

## Round Whitefish

*Prosopium cylindraceum*

Federal Listing

State Listing SC

Global Rank

State Rank S1

Regional Status V. High



Photo by NHFG

### Justification (Reason for Concern in NH)

Since 1983 the round whitefish has been listed as a state endangered species in New York. Waterbodies with indigenous round whitefish populations were reduced from greater than 80 to 7. Low pH (pH<5.5) typically associated with acid deposition and introduced predators were the main causes of decline. Smallmouth bass, yellow perch, and rainbow smelt reduce round whitefish numbers directly through predation (Steinhart et al. 2007). All three of these species coexist with round whitefish in Newfound Lake (NHFG, unpublished data). There are only two confirmed populations of round whitefish in New

### Distribution

The round whitefish is found throughout northeast Asia, northwestern North America, eastern Canada, the northeastern U.S., and in all of the Great Lakes except Lake Erie. It is absent from central and southwestern Canada. Round whitefish were historically reported to exist in Newfound Lake, First Connecticut Lake, and Winnepesaukee Lake, as well as the upper Connecticut River (Scarola 1987, Bailey and Oliver 1939). However, the record from Lake Winnepesaukee may have been a misidentified lake whitefish. In New Hampshire the species is currently known to exist in two waterbodies: Newfound Lake and the upper Connecticut River.

The round whitefish has been documented in the Connecticut River from the Lake Francis Dam south to the bridge at North Stratford (Yoder et al 2010). Prior to the construction of the Lake Francis Dam, round whitefish were captured in 1939 in the section of river now flooded by the lake. Round whitefish were also said to have been abundant in First Connecticut Lake prior to 1939 (Bailey and Oliver 1939). There have been no recent reports of round whitefish in Lake Francis or the Connecticut Lakes.

### Habitat

At the southern end of their range round whitefish usually inhabit medium to large sized lakes with deep, cold water habitat. They spawn in shallow water over cobble and gravel substrate. Round whitefish also inhabit medium to large sized cold water rivers. Riverine populations are more common in the northern parts of its range. Spawning begins as the water temperature falls below 40°F. Peak spawning activity occurs between late November and the second week of December in Newfound Lake (Scott and Crossman 1973, Normandeau 1963, NHFG unpublished data). Round whitefish in Newfound Lake were observed to spawn on the same reef as lake trout (*Salvelinus namaycush*) (Normandeau 1963). Information concerning habitat use of juvenile round whitefish is unavailable.

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During spawning, males and females approach the reef in pairs, not in large schools as is common with other species. The eggs, deposited within rock crevices, receive no parental care and hatch between the end of March and the beginning of May (Scott and Crossman 1973). Egg predation by species such as brown bullhead, burbot, white sucker, and yellow perch appeared to be a significant cause of mortality over the winter (Normandeau 1963).

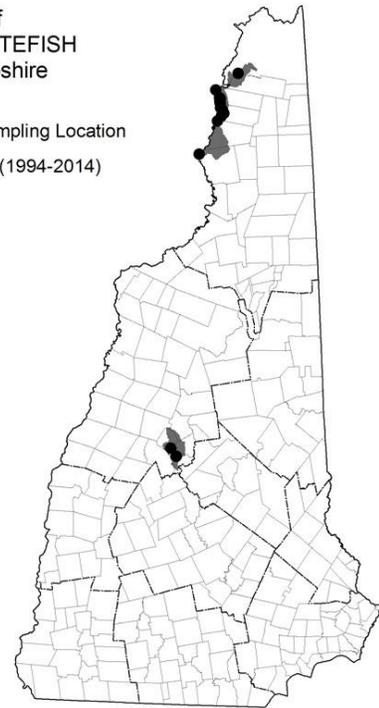
Round whitefish are bottom feeders, preying mainly on benthic invertebrates and fish eggs or newly hatched fry. Although found in deep lakes, they rarely inhabit depths greater than 120 feet. There are anecdotal reports of round whitefish movement into the tributaries of Newfound Lake in the early spring, possibly in response to the availability of prey (i.e. spawning rainbow smelt and their eggs).

