# Superior: a vision for the future. [Supplement, Vol. 17, No. 6] [December 1993]

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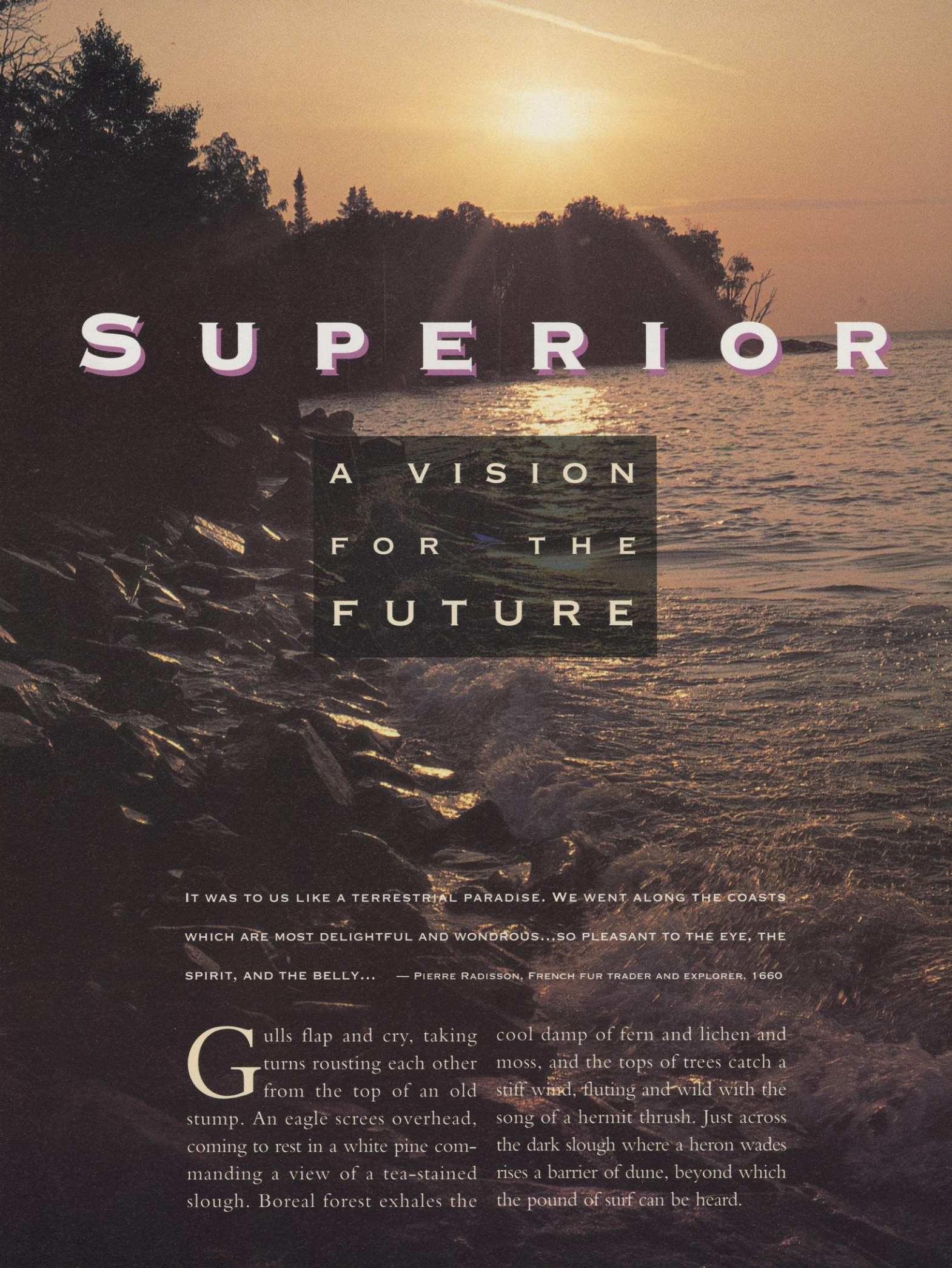


# SUPERIOR

## A VISION FOR THE FUTURE

IT WAS TO US LIKE A TERRESTRIAL PARADISE. WE WENT ALONG THE COASTS WHICH ARE MOST DELIGHTFUL AND WONDROUS...SO PLEASANT TO THE EYE, THE SPIRIT, AND THE BELLY... — PIERRE RADISSON, FRENCH FUR TRADER AND EXPLORER, 1660

Gulls flap and cry, taking turns rousting each other from the top of an old stump. An eagle screes overhead, coming to rest in a white pine commanding a view of a tea-stained slough. Boreal forest exhales the cool damp of fern and lichen and moss, and the tops of trees catch a stiff wind, fluting and wild with the song of a hermit thrush. Just across the dark slough where a heron wades rises a barrier of dune, beyond which the pound of surf can be heard.

These are the wild shores of Lake Superior, the vast repository of fresh water into which all the waters of lakes Michigan, Huron, Ontario and four Eries could be poured. Both the lake and the land encircling it are threatened by pollution, sullied by a history of exploited resources.

Aware that the time for preventive action is dwindling, dozens of citizen groups and government agencies from the United States and Canada have embarked upon a new approach to restore those parts of Lake Superior that have been damaged by human activities, and protect the areas that remain sound and pristine. The newness of the approach isn't so much that it is being done, but rather on what level, and by which groups. Their commitment is to a toxic-free future for Lake Superior, where humans live in harmony with a healthy ecosystem.

# THE PAST

## DISCOVERING WEALTH IN A LAND AND A LAKE RICH IN WILD BEAUTY.

Powerful natural processes concentrated an abundance of resources and raw materials in the Superior basin. In its infancy, the region that now surrounds Lake Superior experienced vulcanism, the remnants of which can be seen in stark rock formations on the lake's North Shore and Keweenaw Peninsula. What is now Lake Superior was a water-filled inland depression as many as 1.8 billion years ago. Iron suspended in the waters precipitated to the bottom; just as limestone forms in sea bottoms today, rich bands of iron settled in that ancient sea.

