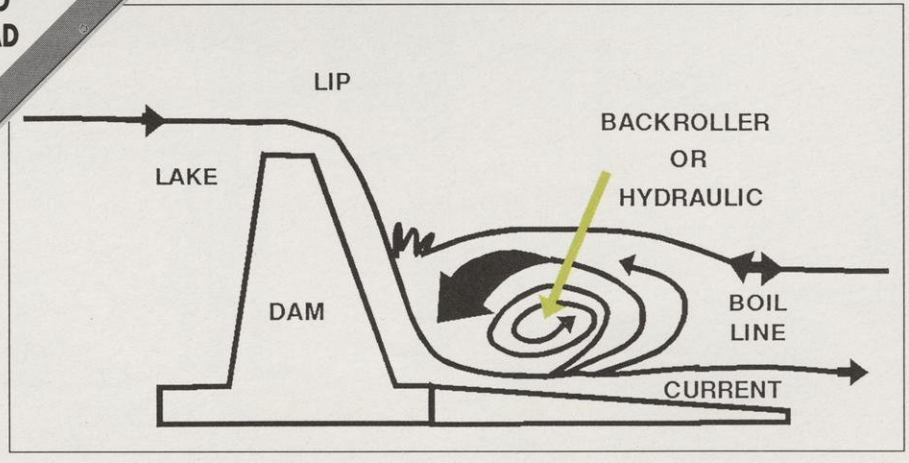
Areas immediately upstream and downstream of dams can be dangerous to recreationists for other reasons. When floodgates open, hydro dams create swift currents and rapidly rising water that can catch boaters, fishers, waders and bathers unaware. Many hydro dams are not staffed and floodgates are opened from remote locations. These dams are equipped with

Low-head dams like the Eureka Dam on the Fox River look safe and benign. Under certain conditions, this dam develops a backroller, a dangerous recirculating current. Unfortunate victims swept into the hydraulic have lost their lives here. You have to be alert and careful to enjoy river water near dams while avoiding danger. Note our page 7 photo of anglers safely fishing just downstream of this spot.

(*bottom*) The diagram shows how a backroller forms. Water falling over a dam can pick up speed and form a current that repeatedly tumbles people, boats or debris caught in the recirculating water. The "boil line" is the frothy divider between currents that roll back towards the dam and water that flows downstream. Anything caught between the boil line and the dam can get drawn into the dangerous hydraulic.



DNR BUREAU OF WATER REGULATION AND ZONING



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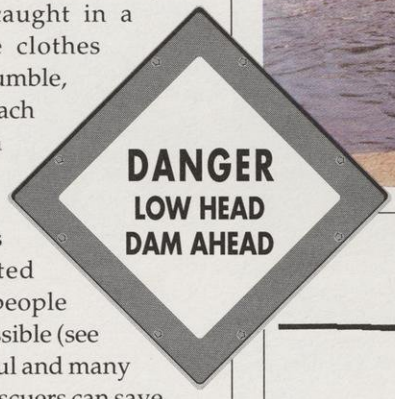

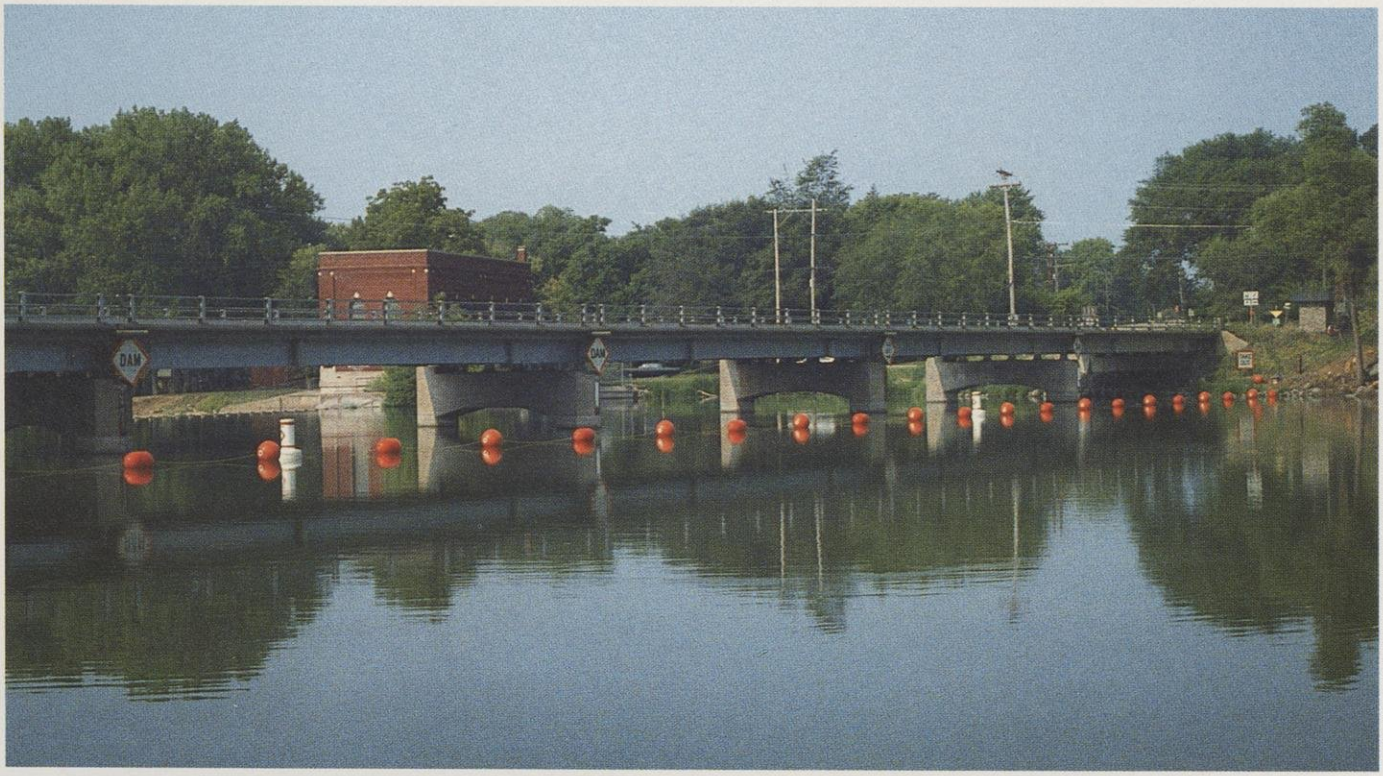

ROCK COUNTY PARKS AND RECREATION, PUBLIC WORKS DEPARTMENT

Signs, red floats and safety cables are strung across the upstream side of this dam on the Rock River. Smaller, low-head dams may have signs or a few warning buoys but often are not protected with cables you can grab onto in an emergency.

horns and flashing lights that typically warn people for a half hour before floodgates are adjusted. Even if the dam is staffed, the control room may not give the operator a clear view of boaters immediately below the dam or the gates may be opened at night.

Dams are also attractive nuisances. Kids like to explore them and canoeists like to practice their skills when open floodgates may create the only fast-moving water for miles.

Snowmelt and flooding conditions change the character of river water at dams. During flood stages, large objects like roadbeds, sections of fencing, even downed trees can dam rivers creating the hydraulic effect where none existed before the storm. Backrollers can form and "safe" sandbars can disappear overnight. Normally tame rivers surprise boaters and anglers alike in springtime. And survival time in the icy spring waters is very short.

Winter weather can mask other conditions around dams. Ice cover may appear uniformly thick all the way to the dam but currents and changing water levels make the ice unsafe for walkers, skiers and snowmobilers. During white-out conditions people have actually run into or off the top of dams.

Safety first

Safe boating and fishing is no accident. Learn about rivers and streams before you take a trip. Look for recent maps indicating launch spots, exits, portage areas and river hazards. Equip your craft with lines, anchors, flares and horns for emergencies. Be wary of changing weather and water levels. The first time you travel a river, it's a good idea to bring along people who have made the trip before. If boating is a new activity for you, take a safety course from the Department of Natural Resources, Coast Guard, local club or a private outfitter.

Buy comfortable life jackets and wear them. You never know when you might end up in the water. On cold days, a life jacket will keep you warm. Non-swimmers need to wear them anytime they are near the water to enjoy water activities with less worry.

Dams can be difficult to spot from upstream.

A survivor recalls the terror and helplessness of being swept into the Indianford Dam on the Rock River two years ago. The boaters tried to dock their craft upstream when their boat motor developed mechanical problems. Swift currents pulled the boat into the dam. Five of six passengers were thrown into the water and through the dam gates when the boat hit the dam.

"The turbulence was incredible," she recalled. "It keeps you down under the water. A lot of junk, boulders and debris were at the downstream end. One person punctured his leg. Being a non-swimmer, I thought what a horrible way to go." Now, she won't go near the dam, even though her efforts prompted installation of a safety cable upstream to prevent similar occurrences.

