

## **A positive charge: hydroelectric plants join in the stewardship of Wisconsin's rivers.**

**[Supplement, Vol. 15, No. 1] [February 1991]**

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[Madison, Wisconsin]: Wisconsin Department of Natural  
Resources, [February 1991]

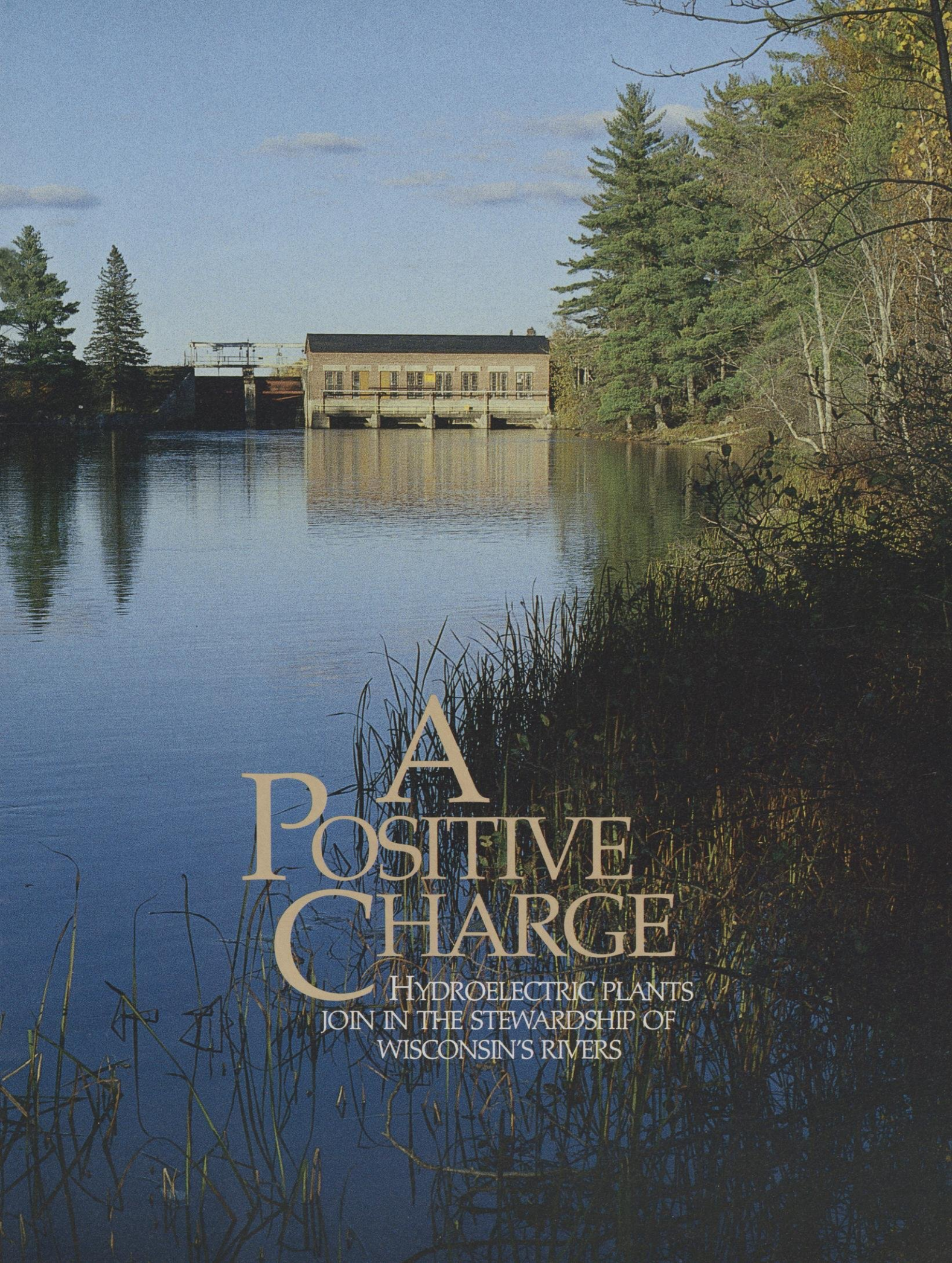
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# A POSITIVE CHARGE

HYDROELECTRIC PLANTS  
JOIN IN THE STEWARDSHIP OF  
WISCONSIN'S RIVERS





WISCONSIN ELECTRIC POWER COMPANY

Stained glass, decorative tile and ornate light fixtures grace Wisconsin Electric Power's Chalk Hill plant on the Menominee River in Marinette County. Built in the 1920s, the architectural treasure continues to produce power today.