Later, ice sheets scoured the sea bottom, leaving the debris on what is now the uplands around Lake Superior. As glaciers receded, lakes formed, leaving sandy beach lines miles inland from the present-day lake.

Tectonic forces then raised the Gogebic Range — and the once-submerged layer of ore. Glacial lakes left behind unstable sand and red clay soils beneath Wisconsin's Superior counties: Iron, Douglas, Bayfield and Ashland. Glaciers left today's Lake Superior the deepest of the Great Lakes, and the largest fresh water lake in the world in surface area.

A FORGOTTEN SCHOOLHOUSE STANDS IN SILENT TESTIMONY TO THE HARDSHIPS FARMERS AND OTHER EARLY SETTLERS FACED IN THE WILD LAKE SUPERIOR REGION.

MEG TURVILLE-HEITZ

The Lake Superior Pierre Radisson found in 1660 was a stark, wild thing. A boreal forest of white spruce and balsam fir dominated the region, with hints of hemlock, sugar maple, yellow birch and mixed pine. Ancient white pines towered more than 200 feet above the land, holding the soils in place and shading the cool streams in which lake trout and lake sturgeon spawned. River estuaries provided shallows for spawning walleye and fishing grounds for wading birds.

Superior remained a wild place for two centuries after Radisson's visit. Neither the fur trade nor the early wars, when Lake Superior went from Native American to French to British to American possession, would change its wild character.

## A BOUNTY SQUANDERED

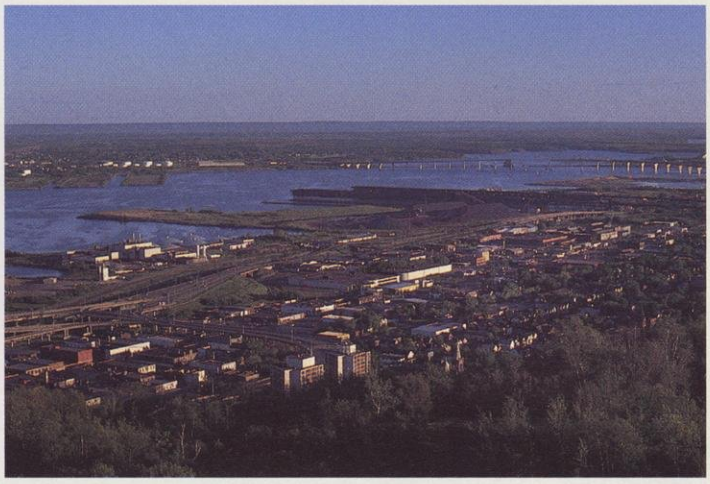
Yet Superior's secrets were bound to be revealed. The discovery of iron ore in the Gogebic Range in 1883 largely determined the future of the Lake Superior region of Wisconsin.

In just six years, from 1883 to 1889, a fur-trading post on the lake's southwestern tip grew into a thriving port city called Superior. Ship arrivals at the port increased from 21 per year to 900 per year. By 1900, Superior was the second largest city in Wisconsin. In 1955, more than 9,500 boats entered or left the Superior/Duluth harbor.

It was a region of superlatives: The great northern ore docks were the world's largest in the 1950s, with 37 million tons of ore shipped from Superior in 1955 alone. The Cary Mine near Hurley shipped 17 million tons of ore in its lifetime. The Montreal Mine in Montreal, Wis., shipped 44.7 million tons, for many years shipping more than any other Superior-region mine.

Both mines closed in 1965. The industry they once so productively represented was in sharp decline, but mining had brought people, steel manufacturing and rail shipping to the area. Mining also left behind water pollution problems.

Shipping products across the great inland seas continued the tradition of biggest and best that ore mining began. In 1958, Superior operated the 10 largest grain elevators in the world, and the largest coal briquette plant in America, with five coal docks. In 1983, Duluth/Superior was still one of the top three shipping harbors on the Great Lakes, equal with Thunder Bay, Ontario, and only smaller than Chicago.



TORSTEN KJELLSTRAND

THE TWIN PORTS OF DULUTH/SUPERIOR STRETCH OUT ALONG LAKE SUPERIOR'S SHORE. THE RICHES OF THE REGION — IRON ORE AND TIMBER — SHIPPED OUT FROM THE CITIES' DOCKS. SHIPPING REMAINS ONE OF THE ECONOMIC STALWARTS OF THE REGION TODAY.

About the same time as iron ore was discovered, the area's massive stands of white pine began to disappear. Wisconsin's four Superior lakeshore counties were cut over, the Apostle Islands completely denuded. Logging reached its peak in 1899.

Slash fires on the cutover landscape were widespread and intense. In 1908, the worst fire year in Wisconsin's history, 1,435 fires burned 1.2 million acres. Farmers were encouraged to settle the land, but most failed on the infertile soils in a region with a short growing season.

At one time, Wisconsin, Michigan and Minnesota provided a third of the nation's forest products. By 1939, the north central states supplied only 3 percent, largely due to the depletion of white pine.

## HARM TO THE FISHERY

When the tree roots that once stabilized the soil were gone, erosion occurred. In some areas, Lake Superior's clear waters clouded with red clay and sand. Sawdust and other woody materials in some rivers and estuaries choked the spawning areas once used by lake sturgeon, whitefish, and other native fish species. Sunken log rafts damaged native aquatic vegetation along shorelines, destabilized streambanks, and destroyed spawning grounds. In some areas, the inrush of nutrients may have caused algae blooms in Chequamegon Bay.

