Fish Species within the Newfound Watershed

The Newfound Watershed Master Plan

Fish Species within the Newfound Lake Watershed

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.

The Newfound Lake Watershed 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. For information regarding the current status of a particular species of concern or rationale as to why the species has this designation visit: http://www.wildlife.state.nh.us/Wildlife/Wildlife_Plan/WAP_pieces/WAP_App_A_Fish.pdf.

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, Lake Winnipesaukee 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.

Table _ Documented Fish Species within the Newfound Lake Watershed

Species	Habitat	Designation	Species	Habitat	Designation
Blacknose Dace	R		Longnose Dace	R	
Brook Trout	L, R	**Species of Concern** Both stocked and self-sustaining game species	Margined Madtom	L	
Brown Bullhead	L	Self-sustaining game species	Rainbow Smelt	L	**Species of Concern**
Burbot	L, R	**Species of Concern**	Rainbow Trout	L, R	Stocked game species
Chain Pickerel	L	Self-sustaining game species	Redbreasted Sunfish	L	
Common Shiner	L, R		Rock Bass	L	
Creek Chub	R		Round Whitefish	L	**Species of Concern**
Fallfish	L, R		Slimy Sculpin	R	**Species of Concern**
Golden Shiner	L, R		Smallmouth Bass	L	Self-sustaining game species
Lake Trout	L	**Species of Concern** Self-sustaining game species	White Sucker	L, R	
Landlocked Salmon	L, R	Stocked game species	Yellow Perch	L	Self-sustaining game species

L=Found in Lake/Pond Habitats
R=Found in Riverine Habitats

Fisheries Management within the Newfound Lake Watershed

The mission of the Inland Fisheries Division of NHFGD is to use planning and science for effective management of New Hampshire's inland fisheries resources. The Inland Fisheries Division utilizes the Department's Strategic Plan (1998-2010) in conjunction with results from New Hampshire angler opinion and attitude surveys (1996 and 2004) to guide its programs. This ensures the division is addressing the needs of the State's inland fisheries resources as well as the recreational groups who utilize these resources.

Fisheries managers assess sport fish stocks through the use a variety of sampling methods. Typical monitoring includes surveys that examine forage fish biomass surveys, tributary spawning smelt surveys, angler surveys, and fall netting. These surveys assess growth and survival parameters which determine stocking rates and angling regulations.

Current quantitative data for aquatic communities within the rivers and streams of the Newfound Lake Watershed is limited. Information obtained through the monitoring component of The Eastern Brook Trout Joint Venture (EBTJV) is expected to become a valuable tool to predict wild brook trout (and presumably other fish species) presence in streams and rivers lacking fish community data. It is anticipated that this predictive analysis will help identify specific land use and landscape thresholds that may limit the ability of a species to persist. It is expected that this information in conjunction with other water quality models will be a valuable guidance tool for land use planners and for the prioritization of conservation efforts in the future.

In an effort to minimize disturbance to species listed on the state threatened and endangered species list, NHFGD personnel have the opportunity to review and comment on wetland dredge and fill permit applications filed with the New Hampshire Department of Environmental Services (NHDES) and aquatic herbicide applications filed with the New Hampshire Department of Agriculture. Permits that may impact fish and wildlife species within areas protected by the Comprehensive Shoreline Protection Act are also reviewed. These reviews include recommendations to NHDES staff that avoids risk and minimize impact to the species.

Lake Level Management Recommendations

Of primary concern regarding the current lake level management plan for Newfound Lake is the fall drawdown and its subsequent impacts to lake trout and round whitefish eggs. Fertilized eggs deposited upon the rocky shallows (in as little water as a few inches) from mid October to mid December may become exposed to open air or frozen within the ice when water levels continue to drop during and after spawning. This can lead to direct mortality of the eggs. These eggs require several months to incubate and develop before hatching. Over time, this impact may lead to serious population declines.

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.