DNR water management specialists and wardens periodically check that dams and portage routes are marked with signs. In less safe stretches where accidents have happened, dam owners have to install buoys and lines or cables that boaters

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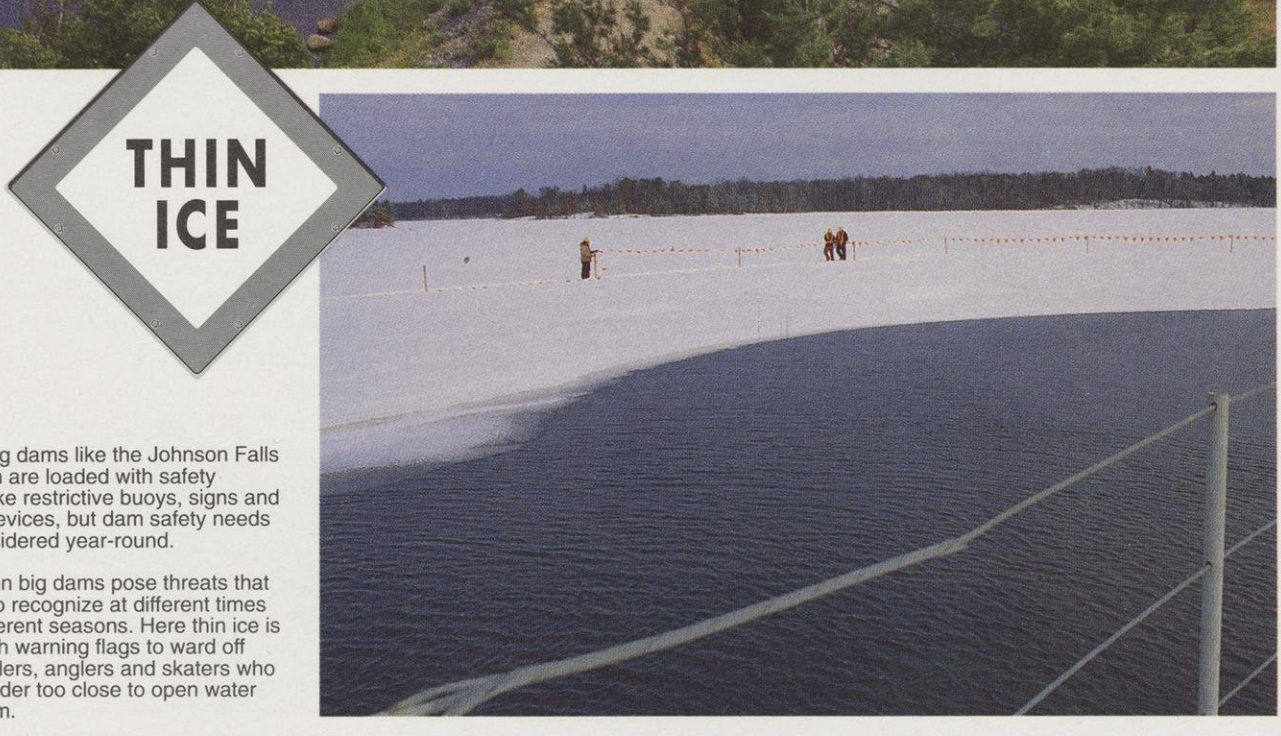


COURTESY OF PUBLIC SERVICE CORPORATION

(*above*) Big dams like the Johnson Falls hydro dam are loaded with safety features like restrictive buoys, signs and warning devices, but dam safety needs to be considered year-round.

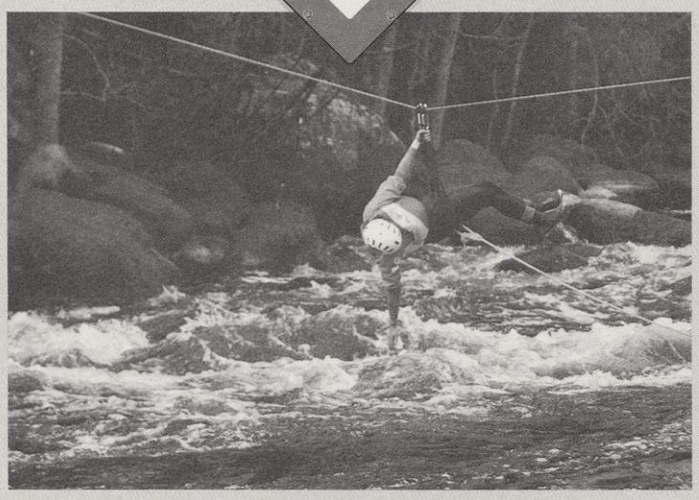
(*right*) Even big dams pose threats that are hard to recognize at different times and in different seasons. Here thin ice is staked with warning flags to ward off snowmobilers, anglers and skaters who might wander too close to open water near a dam.

can grab. Even so, sometimes danger finds boaters. Shoreline vegetation can grow over signs. Cables wear out and fast currents can rip out buoys. Canoeing expert Charlie Walbridge offers these warning signs:

- Look out for flat pools on rivers that are otherwise fast-moving. These can indicate dams.
- Dams are often marked by concrete retaining walls and structures along the shore.
- Be wary if you look downstream and see a thin horizontal line beyond which is fast-moving water. The "line" could be the lip of a dam.

Canoeing maps also rate waters on a scale of difficulty. Beginners and groups with mixed boating/swimming abilities should stick to Class I and II waters that have fast moving riffles, small waves and clear channels. Class IV waters are for advanced boaters who have thoroughly scouted the route. Class V and VI waters expose boaters to powerful rapids, eddies, turbulence and the prospect of severe injury or death in case of mistakes or miscalculations. As the American Canoe Association puts it, individual paddlers are ultimately responsible for their own safety, and must decide which risks to assume. The advice is equally sobering for weekend boaters, anglers, swimmers and sunbathers who choose to test the waters near dams. □

Meg M. Galloway is the assistant state dam safety engineer and an avid whitewater boater.



WHITEWATER SPECIALTY, INC. WHITE LAKE, WIS.

Attempting rescues

Anytime you unexpectedly fall in the water, the most important thing is to stay calm. Calm people can observe and react to the situation. You may be able to help yourself.

Take every advantage nature offers you. Grab onto nearby floating objects. Use natural currents to get to shore. Keep moving. Do whatever you can to get out of the water as soon as possible.

Self-rescue from a low-head dam hydraulic is very difficult. Conventional wisdom from survivors indicates victims should relax and time their breaths as they are brought to the surface of the backroller. This will help you keep conscious as long as possible and work toward the edge of the river where assistance might reach you. In less powerful hydraulics, try diving downward as the water curls you toward the bottom. Hug the bottom. You may catch the bottom current that could sweep you out of the roller to safety.

Rescuing a person caught in a dam backroller is difficult even for trained professionals. It is very risky business that often makes victims of well-meaning rescuers. Numerous dam rescue attempts have turned into double or triple tragedies.

Rescues at dam hydraulics should only be undertaken by personnel trained in swift water rescue. Assisted rescue attempts are most safely done from shore when the victim is conscious and close enough to catch a floating object attached to a safety line. Boats can be used to ferry rescuers to a far shore by crossing the river well downstream of the boil line. Rescuers using lines stretched across the river can work together to assist the victim. As a last resort, rescue from a boat by trained professionals can work as long as people on shore are pulling on guide ropes that keep the boat from being sucked into the backroller. Dangerous actions and heroics without proper safety lines have killed rescuers and victims alike.

Scrap isn't sold, it's bought. The key is developing products from recycled goods that people want to buy.

ROBERT QUEEN

Deb Radder of Engineered Plastics in Menomonee Falls, Wis.

The market's the thing

Mary Sagal

Amid the hum of heavy machinery in a suburban Milwaukee factory Wisconsin's environment is becoming a little cleaner.

The cement walls of Engineered Plastics Corp. in Menomonee Falls might seem an unlikely place for such an ecological phenomenon. Yet the firm's 58 employees blow renewed life into plastics with each cycle of an injection molding press.

For the past year the company has been salvaging plastic laundry detergent bottles collected in community recycling programs. The plastics are chipped and converted into bait buckets and storage bins. The bins are sold back to community recycling programs. This year Engineered Plastics will expand the line. Old ice cream pails, margarine tubs and other mixed plastics will be shredded into small pellets, melted in injection molds and made into bait buckets.

Several business cooperate with Engineered Plastics to complete the reuse cycle. Poly-Anna Plastics Products of Milwaukee shreds the collected plastics. Frabill Inc. of Allentown markets the bait buckets at Wal-Mart stores nationwide as part of its Environmental Sports product line.

"Seeing the pride our employees have taken in their work through these recycling projects has been a hidden but very large benefit," said Deb Radder, president of Engineered Plastics.

Curiosity inspired Radder to try using recyclable material. When bins and buckets made from detergent bottles proved successful, she won a $106,778 grant from the Department of Natural Resources to test if the process would work on other plastics like ice cream pails and margarine tubs.

"The bait buckets and recycling bins are made from 100 percent post-consumer waste collected from *residential* recycling programs, and that's the key," Radder said. "By creating demand we can do our part to keep people recycling. Based on our projected sales, by the end of 1992 we will use about half the laundry detergent bottles collected in Wisconsin. We hope the numbers will be similar for buckets made from mixed plastics."