Fish populations declined in the late 1950s and early 1960s, hastened by aggressive commercial fishing, the accidental introduction of the parasitic sea lamprey, and localized damage to spawning and nursery habitat.

Other accidental aquatic arrivals — alewife, carp, rainbow smelt, white perch and ruffe — made successful inroads in the Lake Superior ecosystem, many of them challenging the native species for dominance.

Of the 73 fish species known to have occurred in Lake Superior and its tributaries in this century, the blackfin cisco is now extinct. Another 10 or more species were introduced accidentally or intentionally.

MIKE GARDNER

(ABOVE) UNSTABLE SAND AND RED CLAY BANKS CRUMBLE INTO WHITTLESEY CREEK. REVEGETATION WILL HELP STABILIZE BANKS, IMPROVING WATER QUALITY AND SPAWNING GROUNDS FOR COHO SALMON AND OTHER FISH. (LEFT) THE CRAGGY SUPERIOR COAST.

## WHITTLESEY CREEK PRIORITY WATERSHED

Whittlesey Creek, an important salmon and trout spawning stream, isn't a typical priority watershed project.

Generally, watershed projects address severe water quality problems caused by agricultural or urban runoff. "Usually you see a stream running through a farm and the cattle down on the banks and there's proximity to the problem," says Mike Gardner, the Whittlesey Creek project manager from the Bayfield County Land Conservation Department. "Here, the banks are too steep for cattle to get anywhere near the stream."

The upper portions of the small watershed are primarily forested, with springs that feed the creek; the lower areas are wetland.

Whittlesey Creek's problems stem from naturally unstable sand and red clay soils disturbed by human activities. The entire conifer forest in the area was logged and cutover in the early part of this century, then intensively farmed. The conifers, which held the soil in place and shaded the creek, were replaced by aspen.

"The Red Clay Interagency Committee did a lot of restoration between 1955 and 1967," says Gardner. "They got livestock out of the stream. They planted a lot of willow in the floodplain, which generated a different kind of problem. Huge, aged willow trees go down and take a whole chunk of the bank with them. In the soft clay areas, there's a tendency for the stream to blow out around the log jam."

One likely action will involve reintroducing conifer in the watershed. The project will look at encouraging landowners to reforest old crop land, and promoting selective cutting over clearcutting when appropriate.

Red clay, Gardner notes, is not as much of a problem as sand. "Red clay washes down and you can see the turbidity in the bay," he says. "Fish adapt to turbidity. It's not great for them, but it isn't as bad as the sand. Sand in the gravel beds smothers spawning habitat. Sand flowing downstream can batter the little fry coming down to the lake.

"Fish managers have estimated that 35 percent of the coho salmon that spawn in Wisconsin waters entering Lake Superior do so in Whittlesey Creek," Gardner says. "Due to the sand coming down, and the way the wind and wave action of the open lake work, there's a lot of sand deposited right at the mouth of the stream."

In-stream restoration will improve spawning habitat, encourage healthy populations of aquatic organisms, and improve the ratio of pool and riffle areas. Banks will be revegetated to prevent erosion. Fish managers also have considered maintaining a channel at the stream mouth.

MEG TURVILLE-HEITZ

# THE PRESENT

## RECOGNIZING THE VULNERABILITY OF A VAST AND COMPLEX NATURAL RESOURCE.

The four Wisconsin counties in the Lake Superior basin are in transition. Industries such as shipbuilding and wood products still dominate manufacturing, and forestry and farming — especially dairy — are still important interests. But the region's population is shrinking and the resource base has changed. No iron ore production occurs in Wisconsin today. The number of farms in the region declined by 15 percent in the last seven years. While forestry remains big, the forest that covers 82 percent of the four Wisconsin counties has changed. Most of the 2.4 million acres of forest is managed for commercial use, primarily for pulpwood, not saw timber.

Fisheries have begun to rebound. Lake trout and whitefish are recovering very well. Populations of lake herring — forage for other fish species — are strong. Most walleye and lake sturgeon populations are healthy, though some localized populations continue to be monitored by fish managers. Deep-water communities are recovering most rapidly with control of the sea lamprey.

Native brook trout populations, impaired by competition with introduced trout species, have been stabilized in stream headwaters over the last few decades.

Today, there are almost as many state and tribal commercial fishing licensees in Wisconsin as there were before the sea lamprey decimated the industry. But the quota of lake trout commercial anglers may harvest is half what it used to be, for fish restoration purposes.

The bones of past commercial fishing operations rot alongside the new outriggers devoted to sport fishing. Sport anglers are allotted one-third of Wisconsin's lake trout quota. Yet the sport fishers face an obstacle, too: Toxic contaminants such as polychlorinated biphenyls and mercury have accumulated in the tissues of many of the larger sport fish in the lake; as a result, some of the largest lake trout and walleye are not recommended for human consumption.

### PEOPLE: THE BACKBONE OF SUPERIOR'S NEWEST INDUSTRY

Tourism has become an increasingly important part of the Lake Superior economy. In the last 20 years in Wisconsin, Big Bay Park on Madeline Island has witnessed a 304-percent increase in visitors, while the Brule River State Forest has seen a 275-percent increase in recreational use.

Bayfield — the gateway to the Apostle Islands — has been the major beneficiary of the tourism boom in Wisconsin.

When Terry McGuire, captain and owner of Catchun-Sun Charter Co., started up his sailboat ride business in 1980, he was the first operator of his kind in Bayfield. "In 1988 I was by myself," he said. "In the past few years [the charter business] doubled, several times. There were five or six [operators] this last year." Since 1988, his business has grown 15-20 percent each year.

Despite the steady increase in visitors, McGuire isn't entirely satisfied with tourism as the only option for the area. "Controlled growth is good: more goods and services and light industry, something that provides year-round jobs," he observes. "More summer houses isn't necessarily what we need. I'd like to see everyone go through the winter without having to collect unemployment."

