Minnesota's Forgotten Fish

~~~~~~~

by
Tom Dickson

"Trout . . . trout . . . another trout." Carrying a 350-watt gas-powered generator on his back, Konrad Schmidt wades up a coldwater tributary of the St. Croix River, counting to himself while netting temporarily stunned 6- to 12-inch brown trout. Using an electrode device attached to a pole, Schmidt pokes under banks, between sunken logs, and around other likely fish-holding spots. He slides the pole into a backwater eddy, and a half-dozen of what look to be minnows pop to the surface. "Okay!" Schmidt shouts excitedly over the motor's roar. "We've got some red-bellied dace!"

Schmidt is big on dace. And on darters, and shiners, and madtoms, and other nongame native fish species that inhabit Minnesota waters. The editor of NANFA's newsletter, *Darter*, and an expert stream fish surveyor, Schmidt is among a handful of native fish fans trying to drum up support for the 100-plus species most anglers dismissively lump together as forage species or rough fish.

It's an upstream struggle. Though biological diversity is one of the hottest topics among Minnesota scientists, environmentalists, and natural resource policymakers, rarely does the conversation include native nongame fish. Warblers, orchids, old-growth forests, and even freshwater mussels are today recognized as important ecosystem pieces deserving study and protection. Yet nongame fish, such as the colorful banded darter, mysterious American eel, and handsome gilt darter, are largely ignored.

Maybe the biggest obstacle impeding nongame native fish conservation is the simple fact that few people even know these species exist. Stuck in obscurity between 35 well-known game species (walleyes, bass, and other fish that recreational anglers catch for sport and food) and 15 commercial species (carp, lake herring, and other fish sold as food) are roughly 100 species ranging in size from pinkie-sized darters to greater redhorse over 3 feet long. Nongame native fish species, hidden from view of all but the occasional angler and a few fish-collecting hobbyists, lack supporters who can champion their needs and value.

"If there was an Audubon Society equivalent for fishes, we'd be in pretty good shape," says Dr. James Underhill, curator of ichthyology at the Bell Museum of Natural History, and professor emeritus at the University of Minnesota.

Endangered Shiner

A 2-inch-long fish species might soon shed some light on Minnesota's forgotten fish. As early as August 1997, the U.S. Fish and Wildlife Service may propose to add the Topeka shiner to the list of species protected under the federal Endangered Species Act. It would be the first federally protected fish in Minnesota.

The Topeka shiner (*Notropis tristis*, front cover), found in Minnesota only in the southwestern corner, is a small relative of the common shiner used for bait. This plain-looking prairie fish requires clear water—something increasingly rare in farmland regions. There, intensive farming practices often cause topsoil to erode off the landscape and into streams, where the resulting silt smothers the eggs of the Topeka shiner and of other fish species.

Minnesota's Topeka shiner population "probably faces no imminent risk," says Chuck Kjos, endangered species coordinator for the U.S. Fish and Wildlife Service. Most of the concern is in Kansas and other plains states. Still, endangered classification could raise
~~~~~~~

Photo: Tom Dickson

Longnose gar (*Lepisosteus osseus*), found in shallow bays and sluggish backwaters of southern Minnesota lakes and larger rivers such as the Mississippi, can weigh as much as 17 pounds.

concerns in Minnesota. Indeed, similar listings of obscure fish species in other states have touched off debates between environmentalists and property rights advocates about the value of protecting (or even conserving) shiners, darters, suckers, redhorse, and dozens of other species lumped under the category of rough fish.

"This could definitely change the climate surrounding nongame fish in Minnesota," says Rich Baker, who coordinates the state's program for listing rare and endangered species.

Little Patience

Though the Topeka shiner has gained some attention, most native nongame fish continue to be ignored. Fish experts admit that some of these species may well be thriving, but they point out that others could be suffering.

"That's the problem," says Underhill. "When it water quality testing has traditionally been done? Besides being expensive and time-consuming, chemical testing lacks accuracy, says Jack Enblom, an Ecological Services biologist. (See "Feminized fish in Minnesota," p. 35, for more on Enblom.)

"Even if you test once a day, you can miss a lot because so much can happen between tests," says Enblom. Most chemical tests are conducted just once a month, yet the level of dissolved oxygen, for example, can drop dra-

Index of *what*?

Want to know if a Minnesota lake or river is clean? Look for river redhorse.