### NH Wildlife Action Plan Habitats

- Lakes and Ponds with Coldwater Habitat
- Coldwater Rivers and Streams

#### Distribution of ROUND WHITEFISH in New Hampshire

- Fish Sampling Location
- Current (1994-2014)



Distribution Map

### Current Species and Habitat Condition in New Hampshire

In New Hampshire, the southern fringe of the overall species distribution, surveys targeting round whitefish during spawning season have produced alarmingly few round whitefish since monitoring efforts began in 2005. Normandeau (1963) focused sampling efforts along the same spawning location. The catch per unit of effort of round whitefish appears to be significantly lower in current surveys when compared to surveys conducted in the early 1960's (Normandeau 1963, NHFG unpublished data). The large size of the individuals captured since 2005 further suggests that survival rates to maturity may be low in Newfound Lake. Additionally, clipped fins to denote previous capture during spawning surveys are routinely observed in later years. It is not known if there are additional spawning areas within the lake. There is additional concern regarding the influence of lake level management on recruitment success. The current water level management strategy at Newfound Lake

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calls for a continued decrease in lake surface elevation throughout the fall and winter. Fertilized eggs deposited in shallow areas of the spawning reef may be frozen within the icepack or exposed to the open atmosphere. The overall status of the population in Newfound Lake is requires further study but has likely decreased in abundance since the early 1960's.

Similarly, the overall abundance of round whitefish occupying sections of the upper Connecticut River is not well understood. There is very little historical information about the species in the Connecticut River to make comparisons with current sampling data. Although the current population in the upper Connecticut River is suspected to be more secure than the Newfound Lake population, more evaluation to determine habitat requirements, core population areas, and a replicable survey technique to define population trends is required. The extent of impact from adjacent land use and dams on the round whitefish population found in the upper Connecticut River is not well understood.

### **Population Management Status**

It is unlikely that the 2 fish daily harvest limit affects populations. A recent survey of anglers indicated that the round whitefish is very rarely, if at all, caught (Duda and Young 1996). Angling pressure is believed to have little effect on round whitefish populations within the state (Normandeau 1963). No other direct ongoing management effort exists at this time.

### **Regulatory Protection (for explanations, see Appendix I)**

- Harvest permit - season/take regulations

### **Quality of Habitat**

There is little information on the seasonal habitat use of round whitefish in the Connecticut River or in Newfound Lake. Electrofishing surveys on the Connecticut River suggest that round whitefish are more common in areas of gravel substrate and steady current compared to reaches with slow flow and silt bottom. In Newfound Lake, round whitefish are known to spawn on a shallow reef off of Pike's Point, at the southern end of the lake. The reef is kept clear of sediment by the wave action resulting from prevailing northwest winds. Although spawning activity has been documented on one reef in Newfound Lake, the extent of spawning activity or habitat use throughout the rest of the lake is poorly understood. Much of the shoreline of Newfound Lake consists of a mix of seasonal and year round homes. There are limited areas of wooded shorelines. The water quality of Newfound Lake continues to be very good with suitable dissolved oxygen levels in the hypolimnion during periods of stratification. An active lake association strives to maintain good water quality by addressing impacts associated with upland development, faulty septic systems, and tributary sedimentation (Boyd Peterson, Newfound Lakes Region Association, personal communication). A watershed management plan and strategies to regularly monitor water quality exists for the lake.

The adjacent land use along the areas occupied by round whitefish in the upper Connecticut River consists of a mix of agriculture and forest. A higher concentration of agriculture is present from North Stratford to the Canaan Dam in West Stewartstown. In these areas, riparian buffers are minimal along some sections. Bank armoring has been installed to protect bank erosion along bends in the river. Water temperatures remain cool throughout the summer because of a tail water release from the Lake Francis Dam. There is little adjacent residential development. The Canaan Dam is the limit of upstream movement for round whitefish that inhabit the river downstream of the dam.