Some people worry that rapid growth might obliterate the pristine wilderness, citing the problems and conflicts related to development in Door County. McGuire and others don't see it quite that way.

"They aren't going to stick a golden arches out there on Stockton Island," he says. "We aren't going to pave everything and put up fudge shops. I don't think we have any kind of paranoia that we're going to become another Door County. And there's no big fears of kiddie parks and theme parks coming in. There's just nothing up here in winter for them to make a go of it. It's frozen here three months of the year."

He does note that winter tourism has been great for the area.

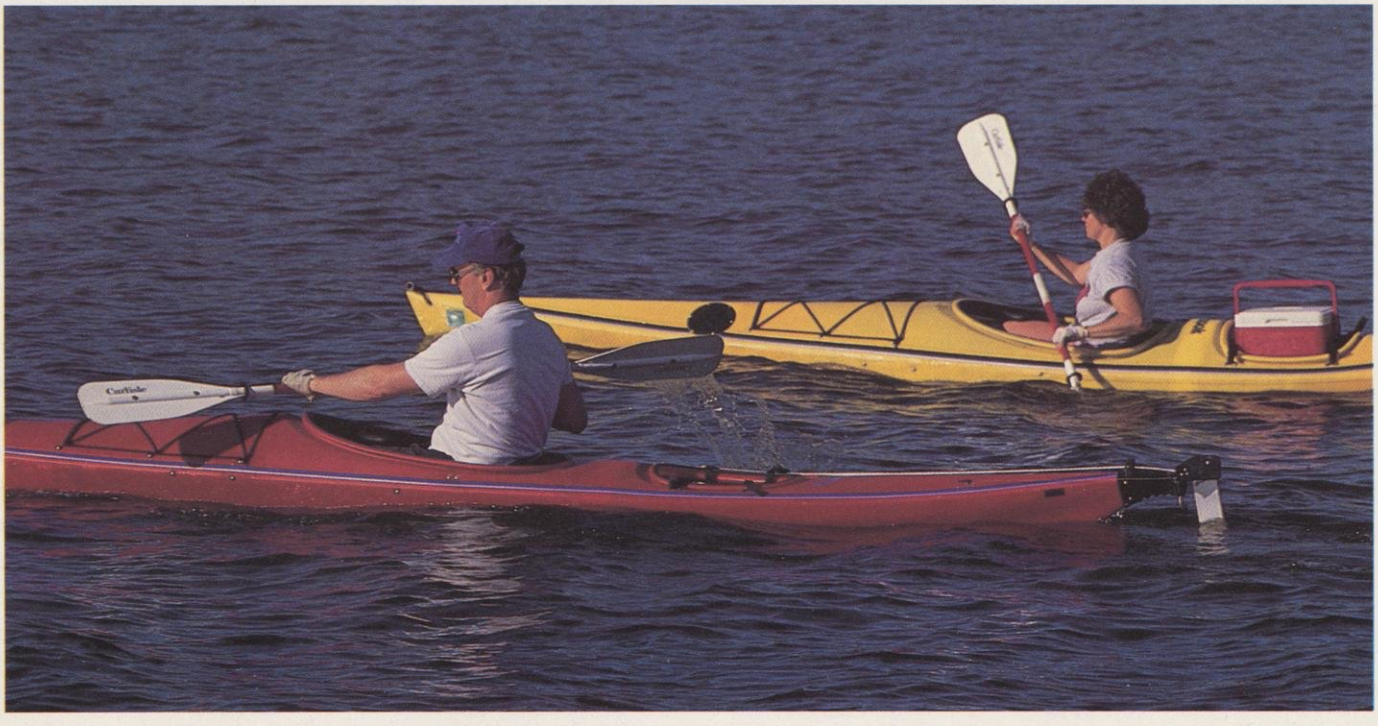
Others, such as Larry Balbear, who represents the Red Cliff Band of Lake Superior Chippewa on the Lake Superior Forum, a public advisory group on Lake Superior issues, says the key to protecting the region while preventing economic decline is to encourage ecologically friendly development.

The forum is grappling with a definition of ecologically friendly development. "We're looking at industrial development that's complementary, as in it doesn't deplete the resource or degrade it," Balbear says.

Balbear says tourism is one of

MEG TURVILLE-HEITZ

TOURISM HAS BROUGHT PEOPLE, JOBS AND A MUCH-NEEDED BOOST TO THE REGION'S ECONOMY. RESIDENTS SEEK GROWTH THAT DOES NOT COME AT THE EXPENSE OF THE ENVIRONMENT OR THE NORTHERN WAY OF LIFE. (ABOVE) CHECKING THE RIGGING IN A FOREST OF SAILBOAT MASTS, BAYFIELD. (BELOW) SEA KAYAKERS PLY SUPERIOR'S BRACING WATER.




TORSTEN KJELLSTRAND


those kinds of industries that can be ecologically friendly and sustainable. McGuire's sailboat charter company is one example of a recreational use that takes nothing from the resource.

"The idea is to bring people to the resource," says Balbear, "but minimize the pollution of development, such as through the sea kayak industry or camping in designated areas. It can be a four-seasons approach." He supports a 1,200-mile Lake Superior Water Trail as one such option.

In Duluth/Superior, development of a remedial action plan (RAP) for cleanup of the polluted harbor has blossomed into a desire on the part of the public for access to a cleaner resource.

Harvey Hoven, the Wisconsin co-chair of the citizen's advisory group to the St. Louis River RAP and an advisory services field agent for University of Wisconsin Sea Grant, says that the RAP is one of the instruments that's planting seeds for the future, a future in which the access to Lake Superior is no longer restricted by pollution. Although Superior continues to be a major working harbor, Hoven sees more emphasis being placed on walking trails, biking trails and harbor access.

