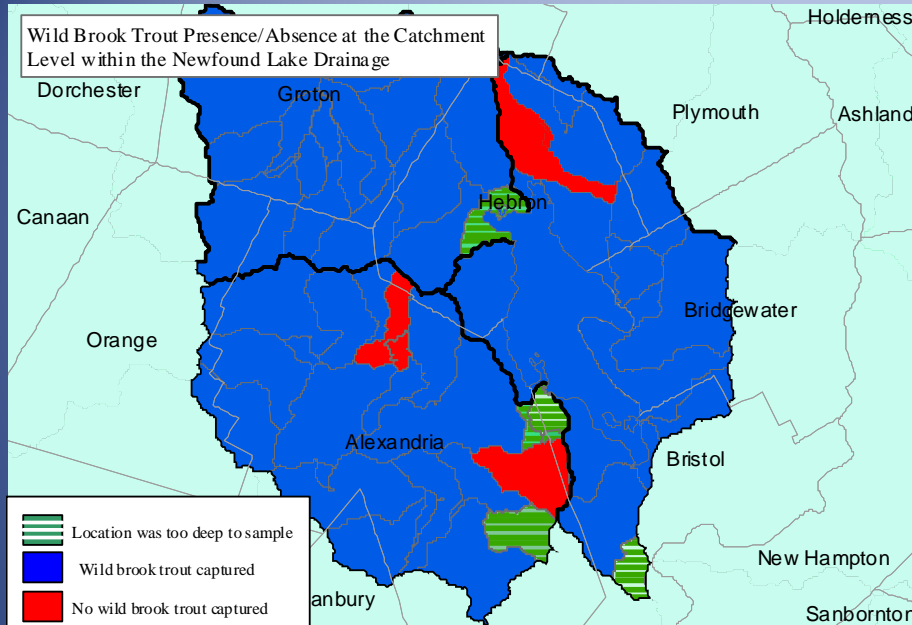


Eastern Brook Trout Populations Within the Newfound Watershed



Examples of Brook Trout Captured in 2009



Results

A total of 14 different species of fish were captured at 47 locations within the Newfound Lake drainage. Wild brook trout were the most dominant species found in the Cockermouth and Fowler watersheds while margined madtom were the most abundant species in the Newfound River watershed, though brook trout were the second most abundant species. Other species captured within the Newfound Lake drainage include: brown bullhead (hornpout), blacknose dace, burbot (cusk), creek chub, common shiner, fallfish, hatchery-reared brook trout, landlocked salmon, longnose dace, slimy sculpin, white sucker, and yellow perch. Of particular interest is the large abundance of wild landlocked salmon found in the Cockermouth River. These juvenile fish are believed to be the offspring of landlocked salmon that are routinely stocked into Newfound Lake as yearlings.

Summary

The surveys show that all three watersheds within the Newfound Lake drainage have intact populations of wild brook trout. The species was found in 43 of the 47 survey locations. Not only do these watersheds offer aquatic habitat suitable for wild brook trout, the overall magnitude of brook trout abundance is suspected to be unique for central New Hampshire and perhaps at the state level. Currently, wild brook trout are not necessarily rare in central New Hampshire, but the projected status of wild brook trout in this drainage is exceptionally good. Adjacent watersheds have suitable habitat for wild brook trout but not to the extent shown by the surveys in the Newfound Lake drainage.

Possible impacts to wild brook trout were recorded at every survey location. The lack of riparian vegetation as a result of logging, lawns, or adjacent road presence was the most common impact recorded. Subsequent increased erosion rates were observed at these locations. Perched culverts, livestock accessing streams, extensive stream bank armoring with riprap, washed out pavement entering the stream and litter were also noted in some locations.

The opportunity to protect intact populations of wild brook trout is uncommon, even in New Hampshire. Land conservation and guidance on land use practices are essential to protecting brook trout habitat. Wild brook trout populations and humans can coexist, but concerted efforts must be made to limit impacts to their habitat. Land and water use guidance should be given for streams of all sizes within a watershed as smaller streams are often used for spawning and nursery areas. Presumably minor human impacts to these streams can be additive throughout the watershed and create problems that are not readily apparent until further downstream. Land use practices do not necessarily have to be limited or halted in these areas; they may just have to occur in ways that minimize their impacts on brook trout and their habitats. The cost to restore a population of any species is always higher than the cost to protect them. Restoration actions require a great deal of effort and may not always guarantee self-sustaining populations would return.