# A RIVER RUNS THROUGH IT

Thorough relicensing helps hydroelectric producers and citizens understand the complex nature of river systems.

In the beginning, rivers had personalities. There were spring-fed streams gurgling with youthful exuberance. There were wide, silty ribbons of water meandering across the landscape tangled in oxbows. And there were bold, full-bodied rivers, whipped into a froth by obstructing boulders, charging downstream in a great rush of self-importance.

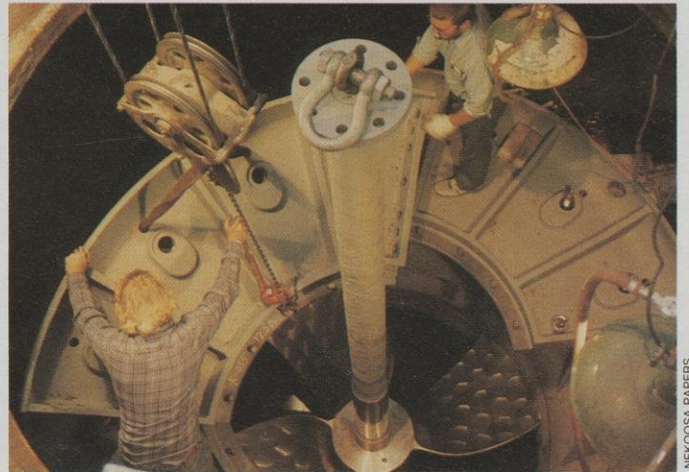
It wasn't long before people took notice of river personalities and decided it was time for some attitude adjustment. There was grain to be ground into flour. There were logs to be sawed into lumber and later, electric lights to be lit and pulp mills to be powered. Rivers had the energy; people had the technology — dams — to put that energy to work.

Now we're learning to live

with what we have built. Dams and hydroelectric plants provide flood control, cheap, clean energy, and increased acres of recreational waters. Yet a lack of firm environmental standards in laws established decades ago allowed some hydroelectric plants to become less-than-ideal neighbors.

Thanks to recent changes in federal regulations, people now have an opportunity to comment and make suggestions on how their dammed rivers should run. In the following pages, you'll learn how you can become involved in dam relicensing. You'll also meet personalities diverse as the rivers themselves, each with a stake in the future of a resource valued for as many different reasons as there are pebbles in a brook.

## The use and abuse of hydropower



NEKOOSA PAPERS

A new turbine propeller dwarfs installers at Centralia Dam on the Wisconsin River.

A dam harnesses the kinetic energy of falling water to serve human needs. Years ago, dammed rivers turned wooden

water wheels. Gears, pulleys, levers and belts attached to the shaft of the wheel transferred the hydropower to millstones



and saws. Later, the wooden wheels powered small electric generators. Appleton's Vulcan Street Plant, which opened for business in September 1882, was the world's first hydroelectric station. The electricity it produced powered the world's first commercially successful electric streetcar railway.

Today, large metal turbines spinning like giant submerged propellers generate electricity from artificial waterfalls created by dams.

Not all hydro facilities are alike. Some are architectural treasures, graced with stained glass windows, ornate light fixtures and decorative tile. At Superior Falls, a plant on the Montreal River owned by Northern States Power, the water drops over 120 feet before it reaches the turbines, while at Wisconsin Power & Light's Central Janes-

is a renewable energy source. Replenished each year by rain and snow, a river passing through a hydroelectric plant is never used up; the same amount of water entering the plant leaves the plant. But the river itself is no longer the same.

A dam ends a river's free-flowing days. A lake or pond forms behind the dam, becoming a reservoir where some hydro stations can store water during periods of low demand for electricity. When demand is high, the water is released and electricity produced. This saving/releasing process, known as "peaking," causes water levels behind the dam to fluctuate, sometimes several feet a day.