"Water quality has been improving with new regulations from Minnesota and Wisconsin and our new sewage treatment plant," says Hoven. "We're getting more anglers, sailboarding, swimming. It's not directly related to the RAP, but it is an indirect result. And there's definitely a perception of improvement."



DNR PHOTO

COMMON TERNS, AN ENDANGERED SPECIES, LAY EGGS IN GROUND NESTS ON SANDY ISLANDS OR PENINSULAS. BIOLOGISTS PLAN TO BUILD NESTING AND REARING HABITAT FOR TERNS ON SANDBARS IN THE DULUTH/SUPERIOR HARBOR.

## WISCONSIN POINT HABITAT RESTORATION

A variety of projects on Lake Superior are aimed at restoring or rehabilitating habitat for birds, mammals and fish.

Wisconsin Point and Minnesota Point, which together form the longest fresh water sandbar in the world, span the Duluth/Superior harbor. The natural mouth of the St. Louis River passes between the two bars. The fringe of woods running down the center of the peninsula helps shelter large, shallow Allouez Bay.

The project targets nesting habitat for the common tern, a Wisconsin endangered species that has experienced problems throughout the country due to habitat loss. Terns nest on sandy, sparsely vegetated islands or peninsulas. Many of these sites have disappeared or become unpopular with the birds due to human activities.

"Terns are a ground-nesting, colonial bird that literally have all their eggs in one basket," notes Fred Strand, DNR project manager for Wisconsin Point. "They aren't spread out. With limited breeding sites, one event could wipe out a population."

Wisconsin Point sits just above river level. The birds nested on the Allouez Bay side of the point in the late 1980s, but they weren't very successful: Occasional high winds and waves sent the water up over the bar, destroying nests.

It isn't ideal habitat, but with engineering, wildlife managers could make a section of the point into artificial nesting and rearing habitat for the terns.

"We hope to develop habitat so it will be ready for the nesting season in spring of 1995," says Strand. But the nesting area must be protected from human disturbance. During nesting and rearing seasons, the area will be posted for no trespassing.

# THE PROGRAM

## FINDING WAYS TO WORK TOGETHER AS A REGION WITHIN AN ECOSYSTEM.

Tourism and the local rediscovery of the resource has led to a shift in the focus on Lake Superior. Just as the discovery of minerals led to the exploitation of the region's resources, the discovery of its wild beauty by tourists has been the impetus for restoring damaged areas and protecting the lake from further harm.

Due to a strong binational grassroots effort, the International Joint Commission (a group of U.S. and Canadian appointees responsible for overseeing the Boundary Water Treaty of 1909) recommended Lake Superior as a demonstration area where the discharge of certain long-lived toxic substances dangerous to the health of humans and wildlife would not be permitted — a concept referred to as "zero discharge." The action sparked an unprecedented binational effort to protect Lake Superior. A coalition of government agencies from the United States and Canada developed A Binational Program to Restore and Protect Lake Superior. This comprehensive program has grown into an effort that's gone beyond government in developing a plan for the entire ecosystem of Lake Superior — its land, air, water, wildlife and people.

Basically, the demonstration part of the program addresses the zero-discharge goals set by the International Joint Commission. "But it's much more than that," says Chris Grundler, director of the U.S. Environmental Protection Agency's (EPA) Great Lakes National Program Office, who also co-chairs the task force which has overseen the development of the program. "We need to look at

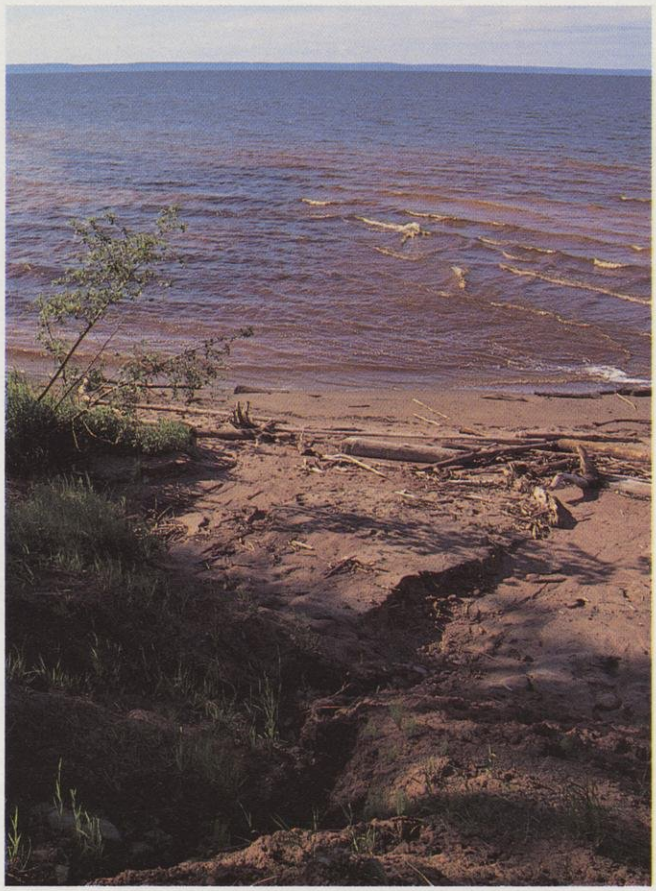
PEOPLE WORKING TOGETHER ON BEHALF OF THE LAKE SUPERIOR ECOSYSTEM: (L TO R) JOANNE PARKER, U.S. SECRETARIAT OF THE LAKE SUPERIOR FORUM; JANINE CHAISON AND PATRICK MORASH, THUNDER BAY REMEDIAL ACTION PLAN.


MEG TURVILLE-HEITZ

Lake Superior as an ecological system, make our goal one of achieving ecological integrity."