Developing novel markets for materials community recyclers collect is crucial to future waste reduction. On Jan. 1, 1993 yard waste will be banned from Wisconsin landfills. In 1995, a host of other recyclable items including newspaper, cardboard, magazines, aluminum cans, glass, plastics and office paper will likewise be prohibited.

Where all those collected resources will go and how they will be reused is still uncertain. But one thing is for sure: The 1990 recycling law is strict and aims to reduce the six million tons of waste and recyclable material that now end up in Wisconsin landfills each year. That's why market development is so important.

Choosing where to bolster the marketplace

A recent Department of Natural Resources survey found almost two-thirds of Wisconsin households are recycling more items this year than

Continued on page 17

Continued from page 16

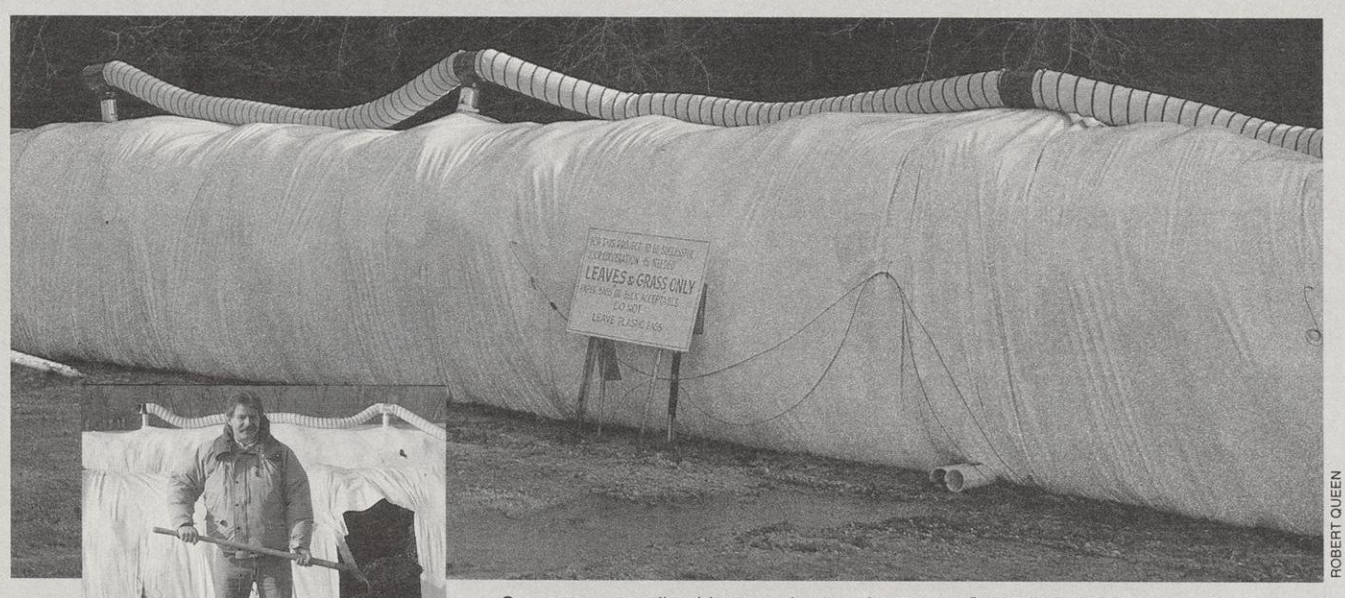
last. In fact, the amount of cardboard, metal cans, glass bottles and plastics collected in 1991 by state residents increased between 14 and 21 percent.

Such enthusiasm, however, must be matched with zeal for recycled products.

"Just putting a milk jug into a collection bin isn't recycling," said Janet Niewold, DNR recycling markets development coordinator. "The process is complete when we then buy available products that are made from that jug, or any other recyclable material."

State recycling laws provide incentives to businesses that make products from recyclable materials that aren't in high demand. These businesses can receive preference for state loans, rebates and other financial aids. Recyclable materials are ranked annually. Items given highest priority need the most market development. "Supply and demand determine which materials will receive state funding," Niewold said.

Then there are the hard-to-recycle



ROBERT QUEEN

ROBERT QUEEN

Some new recycling ideas are kept under wraps. Controlled air flow and moisture content turns community leaves and grass clippings into compost.

A good idea in the bag

Steaming inside a huge plastic bag behind a municipal garage in Oconomowoc may lie an innovative answer to one of the state's solid waste problems.

Last October, leaves and grass clippings were stuffed into an 85-foot long plastic bag. By spring, the mix will compost into a soil enricher.

Sound too good to be true? It's not. The process — developed by Compost Technologies, Inc. of Watertown — is really quite simple.

Oxygen is the key to successful composting because it fuels decomposition. That's why an electric blower forces air into the bag through flexible piping inserted in several points. An electronic sensor in the bag feeds air flow, moisture and temperature information via a modem to a computer 15 miles away in CTI's main laboratory near Watertown. If the computer indicates the temperature and moisture content inside the bag need to be changed to keep the composting action on schedule, employees at the lab tell the computer to adjust the air flow.

Because the entire process takes place inside a bag, the three most common composting problems — odor, stormwater runoff and wind-borne debris — are eliminated.

"The idea came about from an article I read in a trade magazine about yard waste bans," said Don Meyer, president of both Compost Technologies, Inc. and Rock River Laboratory, CTI's parent company. "The article was written from the farmer's perspective, and that's how I got the idea to use Ag Bags in a new way: for composting."

In December 1991, the City of Glendale received a $68,816 demonstration grant from the Department of Natural Resources to try the CTI compost system for its yard waste.

Meyer said Waukesha County is considering using Ag Bags too. The finished product might be sold to plant nurseries and organic farmers.

items, many of which aren't included on the priority list. They include tires, used appliances and used vehicle batteries which are hazardous in some way or currently have few markets.

Many appliances, for example, used CFCs (chlorofluorocarbons) as refrigerants and PCBs (polychlorinated biphenyls) to keep their capacitors cool. Both would threaten human and environmental health without special handling. Vehicle batteries are often made from heavy metals which are toxic to humans and other organisms, plus are difficult to take apart for recycling because they contain caustic acids, plastics and metals. Tires are bonded layers of synthetic rubber, cords and steel wires that are difficult to separate. Tires can also become fire hazards and breeding grounds for mosquitoes when stockpiled.

Wisconsin recycling law banned appliances, lead-acid batteries and used oil from landfills Jan. 1, 1991. Tires will be banned in 1995. CFCs cannot be released from used appliances after July 1 of this year.

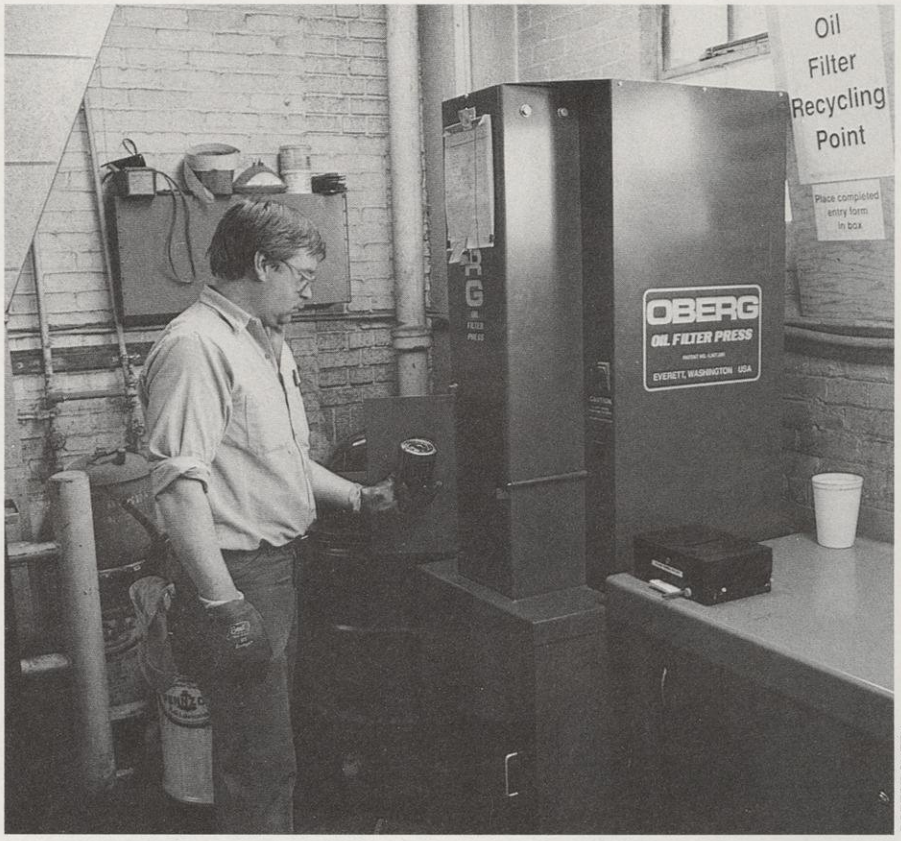
According to DNR waste specialist Paul Koziar, each year in Wisconsin about 800,000 used appliances, two million lead-acid batteries and four to five million used tires wear out and need to be recycled.