Beaches can be swamped when the water is high, while boats moored to buoys and piers can be stuck in mud when the water is low. High water



DAVID HEATH

The aftermath of a spin through the turbines. Special ladders and chutes can be installed to allow fish to pass around a dam unharmed.

ville Dam on the Rock River, the water falls less than 10 feet. Twenty-one dams on the Wisconsin River don't generate power at all; instead, they're used to regulate water flows for 26 hydroelectric plants downstream.

Power generation at Wisconsin hydro plants ranges from less than a half megawatt to 56 MW — enough to light homes in the cities of Stevens Point and Wisconsin Rapids for a year. Together, hydro plants produce approximately five percent of Wisconsin's electricity, about 1.5 billion kilowatt hours.

Like the sun and wind, water

levels conceal submerged logs and stumps — hazards for boaters, canoeists and swimmers. Soggy shoreline property erodes because the roots of grass and trees, which would normally anchor the soil, rot from an excess of water. Silt builds up behind the dam, clouding the water and covering fish spawning grounds; the water temperature rises, making the lake or pond less habitable for aquatic life.

When a hydro station stores water, little is released to the river below the dam. Water levels drop and streamflow slows to a trickle, stranding fish, mussels, other aquatic animals,



BRUCE NEEB

Trash racks in front of a dam act like strainers to keep debris from clogging turbines. Fish can slip through trash racks if the space between the bars is wide enough, but fish and debris may be pinned against the rack by the force of water.

and sometimes, people. Water released too swiftly, however, can wash out riverbanks and swamp boaters. Changing water levels downstream inhibit the growth of aquatic plants.

Hydroturbines present a special problem for a river's wet residents. As water gushes

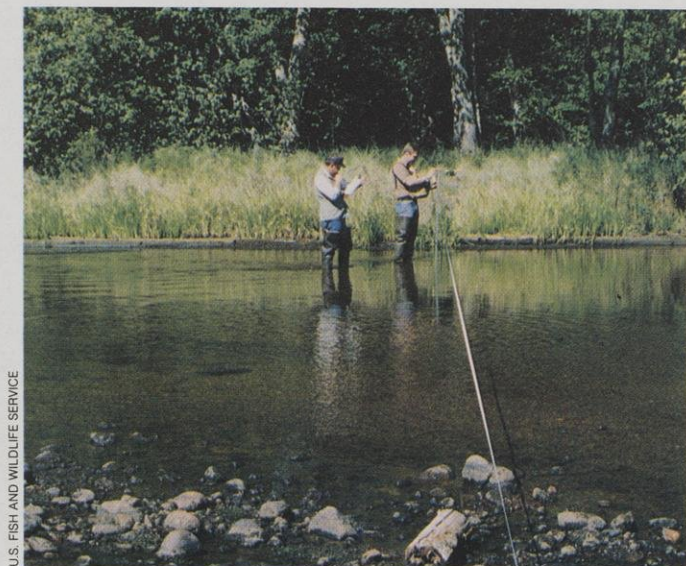
through the swiftly spinning metal blades, fish are carried along for the ride. It's a hazardous, often deadly journey; the fish may be decapitated or emerge minus a tail. Fish surviving the trip cannot leap across the dam and swim back upstream.



DAVID HEATH

Mussels, fish and other species, including humans, can be stranded when waters recede downstream from a dam. The mussel in the center has extended its foot in an attempt to creep back into deeper water, but it's a long walk.





U.S. FISH AND WILDLIFE SERVICE

Technicians measure the Tomahawk River's depth at various flows from the Willow Reservoir Dam to determine the best water level for fish and wildlife. Detailed environmental studies may be required by FERC before a hydroelectric plant can be relicensed.

## License to generate

It's a shame that one of the few nonpolluting sources of energy available can also cause environmental damage and human frustration. But the problems associated with hydropower are not insurmountable — and for the first time in decades, the people of Wisconsin have the opportunity to recommend solutions that will make hydroelectric plants better neighbors.

The invitation to comment comes from the Federal Energy Regulatory Commission (FERC), which licenses hydroelectric facilities on the navigable waters of the United States. A quick look at the legislative history of hydropower offers some insight into the commission's role in dam regulation.

