Big steelhead returning from the big lake can get their start in little tributary streams that DNR teams and sports clubs are working to recover.

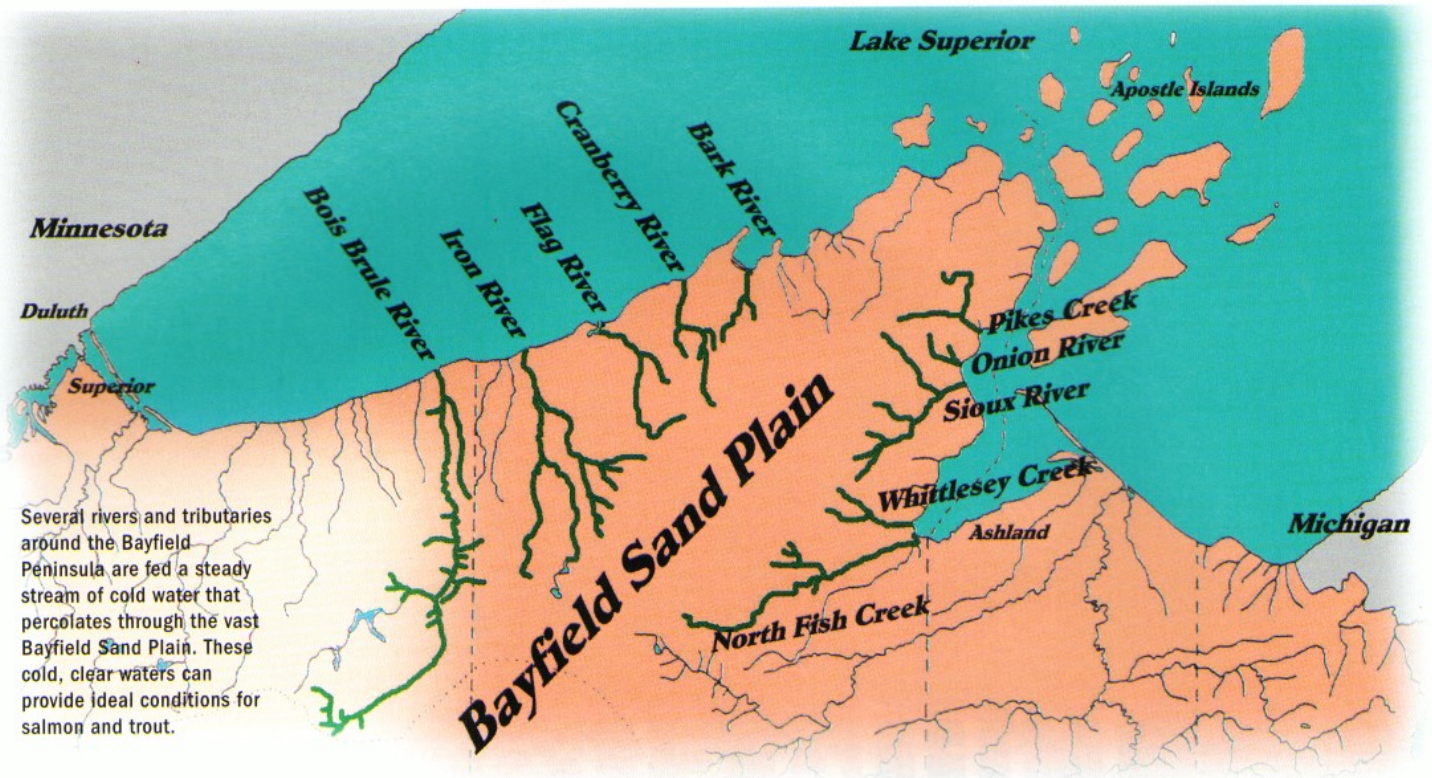
Little streams feed a big fishery

Better trout and salmon fishing along the Lake Superior shore starts in the small streams and rivers flowing into the big lake.

Dennis Pratt and Bill Blust

The Northwoods is a land of pine and water. For the occasional traveler, a road trip heading east from Superior to Iron County cuts through forests where swift, cold rivers are pummeled into foam as the water tumbles over the black rocks and waterfalls. Memorable tourist stops include Big Manitou Falls, Amnicon Falls, Copper Falls and the Potato River Falls.

