

NEW  HAMPSHIRE'S

ENDANGERED FISH

Life cycles, habitat needs and a changing aquatic ecosystem leave rare fish in a struggle for survival

BY BEN NUGENT



The waterscapes of New Hampshire provide habitat for more than 50 native and naturalized fish species. While many are enthusiastically pursued by Granite State anglers, several lesser-known fish help comprise the rich mosaic of the state's aquatic communities. Some of these rare fish are at risk of disappearing forever. It would not be the first time – no one can contest Ernest Theoharris's record catch of a 33-inch Sunapee trout in October 1954; these fish are now just a golden memory.

Endangered fish get little fanfare, perhaps because they are less visible and have odd names like swamp darter, creekchub sucker or burbot. For whatever reason, they are not always afforded the same level of protective stewardship as other endangered species. As with other wildlife, man's ability to alter landscapes and aquatic ecosystems has jeopardized their sustainability.

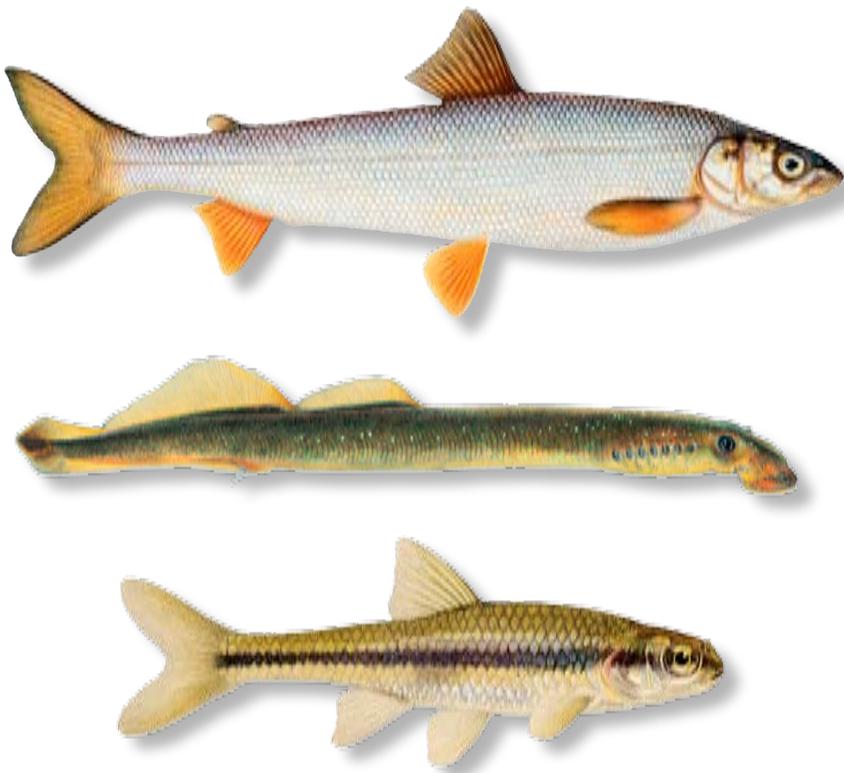
This article looks at three fish species in New Hampshire whose survival is threatened today, as documented in the state's Wildlife Action Plan. The good news is that there are things we can do to help, and these strategies have great potential to make our aquatic habitat a healthier place for many aquatic dwellers.

AMERICAN BROOK LAMPREY

It's hard enough to be endangered, but doesn't help to have relatives with bad reputations. Such is the fate of the American brook lamprey. Distinct differences exist between the American brook lamprey and the sea lamprey, which is both parasitic (attaches to a host fish for food) and anadromous (lives in saltwater but enters freshwater systems to spawn). The sea lamprey can significantly impact fisheries if introduced into new environments, as has happened in the Great Lakes and Lake Champlain. The American brook lamprey, however, is exclusively a freshwater species that is not parasitic.

