Banded Sunfish

Enneacanthus obesus

Federal Listing	
State Listing	SC
Global Rank	
State Rank	S3
Regional Status	V. High

Photo by NHFG

Justification (Reason for Concern in NH)

Surveys conducted since the first Wildlife Action Plan was completed in 2005 suggest that the banded sunfish is more widely distributed in southern New Hampshire than previously thought. However, much of the habitat where banded sunfish are found has been degraded by shoreland development, eutrophication, and runoff from impervious surfaces. Habitat degradation, especially upstream of dams, may increase the vulnerability of banded sunfish to predation by both introduced (largemouth bass) and native (chain pickerel) predators. The long term viability of banded sunfish populations in New Hampshire is still unclear.

Distribution

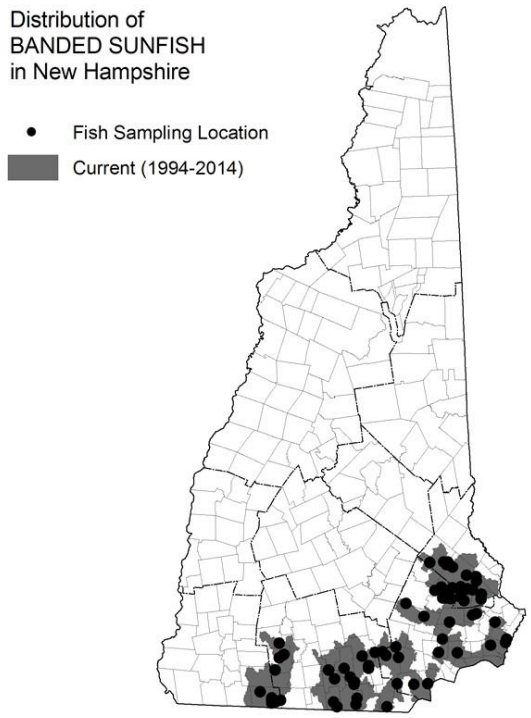
Banded sunfish inhabit the Atlantic coastal plain from southern New Hampshire to Florida (Scarola 1987). In New Hampshire they are found in lowland areas of the Merrimack River and in coastal watersheds (Scarola 1987). A population has also been documented in the upper Millers River watershed, which drains into the Connecticut River (Bailey and Oliver 1939). This is the only known population of banded sunfish within the Connecticut River Watershed in New Hampshire.

Habitat

Banded sunfish prefer vegetated areas of ponds, lakes, and the backwaters of lowland streams (Scarola 1987). Banded sunfish are highly tolerant of acidic water and can withstand pH levels as low as 4.0 (Gonzales and Dunson 1989). Tolerance for acidic water may be an adaptation that provides banded sunfish with access to habitats unavailable to other fish species (Graham and Hastings 1984, Gonzales and Dunson 1991) and may provide the banded sunfish with refuge from both native and introduced species of predaceous fish (Graham 1993). In New Hampshire, banded sunfish are found in a variety of habitats from lakes and ponds to low gradient headwater streams with beaver activity.

NH Wildlife Action Plan Habitats

- Warmwater Lakes and Ponds
- Warmwater Rivers and Streams



Distribution Map

Current Species and Habitat Condition in New Hampshire

Fish surveys for banded sunfish were intended to confirm presence, not to assess the health of individual populations. Banded sunfish are often captured unexpectedly during fish surveys for other target species in southeastern NH. They appear to be more common than previously expected, especially in the Millers River watershed and in the headwaters of the coastal drainages. Banded sunfish are more easily captured in low gradient streams with a history of beaver activity. They appear to be less common in lakes and ponds with high densities of shoreline development, where introduced predators, degraded water quality, and aquatic vegetation removal may impact banded sunfish populations. The relative abundance of banded sunfish populations in New Hampshire presents an opportunity to protect the species at the northern edge of its range, where its habitat is still relatively intact.

Population Management Status

There are no current population management activities for banded sunfish.

Regulatory Protection (for explanations, see Appendix I)

- Harvest permit - season/take regulations

Quality of Habitat

Low gradient, warmwater streams in the watersheds of southern New Hampshire, such as the Isinglass River, Bellamy River, Lamprey River, and Millers River support healthy populations of banded sunfish. These streams often flow through wetlands with a history of beaver activity. There tends to

be fewer predators and better water quality in the low gradient, warmwater stream habitat that makes up much of the headwaters of the rivers in southeastern NH. In the watersheds upstream of sites known to contain banded sunfish, an average of 13% of the landscape is classified as developed, but the level of development is highly variable, ranging from a high of 54% to a low of less than 1%. GIS landcover data can be used to identify the least impacted watersheds where banded sunfish are likely to occur. Protecting headwater stream habitat in the drainages of coastal, southern Merrimack, and upper Millers Rivers, will benefit a number of other aquatic species of concern in addition to banded sunfish.