However, if you take a slower trip at bird's-eye view along the Lake Superior coast, you'll see a very different landscape, one predominated by red clay bluffs and sand. It's a land where streams and small rivers ribbon through soft soils as they flow into the south shore of the lake. From west to east, you'll cross the Bois Brule, Iron, Flag, Cranberry and Bark rivers on the west side of the Bayfield Peninsula; and Pikes Creek, the Onion and Sioux rivers, Whittlesey Creek, and North Fish and South Fish creeks as you head around Chequamegon Bay toward Ashland. These waters produce the lion's share of trout and salmon that feed into the big lake.



Most of the streams in this region drain shallow aquifers near the surface, but these rivers are fed by cold groundwater that collects under the Bayfield Sand Plain, a layer of almost pure sand several hundred feet deep extending from the headwaters of the Bois Brule in a northeasterly direction through the center of the Bayfield Peninsula. Rain and snow falling in this region are quickly absorbed into the soils and may be stored in the aquifer for up to a century before seeping into the headwaters of these streams and rivers. The cold, clean waters provide ideal growing conditions for aquatic insects and fish. Steelhead, brown trout, coho salmon and smaller numbers of brook trout, chinook and pink salmon migrate up these tributaries to spawn. The trout and salmon lay their eggs in gravelly reaches. The eggs incubate over winter and the fry emerge in early spring; spring-spawners (steelhead) deposit eggs that won't emerge until early June. The newborn fry are less than an inch long. They spend from one to two summers growing in the stream environment before they migrate down to Lake Superior to find larger prey and continue to grow to adulthood.

Fisheries managers estimate the populations of both juvenile and adult fish migrating from these rivers into Lake Superior each spring and fall.


Beaver dams on these waters block migrating fish, bury spawning areas and kill riverside forests. Monitoring the streams, reducing the number of beaver dams and controlling beaver populations are important strategies in restoring the fishery.

DNR PHOTO

Records showed the number of fish surviving to reach the big lake started dropping quickly in the mid-1980s; the decline prompted fisheries agencies around the lake to find the cause and search for ways to reverse the precipitous trends.

One culprit appeared to be beaver. Biologists have long known beaver dams on these sand and clay-based streams easily form barriers that prevent migrating fish from reaching their upstream spawning grounds, so beaver control became an important strategy for the fisheries teams. Starting in the mid-'80s, beaver populations began rising as fur prices dropped and fewer trappers found it worth their while to harvest beavers. Wisconsin DNR wildlife staff did aerial surveys to pinpoint beaver dams, produced maps showing dam locations and offered bounties to entice more trapping, but these incentives failed because fur prices remained low. Agencies resorted to using trout stamp funds to hire federal trappers to remove problem beavers and dams. The combination of trapping and dam removal brought desired results. Fish populations started to rise, and today trapping on 117 miles of tributary streams remains an important

strategy. Air and ground surveys check the major rivers and streams in the area before the fall spawning season. Problem dams are noted, mapped, trapped out and removed. Streamside landowners are important partners in reporting problems and providing access to trappers.