Sampling data from the past four years indicates that the round whitefish has seriously declined since a detailed survey examined the population in the 1960's. Information from other states suggests that fluctuating lake levels may have contributed to the decline of round whitefish populations. Fisheries resource managers would support a stable or increasing lake water level at Newfound Lake for the period October 15th through "ice-in". Since round whitefish and lake trout eggs generally hatch before spring, this strategy will still facilitate the preparations necessary to accommodate spring flooding events. This aspect of the lake level management is similar to former Newfound Lake level management plans in the 1970's and early 1980's and the current lake level strategy for Lake Winnipesaukee.

Newfound River Flow Recommendations

Flow stability and consistency are essential to resident fish species found in the Newfound River. The current flow management of this river consists of significant flow variability and periods with severe low water conditions. Typically, these low water conditions are observed during summer months. Stress upon coldwater fish populations is arguably the highest during summertime when water temperature is greatest. Reduced flow rate further amplifies this impact. The NHFGD recommends a flow management plan that provides a minimum of 100cfs flow at all times within the river. However, it is recognized that the hydrology of Newfound Lake (the source of the Newfound River) may not always provide for this minimum flow recommendation.

Maintaining Natural Features and Riparian Buffers in Watershed Tributaries

Rivers and streams and their adjacent riparian zones and floodplains are essential for fish and wildlife within the Newfound Lake Watershed. Access to spawning and feeding areas in conjunction with the ability to recolonize and disperse into new areas is essential for the survival of fish populations. Tributaries not only provide permanent habitat for resident fish species but some lake species depend on these streams and rivers for spawning and feeding migrations. Rainbow smelt, rainbow trout, brook trout, fallfish, suckers, and landlocked salmon ascend tributaries from Newfound Lake seasonally to spawn. Other fish species will follow the spawning fish into the tributaries and prey upon eggs as a seasonal food source. Spawning adults can be somewhat particular about specific substrate sizes in streams to spawn on. In general, fish will avoid areas impacted by excessive siltation and sedimentation. This can be a result of poorly designed stream crossings, impacts to riparian areas upstream, and erosion from adjacent developed areas.

Streams and rivers are dynamic features of a watershed and require much consideration when a new road or development is proposed. The removal of vegetation and an increase in impervious surfaces can dramatically increase runoff rates that enter a stream resulting from storm events. Increased runoff rates, especially in areas with removed vegetation, can scour bare soils and deposit silt, sand and other containments into streams. As sediment loads increase, significant alterations to the streambed may occur. Deep pools become shallow, and stream width increases. The natural streambed is buried under

sediment and the macroinvertebrate community (a primary food source) can become altered as stream temperatures increase.

Stream erosion and deposition are natural functions of a stream's ability to transport sediment. Road crossing structures which focus on only the passage of water and neglect to incorporate sediment conveyance and aquatic organism passage can result in impacts to aquatic ecosystems spanning distances well away from the stream crossing location. Stream crossing structures that are undersized relative to the natural width and depth of a stream, especially those crossings that do not have natural substrate within them, tend to have high velocities compared to what is typical elsewhere in the stream.

Not only can these higher velocities reduce aquatic organism passage during periods of high flow, but also often create a scour pool immediately downstream. A scour pool can and often leads to the phenomenon called perching, in which the streambed is gradually eroded downstream of the crossing until the end of the culvert is well above the streambed, creating a waterfall at all but the highest flows. This condition limits fish from moving upstream through the culvert, especially as many fish species, and most other aquatic species, do not jump. Non-perched culverts may exhibit minimal water depth within the structure, which can restrict aquatic organism passage at low flows. Although properly designed stream crossings may require greater initial capitol costs, long term costs associated with maintenance and replacement are expected to be much less. In an effort to reduce costs associated with stream crossing structures, road planning should minimize the number of crossings or avoid crossing streams altogether.