Initially, hydroelectric facilities were licensed by the War Department, the predecessor of the Army Corps of Engineers. After 1920, licenses were given out by the Federal Power Commission, using guidelines established by the Federal Power Act of 1920.

In 1977, FERC was established to replace the Federal

Power Commission. Hydroelectric plants fell under its jurisdiction, but the licensing of hydro plants still hinged on requirements set down in the Federal Power Act of 1920.

Environmental degradation wasn't much of a concern to the public during the era when the act was passed, and the act reflected this disinterest. Companies seeking hydro plant licenses had only to guarantee that there would be enough water for navigation.

In later years, the act sprung a leak: Weaknesses became apparent as people became more aware of the impact of hydro plants on river ecology. In 1986, Congress passed the Electric Consumers Protection Act to add environmental criteria to the old Federal Power Act. Now, in addition to assessing a plant's ability to generate power, FERC must give equal consideration to non-power issues, such as fish and wildlife habitat, recreational use and environmental quality before deciding whether or not to grant a license.

## How does FERC work?

FERC relicensing is a balancing act, weighing the consumer's need for clean, cheap energy with the public's desire for outdoor recreation and a healthy environment.

The relicensing process begins five years before a plant's license expires. A number of state and federal agencies, including the Wisconsin Department of Natural Resources, the State Historical Society, the U.S. Fish and Wildlife Service, the Environmental Protection Agency, the Army Corps of Engineers and the Great Lakes Indian Fish & Wildlife Commission work with FERC and the license applicant, collecting data to evaluate the hydro plant.

Public meetings are held in the first phase of relicensing for

backed up by facts receive closer consideration than requests based solely on opinion.

Based on the compiled information and comments, the potential licensee prepares a draft application that's reviewed by the consulting agencies. In this second phase, the applicant and the resource agencies negotiate on measures to minimize the impact of the hydro project on the environment.

Two years before the license expires, a final application is submitted to FERC. The document is made available for public review. FERC will again take comments on the application and will also consider petitions to appeal decisions on a project.

Thirty-seven of the licenses granted to Wisconsin hydro-



DNR PHOTO

Dammed rivers provide acres of recreational waters for anglers and boaters, but shoreline property owners may be swamped or left high and dry with a river's rise and fall. Citizens can seek more public access to river flowages and gentler fluctuations in water levels through the FERC process.

citizens to share their ideas on safety, resource and recreation issues associated with the project. Lakeshore property owners might voice concerns about water levels. Communities may desire more public access to reservoirs, or a conservation club submit a petition for a fish ladder to be installed at the damsite. Specific concerns

electric plants under the Federal Power Act will expire in 1993. The owners will apply in 1991 for new licenses under the Electric Consumers Protection Act, and their final applications will be open to public comment. Contact DNR's Bureau of Environmental Analysis and Review (see box) for details.



## Speak now or forever hold your peace

The FERC relicensing process may seem lengthy and cumbersome, but it allows a maximum number of people to express their opinions about hydroelectric plants and river resources. Whether given personally or through governmental agencies, your comments on river management must be considered by hydroelectric plant owners and FERC.

Once a license is granted, it's valid for 30 to 50 years. So it's important for people to speak up for environmental controls and public access when a hydro

facility is up for relicensing.

Careful relicensing ensures a river will be viewed not as an individual waterway, but as a portion of a whole aquatic system. We can take the time to work out a balance between conflicting river uses, or we can leave the problems to our children and grandchildren to tackle a half-century from now.

Wouldn't a more valuable bequest be rivers that produce clean power, yet bear some semblance of their former personalities?



Dams spell danger for unwary boaters. Heed buoys, signs and other watermarkers.

*For a copy of "The Hydropower Relicensing Process," a booklet to guide you through the FERC commenting procedure, write:*

Wisconsin DNR  
Bureau of Environmental Analysis and Review  
Box 7921 • Madison, WI 53707

In a state with more hydroelectric plants due for relicensing than any other in the country, Lloyd Everhart works for one of the industry leaders. By itself, Northern States Power generates half of Wisconsin's hydroelectricity. NSP's 19 hydro plants account for 22 percent of the utility's power generation, and the company's 56-megawatt Jim Falls facility on the Chippewa River is the biggest in the Midwest.