Confirmed populations of American brook lamprey in New Hampshire exist only in the Oyster River Watershed. Biologists have surveyed almost the entire watershed and found small clusters of the species in the towns of Barrington, Durham and Lee. Of the 47 miles of streams within the Oyster River Watershed, the American brook lamprey is now thought to live in three distinct areas, totalling about three stream miles. The rarity of the species and the extent of development within its only home territory has warranted its listing as state endangered.

The American brook lamprey has two distinct life stages, both requiring unique aquatic habitat features. The ammocoete (or juvenile) stage looks something like a large earthworm. During this life phase, the species burrows into the stream substrate, where it filter feeds on microorganisms, much like a mussel or clam. After four or five years, the juveniles transform into the adult phase, typically in autumn. At this time, eyes and teeth become developed, and the species emerges from the stream bottom. The adult brook lamprey spends the winter in the stream near shallow riffles created by fallen trees, rocks or sections of remnant beaver dams. During this phase, it lacks a functioning digestive system and does not eat. In the spring, lampreys construct small nests within shallow riffle sections by moving rocks carried in their mouths. Soon, the adults spawn and then die. The fertilized eggs remain in the constructed nests until the ammocoetes hatch and drift downstream to repeat the process.



Woody structure in the waterway helps create the shallow riffle habitat that American brook lamprey need for spawning. Stream crossings must allow fish to reach these areas.

Detrimental impacts to the habitat required by the brook lamprey's complex life cycle can come from many different parts of the watershed, often far from the water's edge. Impervious surfaces can increase the rate of stormwater runoff, leading to erosion and sedimentation that can embed or cover the ideal substrate the ammocoetes need for burrowing and feeding. Poorly designed stream crossing structures may speed or slow stream flows; altering the way sediment is transported and deposited.

The adult brook lamprey also need riffle habitat for spawning. The Oyster River is mostly a slow moving waterway with a flat water surface. Its riffle habitats are created primarily by fallen trees and old beaver dams, so riparian vegetation is needed to maintain this specialized habitat. Without riffles, brook lam-

New Hampshire's endangered fish (above) include, round whitefish (top) captured in Newfound Lake in 2008; adult American brook lamprey (center) can reach 8 inches in length – only the adults have developed eyes; the bridge shiner (bottom) is one of New Hampshire's smallest fish.

prey spawning success would be reduced. Spawning is also dependent on the adult's ability to migrate to riffle sections of the river, so stream crossings that impede fish movement can also significantly affect spawning success.

Encouraging expansion of vegetated buffers along the Oyster River and ensuring stream crossings allow for fish migration through the watershed will help protect the brook lamprey, as well as several other fish species. Biologists are now trying to publicize the locations of brook lamprey populations so residents and town conservation groups can use this knowledge to guide land use decisions. For maps showing where brook lampreys and other fish species have been found in the Oyster River Watershed, call 603-271-2501.

BRIDLE SHINER

The bridge shiner was once common in the slow-flowing, vegetated waters within the Merrimack, Saco and coastal watersheds. This dainty minnow is one of New Hampshire's smallest fish, having a total length rarely exceeding two inches. Sadly, when biologists recently surveyed areas where bridge shiners had been historically documented, over half the areas no longer contained the species. This drastic decline caused the

bridle shiner to be listed as state threatened in 2008.

The bridle shiner is a short-lived species – its life-span rarely exceeds two years – and it is very sensitive to habitat alterations. Lake level draw-downs, introduced predators, aquatic herbicides and shoreline alterations can all be linked to the species' decline. The bridle shiner needs aquatic vegetation to survive. Vegetation provides cover for the slow-swimming species to hide from hungry predators like bass, chain pickerel and great blue herons. As with several other fish species, the bridle shiner disperses its eggs directly onto vegetation. The eggs incubate and hatched young find refuge within the plant growth.

