

Species Status Assessment

Class: Actinopterygii
Family: Gasterosteidae
Scientific Name: *Apeltes quadracus*
Common Name: Fourspine stickleback

Species synopsis:

The fourspine stickleback is one of five species in the family Gasterosteidae, occurring close to the shore in the western Atlantic Ocean from the Gulf of St. Lawrence, Canada, to North Carolina. A small number of populations are known far upstream in the Hudson, Delaware, and Susquehanna drainages, and a few other isolated freshwater situations (lakes in Nova Scotia) (Wootton 2010). The fourspine stickleback is heavily reliant on the seagrass beds of New York's coastal and estuarine waters for refuge, spawning, nursery and foraging grounds and they are commonly found throughout the estuarine portion of the Upper Hudson and Lower Hudson-Long Island bays watershed basins (NYSDEC 2005). This species is represented by a large number of occurrences, or subpopulations, and no major threats are known (NatureServe 2013). The IUCN reports that fourspine stickleback are expanding their range, colonizing new areas and increasing rapidly in numbers, often to the detriment of native fish species (Wootton 2010). In Lake Superior, this species was accidentally introduced through ballast water discharge and is now considered an invasive species in this region. They compete with other species for invertebrate prey, also preying upon the eggs and larvae of other fishes in the nearshore habitats preferred by this species and populations of native sticklebacks have declined following the establishment of this species in Lake Superior (Fuller et al. 2013). Other sources have noted that this species may be in decline in its native New York range (Carlson 2009, Kelley and Schultz 2003, NYSDEC 2005).

i. Status

a. Current and Legal Protected Status

- i. **Federal** Not Listed **Candidate?** No
- ii. **New York** Not Listed; SGCN

b. Natural Heritage Program Rank

- i. **Global** G5
- ii. **New York** S4 **Tracked by NYNHP?** No

Other Rank:

IUCN: least concern

Status Discussion:

Due to its wide range along the coast of northeastern North America, large population size, and lack of major threats, the fourspine stickleback is ranked secure (G5) (NatureServe 2013). The IUCN determined a status of least concern because this species is able to adapt to living in a range of habitats from coastal marine waters to freshwater lakes and is unlikely to be impacted by degradation of a specific habitat type (Wootton 2010). In recent years it has expanded its range to new localities and is capable of outcompeting native species.

II. Abundance and Distribution Trends

a. North America

i. Abundance

 declining increasing X stable unknown

ii. Distribution:

 declining increasing X stable unknown

Time frame considered: _____

b. Regional

i. Abundance

 declining increasing X stable unknown

ii. Distribution:

 declining increasing X stable unknown

Regional Unit Considered: Mid-Atlantic

Time Frame Considered: _____

c. Adjacent States and Provinces

CONNECTICUT **Not Present** _____ **No data** **X**

i. Abundance

_____ **declining** _____ **increasing** _____ **stable** **X** **unknown**

ii. Distribution:

_____ **declining** _____ **increasing** _____ **stable** **X** **unknown**

Time frame considered: _____

Listing Status: _____ **Not Listed** _____ **SGCN?** **Yes**

MASSACHUSETTS **Not Present** _____ **No data** **X**

i. Abundance

_____ **declining** _____ **increasing** _____ **stable** **X** **unknown**

ii. Distribution:

_____ **declining** _____ **increasing** _____ **stable** **X** **unknown**

Time frame considered: _____

Listing Status: _____ **Not Listed** _____ **SGCN?** **No**

NEW JERSEY **Not Present** _____ **No data** **X**

i. Abundance

_____ **declining** _____ **increasing** _____ **stable** **X** **unknown**

ii. Distribution:

_____ **declining** _____ **increasing** _____ **stable** **X** **unknown**

Time frame considered: _____

Listing Status: _____ **Not Listed** _____ **SGCN?** _____

d. NEW YORK

No data _____

i. Abundance

 X declining ___ increasing ___ stable ___ unknown

ii. Distribution:

___ declining ___ increasing ___ stable X unknown

Time frame considered: _____

*Long-term analysis from the Hudson River Estuary Monitoring Program has shown a moderate decline in fourspine stickleback abundance (Kelley and Shultz 2003).

Monitoring in New York.

There are no regular surveys or monitoring activities that are specific to the fourspine stickleback in New York waters. Fourspine sticklebacks may be captured by the NYSDEC Western Long Island Beach Seine Survey, although this survey does not target this species or its habitat. The Hudson River Estuary Monitoring Program may also collect data on fourspine sticklebacks occurring in that area (Kelley and Shultz 2003).