As NSP's administrator for hydro relicensing, Everhart has an unique view of the industry's history, including an appreciation for turn-of-the-century plants continuing to generate power on the nation's rivers. The fact that some of those plants may be eligible for inclusion in the National Register of Historic Places leaves NSP caught between two sets of federal regulations with potentially conflicting requirements.

"We don't know the repercussions of a listing on the National Register," Everhart says. "It could tie our hands as far as things we can do with maintenance and upgrades at the facilities. It's amazing — some of these plants are in excess of 80 years old and they're still operating with just preventative maintenance and occasional concrete work at the dam."

Everhart says he's concerned the costs associated with



*"We're  
willing to  
sit down  
and talk."*

LLOYD EVERHART

relicensing may be enough to prompt owners to retire or abandon some small hydro plants. He offers NSP's project on the Namekagon River in the city of Hayward as an example. After requests from the DNR and the U.S. Fish and Wildlife Service for an estimated \$50,000-plus fisheries population assessment and a \$120,000-plus fish passage study, NSP considered abandoning the plant. "The present worth of that project to us is in the neighborhood of \$135,000 over a 30-year period," Everhart says. "Those two studies alone would exceed the worth of the project to us."

Everhart says DNR is willing to help with the work so long as NSP provides funding. "The impoundment up there, Lake Hayward, is an asset to the community," he observes. "And if we weren't able to profitably operate the project, we'd have to sell it or apply to FERC for abandonment."

By looking for a middle ground, NSP and the agencies reached an agreement allowing the company to continue working toward relicensing on the Hayward project. Says Everhart: "If people are willing to sit down and talk, I think things probably can be worked out to the satisfaction of both sides."



## WISCONSIN HYDROPOWER FACILITIES REGULATED BY FERC



Of the 10,000 dams in Wisconsin, only 150 produce hydropower. (The rest serve as flood controllers, flow regulators or, in the case of abandoned dams, picturesque reminders of the past.) Over half of Wisconsin's hydro facilities — 81 plants — are subject to FERC regulation. In 1991, 37 Wisconsin hydropower plants will apply for new FERC licenses. The applications will be available for public comment.

### HEADWATERS (Wisconsin Valley Improvement Co.)

- H1 Lac Vieux Desert
- H2 Twin Lakes
- H3 Buckatahpon
- H4 Long Lake
- H5 Little Deerskin
- H6 Seven Mile Lake
- H7 Lower Nine Mile Lake
- H8 Burnt Rollways
- H9 Sugar Camp
- H10 Little Saint Germain
- H11 Big Saint Germain
- H12 Rainbow
- H13 Minocqua
- H14 South Pelican
- H15 North Pelican
- H16 Pickerel
- H17 Squirrel
- H18 Willow
- H19 Rice (Lake Nokomis)
- H20 Spirit
- H21 Eau Pleine

### WISCONSIN

- W1 Rhinelander
- W2 Kings (Lake Alice)

- W3 Jersey
- W4 Grandmother Falls
- W5 Wausau
- W6 Rothschild
- W7 Mosinee
- W8 Stevens Point
- W9 Wisconsin River Division
- W10 Biron 2
- W11 Wisconsin Rapids
- W12 Centralia
- W13 Port Edwards
- W14 Nekoosa
- W15 Petenwell
- W16 Castle Rock

### CHIPPEWA

- C1 Snaptail Rapids
- C2 Holcombe
- C3 Wissota
- C4 Chippewa Falls
- C5 Dells (Eau Claire)

### FLAMBEAU

- F1 Upper
- F2 Lower
- F3 Pixley
- F4 Crowley Rapids
- F5 Big Falls
- F6 Dairyland
- F7 Thornapple

### PESHTIGO

- P1 Caldron Falls
- P2 High Falls
- P3 Johnson Falls
- P4 Sandstone Rapids
- P5 Potato Rapids
- P6 Peshtigo

### MENOMINEE

- M1 Brule Island
- M2 Twin Falls

- M3 Pine
- M4 Kingsford
- M5 Big Quinnebec
- M6 Little Quinnebec
- M7 Sturgeon Falls
- M8 Chalk Hill
- M9 White Rapids
- M10 Grand Rapids