To do this, says Grundler, the program must establish environmental objectives and implementation policies that are common across the entire region, provide special protection for the areas through special designations and enhanced regulations, and set up a system for identifying what the key chemicals of concern are, where they come from and how to get rid of them.

"The best way of achieving zero discharge is through pollution prevention," he says. "We will make Lake Superior a pollution prevention proving ground through innovation."



MEG TURVILLE-HEITZ

EROSION CAUSED BY IMPROPER LAND USES THREATENS LAKE SUPERIOR'S CLEAR WATERS.

The ecosystem view and coalition effort are relatively new approaches on a program of this large scale.

"Minnesota, all by itself, no matter what it did, could not achieve a reduction in the toxic substances in Lake Superior," says Patricia Burke, water quality division manager for the Minnesota Pollution Control Agency. "All together we can make this difference."

"We view it as a top priority to preserve the ecosystem and to take the ecosystem approach, looking at cross-media regulation, aquatic and terrestrial issues, all as a total package," says Tracy Meehan, director of the Office of the Great Lakes for the State of Michigan. Bruce Baker, director of the Wisconsin DNR Bureau of Water Resources, notes that "we've learned from our efforts on Lake Michigan, where tremendous pollution problems have led to almost impossible remediation efforts, that it is better to protect the resource and control problems now."

But there would be no program without the public. The public's renewed interest in Lake Superior drew attention to the threats to it. And there could be no future for the lake without public input and cooperation.

## THE LAKE SUPERIOR FORUM

Prior to the announcement of the binational program, the Lake Superior Center, a nonprofit educational center in Duluth, pulled together an advisory group of people from throughout Lake Superior's basin to deal with the issues facing the lake. Ten U.S. and 10 Canadian "stakeholders," or interest groups, were represented on the Lake Superior Forum.

"The forum floundered in the first six months," says Gayle Coyer, organizer of the National Wildlife Federation's Lake Superior project and forum representative from the perspective of a large U.S. environmental organization. "The Center didn't know what it wanted to do or see."

When the binational program took shape, Coyer said the forum became the official public advisory body, and an entity that could do other things for Lake Superior as well.

"The forum is kind of a unique group of individuals with a lot to offer from varying backgrounds," says Steve Brand, water and wastewater utility manager for the Ashland Water Utility. He represents the interest of a municipal utility on the forum. "This is the kind of group that would not be sitting down together even five years ago."

The forum facilitates basinwide dialogue about reductions in the use and discharge of toxic substances. It is working to establish a zero-discharge reduction schedule and will hold workshops for companies and communities on financial incentives to reach zero. It reviews proposed management plans, and participated in the development of ecosystem objectives for the future of Lake Superior. The forum also conducted a survey to identify the barriers to reductions in pollutant use and to propose alternatives for overcoming those barriers. As a conduit for public education and input on issues involving Lake Superior, the forum co-sponsored Lake Superior Days, a celebration that occurred simultaneously in Thunder Bay and Ashland last summer.

# THE PROJECTS

## PLANNING CLEANUP STRATEGIES FOCUSED ON RESULTS, NOT PROCESS.

Recently, a draft lakewide management plan (LaMP) identifying the sources and reduction goals for nine targeted chemicals in Lake Superior was released for public review. The LaMP is the first stage of a planning process to identify ecosystem problems, the sources of the problems, and cost-effective strategies for restoration.

A pollution prevention strategy is a major element of the toxics reduction program. The strategy aims to identify the sources of pollutants and find ways to eliminate them. Training programs and facility inspections can help wastewater treatment plant operators identify problems and improve efficiency; household and agricultural Clean Sweeps collected thousands of pounds of hazardous waste; and other programs target voluntary reduction on industrial and individual levels.

Contaminated sediment projects evaluate cleanup options for toxic hot spots on the lake. Enhanced controls and regulations have led to new discharge permits for the Murphy Oil USA, Inc. refinery and the City of Superior.

These new permits include two key aspects not typical of wastewater permits. First, the facilities are asked to take pollution prevention actions: In Murphy Oil's case, looking for sources of pollutants, reducing the amount of certain pollutants, and recycling. Second, the permits require bioconcentration studies to determine if there are levels of chemicals lower than otherwise detectable. The studies monitor fish exposed over time to effluent discharged by the facility.

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HOG ISLAND INLET.

### HOG ISLAND INLET AND NEWTON CREEK SEDIMENT REMEDIATION

Hog Island Inlet and Newton Creek, which drains into the inlet, comprise a shallow, warm water area surrounded by wetlands. According to DNR project manager Scott Redman, this lovely setting should be an important fish spawning area. But beneath the inlet's calm waters lay sediments contaminated with polycyclic aromatic hydrocarbons (PAHs), heavy metals, and oil and grease. When the wind is just right, or when someone stirs up the sediment by wading, the waters give off a noticeable stench.

"We think it's mostly a historic discharge problem," says Redman. "There appears to be clean sediment atop old, oily sediments."

The project will attempt to demonstrate fast-track cleanup of contaminated sediment sites. "What we hope to gain is a process for cooperative cleanup efforts," says Redman.

Redman says that the sediments are toxic to organisms at the lowest levels of the ecosystem. "If we just look at the top predators, humans, predator fish, predator birds, they would likely appear unaffected," he notes. "But we can't be sure that lower levels of the ecosystem aren't poisoned. It's not as glamorous looking from the macroinvertebrates (small aquatic animals fish feed on) up, but this is also a habitat project. The biota are part of it."

The goal is to return this portion of the harbor to viable wetland, provide shallow-water breeding areas for fish, and reduce the flow of contaminants to the lake.

Cooperation from those whose discharges may have contributed to the problem is vital to the project's success. "We want to work together to get results quickly — to focus on the result, not the process," Redman says. He's pleased with the progress so far: "A relationship with Murphy Oil has been established, we've identified a lot of the work that needs to be done, and we've set an agenda. We didn't have that when we started."