Officials with the Minnesota Pollution Control Agency (PCA) are looking to native fish such as redhorse and darters for answers to questions about water quality. Employees of the PCA, working with DNR Ecological Services scientists, have surveyed fish communities in the Minnesota, Red, St. Croix, and several other rivers as a way to determine their overall ecological health, which is related to water purity.

By establishing various standards of measurement (known as metrics), the Minnesota scientists are devising an "Index of Biotic Integrity." This scale rates the relative health of streams, lakes, and rivers based on such "biocriteria" as the diversity and abundance of aquatic life.

Cleaner waters support many different fish and underwater insect species. They also contain species such as crystal darters or river redhorse that can't live in polluted environments. Lakes and rivers with dirtier water contain a high percentage of fish such as black bullheads and fathead minnows that tolerate pollution and sediment.

So, why not continue to use chemical analysis, as

comes to native species, we don't know if we're in good shape or not."

Compared to the warehouse of information on game fish, what's known about species such as blue suckers (once common in the Mississippi River but now increasingly rare) or burbots (the only freshwater species to spawn in midwinter) is alarmingly insufficient. With a few exceptions, the Minnesota Department of Natural Resources Fisheries Section has done little research or management aimed at nongame species. Surveying nongame fish sometimes requires different collection equipment from that used for muskies and other game species. And even fisheries managers who want to spend time on native nongame species have trouble convincing angling clubs and lake associations that some fishing license dollars should go toward maintaining fish biodiversity.

Photo: Rob Butler

The mooneye (*Hiodon tergisus*), distinguished by its large eye and silvery iridescent coloration, swims in lakes and rivers throughout the state.

"People want walleyes," says Tim Brastrup, a fisheries manager at Brainerd. "It's tough enough just getting them to accept us managing bass in their lake, much less Johnny darters and bowfin."

What's a Dace Worth?

The primary challenge facing nongame fish fans is to articulate the value of these apparently worthless species. Schmidt, who dotes on his aquarium rainbow darters and young paddlefish like a gardener pampering petunias, says that for nongame fish to get the same attention as nongame wildlife, "more people have to understand why these species are worth saving."

It's a tough sell. Though some larger nongame fish such as redhorse carpsuckers and mooneyes fight hard or taste good, features such as a sucker mouth or bony flesh make them undesirable to most sport anglers.

The most convincing argument has been to point out the value of native nongame fish as ecological barometers. Dr. Bob Bellig, a biology professor at Gustavus Adolphus College in St. Peter who surveys Minnesota River fish populations, points out that nongame species are indicators of aquatic system health. "The status of these species reflects water quality and the status of the environment in general," says Bellig.

Found only in clean rivers, the river redhorse (*Moxostoma carinatum*) indicates high water quality. When the species disappears, it's cause for concern.

Photo: Tom Dickson

matically during a single night. Enblom says that far more informative is the practice of using biological organsims as indicators of water quality.

"Fish, insects, and other aquatic fauna can tell you much about the overall water quality because their populations change relatively slowly," Enblom says. "When you net a river redhorse, you know you're seeing high water quality that hasn't altered much in the past few months."

Photo: Tom Dickson

Konrad Schmidt (right) probes for native fish on a coldwater tributary of the St. Croix River. The 350-watt backpack generator sends an electrical current between the electrode fixed to the pole in his hand and a wire trailing in the water. Temporarily stunned, the fish rise to the surface and are then netted, idenified, measured, and released alive.

Another important value of nongame fish is their link in complex ecological chains. For example, the disappearance of the ebony shell mussel in the upper Mississippi River has been traced to the disappearance of the skipjack herring, which assists in ebony shell distribution by transporting the mussel's larvae in its gills. In Ohio, the gizzard shad has been closely linked to bluegill reproduction and walleye growth in large reservoirs.

What's more, birds such as loons, herons, and kingfishers depend on dace and shiners for food. Otters and other water-based predators feed on these fish species as well.

Nongame fish can also belong to a group of animals known as keystone species. These seemingly insignificant animals act like the keystone at the top of an arch, holding the entire ecological structure together.

According to John Lyons, a fisheries research biologist with the Wisconsin DNR, the hornyhead chub and stoneroller are considered keystone species for Upper Midwest streams. These fish, when digging out their nests, make gravel piles used for spawning by redbelly dace, rosyface shiners, and other stream residents.

"Dace and shiners provide key forage for smallmouth bass and walleyes," says Lyons. "Without the hornyhead chub and stoneroller, entire stream food chains could break down."

