Swamp Darter

Etheostoma fusiforme

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

Photo by NHFG

Justification (Reason for Concern in NH)

Swamp darter populations appear to be restricted to watersheds in the southeastern corner of the state. New Hampshire is near the northern extent of the swamp darters' global range. The short life span of the swamp darter (1 to 2 years), combined with aquatic habitat degradation caused by increasing development in southeastern New Hampshire, make the species vulnerable to extirpation from state waters (Schmidt 1983). Swamp darters are difficult to capture, and as a result they may be more widely distributed than records indicate. They are listed as imperiled, critically imperiled, or vulnerable in the majority of states throughout their range. The swamp darter is a state threatened species in Maine and is presumed extirpated from the state of Pennsylvania.

Distribution

Swamp darters have a patchy distribution along the Atlantic coastal plain from southern Maine to the gulf coast and the Lower Mississippi drainages (Scarola 1987). In New Hampshire, swamp darters are restricted to the coastal and lower Merrimack River watersheds.

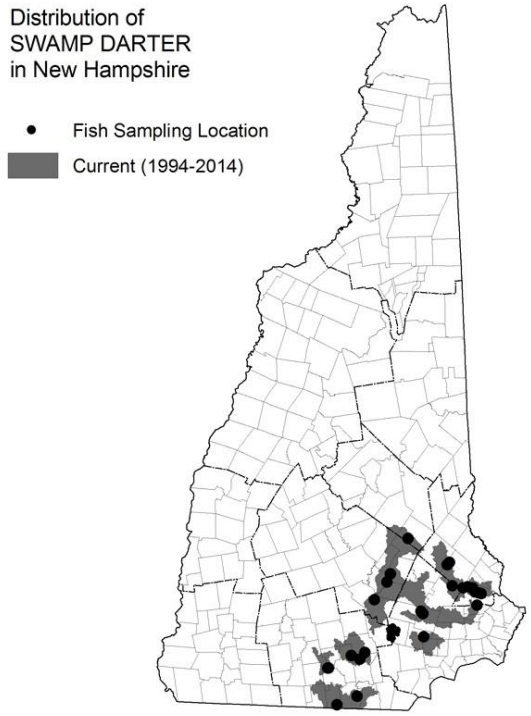
Habitat

The swamp darter inhabits lakes and ponds in shallow areas of soft muddy substrate, dense vegetation, and accumulated detritus. Stream habitats include both swift and slow moving water with patches of thick vegetation (Schmidt and Whitworth 1979, Scarola 1987). Research in Connecticut streams and ponds found swamp darters to be more abundant in ponds than in streams, and stream populations were usually found near known pond populations. Spawning activity was not observed in streams, indicating that stream populations may depend on recruitment from ponds (Schmidt and Whitworth 1979). Swamp darters are dependent on vegetation for spawning (Toth et al. 1998).

In New Hampshire, swamp darters have been observed in a wide variety of habitat types, including small vegetated ponds, impounded rivers, low gradient streams with little instream vegetation, and large rivers with sandy substrate.

NH Wildlife Action Plan Habitats

- Warmwater Rivers and Streams
- Warmwater Lakes and Ponds



Distribution Map

Current Species and Habitat Condition in New Hampshire

There are 26 records of swamp darter from 13 watersheds at the United States Geological Survey (USGS) Hydrologic Unit Code 12 digit scale (HUC 12) in southeastern New Hampshire (Seaber et al. 1987). Records most likely reflect survey effort rather than actual distribution. In most cases, a small number of individuals were captured and little can be said about the relative abundance of swamp darters where they are known to occur. The greatest number of records from one watershed is 6, in the Oyster River. This is likely due to an extensive survey effort to map habitat for the state endangered American brook lamprey, but it does suggest that swamp darters are widespread and relatively common in the Oyster River watershed. Other watersheds with multiple records of swamp darters include Baboosic Brook, the Suncook River, the Lamprey River, and the Isinglass River.

Population Management Status

There are no population management efforts focused on swamp darters.

Regulatory Protection (for explanations, see Appendix I)

- NH NHB Database - current

Quality of Habitat

Swamp darters have been captured in watersheds of a variety of sizes ranging from 3 square km to

622 square km. They have been documented in both riverine and ponded habitats. The overall quality of these habitats has been degraded by the impacts of urbanization throughout much of southeastern New Hampshire, where swamp darters are found. However, there is little information on the tolerance level of swamp darters to different types of environmental stress.

The percent impervious surface coverage in watersheds upstream of the 26 sites where swamp darter have been recorded averages 5% (min=1.8; max=20.2; SD = 3.7). The effects of impervious cover vary by watershed size and the sensitivity of different stream types, but measurable effects on aquatic habitats can occur at low levels of impervious cover (Schueler et al. 2009). Most streams show signs of degradation at between 5 and 10% impervious cover, but when impervious cover exceeds 10%, impacts to aquatic habitats can be severe (Cuffney et al. 2010; Stranko et al. 2008; Wang et al. 2001).

Records of swamp darter are too scarce to be used for targeting conservation actions. Swamp darters will benefit from overall land protection and aquatic habitat restoration work in southeastern New Hampshire. However, there are some areas that should be prioritized. The Oyster River appears to support a healthy population of swamp darters, along with other species of concern, including the state endangered American brook lamprey. The Isinglass River watershed also contains a variety of native fish species. The aquatic habitat throughout the Isinglass River watershed is relatively intact and should be the focus of land protection efforts, especially along the riparian zone. The Lamprey River is under development pressure and has shown signs of degradation, with a significant loss of freshwater mussel abundance and diversity (Nedeau 2011). Efforts to reduce the impacts of stormwater runoff and undersized stream crossings in the headwaters of the Lamprey River will improve aquatic habitat quality throughout the watershed (NHFG 2012).

Habitat Protection Status

Habitat Management Status

Swamp darters will benefit from habitat management projects focused on riparian buffer protection, barrier removal, stormwater management upgrades, and water level management practices that imitate natural flow regimes. There are no current habitat management projects that specifically target swamp darters in New Hampshire.

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.

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 (Bryan 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.

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 leads to a decrease in groundwater infiltration, 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 temperatures in local streams when stormwater flows directly into surface waters.

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

Disturbance from eutrophication (Threat Rank: Medium)

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 in many of the water bodies that support aquatic species of concern, including banded sunfish, bridle shiner, redfin pickerel, swamp darter, and eastern pondmussel.

List of Lower Ranking Threats:

None

Actions to benefit this Species or Habitat in NH

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:**

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:**

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:**

Stormwater Management

Primary Threat Addressed: 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:**

Research survey methods

Objective:
Develop or improve survey methods for fish species of conservation concern.

General Strategy:
Experiment with survey methods to improve data collection on swamp darter distribution and abundance. Potential sampling methods may include kick seines, baited minnow traps, underwater cameras, electrofishing, or a combination of approaches.

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 (fourth 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:**

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 contains records from over 2,000 sites dating back to 1980.

Data Quality

There are 26 sites where swamp darters have been recorded since 1984. Of these records, 14 were part of an effort to revisit sites surveyed in a statewide biological inventory conducted in the late 1930s by the NHFG (Gordon 1937, Bailey 1938, Bailey and Oliver 1939). There does not appear to be a decline in the distribution of swamp darters in New Hampshire compared to historical records (swamp darters were captured at 12 sites in the 1930's). Some of their apparent scarcity may be explained by difficulty of capture. Data on the condition of swamp darter populations is lacking. Habitat condition data continues to improve with upgrades to GIS layers such as impervious surface coverages.

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2005 Authors:

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