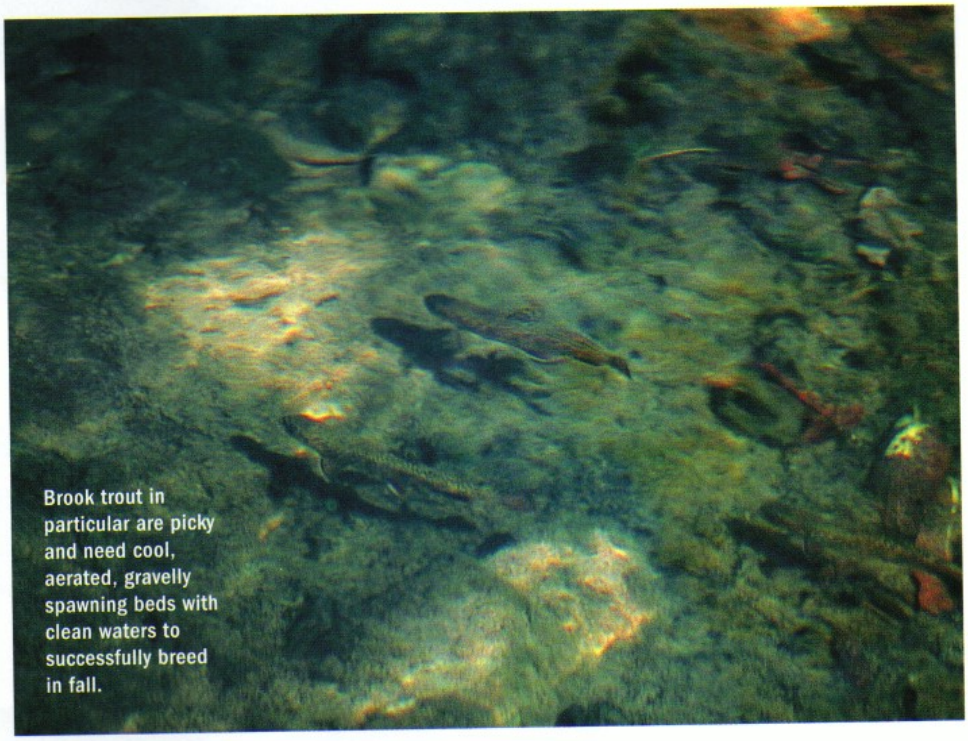
Biologists also noted that as lake trout populations rebound in Lake Superior, the young trout and salmon migrating from streams into the big lake face two additional challenges: the stream trout must compete with lakers for dwindling amounts of food, and the smaller stream fish themselves become food for the larger, swifter and more experienced lake trout. Tightening bag limits for anglers and raising the minimum size limits for harvesting trout and salmon helps to compensate for these losses.

Fisheries managers also began more intensive research on the tributary streams to tease out other factors that were reducing the survival rates of juvenile trout and salmon. Stream surveys on the Brule River over four years (1987-91) showed how high, fast water takes its toll on young fish. Trout and salmon are strong swimmers able to battle strong currents as adults, fighting their way upstream and passing barriers to reach spawning grounds in riffles of cool, oxygen-rich waters. However, these same fish turn out to be very vulnerable to the whims of fast-moving, quick-rising waters in the eight months it takes for fertilized eggs to grow into two-inch fingerlings. Untimely floods can dislodge eggs or quickly cover them with a smothering layer of silty red clay soil or sand. Flood waters may kill newly emergent fry and small fingerlings that are still weak swimmers.

Searches of historical records and recent studies by the U.S. Geologic Survey on North Fish Creek, the Bark River, Sioux River, Whittlesey Creek and the Cranberry River verified that floods in recent years are more than twice as powerful as floods during presettlement times. Extensive logging and subsequent development removed a lot of the natural cover that slowed down runoff, rain and snowmelt. Floods changed the character of some stream segments and even destroyed spawning reaches on the middle and lower portions of some Bayfield Peninsula streams. The studies suggest it is especially important to slow the flow of snowmelt and rainwater draining off the land just upstream of river reaches that provide spawning habitat and rearing areas for fish.

Strong flooding on lower reaches of these tributary waters dislodged eggs, smothered redds, overcame young fingerlings and washed out stream improvements. Clearly, stream recovery needed to start farther upstream to restore streambank habitat and slow the flow of snowmelt and runoff.

DNR PHOTO



Brook trout in particular are picky and need cool, aerated, gravelly spawning beds with clean waters to successfully breed in fall.

DON BLEGEN

Rebuilding spawning grounds

What corrective measures might help fish? One river where it's easier to gauge success is the Bois Brule. The river has a lamprey barrier and a fishway with a large glass window where returning trout and salmon can be counted and observed. Moreover, the Brule is a favorite with anglers, and stream improvements here provide a lot of recreation. A first step in helping more fish survive here was setting more restrictive fishing regulations to protect juvenile fish, the trout residing year-round in the river and returning spawners.