"The key to solving the problem is building a demand for these items; one that supports new uses," said Koziar, who is charged with tracking and encouraging market development for used appliances, tires and vehicle batteries.

"Without markets for recyclable materials, they will be stockpiled or illegally dumped," said Koziar. "That's both a waste of valuable resources and a detriment to Wisconsin's beautiful environment."

Squeezing an additional use from oil filters

One Wisconsin company that is building demand for recyclable material is Madison Gas and Electric. With an investment of less than $6,000, the utility now collects and recycles used oil filters generated from its fleet of more than 275 vehicles and from private vehicles owned by its 755 employees.



ROBERT QUEEN

Jerry Martinson of Madison Gas and Electric Company presses oil filters to extract oil for fuel. The used paper filters and metal containers are also recycled. MG&E recycles filters from its automotive fleet and gives employees cartons to bring in used car filters from home.

Employees bring their used oil filters to work in reusable plastic containers provided by the company free of charge. Filters are left at one of three drop-off sites, collected by the company's fleet operations crew and taken to the main automotive garage. There, a specially designed press crushes the filters. In the process, 4 to 10 ounces of residual used oil is forced out and drained into a barrel under the press.

The crushed filter is given to a scrap metal dealer for recycling. The oil is burned to recover energy. The company also is searching for a way to recycle aerosol cans and is saving antifreeze until an easy way to recycle it becomes available.

Used oil filter collection began in January. So far the company has collected and recycled 300 used filters.

"Our ultimate goal is to recycle if we can't eliminate the waste," said Michael Ricciardi, superintendent for environmental affairs. "We need to stay ahead of environmental regulations and more quickly help find solutions to problems."

Backing recycling ideas with bucks

The recycling law created several financial assistance programs to help Wisconsin businesses and industries start recycling ventures like Engineered Plastics' bait buckets.

"The Legislature included several programs to stimulate markets for all of the recyclables that are or will be banned from state landfills," Niewold said.

Demonstration grants — A DNR program that gives businesses and municipalities money to develop innovative ways to reduce wastes and promote recycling. Grants foster practical projects which can be shared with other businesses and communities to significantly reduce the amount of

solid waste put in landfills.

Recipients to date include Chicago Art Glass and Jewels, Inc. of Plymouth, which received $148,453 to test making clear and stained sheet glass, glassware and concrete additives from glass collected through a local recycling program; and Georgia-Pacific Corp. of Superior which got $23,250 to test if phone books, newspaper, corrugated cardboard and other recycled paper can be made into wood fiber which in turn would be used in garage doors, automotive parts, furniture and other products.

The one-time grants do not exceed $150,000 and are given in two installments. Contact: Janet Niewold, DNR, P.O. Box 7921, Madison, WI 53707; (608) 267-7680.

Recycling loan program — A Department of Development program for new or expanding businesses that produce at least one product made from recyclable material. Cloth diaper services are also eligible.

Loans do not exceed $750,000 and must be used for capital expenses, working capital or to cover the cost of modifying or buying new equipment.

Business rebate program — A Department of Development program that offsets a percentage of the increased cost of making products from recyclables. The products are then better able to compete with those made from virgin materials. For information about recycling loan and rebate programs, contact Louie Rech, Office of Development Finance, Department of Development, P.O. Box 7970, Madison, WI 53707; (608) 266-2766.

WHEDA recycling fund — A Wisconsin Housing and Economic Development Authority program that underwrites and guarantees up to 90 percent of a loan obtained from a private lender by Wisconsin businesses developing or using products made from recyclable material. The maximum guarantee is $675,000 per business. Interest rates and fees are determined by the lender. Contact: Recycling Fund, WHEDA, 1 South Pinckney St. #500, P.O. Box 1728, Madison, WI 53701-1728; (800) 642-6474.

Minority business program — A Department of Development program that provides loans to minority-owned businesses that use recyclable material in some way. Loans do not exceed $250,000 and must be used for capital expenses or for working capital. Contact: Minority Business Development Bureau, Department of Development, P.O. Box 7970, Madison, WI 53707; (608) 267-9550.

Several other programs that were not specifically addressed in the recycling law also help businesses create markets for recyclable materials:

- The DNR offers $1 million each year to businesses and others who recycle used tires for energy recovery or prevent tires from being illegally dumped. Contact: Paul Koziar, DNR, Bureau of Solid and Hazardous Waste Management, P.O. Box 7921, Madison, WI 53707; (608) 267-9388.
- The Wisconsin Energy Bureau's renewable energy assistance program offers grants to state businesses, municipalities, tribal governments and nonprofit organizations that want to build or modify a small or medium-sized renewable energy system. Contact: Renewable Energy Assistance Program, Wisconsin Energy Bureau, P.O. Box 7868, Madison, WI 53707; (608) 266-8234.
- WHEDA Business Development Bonds provide low-cost, fixed-rate financing for small businesses. Contact: Business Development Bond Program, WHEDA, P.O. Box 1728, Madison, WI 53701-1728; (608) 266-2297 or 1-800-362-2767.
- Technology development grants from the Department of Development cover up to 40 percent of the costs to research and develop new products including those made from recyclable material. Contact: Technology Development Fund, DOD, P.O. Box 7970, Madison, WI 53707; (608) 266-2742 or 266-2766.
- Community development block grants for municipalities from the Department of Development's Wisconsin Development Fund can be used to help recycling businesses remain or locate in a community. Contact: Marc Williamson, DOD, P.O. Box 7970, Madison, WI 53707; (608) 266-2435.
- Trust Fund loans for municipal capital improvement from the Board of Commissioners of Public Lands help finance improvements on municipal property. Loans could be used to construct a facility to store and process recyclables. Contact: Board of Commissioners of Public Lands, 110 East Main Street #701, Madison, WI 53707; (608) 266-0034.
- Construction, equipment and working capital loans guaranteed by the Farmer's Home Administration can be used for recycling-related projects that create jobs in rural areas. Contact: Robert Ruef, Business and Industry Program, Farmer's Home Administration, 4949 Kirschling Court, Stevens Point, WI 54481; (715) 345-7600.
- Start-up and expansion loans for small businesses through the Wisconsin Business Development Finance Corporation finance the purchase of land and equipment. Recycling projects can qualify for loans. Contact: John Giegel, Wisconsin Business Development Finance Corporation, P.O. Box 2717, Madison, WI 53701-2717; (608) 258-8830.

A Wisconsin Recycling Markets Directory which helps communities find businesses willing to buy or at least accept recyclable material is available from the Department of Natural Resources. Contact Janet Niewold at DNR, Bureau of Solid and Hazardous Waste Management, P.O. Box 7921, Madison, WI 53707; (608) 267-7680.

Both businesses and municipalities can contact their local DNR recycling specialists for help with any aspect of recycling. □

Mary Sagal was a science writer for DNR's Bureau of Information and Education. She now resides in the Pacific Northwest.

A lone paddler soaks up the sunset off the Lake Superior shore.

TODD KESSLER

Touring in quiet style

Explore the Great Lakes shores in a sea kayak.

Pam Troxell

Reddish-brown rock envelopes me. As I glide forward on the water, the rock walls form a cave with a ceiling and walls smoothed down by eons of moving ice and water — centuries of a cold lake continually washing at its rough face.

It's a lot quieter in here than on the open Lake Superior waters. I inch the kayak ahead through the darkness, touching the damp, ancient walls. The adventurer in me says move on, but I'm ever mindful of staying upright and avoiding a dip into the icy waters. I focus on keeping my double-bladed paddle, and bow and stern tips away from the walls. The chute through the cave is narrow and I skim the rock, scraping my equipment ever so lightly.

Like a playful otter, I can move my craft in and out of the row of caves, around arches and pillars of sandstone. I maneuver with quiet power, and I listen. Lapping water calmly ebbs and echoes through the cavern. Gazing back through the cave opening, the huge body of water looks as endless as an ocean. I can see an island in the distance. The Ojibwa people believe this splatter of 22 islands, the Apostle Islands National Lakeshore, was formed by rocks thrown at a fleeing deer by the spirit Manitou.

I'm paddling a sea kayak. Out here it is both lifeline and companion. The modern sea kayak derived from traditional seal hunting boats of the Innuit and Aleutian Eskimos of coastal North America and the Arctic. It was originally built of the sparse materials at hand: driftwood, seal skin, willow and bone. It's a boat of the northern oceans, a craft we envision in waters littered with icebergs and whales, but it's equally at home in our inland seas.

Sport kayaks come in two types for two temperaments. River kayaks are for the sports car set of the kayaking world. They are smaller, sleeker, built for the thrills of turning and cascading through frothy rapids, ferrying behind rocks and spinning into eddies. Sea kayaks are more like touring sedans. They are larger seaworthy craft, built to hold a lot of gear, hold a course in a strong wind and safely ride out waves. Put a river kayak on big, open water and you may find yourself spinning in circles trying to keep on track.