Local Conservation Strategies

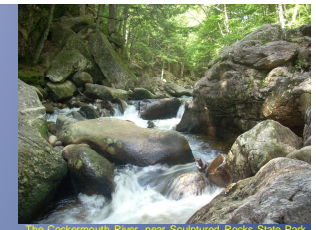
- Work with local conservation groups to increase public awareness of the importance of brook trout and water quality
- Promote protection of headwater and smaller streams
- Reduce barriers to dispersal (i.e. perched stream crossings, dams)
- Consider the effects of stormwater and sedimentation in future development

Background

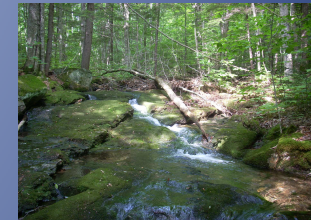
Brook trout are the only native stream dwelling trout species in New Hampshire, having a historic range that extended from Georgia to eastern Canada. It is believed that wild brook trout were once present throughout all watersheds in New Hampshire. Increased stream temperatures, changes to water chemistry, habitat fragmentation, increased rates of predation and competition, loss of spawning locations, and the loss of stream habitat complexity have led to reduced and isolated populations of wild brook trout both in New Hampshire and throughout the species native range in the eastern portions of the United States.

Recognizing the reduction in the distribution of wild brook trout, the Eastern Brook Trout Joint Venture (easternbrooktrout.org) was established. This public and private partnership of state fish and wildlife agencies, federal natural resource agencies, academic institutions, and local conservation organizations is working to protect existing wild brook trout habitat, enhance and restore impacted habitat, and raise public awareness about their current status. These efforts will also benefit other native stream dwelling species, because brook trout serve as an indicator for healthy aquatic ecosystems. Fortunately, New Hampshire has more intact populations of brook trout (meaning more than 50% of a sub-watershed's habitat is occupied by wild brook trout) when compared to the southern portions of the species eastern U.S. range. However, information to quantitatively describe the status of brook trout populations in New Hampshire is limited.

To assess the status of brook trout within the Newfound Lake drainage, the New Hampshire Fish and Game Department (NHFGD), Pemigewasset Valley Trout Unlimited, and the Newfound Lakes Region Association conducted electrofishing surveys during the summer of 2009. The scale used in the Eastern Brook Trout Joint Venture required that the Newfound Lake drainage be divided into three watersheds. These watersheds include: the Cockermouth River watershed, the Fowler River watershed, and a combination of the Newfound River and smaller tributaries that enter Newfound Lake.



The Cockermouth River, near Sculptured Rocks State Park



A small tributary to the Cockermouth River



Trees allowed to fall and remain in streams and rivers provide channel forming features and ideal habitat for brook trout



Perched crossings such as this, can prevent brook trout and other fish species from accessing necessary habitat. They can also change the morphology of a stream, altering erosion and sedimentation rates.



Wild Landlocked Salmon



Burbot



Slimy Sculpin



White Sucker



Margined Madtom



Blacknose Dace



Fallfish

The Fish Community of Newfound Lake



The Newfound Lake Watershed (Newfound Lake and surrounding streams) contains twenty-two different fish species. Of these, six species have been identified as requiring special consideration in the New Hampshire Wildlife Action Plan (2006). This designation of a species of concern is based on population status, integral ecological function of a species, or the ability of a species to indicate a healthy aquatic ecosystem.

The presence of the round whitefish in Newfound Lake is of particular interest to natural resource managers in New Hampshire. Recent documentation suggests that populations of this species are only found in Newfound Lake, and upper portions of the Connecticut River. While attempts to obtain information regarding the current status of these populations are ongoing at Newfound Lake, little information is available to describe the status of other populations. Documentation suggests the species is vulnerable to predation and competition with introduced fish species, acid deposition, degradation of spawning habitat, and poorly timed lake level fluctuations. The species is rarely targeted or caught by anglers, has a cylindrical body shape and most likely grows to a maximum size of approximately 20 inches in New Hampshire.



Sampling data from the past five years indicates that the round whitefish have declined since a detailed survey examined the population in the 1960's. Information from other states suggests that fluctuating lake levels may also have contributed to the decline of round whitefish populations. Lake trout and round whitefish are self-sustaining populations, these species are not stocked by the NHFGD and their survival is completely dependent on natural reproduction. Fall netting surveys and angler reports reveal the potential of Newfound Lake to produce trophy sized lake trout including the NH state record fish.