Shoreline manipulation that promotes the loss of aquatic vegetation (constructing beaches, etc.) can lead to a loss of essential habitat for the bridle shiner. Herbicide use and the practice of drawing down lake levels to temporarily remove aquatic vegetation seriously affects the species. To protect the bridle shiner, we need to consider alternatives to how we alter shorelines and shallow aquatic habitats. Shoreline property owners naturally seek water views and sandy, vegetation-free beaches, but these conditions may not be in the best interest of countless species – or good water quality. The bridle shiner evolved to exist in dense aquatic vegetation. When we manage shorelines without this in mind, the impacts ripple through a rich aquatic community – from microscopic organisms to bald eagles.

ROUND WHITEFISH

Although the round whitefish was never widely distributed in New Hampshire's waters, recent surveys indicate the species' numbers may be declining. This slowly maturing species can reach lengths exceeding 18 inches. It has a very small mouth, well adapted for specialized feeding on crustaceans and macroinvertebrates on lake and river bottoms, but too small for traditional fishing tackle. That makes the round whitefish a difficult catch for anglers.

Round whitefish populations are documented in two locations in New Hampshire – the upper Connecticut River and Newfound Lake. Historically, the species was once abundant in the upper Connecticut, before Murphy Dam was constructed to form Lake Francis in Pittsburg. Fish and Game biologists hope to learn more about the status and habitat requirements of this river population in the future.

The Newfound Lake population of round whitefish was thoroughly studied in the early 1960s. At the time it was a healthy, robust presence. Unfortunately, current surveys show considerable change. The population of round whitefish in Newfound Lake has now declined to the point that it warrants listing as a Species of Concern – one step away from being

placed on the state's threatened or endangered list.

The population of round whitefish in Newfound Lake appears to be particularly susceptible to lake level drawdowns. Over the past 50 years, lake level management at Newfound has changed. Seasonal lake level fluctuations are now poorly timed and likely reduce the species' spawning success. Round whitefish spawn along rocky reefs in very shallow water in late November through early December. Fertilized eggs that escape the stomachs of white suckers, fallfish and rainbow trout come to rest within the spaces of the rocky bottom and incubate through the winter. Current policy calls for Newfound Lake to be continually drawn down throughout the winter months, which can lead to round whitefish eggs becoming frozen in the ice mass or exposed to the open atmosphere.

Changing the timing of the drawdown at Newfound Lake so that the lake level remains stable throughout the winter months could make a profound difference for the survival of the round whitefish. Greater understanding of the issue is essential, as many lake residents may not even be aware that a common practice intended to protect their docks could affect the future existence of a fish species.

LOOKING AHEAD

A collaborative effort is needed to protect New Hampshire's rare fish species. Otherwise, we risk losing forever the flash of the bridle shiner, the roving shadow of the white roundfish, or the pebbly riffle nests of the brook lamprey. Regulations to reduce shoreline impacts and improve water quality are good stepping stones, but only a start. More outreach is needed to show where and how these rare fish live and what individuals and groups can do to manage their properties in ways that have a gentler impact on complex aquatic habitats. In the end, it will take a conscious but committed effort by all of us to live responsibly so that the rich fish assemblages in New Hampshire will still be here for future generations. **W**

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DID YOU KNOW?

FISH ARE PART OF THE WILDLIFE ACTION PLAN!

The NH Wildlife Action Plan lists 24 fish species as being of greatest conservation need. Diadromous species like Atlantic salmon, American shad and herring, have been managed under restoration plans for years, but we are just now understanding the extent of decline in other fish species. Although only three fish species are on the state's endangered list, an additional 13 are species of special concern, meaning that action needs to be taken now to prevent them from becoming extinct. Some, like rainbow smelt, are important food fish for the landlocked salmon and trout that we love to catch. Many are more obscure, and our fishery biologists are working to learn more about their distribution and needs. But all play an important role in balancing the aquatic ecosystems of the state.

The Wildlife Action Plan lists several threats to fish species, including fragmentation of stream habitat by undersized culverts and silt and chemicals entering streams through storm runoff. Communities can help fish and other aquatic species by following the best stream crossing guidelines for new and replacement culverts, as well as addressing runoff issues. Find out more at www.wildnh.com/nongame.

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