Trends Discussion:

The fourspine stickleback is common in much of its range and although total population size is unknown, it presumably exceeds 100,000 (NatureServe 2013). However, long-term analysis from the Hudson River Estuary Monitoring Program has shown a decline in fourspine stickleback abundance (Kelley and Shultz 2003). Additionally, NYSDEC fishery-independent surveys have demonstrated a general decline from the mid-1980s for some submerged aquatic vegetation-dependent fishes (NYSDEC 2005). Although still found in target waters, in the 2000s this species was found with lesser frequency than in previous years (Carlson 2009).

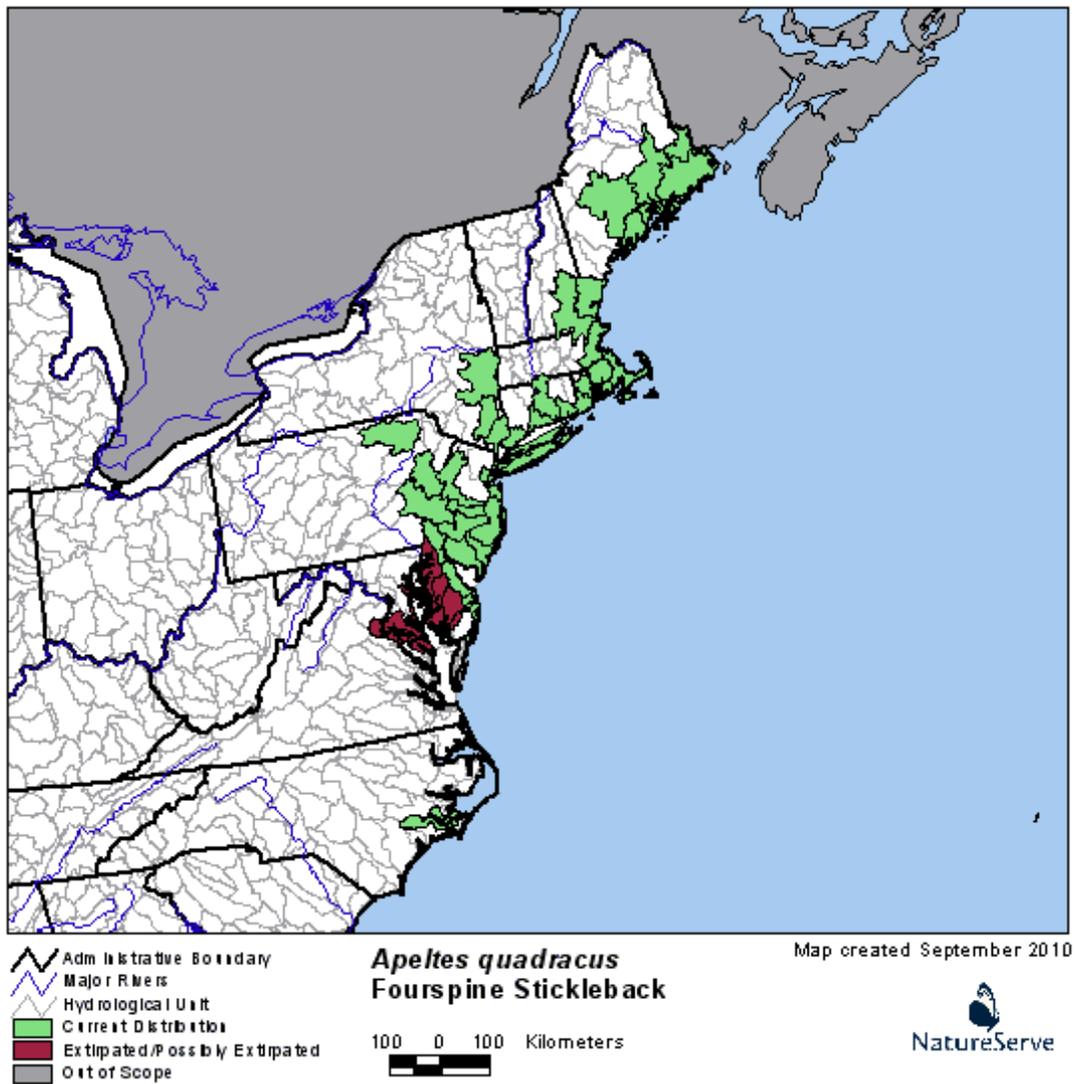


Figure 1. U.S. distribution of the fourspine stickleback by watershed (NatureServe 2013).

III. New York Rarity, if known:

Historic	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
prior to 1970	_____	_____	_____
prior to 1980	_____	_____	_____
prior to 1990	_____	_____	_____

Details of historic occurrence:

Historically, fourspine sticklebacks have been found in the coastal waters of Long Island, the lower Hudson River, and in Columbia and Bronx Counties. Their range in the Hudson River extends up to

dam at Troy, with one record of occurrence further upstream in Saratoga County near the Champlain Canal in 1934 (Carlson 2009).