### **Habitat Protection Status**

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### Habitat Management Status

Water level management on Newfound Lake may affect round whitefish egg survival at the spawning reef off of Pike's Point. NHFG biologists are working with the NHDES Dam Bureau and other stakeholders to develop guidelines for water level management that protects round whitefish and lake trout eggs while balancing needs for flood control, recreational boating, shoreline property maintenance, and a downstream hydroelectric facility.

There are no current management efforts specific to the population inhabiting the upper Connecticut River.

### Threats to this Species or Habitat in NH

*Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.*

### Disturbance from water level management that can affect spawning success (Threat Rank: High)

Unnatural water level fluctuations alter upstream lake and pond habitat. Lake drawdowns, usually during winter, reduce shoreline plant communities and expose aquatic organisms to desiccation. Poor recruitment may be an issue for species that spawn on shallow reefs or along the shoreline, depending on the timing and extent of the drawdown. River and stream habitat below lakes and ponds may also be impacted as flows are reduced in an attempt to refill lakes or increased rapidly to lower the water level.

The water level of Newfound Lake is currently reduced every winter. This practice may have significant impacts on round whitefish spawning success. However, the actual effects of water level fluctuation on spawning success and the total extent of spawning areas in the lake are not well understood. The few round whitefish captured on the one known spawning reef in Newfound Lake are typically large individuals and, in some instances, excised fins indicate that they have been captured in multiple years. The absence of younger age classes suggests that poor recruitment may be an issue in the lake.

Artificial flow fluctuations below the Lake Francis Dam may impact the round whitefish in the Connecticut River. There has been no report of round whitefish from Lake Francis, where a population was documented in the river before it was flooded by the Lake Francis Dam in the late 1930's. Significant water level fluctuations in Lake Francis may have created unsuitable spawning conditions for a round whitefish population that was adapted to spawning in a riverine environment.

### Species impacts from competition (with introduced species) (Threat Rank: Medium)

Introduced fish species may compete with native fish species at various stages of their life cycles.

Rainbow smelt, yellow perch, and smallmouth bass have been implicated in the decline or extirpation of round whitefish in a number of Adirondack lakes (Steinhart 2007).

### Disturbance from sedimentation, turbidity, nutrients and contaminants (Threat Rank: Medium)

Sediment, fertilizers and pesticides from agricultural areas are known to degrade water and habitat quality in aquatic habitats (Allan 2004).

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The extent that agricultural practices influence the round whitefish population in the upper Connecticut River is unknown. The population appears to be abundant with multiple age classes present (NHFG survey data). However, eroded banks, poor water clarity, embedded substrate, and rapid flow fluctuations are habitat impacts commonly observed in this section of river.

### **List of Lower Ranking Threats:**

Disturbance from reduced area of coldwater habitat

## **Actions to benefit this Species or Habitat in NH**

### **Water level management**

**Primary Threat Addressed:** Disturbance from water level management that can affect spawning success

**Specific Threat (IUCN Threat Levels):** Natural system modifications

**Objective:**

Reduce the aquatic habitat impacts associated with artificial water level fluctuation at dams.

**General Strategy:**

Work with dam managers to achieve water level fluctuations that mimic natural flow regimes. Practices such as rapid changes in water level, excessive winter drawdown, and shutting off downstream flow to refill a waterbody should be avoided. For coldwater species that spawn on shallow reefs, including lake trout, round whitefish, lake whitefish, and burbot, it is important that water levels do not drop significantly after the spawning season, such that the eggs would be exposed. Engaging stakeholders, including shorefront property owners, boaters, anglers, and hydropower project owners is critical to changing long established water level management traditions. The NHDES Dam Bureau is the lead on dam management issues in New Hampshire. The best strategy for improving water level management practices for fish and wildlife is to work with the Dam Bureau to identify opportunities to create more natural water level fluctuations at a certain dams and then make slow incremental changes. This allows stakeholders to adjust to the changes and make comments when conflicts arise.