### ROCK

- R1 Janesville (Central)
- R2 Beloit (Blackhawk)

### OTHER HYDRO DAMS

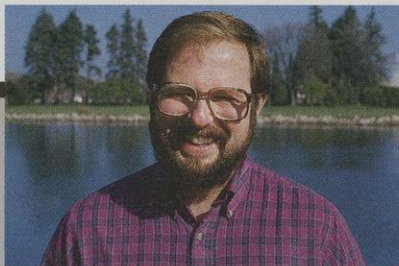
- Z1 Superior Falls
- Z2 White River
- Z3 Hayward
- Z4 Trego
- Z5 Cedar Falls
- Z6 Menomonie
- Z7 Black River Falls
- Z8 Balsam Row (Shawano)
- Z9 Weyauwega
- Z10 Little Chute
- Z11 Combined Locks
- Z12 Upper Oconto Falls
- Z13 Lower Oconto Falls
- Z14 Stiles



Neal Kutchery had worked in the DNR's Marinette Area Office for nine years when, back in 1987, a surge of hydro relicensing projects showed up on his desk. As the area's water management specialist, the task of coordinating DNR review of dam relicensing on the Menominee and Peshtigo Rivers fell naturally on his shoulders. Experienced in the permitting process for bridges, boat shelters and other types of waterway modifications, Kutchery quickly found himself swamped in hydroelectric plants.

Of 18 hydro plants regulated by FERC in Kutchery's assigned area, 12 have licenses due to expire by the end of 1993. Kutchery says it didn't take long to discover the tasks associated with his projects were more than one person could handle. "I don't think anyone knew how big a project this would actually be," he says.

Kutchery and area fish manager Tom Thuemler have been immersed in the task of assisting relicensing applicants. A team representing nearly every program in the department helps out. "Fish and wildlife management, recreation, forestry, water quality, land management, law



BETH SABATINO

*"Consider the quality of life."*

NEAL KUTCHERY

enforcement, endangered resources, they're all a part of it," Kutchery says.

While he appreciates the beauty and ruggedness of the reservoirs and river channels surrounding the dams, Kutchery acknowledges that "dam duty" can be a tough assignment: "People who do studies on the dams and around the gates are very aware of the danger involved."

The greatest challenge, Kutchery admits, can be convincing license holders that environmental studies need to be done. "Some of these studies can be very expensive and the utilities are concerned that they may not be necessary," he says. "But these are the only sources of information we have to determine the impact of the dam."

Kutchery says he's been frustrated by poor attendance at public hearings and a lack of interest in what's being done. But he's comfortable asking that hydroelectric plants take better care of the environment. "It's a challenging situation, realizing what's happening around the world with the price of oil," he says. "But I think it's very important to consider the quality of life and quality of environment we're creating for the century to come."

Sue Rowan wasn't born on Trego Lake. But today, her efforts on behalf of the people who live on this flowage are shaping the operations of the Northern States Power Company's 1.2-megawatt Trego Dam. A tiny resort community north of Spooner, Trego is a long way from Chicago, where Rowan first started her family. Eighteen years ago, Rowan says the lake and the quiet convinced the family to stay and build their own small resort with four housekeeping cottages.

"Our guests used to catch northern pike, walleye and panfish right off the dock here," she says. "My son and his friends would troll right in front of our home and catch their limit of walleye. Now you can't troll, you can't even get through. I had six feet of water at my dock at one time, now I have two."

Rowan says bridge construction upriver generated sediment and the backwater created by NSP's 1920s-vintage dam allowed it to accumulate in Trego Lake. It was 1985 when residents on the lake first noticed shallower water and an increase in weed growth. "This is my



JIM BISHOP

*"This is my livelihood."*

SUE ROWAN

livelihood," Rowan says. "So I sent out bulletins and got all the neighbors involved and we had about 150 people there at our little town hall. That was our very first meeting."

Today, the Trego Lake District includes 70 members. They've hired an engineer who's advised them the lake might be partially restored through a combination of dredging and sediment traps upstream. The district has asked NSP to help as a condition of the Trego Dam relicensing process.