Interest in sea kayaks and weekend touring has risen phenomenally in the last decade, especially as a means to explore the Apostle Islands. In the early 1980s a few hundred kayakers plied these waters. Now several thousand kayakers are drawn here to explore Lake Superior and set up summer expeditions. Kayakers are charting courses on other paddling hot spots along Lake Michigan shorelines, large rivers and traditional silent sport meccas like the Boundary Waters Canoe Area in Minnesota.

Sea kayaking is becoming as popular as canoeing, and small wonder: they attract the same people. Both kayaks and canoes are self-propelled, streamlined boats. Both allow paddlers to experience solitude and excitement on waters that power boats can't negotiate. In fact, every kayaker I know is also a seasoned canoeist.

Kayaking gets paddlers even closer to the watery environment they enjoy touring. Paddlers sit lower in the boat, get more back support and are protected by an enclosed deck that gives freedom to bound through waves and rain without getting the lower torso wet or taking on water. A double-bladed paddle provides variety to traditional paddling motions.

Both types of kayaks are fashioned with a cockpit where the paddler sits cocooned by a sprayskirt that fits snugly around the paddler and the opening. Beginners often fear getting jammed in the cockpit, unable to escape when the kayak flips over. I am glad to say I have never seen that happen. A sea kayak is roomy enough that the paddler can easily bring his knees up to his face. Before I tried a touring boat, I was so conditioned by years of whitewater kayaking that I had accepted my fate to painfully peel myself out of small cockpits after every run.

Kayak designs

Sea/touring kayaks are made in a number of designs from a wide variety of materials. They are commonly crafted of fiberglass and rotomold (plastic), but one can find manufacturers who specialize in traditional designs that use skin, canvas and wood. These kayaks tend to be more expensive but they are light, magnificent works of art. Collapsible, hard-shell and inflatable designs each offer advantages and disadvantages to the paddler.

TODD KESSLER

Have kayak, will travel. This family prepares to shove off to join friends exploring the Apostle Islands near Bayfield. Foldable kayaks like this one can be disassembled and packed into a few duffel bags.

Kayak design is a compromise between stability and maneuverability. A narrow-beamed (width) boat is extremely responsive but unforgiving. A skilled kayaker can turn one on a dime, start and stop in a shot. However, the paddler must be confident since responsive kayaks also flip over easily. To enjoy these boats you must have a dependable brace to stop tipping and a surefire roll to right yourself if you do go over.

Wide-beamed boats offer greater stability at the expense of performance. These boats are harder to roll. They are preferred by photographers who need time to set up a good photo shot without getting wet and anglers who need leeway to fight big lake trout without worrying about taking a dunking while hoisting a fish out of the water.

Also consider your space needs, paddling abilities and destinations. Narrower boats have less storage space for camping equipment and food. You can compensate if you don't mind carrying dehydrated foods and living in the same tee shirt for a few days. Any boat needs enough space so you can wear a life jacket comfortably and carry water and emergency supplies.

As kayak designs vary, so does the choice of hardware to equip the kayaking shell. Cockpits, seats, foot braces, hatches, hatch covers, hull shapes, decks, bows, sterns, rudders and keel-like skegs all vary in style.

I don't mean to overwhelm you, but you can also choose single or double (tandem) kayaks. Single boats give independence. Doubles take more coordination, but two paddlers are stronger than one. Tandems are also dandy for a weaker paddler who could truly use extra paddle power from a partner.

Speaking of partners, I don't recommend that two novices learn to kayak in a double, anymore than two new bicyclists should learn to ride together on a tandem bike. Get comfortable with kayaking first, then consider a tandem. Trust me. Paddling partners don't need an excuse to become battling partners. Your relationship has to be pretty solid to maintain a sense of humor after being turned upside down in the water a few times. Moreover, you have to learn how to save yourself before you can assist anyone else. Paddlers have to practice strokes, braces and rolls over and over again. When the need arises, you want to react without panicking. After all, this is supposed to be fun!

Doubles are also great for families. They have large, handy storage areas for carting food coolers as well as young children. I used to sit my nine-year-old daughter and four-year-old son in the center hatch, seated on extra lifejackets for comfort. Now, three years later, my daughter sits at the bow and my son fits in the center or back hatch, trailing a fishing line off the stern.

If you get the bug to try kayaking, I recommend taking a few lessons, starting with short trips and renting several kinds of kayaks before you buy one. Specialty sports shows and expositions give you the opportunity to learn about kayaking and try out several models in one place. It is a great place to bring a list of questions and test as many boats as possible in a weekend's time.

Charting your course, planning your adventure

Kayaking trips can be tailored to your whims — an afternoon of exploring offshore, a fishing trip, weekend family camping, long weekend tours, week-long tours or month-long expeditions. Shops selling recreational equipment, regional chambers of commerce, outdoor outfitters and local parks can all provide information. Maps and charts can be ordered from communities surrounding the area you plan to paddle. Part of the fun is planning the route. It is fun to spend time poring over charts and refining the daily route and agenda.

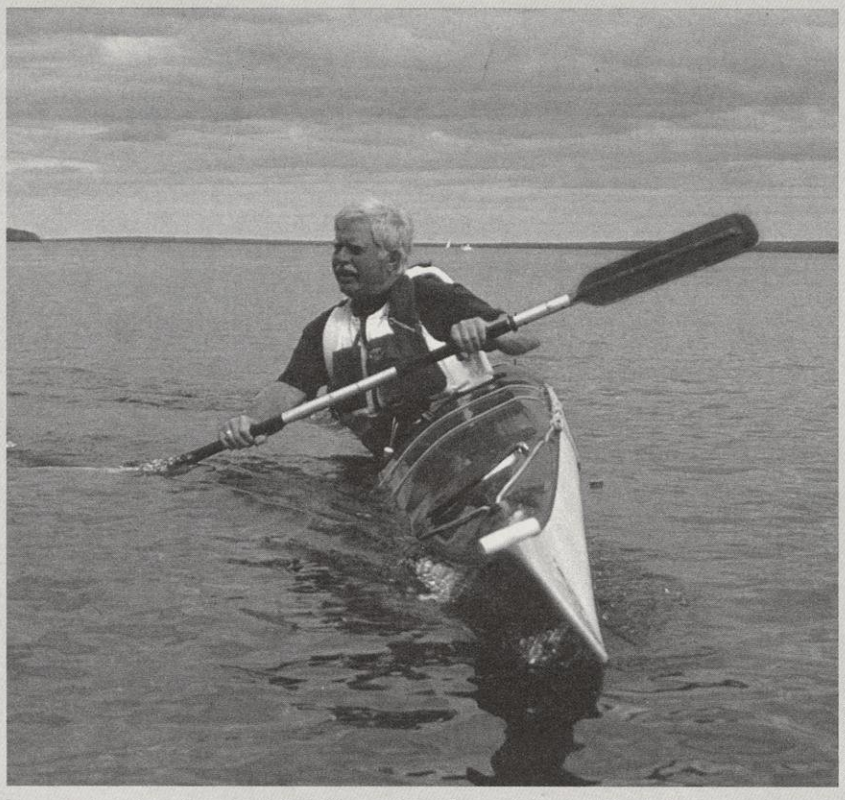
If you are not ready to plan your own trip, many outfitters around the Great Lakes offer guided paddle tours. Stores selling recreational equipment often offer tour packages. Outfitters in tourism hot spots like Minocqua, Door County, Duluth-Superior and Bayfield offer half day, full day, and extended trips as well as instructional classes on paddle strokes, rescue techniques, Eskimo rolling, reading weather and waves, boat design and safety. These package deals are a great way to learn and experience kayaking.

Safety and planning

Sea kayaking is as safe as you choose to make it. If you plan ahead and answer some questions *before* embarking on unprotected water, you can avoid potential hazards. Seasoned tour groups make most of these judgements for the novice, but every expedition needs to consider these matters. Know your group's limits. Assess how long the group can paddle at a comfortable, relaxed pace. Remember, the fun in this kind of trip is taking the time to explore an area. You're not in a race and you don't want people so dog tired by the time they reach a destination that they don't have enough energy to enjoy the experience. Moreover, you need to save more than half your energy for the return trip, because people get more tired throughout the day. If your group includes kayakers of mixed abilities, the more experienced paddlers need to stick with the group and pace themselves with weaker paddlers, not push the whole pack.

Also pay a lot of attention to the weather. Is a storm brewing? Are the one-foot waves going to turn into four-foot breakers? Can your group handle the situation? If there is any doubt, the best option is to stay put.

Learn about the variety of safety equipment available to kayakers, and practice using it. Equipment like paddle floats enable self rescues. Kayaks can be equipped with bilge, and deck-mounted pumps and bailers to remove water trapped in cockpits. Life jackets are a must. Flare kits, first aid kits, lights and marine weather radios may be warranted depending on the waters you travel and the length of your trip. Educated, practiced paddlers can reduce risks and confidently enjoy outings even if rough weather kicks up.



TODD KESSLER

Famous kayakers like Derek Hutchinson from England teach skills at the symposium.

The inland sea symposium

From June 18 through 21, the Inland Sea Society, a non-profit, environmental organization, will hold its fifth annual Inland Sea Symposium in Bayfield, gateway to the Apostle Islands National Lakeshore on Lake Superior.