If chemicals have been accumulating in fish tissue, the company must look for the sources of the chemical. In response to the need to protect Lake Superior waters, Murphy Oil is building a new treatment plant to meet permit requirements.

"I think (the program) is going to be expensive, as is the case with most new regulations," says Mark Miller, manager of safety and environmental control for Murphy Oil, one of the top five employers in Douglas County. "Most equipment and technology is extremely expensive. The easy-to-remove substances already have been done. It may not be physically possible to get every last atom out. We need a level for protection of health and the environment, but not at such a price that people can't stay in business."

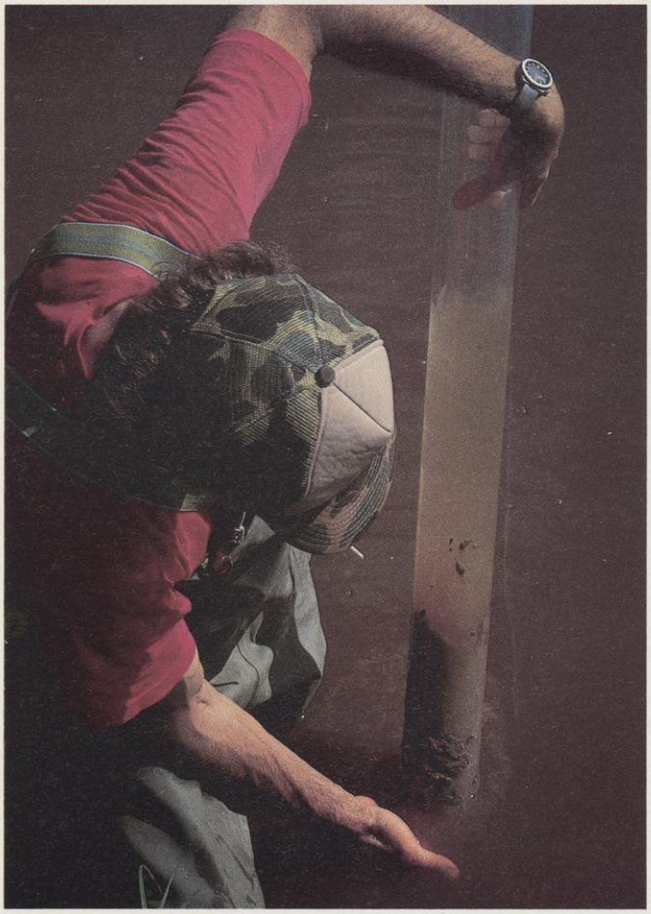
He adds: "There needs to be a middle ground between zero and throwing it all into the lake."

Gayle Coyer disagrees. "To us, preventive measures include saying no polluting industries will be sited in the basin, a prohibition of new or increased sources and phaseouts of those existing," she says. "We believe in the idea that this is a zero-discharge demonstration area."

Other projects underway include monitoring of the water, air, wildlife and plants in the basin to determine the condition of the lake's ecosystem, and establishing baselines for judging success in cleanup and preservation.

Large amounts of toxic substances enter the lake from the air. Particles released into the atmosphere fall on the lake as rain or snow. The lake's broad surface makes it a giant collector for airborne pollutants — not just from the Great Lakes region or North America, but from around the world. A new monitoring site has been established near the Brule River to track airborne pollutants.

DRAWING A SEDIMENT SAMPLE FOR TESTING. RESEARCHERS MONITOR POLLUTANTS IN THE WATER, AIR, WILDLIFE AND PLANTS OF THE REGION TO ESTABLISH BASELINES FOR JUDGING SUCCESS IN FUTURE CLEANUP AND PRESERVATION PROJECTS.



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Some work involves encouraging native wildlife through reintroductions and habitat improvement. One proposed project involves restoring aquatic vegetation in Chequamegon Bay. DNR Project Manager Fred Strand says the proposal is based on historical evidence that emergent vegetation was abundant in the bay.

"We're unsure of the causes of the decline, but we suspect it could be linked to the common practice of storing log rafts in the bay before they were processed," says Strand. The project would evaluate the feasibility of reintroducing aquatic species in an area that now lacks vegetation.

"A variety of fish, insects and waterfowl rely on such vegetation," Strand says. "It would likely help increase the number of fish in the area." However, he's uncertain if the aquatic plants would survive, deprived of sunlight in the cloudy, silty water near shore that's caused by red clay runoff stirred up by wind and waves.

Information and education is another key element of the program. Lake Superior Riverwatch is a tri-state effort to provide hands-on opportunities for students and the public to learn about river and lake water quality concerns. Students will conduct water quality monitoring and share data among schools, and learn about river ecology and pollution problems. "Frog watches" and community cleanups will be part of the Riverwatch program.

## CONSENSUS CAN BE ELUSIVE

Working together is a fine goal, but the truth of the matter is, it's hard.

"Obstacles include learning how to work in a holistic, integrated way," says Chris Grundler. "Diverse interests have to agree on key steps to make progress. It's even more complicated when you add three states and a foreign country."

Participants stress a need to work together to get anything done. That involves trust.

"It's difficult to be a member of the environmental community and


MEG TURVILLE-HEITZ

(ABOVE) STORMWATER GUSHES INTO A LAKE SUPERIOR BAY, CARRYING BACTERIA, HEAVY METALS, PESTICIDES AND OTHER POLLUTANTS. ESTUARIES, BAYS AND STREAMS ARE ESPECIALLY VULNERABLE TO STORMWATER POLLUTION. (RIGHT) WILDFLOWERS GRACE ONE OF THE MANY SMALL STREAMS FEEDING THE WORLD'S LARGEST FRESHWATER LAKE.

be involved in the program," says Coyer. "Things move exceedingly slow. We're continually frustrated, asking ourselves, 'Is this the right type of area to be in? Would we be better if we were outside of the process?'