Current	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
	_____	_____	_____

Details of current occurrence:

Currently, the fourspine stickleback is found in the Lower Hudson and Long Island Bays, the Atlantic Ocean-New York Bight, and other inland areas along the Hudson (NYSDEC 2005).

New York's Contribution to Species North American Range:

% of NA Range in New York	Classification of New York Range
___ 100 (endemic)	___ Core
___ 76-99	<u>X</u> Peripheral
___ 51-75	___ Disjunct
___ 26-50	Distance to core population:
<u>X</u> 1-25	_____

IV. Primary Habitat or Community Type:

1. Estuarine, Brackish Shallow Subtidal
2. Estuarine Subtidal, Tidal River
3. Marine Eelgrass Meadow
4. Estuarine, Brackish Shallow Subtidal, Aquatic Bed

V. New York Species Demographics and Life History

- Breeder in New York**
- Summer Resident**
- Winter Resident**
- Anadromous**
- Non-breeder in New York**
- Summer Resident**
- Winter Resident**
- Catadromous**
- Migratory only**
- Unknown**

Species Demographics and Life History Discussion:

Spawning occurs in late spring or early summer (May to July) in bays, sounds, lagoons, river mouths and tidal rivers throughout their range (Grant and Lee 2004). Sticklebacks exhibit unique reproductive behavior where males and females appear simultaneously on the spawning grounds and males construct nests. Cup shape nests are constructed in the branches or on stems of plants in shallow water. Although no particular substrate has been associated with spawning in the field, laboratory experiments indicate that eelgrass is the preferred vegetation for nest building (Grant and Lee 2004). It has been reported that males may construct and tend two or three nests within the same vicinity, either placed on top of each other in a tiered effect or be scattered throughout the male's territory (Grant and Lee 2004). Females then deposit clutches of 15 to 50 eggs within the nest and males guard and fan the nest to provide oxygen. Larvae hatch within a week at temperatures of 16-18°C, or longer in warmer temperatures, and remain on the bottom for several days before swimming (Grant and Lee 2004). Males have a one year lifespan, but females may live a second winter and spawn the following spring. In the Great Lakes areas, they have been reported to reach sexual maturity at age 2 (Grant and Lee 2004).

VI. Threats:

The fourspine stickleback is used in the public aquarium trade, however there is no evidence to suggest that it is harvested in high enough quantities to result in significant population declines and their short generation time likely results in a tolerance to moderate harvesting. The largest threat is habitat degradation and loss of salt marsh and SAV beds from tidal flow restrictions. Sea grasses are declining in New York at an alarming rate and continue to be threatened by nutrient loadings, decreased water quality, harmful algae blooms, habitat degradation, fishing gear and boating activities, and climate change. Sea level rise may result in deeper water in some coastal environmental, meaning less light will be able to penetrate down to bay bottom seagrass habitat, resulting in significant implications for seagrass health and fourspine stickleback habitat (NYS Seagrass Taskforce 2009). Changing temperatures and habitat shifting and alteration of coastal marine ecosystems from climate change may have potential negative effects for this species (Harley et al. 2006). Fourspine sticklebacks are able to adapt to living in a range of habitats so the degree of threat from degradation of seagrass or climate change is unknown.

Entrainment and impingement in cooling water intake systems of power plants kill billions of eggs, larvae, young fish and adult fish every year, including many estuarine associated species such as the fourspine stickleback. The north and south shores of Long Island and the East and Hudson Rivers are home to multiple power plants with once-through cooling systems, negatively affecting the estuarine and tidal rivers that provide essential habitat and nursery areas for the fourspine stickleback and other SAV associated species (Network for New Energy Choices 2010).

Are there regulatory mechanisms that protect the species or its habitat in New York?

No Unknown

Yes

There are no species-specific conservation measures in place; however there is protection of critical seagrass habitat in New York under the Seagrass Protection Act signed into law in 2012. This law protects seagrass by granting the NYSDEC the authority to regulate coastal and marine activities that threaten seagrass beds or seagrass restoration efforts.

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

Efforts to improve coastal and marine water quality are necessary, and new and additional resources are essential to monitor, manage, restore and research seagrasses, and efforts to educate and engage citizens in the process to restore and protect seagrass habitat is crucial (NYS Seagrass Taskforce 2009). Research is needed to understand the inter- and intra-species relationships and population trends of species whose populations are dependent on SAV beds and salt marsh habitat

protection and restoration are important elements to manage all SAV dependent species (NYSDEC 2005).

VII. References

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