The symposium attracts an international audience of kayaking enthusiasts who offer instruction for novice and experienced paddlers alike.

The weekend will include on-water skill classes on basic and advanced paddling strokes, rescue techniques, and Eskimo rolling. Twenty workshops will review kayaking equipment, teach on-water navigation, dish up kayak cookery, and describe keeping a sea journal. Participants can choose among 12 interpretive paddle tours to various parts of the Apostle Islands. The symposium also offers a complete family program for children.

Visitors can meet dozens of boat manufacturers and try a wide range of boats. Evening programs will include slide shows of sea kayaking adventures, as well as cultural programs by local groups.

Guest instructor George Gronseth, a splendid kayak instructor from Seattle, and Paul Caffyn from New Zealand, a world adventure kayaker and author of three books, will highlight the program.

Introductory sailing classes and two-hour tours around the islands will be offered also.

A companion program will highlight the value of ecologic and economic diversity of the Lake Superior basin. Participants will include the National Wildlife Federation, the Sierra Club and the Lake Superior Alliance.

For registration information, contact the Inland Sea Society, P.O. Box 1202, Bayfield, WI 54814 or 715-765-4793.

–Pam Troxell

Packing for a trip and stowing gear

When traveling with a group and the plan is to load two coolers, three tents, four drybags of food, two camp stoves, two fuel bottles, a large personal drybag for each participant, plus sleeping bags, and sleeping pads, mess kits, and two large plastic containers of kitchen necessities, you have to be organized. All of the equipment will be squeezed, shoved, and jostled into the bow and stern hatches of each boat. (Bulkheads behind seats and in front of braces create these dry storage spaces.)

Loading a kayak for the first time takes patience and ingenuity. A dry run on the lawn or in the living room isn't such a crazy idea. Usually, by the end of a three-day trip everyone is a seasoned hand. Pack essentials in a handy place. Raingear, sunglasses, an extra sweater, binoculars, flare kits, first aid kit and water bottle can all be stored in the small area just behind the seat. Maps, compass, hat and extra paddle can be stored under the deck-mounted bungee cords. Each morning, make sure that lunch for that day is easily accessible. It can be a pain unpacking nicely stored gear just to find the peanut butter!

Lodging

If you're taking more than a day trip, it's likely you will be camping. Areas like the Apostles are not developed with cabins, bunks and showers. In the National Park System, designated camping sites may be reserved and permits are required. Sites may be equipped with solar-powered water pumps, a fire ring and simple outhouses. If you'd prefer to hunt down a campsite on your own, check on local requirements, contact landowners, plan a scouting trip and prepare to pack out every bit of material you bring with you.

Sea kayakers bear special responsibilities because their craft allow them to reach places inaccessible to other travelers. Many shores where kayaks can land and camp are fragile places.

ROBERT QUEEN

Practice packing your gear before the trip. Keep raingear and drinking water handy. Put on your life jacket just before you start out. Equipment can be stowed or strapped to leave the paddler plenty of room to relax and enjoy an adventure.

These beaches, covered with dune grasses, beach pea and other vegetation can be trampled or eroded by kayak campers. You need to be observant and tread lightly.

Clothing

You can buy specialty paddling clothing, but your checkbook will feel it. As with other aerobic outdoor activities, kayakers should dress in thin layers so they can add or peel off clothes to adjust to the temperature. Sturdy, breathable raingear and windbreakers are a must.

Fun on small and big waters

Kayaking is a growing hit in the Midwest. It's evolving into a respected sport that gives paddlers with even moderate abilities the opportunity to explore the nearshore areas of our great inland seas using their own power.

Take your time. Ease into kayaking at your own pace on your own schedule. The beauty of the sport is that it can be equally enjoyed on a calm evening when the water is as smooth as silk or when the surf swells in four-foot crests. You can gently flow along the city harbors, soak in the setting sun and watch the evening skyline light the sky, or ride out waves crashing along white sandy beaches. Kayaking gives the curious traveler the opportunity to sit just above the water, explore quiet corners of our powerful Great Lakes, touch the weathered surface of aged bedrock, feel the canopy of night stars gaze from above and float on deep waters that quietly lift and lower you in a boat of ancient beginnings. □

Pam Troxell is a kayaking instructor in Bayfield and an organizer of the annual Inland Sea Symposium. She is waiting for the day when she can sit in the center hatch while her two children paddle!

DNR BUREAU OF SOLID AND HAZARDOUS WASTE MANAGEMENT

A THREAT FROM BELOW

Storage tanks were buried underground for safety. As many as 12,000 aging tanks at gas stations, businesses and homes may be leaking fuels toward groundwater.

Paul R. Holtan

You load into the family car for a Sunday afternoon drive. The gas gauge is dragging on E. No problem, you think. A quick stop at the corner gas station and you'll be on your way.

As you drive up to the station, snow fence blocks off the pumps. Inside the fence is a large hole next to an equally impressive pile of dirt. The nearest station is across town, and you drive there with one eye on the gas gauge. Lately you've seen other gas stations digging up their buried tanks.

What's going on? Are they burying the mechanic's favorite car?

No. It's a major campaign statewide and nationally to prevent groundwater pollution and soil contamination from petroleum products that can threaten human health, public safety and the environment. Underground tanks buried 10-30 years ago or more to store gasoline, other fuels and chemicals are aging and silently leaking without warning. As investigators probe the ground and the extent of this problem, it's becoming clear that leaking underground storage tanks, or LUSTs, are one of the most common environmental threats in every community.

A major problem

Compared with a Superfund site, a leaking landfill, or a chemical spill, a leaky tank at the corner gas station may not seem like a major problem.

Unfortunately, underground gas spills lead to big troubles. Ask 13 property owners in the small Wood County village of Milladore. They're among 60 or so known residences, restaurants, schools or taverns in Wisconsin where occupants can no longer go to their faucet for a drink of water. Their wells are contaminated with benzene or

other gasoline components. Most of these folks must depend on bottled water for drinking water. Some have installed bulk water tanks because their well water is too contaminated to use for washing or showering.

Ongoing investigations in Milladore have identified three sites where buried tanks leaked gasoline or other fuels.

Similar leaks in other communities have contaminated 10 municipal wells. And investigators documented more than 100 cases in Wisconsin where petroleum vapors seeped through soils into basements, septic tanks, buried utility lines or other underground cavities and reached potentially explosive levels.

The problem is numbing. Think of the sheer number of gas stations and other businesses with buried fuel tanks, then consider that more than 25 percent of the tanks inspected so far have leaks. Now recall that nearly 75 percent of Wisconsin residents rely on groundwater supplies for drinking water. You start to appreciate the damage leaking tanks could cause.

Why are we finding so many leaks now? Tanks are getting old. Most only last 25 years or so and many were installed in the 1960s and '70s when cheap gas prices encouraged frequent travel. Prior to the early 1930s storage tanks were erected on raised supports so vehicles could wheel up to the tank and use simple gravity-fed hoses to fuel up. Later, these tanks were buried to reduce fire potential, keep people from inadvertently backing into them, slow down rusting and avoid freeze/thaw problems.

Since buried tanks are out of sight, it's difficult to detect leaks. Commercial tanks are pumped under pressure to dispense fuel quickly and effortlessly. Sophisticated electronics that can detect pinhole leaks in tanks are a recent invention and they are very expensive. Now, they're required, but they were not routinely installed in tanks. The volume of fuel in buried tanks was roughly calculated. You may recall seeing a service station operator lower a long dipstick down a porthole to estimate how much fuel remains in a tank.

As of March 1992, the Department of Natural Resources had identified more than 6,000 sites across Wisconsin where tanks, pipes or pumps have leaked, or where surface spills trigger an environmental investigation and cleanup. Groundwater pollution has been confirmed at more than 1,200 of these sites and is suspected at another 1,600 sites.

Laurie Egre, DNR tank response unit leader with the Bureau of Solid and Hazardous Waste Management, estimates that by the year 2000 the Department of Natural Resources will have identified more than 12,000 sites in Wisconsin with leaking underground tanks. That astounding figure does not include thousands of other tanks buried at farms, homes and businesses across Wisconsin that are not subject to federal rules and won't be checked out by state inspectors until the year 2001.

Why gas only goes with the flow sometimes

The old axiom that water and oil don't mix does not apply to all petroleum products. Gasoline is a complex mixture of as many as 200 different compounds, many of which dissolve easily in water and are harmful to humans.

One notorious component is benzene, a volatile chemical linked to leukemia and other blood diseases. State health standards restrict the compound in drinking water to five parts benzene per billion parts of water. Other gasoline constituents can damage the nervous system, liver, kidneys and the reproductive system.

When gasoline leaks from buried tanks, it may pool underground or float on top of groundwater. There, the constituents that can dissolve in water — like benzene — can spread as groundwater moves. As a consequence, gasoline leaking from one spot can seep in one direction while the water-soluble components flow in a different direction.

Trapped underground, the components in gasoline break down very slowly. Depending on the soils and groundwater flow, contamination can spread great distances, or hardly move at all.

The federal rules

Before 1987, most leaking underground storage tanks were discovered by smell. Someone contacted the Department of Natural Resources or a public health agency to report a gasoline smell in well water or fumes in a basement.