Next, fish managers worked to restore spawning grounds, particularly

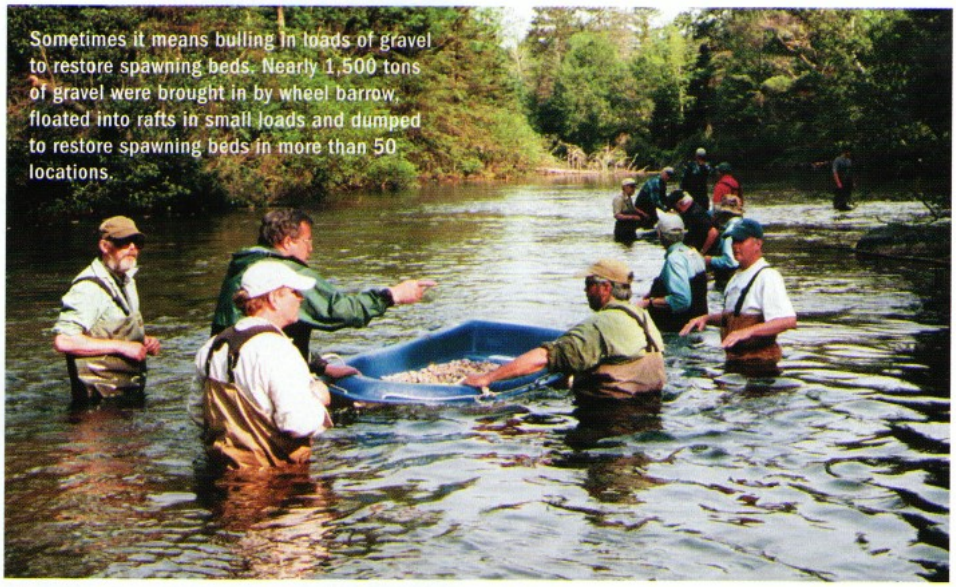
Streams and rivers recover foot by back-breaking foot. Sometimes that means adding structures like logs to create deeper channels, increase water flow and scour the stream bed to help restore gravelly bottoms.

DNR PHOTO

above County Highway B. Research has shown that juvenile fish depend on the cover near their spawning beds to survive their early days; survival drops off quickly in open downstream areas. State crews funded with trout stream money along with volunteer help from the Brule River Sportsman's Club hauled in nearly 1,500 tons of washed, uncrushed gravel to artificially rebuild spawning beds at 50 locations on the upper Brule.

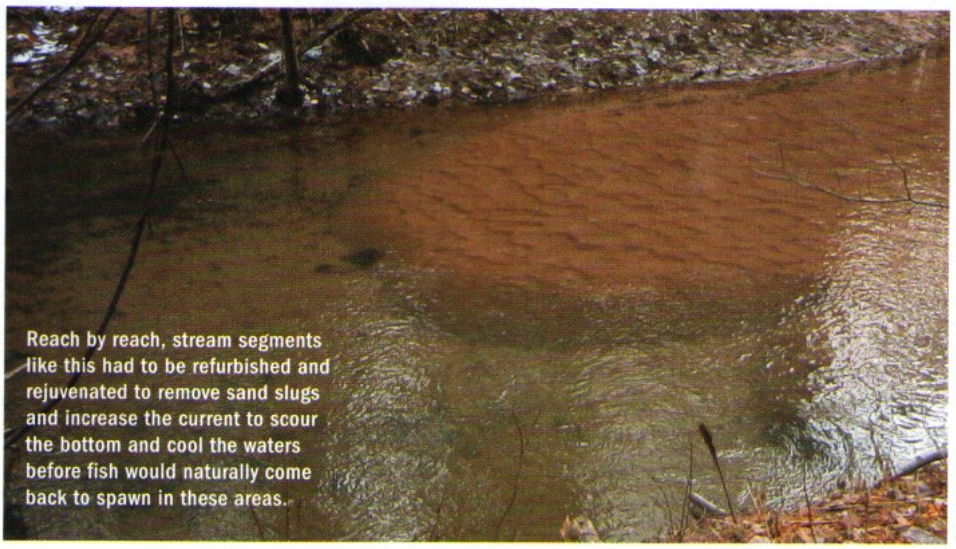
Over the last century, small woody debris, much of it tag alder, had fallen into many upriver feeder streams, collecting sand and burying the stream channel to depths of one or two feet. That made the streams wider and shallower, slowing down the water and limiting the flowing water's ability to flush out sandy sediment.