Banded sunfish populations in some shallow eutrophic ponds are subjected to degraded water quality. Low dissolved oxygen levels and increased turbidity due to shoreline development and polluted runoff from the surrounding watershed can impact fish species like banded sunfish, which prefer to forage in healthy stands of submerged aquatic vegetation. These ponds, often created by dams, tend to have abundant populations of introduced predators, such as bass and bluegill, which may limit banded sunfish productivity. Examples include Flints Pond (Hollis), Canobie Lake (Salem), Powwow Pond (Kingston), and Mill Pond (Durham). Reducing nutrient loading, managing stormwater runoff, and protecting shoreline habitat will improve habitat for banded sunfish and other aquatic species in shallow warmwater ponds.

Habitat Protection Status

Habitat Management Status

There are no habitat management projects directed at banded sunfish.

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 eutrophication (Threat Rank: High)

Nutrients from agricultural sources, sedimentation, lawn fertilizers, and poorly functioning septic systems contribute to increased algal growth in lakes and ponds. This excess productivity causes reductions in water quality and eventually lower dissolved oxygen levels as microorganisms consume the dead algal cells, using up oxygen in the process.

Many lakes and ponds in New England show signs of degraded water quality due to cultural eutrophication (USEPA 2010). Increasing development pressure in southern New Hampshire has led to eutrophication issues with many of the water bodies that support aquatic species of concern, including banded sunfish, bridle shiner, redfin pickerel, swamp darter, and eastern pondmussel.

Species disturbance from shoreline development (Threat Rank: Medium)

Development along the shoreline of lakes, ponds, and larger rivers degrades critical habitat for aquatic species.

Aquatic plant removal, clearing of trees and branches that fall into the water, shoreline armoring, dock construction, tree and shrub thinning, and lawn maintenance are common practices associated with shoreline development. The cumulative effects of shoreline development combine to reduce

habitat quality throughout a waterbody (Brian and Scarnecchia 1992; Hicks and Frost 2010). Vegetation removal, in particular, degrades habitat for species like banded sunfish, bridle shiner, and swamp darter, which depend on submerged aquatic plant species for spawning and refuge from predators.

Habitat conversion and degradation caused by water level management (Threat Rank: Medium)

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 shutdown in an attempt to refill lakes or increased rapidly to lower the water level.

Aquatic habitat in the littoral zone becomes degraded during excessive water level drawdown, including declines in aquatic macrophytes, invertebrate density, and species diversity. These impacts are linked to overall lake function, including potential influences on nutrient cycling (Zohary and Ostrovsky 2011). Changes in fish communities that result from artificial flow manipulation involve a shift to habitat generalist fish species. These changes have been have been well documented in studies related to instream flow (Kanno and Vokoun 2010).

Mortality from subsidized or introduced predators (Threat Rank: Medium)

Fish species including largemouth bass, smallmouth bass, black crappie, and northern pike are often illegally introduced into waterbodies by anglers to create new fishing opportunities. These introductions can significantly alter the species composition of a lake or pond.

Introductions of predator fish species have been implicated in an overall loss of minnow species diversity throughout the northeast (Whittier et al. 1997)

Species disturbance from impervious surface run-off (Threat Rank: Medium)

Stormwater runoff from impervious surfaces changes the hydrology of local rivers and streams. Flashier flows cause an increase in erosion and sediment deposition along stream banks and in the stream channel. More surface flow during rain events reduces the amount of precipitation that infiltrates into the ground, which results in lower base flows during dry periods. Oil based pollutants, sediment, and road salt are washed from roads and parking lots into surrounding waterbodies which can lead to chronic declines in water quality. Runoff from pavement warmed by the sun can also lead to increased water temperatures in local streams when stormwater flows directly into surface waters.

The impacts of impervious land cover on aquatic habitats have been well documented (Wang et al. 2001; Cuffney et al. 2010; Stranko et al. 2008).

List of Lower Ranking Threats:

None

Actions to benefit this Species or Habitat in NH

Reduce nutrient loading

Primary Threat Addressed: Disturbance from eutrophication

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:**

Water level management

Primary Threat Addressed: Habitat conversion and degradation caused by water level management

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. 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 mangement 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:**

Land Protection

Primary Threat Addressed: Species disturbance from impervious surface run-off

Specific Threat (IUCN Threat Levels): Pollution / Domestic & urban waste water / Run-off

Objective:
Preserve the natural ecological functions of an area by protecting land from development.

General Strategy:
Land protection is a strategy that can be used to ensure a level of habitat quality that is necessary to support certain species and habitats of conservation concern. For aquatic species, land protection prevents many of the impacts caused by sprawling development. Groundwater recharge, intact riparian zones, and unrestricted migration corridors are some of the benefits. Species with limited ranges and mobility may be protected almost entirely through land conservation. For wider ranging species, land protection will be part of a greater restoration strategy. Land conservation projects that include lake and pond shorelines and low gradient streams in southern New Hampshire will benefit banded sunfish. Land protection projects in New Hampshire usually require the coordination of a variety of funding sources, with involvement from town conservation commissions, local land trusts and watershed associations, government agencies, and state or national NGO's. Since 2005, the NH Wildlife Action Plan has helped direct land protection efforts toward conserving habitat for species and habitats of concern. The effectiveness of land conservation could be improved by identifying and addressing barriers to land conservation in New Hampshire and increasing outreach to help prioritize projects that benefit species and habitats of concern.