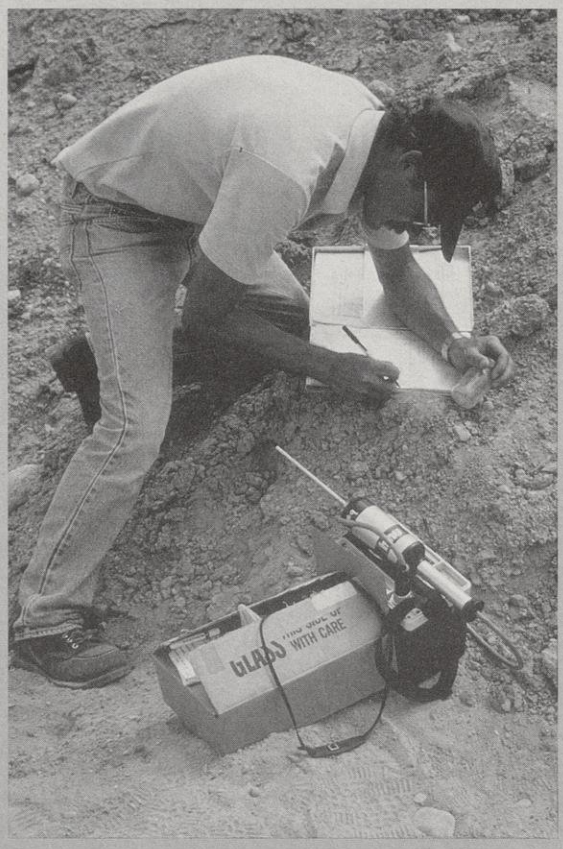
The first national standards for underground tanks were set in solid waste laws of 1976. Federal Superfund amendments in 1986 required an inventory and inspection of tanks which were proven groundwater threats.

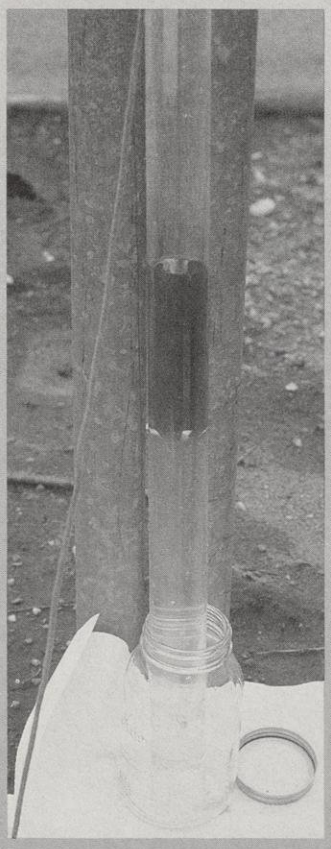
As with most environmental laws, regulations will first aim to clean up big industrial problems. Service stations, refineries and tank depots that have large tanks will be inspected first. Smaller commercial tanks and home fuel tanks are slated for state inspection in later years.

The laws require owners to protect tanks against corrosion, to install leak detectors and to install overfill protectors that drain excess gas back into underground tanks when bulk tankers unload at service stations. Tank sites must be inspected whenever tanks are replaced or removed to determine if the old tanks leaked. Deadlines were set so owners of old tanks had to meet the requirements first. Many of the service station tanks installed more than 20 years ago have already been inspected.

"That is why it seems that so many gas stations are replacing their underground storage tanks these days," Egre notes. "The rules aim to prevent future problems as well as identify and clean up past problems." All federally-regulated tanks must be upgraded or removed before the end of the decade.

"Some of these tanks have been leaking for decades," Egre says. "Identifying the sites is only the first step. The cleanups will be ongoing for many years."





DNR BUREAU OF SOLID AND HAZARDOUS WASTE MANAGEMENT

(*left*) It's tedious and costly to keep sampling soil around and under leaking tanks. Samples are analyzed to determine how wide an area is contaminated. Follow-up samples determine whether cleanup efforts are successful.

(*right*) Wells may also be installed to monitor if spills are seeping into groundwater or drinking water supplies. Note the thick layer of petroleum fuel floating on top of this water sample.

How leaky sites are inspected and restored

Under cooperative agreements with the federal government, the Department of Natural Resources and the Department of Industry, Labor and Human Relations (DILHR) share responsibility for regulating underground storage tanks. DILHR regulates the storage of flammable and combustible liquids, registers underground tanks, and sets standards for tank design, construction, installation and closure. When tanks are replaced or removed, certified inspectors look for leaks and collect soil samples for lab analysis. In fact, that's how most leaks are discovered.

If the soil is contaminated, the tank owner must notify the Department of Natural Resources and hire a qualified environmental engineer to devise a cleanup plan.

DNR staff oversee cleanups where groundwater is threatened or explosive vapors are possible. In less serious cases, the engineering firms follow written guidance and file a report before the case is closed.

Cleanup techniques are designed to treat or dispose of contaminated soil or groundwater. The most common techniques include installing vacuum-like systems to draw volatile fumes and liquids out of soil, pumping and treating contaminated groundwater, and excavating contaminated soil.

A technique that works in some cases is called "bioremediation." Bacteria that can decompose dilute levels of gasoline products are fed plenty of food and air. They eat their way through contaminated soil for months or years while their progress is monitored. In other cases, contaminated soil can be mixed with asphalt or burned in a furnace-like kiln.

If the spill or leak area is very large, a method of treating the site is installed on-scene and may have to operate continually for several years, slowly cleansing the site.

Cleanups are costly

LUST cleanups are costly, averaging $25,000 to $100,000 for simple sites and several hundred thousand dollars where large areas are contaminating groundwater.

Obviously, small business owners cannot afford this kind of expense. Most owners never discovered their tanks were slowly leaking.

"Generally, the contamination at LUST sites is not the result of negligent individuals," Egre says, "but of industry-wide standards that proved to be inadequate to protect the environment."

The Legislature created a petroleum environmental cleanup fund in 1987 to reimburse tank owners for cleanup costs after a deductible. The fund has provided a strong incentive for voluntary cleanups — so strong that demand outstripped revenue. To cover increased costs, the State Legislature increased fees for petroleum inspection, resulting in an .8 of a cent per gallon fee on motor fuels and airplane fuels brought into Wisconsin.

How clean is clean?

Another knotty problem is determining when contaminated sites are restored and clean.

State spill law requires tank owners to restore the environment to the extent practicable. DNR legal staff interpret that to mean a tank owner must clean up a site until contaminants can no longer be detected or are no higher than levels that occur naturally in surrounding soil.

Reaching that goal often costs more than the property value, and some people question that stance. DNR staff counter that the law protects more than the current property value — it aims to protect groundwater, nearby drinking water supplies, human health consequences for decades and the future property value as well.

"Our groundwater resources belong to all the people of Wisconsin," Egre says. "How can we know where someone in the future may need to drill a new drinking water well?"

Taking the moral high ground comes at a high price. Some owners of contaminated sites have authorized environmental consultants to excavate thousands of yards of soil — nearly entire parcels of property — to remove very small amounts of contaminants. Much of that soil was trucked to landfills for disposal and the cost charged to the state fund.

"That's just not a sound environmental solution," Egre said. "Landfill space is too valuable given other alternatives."

Since treatment, like ventilating soil, may not remove every last bit of contamination, the question becomes "how clean is clean enough," Egre said.

Carol McCurry, a DNR hydrogeologist who has spent months researching the topic, is looking for practical ways to estimate when contamination doesn't threaten health or environment. Removing gasoline and other products to "safe" levels varies widely depending on soil type, distance to groundwater, soil acidity, conductivity and other measures. The country has no standards for soil cleanliness and states take slightly different approaches in drawing the line between clean and contaminated.

Since it's too costly to test every inch of soil at every contaminated site, Wisconsin proposes using a computer model to estimate how contaminants change when different soil types are exposed to weather and water (chemical fate). The computer is fed information regarding what leaked from the tanks. The program then estimates how far contaminants are likely to spread in mixtures of soil, groundwater and bedrock. By comparing projected estimates to state groundwater standards, state regulators expect to determine when soil contaminants in a specific location won't pollute groundwater.

"The model sort of runs backwards," McCurry explains. "It starts with known levels of soil contamination and predicts whether groundwater contamination may result."

Results will help develop worksheets that environmental consultants can use to gauge soil contamination at a site. In locations where groundwater is not threatened by pollutants, soil may remain in place as contaminants naturally degrade over time. Tank owners will have to regularly monitor groundwater for contamination in these cases and take additional action if the situation worsens.

A key question is whether tank owners and the public will accept the notion that residual contamination can be left in place without threatening their own or their neighbors' drinking water.

While sites are being restored we need to accept that property that is being treated to remove contaminants still has value. Gas stations, for example, can usually continue operation while a cleanup is ongoing.