The NHFGD recommends using the New Hampshire Stream Crossing Guidelines (2008) when a stream crossing structure is considered. This document provides direction to designers that promote structures that minimize impacts to aquatic ecosystems. Existing stream crossing structures throughout the Newfound Lake Watershed should be surveyed to determine areas where inappropriately sized crossing structures are creating excessive erosion or sedimentation. Crossing structures should also be analyzed for the ability to allow fish passage and the amount of habitat that would be reconnected if the crossing was improved. A database with this information would help prioritize areas if funding for replacement structures becomes available.

Allowing native vegetation to grow along streams, wetlands, ponds, and lakes is a cost effective management strategy for maintaining water quality and protecting wildlife habitat. Preventing development in these vegetated strips, or buffers, along aquatic habitats may avoid costly flood damage, wetland mitigation, and stream restoration projects. Riparian buffers provide many benefits to fish and wildlife. They help prevent sediment and pollutants from entering water bodies. Trees along the water's edge provide shade and reduce water temperatures. Fallen trees, branches, and leaves provide food for aquatic microorganisms, which form the base of the food chain that supports invertebrates, fish, and other aquatic wildlife. Fallen wood also improves fish habitat by providing cover, trapping sediment, and creating pools. Strips of native vegetation along streams and shorelines act as wildlife corridors and reduce the impacts of habitat fragmentation.

In general, the wider the buffer, the more environmental benefits that are provided. Recommended buffer widths usually range between 100 and 300 feet, depending on the desired level of protection. A 100 foot buffer will provide adequate water quality protection, but is not optimal for protecting fish habitat or wildlife corridors. Buffers of 300 feet or more provide the best protection for both water quality and habitat. Other factors to consider are the steepness of the terrain and land use in the surrounding watershed. For the best results, buffer protection should be applied to all aquatic habitats, including intermittent streams and small wetlands. Riparian buffer protection should be part of an overall plan to manage growth in a town or watershed, including other strategies such as limits on impervious surface and low impact development practices. Attached is a list of resources related to riparian buffers and developing town ordinances to protect them.

The NH Wildlife Action Plan acknowledges that shoreline development can limit the future expansion of a recovering population and act to reduce future carrying capacity of areas that currently support bald eagles. This species is a state threatened species protected by RSA 212-A, the New Hampshire Endangered Species Conservation Act. Shoreline development affects nesting, perching, roosting, and foraging by eagles, with direct and indirect effects on reproductive success and suitability of overwintering areas. The NH Wildlife Action Plan cites that one of the greatest ongoing habitat quality concerns for bald eagles is additional shoreline development on rivers and large lakes, especially in the Merrimack River watershed and Lakes Region areas. Every effort should be taken to preserve large trees, especially mature white pine, in order to preserve potential nest and roosting trees for bald eagle in the protected shoreland in this area.

Maintaining the Presence of Essential Aquatic Vegetation

Aquatic vegetation is vital for a wide and diverse range of fish and wildlife species. The sustainability of several fish species at several different life stages is intimately dependent on this habitat type. Aquatic vegetation, particularly when found in dense masses, is utilized for protection from predation, egg incubation, and feeding. Given the limited areas where aquatic vegetation can be found around the perimeter of Newfound Lake, shoreline property owners should attempt to limit disturbance to this lake habitat feature.

Aquatic vegetation is also instrumental in maintaining good water quality. When removed, the shoreline buffering capacity of aquatic vegetation on waves generated by wind and boat wakes is lost contributing to shoreline erosion (property damage) and higher levels of turbidity. Furthermore, when aquatic plants are removed from a system both existing and introduced nutrients become available for other organisms including several algal species. Significant available nutrients can lead to algal blooms which can create an objectionable scum on the water and in turn reduce water clarity. In some cases, certain algal types may reach concentrations which are toxic to humans, pets, and livestock. The removal of native vegetation is especially harmful as it leaves a void for non-native plant species to become established.