Political Location: **Watershed Location:**

Shoreline Buffer Protection

Primary Threat Addressed: Species disturbance from shoreline development

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:
Protect important habitat features along the shorelines of lakes, ponds, and larger rivers.

General Strategy:
The NH Shoreland Water Quality Protection Act provides a minimum level of protection for shoreline habitat along New Hampshire's lakes, ponds, and rivers (third order and larger). While the Shoreland Water Quality Protection Act focuses on protecting natural vegetation along the shoreline, it falls short of protecting other important habitat features such as submerged aquatic vegetation and trees that fall into the water. Landowners often remove plants and trees from the water to improve access for swimming and boating. These trees and submerged aquatic plants offer important structure for spawning, foraging, and evading predators. Increasing the percentage of natural or undeveloped shoreline will improve the overall habitat quality in a lake or pond. Conservation easements, changes in zoning, legislative acts, or landowner outreach programs may be used to restore natural shoreline features to New Hampshire lakes and ponds, many of which have little remaining undeveloped shoreline.

Political Location: **Watershed Location:**

Stormwater Management

Primary Threat Addressed: Species disturbance from impervious surface run-off

Specific Threat (IUCN Threat Levels): Pollution / Domestic & urban waste water / Run-off

Objective:
To reduce the impacts of runoff from impervious surfaces by using Low Impact Development Technology.

General Strategy:
Stormwater runoff from impervious surfaces has been shown to damage aquatic habitats (Wang et al. 2001; Cuffney et al. 2010). Much of this damage can be prevented by stormwater management practices that filter runoff through the ground before it enters surface water. This practice not only removes much of the sediment and toxins that are typically washed into streams, but it also reduces the rapid fluctuation in temperature, as well as the excess erosion and sediment deposition that have become a chronic issue for rivers and streams in developed areas. The University of New Hampshire Stormwater Center is an excellent resource for Low Impact Development (LID) practices for stormwater management.

Political Location: **Watershed Location:**

Life history research

Objective:
Study the life histories of fish species of conservation concern in New Hampshire.

General Strategy:
There is a lack of basic information on the reproductive behavior, foraging habits, habitat requirements, seasonal movement patterns and other aspects of the life history of many lesser known fish species of concern in New Hampshire. A better understanding of these species would aid in the assessment of potential threats and the development of appropriate management actions. Also of interest is their ecological role in aquatic communities and their potential use as indicators for water quality or intact habitat.

Political Location: **Watershed Location:**

Distribution surveys

Objective:
Map the distribution of fish species of conservation concern.

General Strategy:
Continue to conduct surveys to monitor the distributions of fish species of concern in New Hampshire.

Political Location: **Watershed Location:**

References, Data Sources and Authors

Data Sources
Published literature provided information on distribution and habitat requirements. The NHFG fish survey database, NHDES Biomonitoring data, and watershed biological surveys conducted by NHFG from 1937 to 1939 were used in identifying current and historic records of the species within New

Hampshire.

The NHFG fish survey database includes records from a variety of projects both within and outside the department. Data sources include the NHDES Biomonitoring Program, Eastern Brook Trout Joint Venture wild brook trout brook monitoring surveys, Sportfish Restoration project data, and status assessments for the Wildlife Action Plan.

Typical survey methods include backpack electrofishing, boat electrofishing, seine surveys, gill netting, and fyke netting. Surveys targeting sites with historical records of banded sunfish were generally conducted with a bag seine. Banded sunfish are most often captured incidentally during backpack electrofishing surveys in shallow, low gradient warmwater stream habitat.

Data Quality

There have been 82 records of banded sunfish collected since 1984. This is a significant increase over the 14 sites where banded sunfish were recorded in a statewide biological inventory conducted in the late 1930s by the NHFG (Gordon 1937, Bailey 1938, Bailey and Oliver 1939). The 81 records of banded sunfish span 31 watersheds in southern New Hampshire at the United States Geological Survey (USGS) Hydrologic Unit Code 12 digit scale (HUC 12) (Seaber et al. 1987). The broad scale distribution of banded sunfish in New Hampshire has been established, but the distribution of the species within each watershed where it occurs is less well understood. Banded sunfish appear to be relatively common in the Oyster River watershed, where the species was recorded at 13 sites during fish surveys conducted in 2007 and 2008 as part of an American brook lamprey habitat mapping project.

While there is increasing knowledge of the distribution of banded sunfish in New Hampshire, there is little information on the health and long term viability of individual banded sunfish populations.

2015 Authors:

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2005 Authors:

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