**Political Location:**

**Watershed Location:**

### **Population assessment**

**Objective:**

Assess the status of round whitefish populations in New Hampshire.

**General Strategy:**

Explore methods for assessing the populations of round whitefish in Newfound Lake and the Connecticut River. More information on population size, age structure, and extent of spawning habitat is necessary to evaluate the status of the round whitefish in Newfound Lake, where the species may be at risk of extirpation. The round whitefish population in the Connecticut River

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appears to be stable, but studies of distribution, habitat needs, and population density would help guide management decisions.

**Political Location:**

**Watershed Location:**

### **Reduce nutrient loading**

**Primary Threat Addressed:** Disturbance from sedimentation, turbidity, nutrients and contaminants

**Specific Threat (IUCN Threat Levels):** Pollution

**Objective:**

Reduce the impacts of eutrophication by removing excess sources of nutrients.

**General Strategy:**

The primary sources of excess nutrients are lawn fertilizers in residential and commercial developments, agricultural fertilizers, and poorly functioning septic systems. Reducing nutrient loads can be achieved on two fronts. One is through outreach, which includes creating awareness about the effects of fertilizers on water quality and offering alternatives to fertilization practices that lead to the greatest amount of nutrient loading in nearby waterbodies. Best management practices can be developed for property owners with a focus on reducing runoff, minimizing or eliminating fertilizer use, and landscaping in a way that reduces the need for fertilization. In the case of septic failure, shoreline property owners with older septic systems can be targeted with incentives for upgrading. The second front is legislative. Laws that set limits on fertilizer use and require upgrades to septic systems will have long term benefits on water quality throughout the developed watersheds of southern New Hampshire. Requirements for new septic systems have greatly improved in recent years. The challenge is identifying and upgrading older systems that were constructed before septic systems were required to meet modern standards.

**Political Location:**

**Watershed Location:**

## **References, Data Sources and Authors**

### **Data Sources**

New Hampshire Fish and Game Department unpublished survey data, historical watershed biological surveys, and angler reports were used in defining locations of the species within the state.

Much of what is known about round whitefish in Newfound Lake is owed to the doctoral research of Donald Normandeau in 1963. NHFG biologists have been conducting gill net surveys for round whitefish during the spawning season on Newfound Lake since 2005. Electrofishing surveys have confirmed that round whitefish are relatively common in sections of the upper Connecticut River (NHFG unpublished data; Yoder et al. 2009).

### **Data Quality**

NHFG has conducted electrofishing surveys in the upper Connecticut River and gill net/fyke net surveys on Newfound Lake. The upper and lower extent of round whitefish habitat in the Connecticut River has not been clearly defined. There have been no recent reports of round whitefish in the

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Connecticut Lakes or Lake Winnepesaukee, but these are large lakes and they have not been surveyed during the round whitefish spawning season. Round whitefish catches are occasionally reported by anglers, but they are easily confused with more common species, such as fallfish.

Low catch rates and recaptured individuals in gill net surveys during the spawning season suggest that the Newfound Lake round whitefish population may be at very low abundance due to poor recruitment. There is concern that an increased survey effort may harm valuable mature adults during the spawning season. Additional sampling methods, such as acoustic telemetry, may be required to target round whitefish outside of the spawning season, so that a more complete population assessment can be conducted.

Electrofishing surveys on the upper Connecticut River have provided some baseline relative abundance data for the section of river between the Canaan Dam and the bridge in the town of Colebrook. More information is required to assess the current status of the round whitefish population in the upper Connecticut River. Current sampling efforts have focused primarily on habitats conducive to boat electrofishing.

### **2015 Authors:**

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### **2005 Authors:**

## **Literature**

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