"The reason the environmental community stays with representation on the forum is that it's an attempt to do something different and figure out a way to achieve zero discharge. That's why we haven't walked away. We've stayed to see if we can make a difference. As a program it's at least mouthing the words that are important to us."

"It can be frustrating," says Steve Brand of the forum. "There's so much to learn, so much to know. And it all affects people's lives, their jobs, the economy.

"It took time for everyone to get past looking for hidden agendas. And everyone needs to respect each others' perspectives. There have been some tense times."

"Some people will say we're not moving fast enough or far enough," says Grundler. "Others think we're going way too far too fast. It's the job of the forum to keep raising the bar higher for us to achieve. No one should make the mistake of thinking we're approaching Lake Superior with a business-as-usual attitude."

## LAKE SUPERIOR STORMWATER PROJECT

Rain flushes the residue of a city's streets and parking lots into storm sewers and directly into lakes and rivers, carrying a host of toxic substances: Oil and grease, phenols, nutrients, sulfate, phosphates, chloride, arsenic and heavy metals such as copper, lead, nickel and zinc.

"We're finding a lot of nasties in stormwater," says Jeff Prey, DNR Lake Superior stormwater project manager. Bacteria counts, for instance, are "magnitudes higher" in stormwater than what's found in industrial or municipal treatment plant discharges.

"The limit is 400 bacteria per 100 milliliters of water in a regulated discharge," says Prey. "In stormwater we're finding hundreds of thousands of bacteria per milliliter. Stormwater can kill fish. It can be acutely toxic when running off certain land uses. Then there are the combinations. Certain pesticides don't mix safely with copper, but your find them combined in stormwater. And even a non-bioaccumulative substance can, over time, kill an organism if it keeps digesting it."

"It may have a relatively small impact on Lake Superior itself," says Prey, "but stormwater can have a large impact on the bays, estuaries and streams where many creatures reproduce."

As part of the binational program, Wisconsin, Minnesota and Michigan are jointly conducting a stormwater project to assess this threat to water quality. Stormwater sampling occurs at communities in the Lake Superior drainage basin with populations larger than 5,000: Cloquet, Virginia, Hibbing and Duluth, Minn.; Superior, Ashland and Hurley, Wis.; Sault Ste. Marie, Ishpeming/Negaunee, Marquette, Ironwood and Houghton/Hancock, Mich. The water monitoring is only concerned with what runs off in stormwater, not with materials blown into the water by wind, such as dust.

Coal, sulphur, taconite and woodchip storage pile areas will be inventoried; a few will be monitored. The goal is to find out if anything is running off from the piles. If that's the case, a procedure to safely manage piles will be developed.

Prey says the monitoring will be complete by the end of 1994. The study will determine the total amount of contaminants flowing into the lake from each of the municipalities. From this information, a model can be developed which will help the communities plan to reduce the amount of pollutants in storm runoff.

One community in each state will be targeted for assistance with stormwater planning. While the management plans won't necessarily be binding, the community receiving assistance will need to be supportive for the plan to succeed.

MEG TURVILLE-HEITZ

# THE FUTURE

## MOVING FORWARD WITH PUBLIC SUPPORT TOWARD A CLEANER, HEALTHIER LAKE.

The future of Lake Superior is one where humans and the environment are not at odds. Some see it as a challenge.

"Murphy Oil will try to be a part of the future," says Mark Miller. "Like most industries, we want to see a pragmatic approach as the Great Lakes Initiative is initiated. Like all businesses, we feel regulating substances is fine and dandy as long as there is a good scientific basis for doing so. And you have to have the technology available, and affordable, to achieve the limits set. Murphy Oil would prefer that limits be set on a rational basis."

Larry Balbear sees a future full of long-term changes that will affect communities as cleaner industries are promoted. But he poses a pessimistic caveat: "I'm not fully convinced a lot of the changes we discuss will come to be in my lifetime. I'm seriously wondering if the various government units will make the kind of commitment, long-term, to maintain that focus before and after their [elected] terms."

Balbear doesn't want to see the task of program leadership relegated to the agency level of government, where visions and missions can be lost. He says it's up to the elected state, tribal and local officials to create and maintain some sort of vision for the future.

"Communities will determine a lot of directions," Balbear concludes. "They'll determine which policies will be relegated and which received." Things will flip-flop when people are upset about stricter regulations, he says, or each time a newly elected official takes office with a mandate for change.

MEG TURVILLE-HEITZ

WHETHER YOU LIVE IN THE LAKE SUPERIOR REGION OR ARE A VISITOR TO ITS SHORES, CONSIDER MAKING A COMMITMENT TO IMPROVING THE LAKE SUPERIOR ECOSYSTEM. PROGRESS HAS BEEN MADE, BUT RESTORING THE REGION TO FULL ENVIRONMENTAL AND ECONOMIC HEALTH IS A TASK THAT WILL SPAN THE GENERATIONS. THE TIME TO START IS NOW. (ABOVE) SANDY BOTTOM ETCHED BY THE EBB AND FLOW OF SUPERIOR'S WAVES.

There can be no turning back, says Chris Grundler, especially if an informed public drives the program. "People in and outside of government have invested too much," he says. "I don't see any possibility that we can go backwards. It's too late. The forum and the public in many cases are out in front of us and we're catching up to them."

But most forum members agree increased public involvement is a must.

"For a lot of people in the basin the program is just not on their radar screen," says Gayle Coyer. "It's a big challenge to understand."

Forum members recommend citizens get involved in RAP organizations, school programs, attend RAP and LaMP meetings, make a mission of private and public stewardship, and let their political voice be heard by local and state government.

Notes Grundler: "Everyone has a responsibility for the future of Lake Superior."

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