Newfound Lake is a popular year round fishery for New Hampshire anglers. Landlocked salmon, rainbow trout, lake trout and smallmouth bass are the species most primarily targeted during open water fishing seasons. The total number of bass tournaments, which are only authorized when permitted by the New Hampshire Fish and Game Department (NHFGD), have averaged below ten tournaments annually for the past ten years. Rainbow trout, lake trout, and yellow perch are most commonly targeted during the ice fishing season. A survey conducted during February and March of 1999 estimated that anglers spent over 7000 hours ice fishing on Newfound Lake. Staff from the New Hampshire Fish and Game Department routinely monitor the health of the fishery of Newfound Lake. Annual surveys include hydro-acoustic forage biomass assessments, rainbow smelt tributary spawning runs, and fall netting surveys for lake trout and round whitefish.



Common Noddy



Rainbow Trout



Brown Bullhead



Smallmouth Bass



Yellow Perch



Burbot (Cusk)



Chain Pickerel



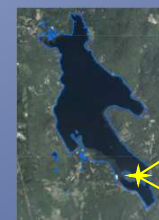
Landlocked Salmon

The fish community of Newfound Lake consists of 19 different fish species. Some species have lifecycles that depend completely on in-lake habitats while other species also depend on temporarily accessing the lake's tributaries to complete their life cycles. Regardless, the health of the lake fishery is a function of the water quality of tributaries.

Fish Species Documented In Newfound Lake

- Brook Trout
- Margined Madtom
- Brown Bullhead (horn pout)
- Rainbow Smelt
- Burbot (cusk)
- Rainbow Trout
- Chain Pickerel
- Redbreast Sunfish
- Common Shiner
- Rock Bass
- Common Sunfish
- Round Whitefish
- Fallfish
- Smallmouth Bass
- Golden Shiner
- White Sucker
- Lake Trout
- Yellow Perch
- Landlocked Salmon

Pike's Point (point closest to Mayhew Island on the eastern shoreline) is the only known spawning location for round whitefish in Newfound Lake. This location is also utilized by spawning lake trout. Each species uses a slightly different substrate (rock) size to spawn over. The prevailing northwest winds help keep this area clean and silt free. Lake trout and round whitefish eggs can be deposited here in only a few inches of water in the fall. Spring activity and currents help provide oxygen to the eggs.



The Importance of Lake Tributaries



Several fish species are year round residents within the tributaries while other species ascend tributaries to spawn and feed.

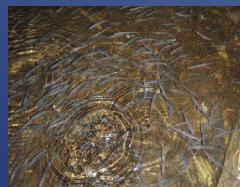
•Avoid crossing structures that can become barriers (i.e. undersized culverts) and small dam structures that would inhibit fish movement and impact water quality

•Continue to monitor water quality (point/nonpoint source pollutants) and identify sources of sediment from erosion. Sedimentation can cover spawning substrate, compromising reproduction

•Maintain Riparian Buffers



Four different age classes of rainbow smelt captured in Newfound Lake



Rainbow smelt ascend lake tributaries in the spring to spawn. The growth and health of several fish species is dependent on the density of rainbow smelt in Newfound Lake.



Lake Trout Captured in 2007 during a survey for round whitefish (43" and 22 pounds)

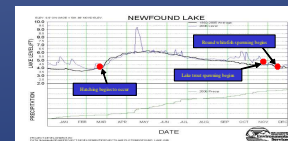
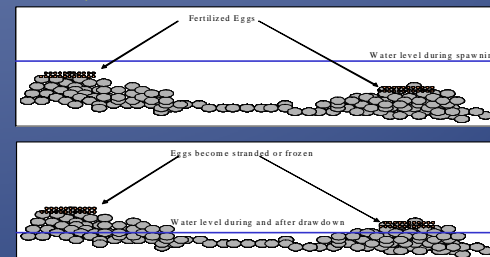


Lake Trout Captured in 2008 during a lake trout spawning survey (39" and 17 pounds)



Illustrating How a Continual Winter Drawdown can Impact the Survival of Eggs

The current lake level management policy for Newfound Lake calls for a continual drawdown of about 3.5 feet beginning in mid October through the winter. Beginning in late October, lake trout ascend to shallow rocky areas to spawn and deposit fertilized eggs within the spaces of rocks. Eggs that do not fall within the spaces of rocks become available for predators (crayfish, fallfish, white sucker, etc). The same process occurs in late November/early December for round whitefish. These eggs incubate throughout the winter at hatch in early spring. Eggs deposited in the shallows can be impacted by this drawdown regime by become exposed to the open atmosphere or frozen within the ice pack.



To avoid impacts to the eggs of round whitefish and lake trout lake levels should remain consistent (or even allowed to rise) between mid October and ice-out.



An adult round whitefish captured in December, 2009 at Pike's Point



The small mouths of the round whitefish are adapted to accommodate a diet of small macroinvertebrates.