Some Studies Being Done

As is the case in most states, Minnesota has yet to formally embrace nongame fish management. Still, work is being done, and progress is being made. Though not targeted to nongame species, ongoing DNR fish population surveys in lakes and rivers do pick up a wide range of nongame species, which are sometimes recorded.

"Information collected in conjunction with our lake and stream surveys is probably still the main source of information on these species," says Jack Skrypek, DNR Fisheries chief.

Over the past decade, more than two dozen studies, most of them funded by the DNR Nongame Wildlife Program, have been conducted on nongame fish biology, ecology, and distribution, including:

- fish population surveys of the Mississippi River from Minneapolis to the Iowa border
- analysis of Northern brook lamprey genetics and population distribution

- research on paddlefish by the U.S. Fish and Wildlife Service.

In addition, Schmidt has voluntarily surveyed fish populations in all Minnesota national wildlife refuges and in several state parks and large wildlife management areas.

Dr. Jay Hatch of the University of Minnesota and Dan Siems of Bemidji State University recently completed a scientific paper describing the newest documented revisions in the occurrence, distribution, and conservation of Minnesota species. This information is being incorporated by Hatch and Underhill into a comprehensive atlas of Minnesota native fish distribution and natural history.

Other important work targeting entire fish communities includes:

- U.S. Geological Survey analysis of fish communities of the Upper Mississippi River and Red River basins
- DNR Ecological Services studies to document the water flow needed by all fish species living in streams and rivers
- efforts to establish an Index of Biotic Integrity for the major lake and river basins in Minnesota (see "Index of *what*?")

Some DNR fisheries managers interested in nongame species try to squeeze them into their game fish management work. The most notable example has been Knife Lake, in Kanabec County, which in 1989 was chemically treated to remove carp and bullheads. Lake rehabilitations such as this remove all species, including native nongame fish. In this case, the kill-off included 17 miles of the Knife River and its tributary streams.

Though the DNR planned only to replace game fish (walleyes, bass, catfish, and bluegills), several fisheries biologists recognized the need to also restore the nongame species. Working after hours and on weekends, Schmidt and Brastrup—along with fisheries biologists Kit Nelson and Roger Hugill and DNR conservation officer Paul Hopp—seined and shocked darters, shiners, dace, redhorse, and other native species from nearby streams and restocked them into the Knife Lake system. According to Schmidt, 38 of the original 45 species have been replaced so far. "It's definitely on its way back," he says.

Another sign that fish biodiversity has gained some official recognition is the Fisheries Section's long-range plan for nongame fish. Completed in the early 1990s, the plan points out the need to hire a nongame fish specialist and broaden surveys to record the status of Minnesota's nongame species. It also recommends reintroducing native nongame fish with game fish in rehabilitated lakes, as was done on Knife Lake.

Even guidelines for walleye management now note the effects of certain practices on nongame species. For example, the guidelines point out that walleye stocking in Canada has killed some lakes' log perch populations. (How that might disrupt an entire lake ecosystem and threaten game fish populations is unknown.)

Below the Surface

These efforts notwithstanding, native fish conservation sorely lacks funding and interest. The nongame fish management plan, like many well-intentioned plans that are never carried out, needs a source of funding to be put into action.

And that could happen. If it wins congressional approval, a new federal fish and wildlife conservation initiative could pay for research and management of nongame fish species. The program would use an excise tax on sporting equipment such as binoculars and tents to pay for new conservation programs. Though its name contains no mention of finned creatures, the Teaming With Wildlife initiative is modeled after the successful Sport Fish and Wildlife Restoration Program, which over the past 60 years has raised hundreds of millions of dollars for game fish and wildlife management programs.

"It's the best hope yet for raising money to conserve Minnesota species not in the angling limelight," says Steve Hirsch, DNR fisheries program manager.

But that could be years away. For now, most anglers and other conservationists have yet to recognize the interconnectedness of all native underwater plants, insects, and fishes. Until they do, and demand more public funding to study and understand these connections, nongame fish will continue to remain below the surface of public attention.

Tom Dickson is editor of Fish & Wildlife Today*, the quarterly publication of the Minnesota Department of Natural Resources, where this article originally appeared.*

"I am the wiser in respect to all knowledges, and the better qualified for all fortunes, for knowing that there is a minnow in the brook."

Henry David Thoreau

Rare and getting rarer, the Topeka shiner (Notropis tristis) could soon be listed as federally endangered in several states. The status of this fish is discussed in Tom Dickson's "Minnesota Forgotten Fish," pp. 18-22. Photograph by Konrad Schmidt. The Thoreau quote is from A Natural History of Massachusetts.