As more and more tanks are inspected and leaks are discovered, we expect to face these dilemmas in more places throughout the country. It's easy to downplay the consequences of leaking tanks if you're not constantly reminded of them. Driving across town for gasoline while tanks are being replaced is tolerable. Smelling gasoline when you turn on your faucet is not. □

As gasoline stations are constructed or renovated, better protections against spills and leaks are built in. New tanks are coated or lined to prevent leaks. Electronic monitors keep accurate records on tank contents and new safety devices are added. Wide collars shown above are built into fill pipes. When bulk tankers are done filling underground tanks, these reservoirs catch residues that might otherwise drain on the ground or down the side of the tank.

Paul R. Holtan communicates the environmental complexities of leaking tanks for DNR's Bureau of Information and Education.

Readers Write

PRIDE IN THE PADDLE

A December letter writer who enjoyed our October piece on hand-crafted canoes poked fun at the canoewrights for using store-bought paddles. The paddle pictured was custom-made and hand-crafted by the McCann Paddle Company of Cornell, Wis. The firm offers stock and custom-made paddles of white ash shafts laminated with sitka spruce, cedar-sitka spruce, butternut and black walnut.

SNAKE CHARMED

As a long time subscriber, I enjoy every issue but I was particularly drawn to Johanna Fabke's *Warm feelings for cold critters* in the February issue.

I grew up in Sauk County and I just bet the police got a bit excited when the rattlers started buzzing! I thought I'd pass along the sound that, to my ears, is closest to a rattler's buzz: It's the sound electric wires make on a very cold day. If you hear that sound when afield, stand still until you know where it's coming from. Move away very slowly and chances are the snake will not strike. Look before you sit. Don't reach out where you can't see and don't step over logs without looking on the other side. Rattlers don't always rattle. But, with a bit of precaution, chances of seeing one are pretty rare. Many people who are bitten were trying to kill a snake that was not harming them. Leave rattlers alone. If they threaten your living environment, call the authorities for professional removal.

Dave Alderman
Spooner, Wis.

HAPPY TRAVELER

Thanks for bringing back *Wisconsin Traveler* in the February issue.

John Welsh
Rockford, Ill.

We sure enjoyed the Outdoor Traveler in the February issue. Let's have one every mailing.

Dave Radke
Milwaukee, Wis.

We'd like to bring it back on a regular basis. We're working to rekindle interest in our partners.

TREE PLANTING MEMORIES

I look forward to receiving *Wisconsin Natural Resources* magazine. It's quite popular among my patients here in California. In particular, I enjoyed the article *A growing habit* in the December issue. Way back in 1936 my father began planting white pine, Norway pine and Colorado blue spruce on his Waupaca County property. He had the most extensive shoreline on White Lake and set a yearly ritual for a decade, planting 25,000 trees. I personally must have planted 4,000 to 5,000 white pines. To my knowledge, no one offered advice in those days.... We simply went to the railroad depot in Weyauwega and picked up various bundles of seedlings which I believe were provided by the State of Wisconsin free of charge, except for shipping.

My father died several years ago and I haven't been back to Wisconsin recently. The last time I was there the roadway to the cottage looked a lot like your page 16 photograph. Father took pride in any tree planting effort, and so do I.

Incidentally, to the best of my recollection, the program back in those days was called "Trees For Tomorrow."

Dr. Boyd F. Nirschl
Sunnyvale, Calif.

WATER QUALITY GRANTS

You continue to produce a wonderful magazine, but I strongly object to your choice of Apple River tubing as an example of renewed recreational opportunity.

Many people are unaware of what takes place each summer on the river. Thousands of beverage containers are thrown at "can targets" placed on the riverbank. Those that don't fall into a bin litter the land or fall back into the river. Cleanup efforts seem futile. Downstream of Somerset, the debris forms "canbars," not sandbars. A no-container rule was enacted a few years ago, but was dropped when attendance sagged.

Several tubing businesses have placed chain link fences along riverbanks that would otherwise be accessible from bridges and rights of way.

I feel the beauty of the river is being destroyed by a few people who value a dollar more than the environment.

Brian Brathol
Star Prairie, Wis.

Your February article *New paths to a cleaner environment* intimates that action to clean up the lakes and streams started in the 1970s. To set the record straight, I would like to point out that this was a paramount issue in the 1960s. In 1965, I created a committee headed by Leo Roethe of Fort Atkinson to study methods of preserving our environment. The committee reported on the need to treat pollution, and preserve parks and recreation lands. In 1968, the ORAP program provided $144 million for matching funds for sewerage treatment plants and $56 million to purchase lands for parks and recreation. This gave Wisconsin a head start in acquiring funds that permitted matching funds under the Federal Clean Water Act. This became law in 1969 and was the foundation for future action in wastewater treatment. Wisconsin was regarded as the first state to take this forward-looking legislation.

I might add, the original legislation provided a mechanism for financing the bonds with a .0165% property value assessment. This was payable out of general purpose revenues and was intended to guarantee bond repayment, perpetuate a program until the water treatment was completed and provide a continuing source of revenue. I have never been able to understand why the program was changed. Eventually the formula was abandoned and the statute repealed in 1987.

Conditions change with time, and the plants installed in the 70s must be renovated, replaced and improved. I'm also aware that increased populations and new types of pollution are discovered that require new, innovative solutions. Such is progress, and this is the way of life.

Wisconsin has every right to take pride in our progress. But as you indicate, had the original statute been followed and funded through the Clean Water Fund, allowed to accumulate and not transferred to the general fund to balance the budget, we would not be faced with the current dilemma.

Warren P. Knowles
Milwaukee, Wis.

Former Governor Knowles championed many environmental and natural resource causes during his 1965-71 term. He's especially recognized for providing leadership and developing programs to control wastewater pollution and acquire public lands for outdoor recreation. After serving as governor he headed the Outdoor Recreation Action Plan 200, a task force with the late Senator Walter Hollander. ORAP 200 was designed to purchase recreational lands, fund environmental improvements and automatically provide increasing revenue as the costs of buying and developing land increased.

JIM MC EVOY

Continued from page 2

feet were almost a blur of motion as he tunneled past a tumble of wet rocks.

At first glance the shrew appeared mouse-like, but this tiny warrior had an impressive array of adaptations quite different from any mouse. His tiny black eyes could only perceive objects at close range, but he possessed excellent senses of smell and hearing, and radar. On the move, he constantly emitted a series of high-pitched clicks to locate and avoid objects along his dark runways. This specialized echolocation system was extremely helpful in finding food, mates and escaping predators.

He carried another fascinating adaptation unique among the world of mammals: poison glands! Twin sacks positioned along both sides of his lower jaw contained enough venom to kill several dozen mice. Whenever the shrew bit into an animal, the poison automatically moved through tiny ducts to the ends of his long, sharp, red-tipped teeth. His prey — mouse, worm, frog or insect — would soon be paralyzed and die. The shrew could then track down its victim and consume it at his leisure.

As he trotted along, the shrew approached an intersection of four tunnels leading in different directions. He suddenly caught the scent of something foreign, reptilian — a snake! In the tunnel to his left, a coiled garter snake slowly moved its head and waited to ambush its next meal. Using radar, the shrew caught the motion of the snake's head, instantly turned and fled back on his trail. Unaware, the snake remained in the tunnel, still on the prowl.

The shrew quickly retraced his steps until he returned to the wet rocks. Another tunnel led to a miniature forest of young saplings and he turned to head down the runway. Just ahead he detected a sound.

He froze! He could clearly hear a soft chewing sound. Then the scent of meadow vole reached his nostrils. Immediately he attacked! He closed the distance between himself and his larger adversary. The vole, still feeding on some soft bark of a sapling, was knocked off its feet by the speeding shrew. For several long seconds the two tumbled together. The vole valiantly tried to escape; the shrew savagely bit it several times along the back and sides. After a desperate violent shake, the vole threw off his attacker and fled up through the leaves away from the tunnel. Tiny drops of blood oozed from the vole's wounds and fell on the damp forest floor, glowing for an instant in the bright moonlight.

The shrew recovered its footing and began the search for its prey. It quickly discovered the place where the vole had escaped from the tunnel. The shrew emerged to follow the trail. Nose to the ground, it eagerly tracked the blood trail to the dying vole only 30 feet from the tunnel. The shrew's poison had done its job.

Without waiting for the vole to die, the shrew began to consume part of the hindquarters. It eagerly tore off bits of flesh and gulped them down. The vole, deep in shock, felt no pain. It quietly died less than a minute later. The shrew continued to eat his fill, relishing the taste of fresh vole.

After feasting on more than a quarter of the vole, the sated shrew turned away from the remaining carcass. The forest floor was a tangle of dark shadows and bright moonlit leaves. He retraced his steps back toward the tunnel. He moved at his usual rapid gait, rustling a few leaves along the way.

He almost reached his runway. Suddenly a dark shadow passed overhead. An instant later, he felt sharp stabbing pains as a screech owl's talons entered his body. He immediately went into shock and died.

The beautiful gray-phase screech owl clutched the shrew tightly and flew to a limb of a leafy oak to satisfy its own hunger. The bird leaned down, plucked the shrew's body from its talons, and swallowed it whole with several gulping motions.

For the rest of the night the screech owl huddled close to the tree trunk, content. It would not have to remain on the prowl. □

Naturalist and waterfowl researcher Lawrence E. Vine works in Horicon, Wis. as a member of DNR's wildlife research unit.

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