"We feel that for 63 years they've been generating power and collecting money," Rowan says. "Now they should try and do something for us. NSP can walk away, but there's a bay here with 20 private homes

and two other resorts in addition to ours. These people have invested their life savings in the lake."

Rowan feels her group and NSP are learning from the experience: "They're listening to us. They've given us a package explaining all the things they need to do. At the beginning they were saying there were just a few homes along the river here, but now they're beginning to understand there are more people up here than they realized."

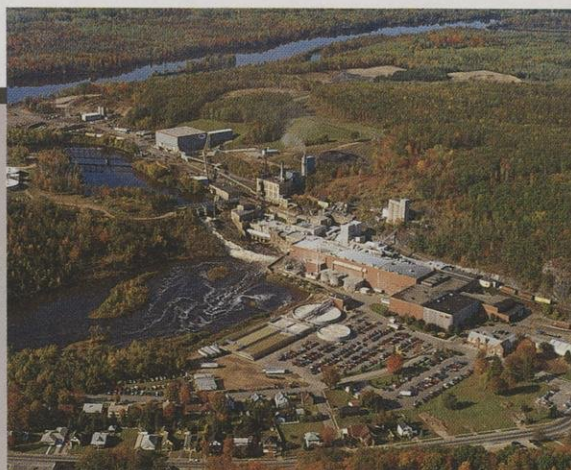


As hydro electric plants go, the one powered by Little Quinnesec Falls on the Menominee River might be placed in the "little engine that could" category. Built in 1900, the plant lies amidst the rock bluffs of Wisconsin's border with Michigan's Upper Peninsula. Each day it shapes the lives of roughly 2,000 people in the Village of Niagara.

While the plant's turbines do nothing to fuel or light homes in the village, they play a key role in the local economy. From 8 a.m. to 8 p.m. each day, they provide the power to run huge wood grinders and processing equipment for the Niagara Paper Company. The village's only large private employer, the company has been producing paper in Niagara since 1889. As environmental manager for Niagara Paper, Dave Schmutzler has the job of making sure the company's hydro plant keeps running with a renewed license after its existing license expires in 1993.

Schmutzler describes the dam's electric power contribution as "extremely important" to Niagara Paper's operations. "If we had to purchase all the power we'd be looking at an additional three million dollars in operating costs on an annual basis," he says. The plant uses water from peak flows at Big Quinnesec, a Wisconsin Electric facility upstream, to fuel peaking and ponding operations.

The DNR is asking Niagara Paper to level off the



Little Quinnesec Falls on the Menominee River powers a paper mill vital to the local economy of a northeastern Wisconsin community.

NIAGARA OF WISCONSIN PAPER COMPANY

plant's operations at a time when the company had been hoping to boost electric output. "Approximately 35-40 percent of the year, we're passing more water than we can actually utilize for hydro generation," observes Schmutzler. Levelling out the flow from Big Quinnesec would force the company to let even more water pass by

unused. While studies show fish habitat and portions of the river bed have been washed away by the flow from Little Quinnesec during peak operations, Schmutzler says there is excellent fishing less than two miles downstream. He said the company plans to add a small boat access to help area anglers get to the hot spot.

Schmutzler decries the confusion caused because the Wisconsin DNR, Michigan DNR and U.S. Fish and Wildlife Service are all making requests of the company. The whole process of seeking relicensing, he says, has proven far more expensive than the company anticipated. "We'll probably

spend \$500,000 to \$600,000 on studies and associated costs," he says. "I don't think the people who wrote the laws realized what they were asking of us."

"We've got some conflicts we'll need to resolve, but overall, I think we'll come out of this in fairly good shape," he says. "I don't anticipate any major problems. The people we've been dealing with on a local basis have been very cooperative."

*"We've  
got some  
conflicts to  
resolve."*

DAVE SCHMUTZLER



DNR PHOTO

Often called the nation's hardest working river, the Wisconsin River thunders through the Prairie du Sac Dam.

On the cover: Pixley Dam on the North Fork, Flambeau River by Bruce Neeb

Produced by the DNR Bureau of Environmental Analysis and Review  
Written by Maureen Mecozzi, Bruce Neeb and Beth Sabatino • Map by Julee Barnett  
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PUBL-EA-003