DNR trout habitat crews removed debris and cut and pulled out alder. Water started flowing faster and the stream naturally cut deeper channels, exposing gravel and uncovering large logs that could provide cover. Portions of nine high-quality feeder streams on 8.3 stream miles were restored. Finally, managers experimented with installing large logs in different patterns to provide overhead cover and channel water so it would scour sand and soft bottom mud, exposing streambed gravel. These



Sometimes it means bulling in loads of gravel to restore spawning beds. Nearly 1,500 tons of gravel were brought in by wheel barrow, floated into rafts in small loads and dumped to restore spawning beds in more than 50 locations.

FRANK KOSHERE



Reach by reach, stream segments like this had to be refurbished and rejuvenated to remove sand slugs and increase the current to scour the bottom and cool the waters before fish would naturally come back to spawn in these areas.

DNR PHOTO

restored waters are monitored annually for spawning activity and hatching success.

Efforts to restore trout and salmon on other tributary streams along the Bayfield Peninsula historically met with limited success. The in-stream tactics we tried on the lower stream portions and rip-rapping to control streambank erosion were too easily washed away by flood waters. These lower areas drain red clay soils and are subject to the same flood conditions that muddy waters on the lower Brule. Sands continue to fill in and bury the native gravel fish depend upon for spawning. Just as on the Brule, restoring these rivers will have to start upstream on the headwaters by clearing debris, removing beaver dams, increasing the water flow rate and uncovering buried spawning habitat. To date, DNR crews have restored about 5.7 miles of several streams – two tributaries of the Bark River, Four Mile Creek on the Sioux River, two tributaries of the Flag River and a tributary of the East Fork of the Cranberry River. We estimate at least another 10 miles of similar degraded stream habitat need refurbishment.

We hope continued restoration will be great for the fishery. In areas with completed projects the streams are narrower and deeper, the water flows faster, and the stream bottoms are now 90 percent gravel rather than 90 percent sand. When we combine this work with upland efforts to reduce flood flows, we expect both trout and salmon populations to improve as migrating fish have more places to spawn and a greater percentage of hatching fish have a better chance of growing bigger and stronger before they migrate downstream into Lake Superior. We think the results will justify the ongoing restoration of the small rivers that feed the big lake and provide a foundation for its trout and salmon fishery.

State, federal and tribal fisheries managers have launched experiments to see if we can rehabilitate the populations of brook trout migrating into Lake Superior — the "coastal" brook trout or "coasters" that grow to 11 inches or more, larger than fish that reside in streams. Historically these "rock trout,"

Restoring tributary streams to Lake Superior often requires removing thickets of brush, and narrowing channels to scour out silt, sand and increase water flow.

DNR PHOTO

After restoration note deeper channels, riffles, pools and in-stream structures that provide spawning habitat.

DNR PHOTO

as they were called, stayed near the stream mouths and along the 40 miles of rocky sandstone shoreline adjoining the Bayfield Peninsula. The remaining 85 percent of Lake Superior's south shore is a sandy and clay bottom that held fewer coasters. A rehabilitation plan approved by our Natural Resources Board last August — the Wisconsin Lake Superior Basin Brook Trout Plan — was jointly prepared by staff from the Wisconsin Department of Natural Resources and the U.S. Fish and Wildlife Service. It calls for:

- researching traditional brook trout ranges and migratory routes in the nearshore
- restoring habitat along the lower reaches of streams and Apostle Island shoals where coaster brook trout live
- controlling the harvest to prevent overexploitation
- stocking genetically-appropriate strains of fish that stand a better chance of reproducing naturally
- monitoring results

These projects complement efforts to restore the cold streams feeding into Lake Superior's southern coast. We have high hopes that restoring these waters will improve habitat for trout and salmon and sustain a lot of fun and recreation along this part of the Great Lakes coast.

Dennis Pratt is a DNR fisheries biologist in Superior, and Bill Blust is a DNR fisheries technician in Superior. Readers can learn more about Lake Superior Fishery work on the web at dnr.wi.gov/org/gmu/superior/Fish/Fish.html.