# Species Status Assessment Cover Sheet

**Species Name:** American Eel **Date Updated:** January 2023

**Current Status:** Not Listed – HPSGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** S2S3

**Distribution:** The American Eel has a very large range extending from southern Greenland, Labrador, and Newfoundland southward along the Atlantic coast to southern Florida, along the coast of the Gulf of Mexico to the northern tip of the Yucatan Peninsula, and south along the Caribbean coast of Central America and the Atlantic coast of the Caribbean Islands. They are sometimes found as south as northern South America. In New York, American Eels historically penetrated inland throughout much of the state. There are American Eel records in all 18 watersheds within New York; however, the highest frequencies of occurrence for American Eel are in the Long Island, Lower Hudson, and Delaware watersheds where there are fewer barriers to migration.

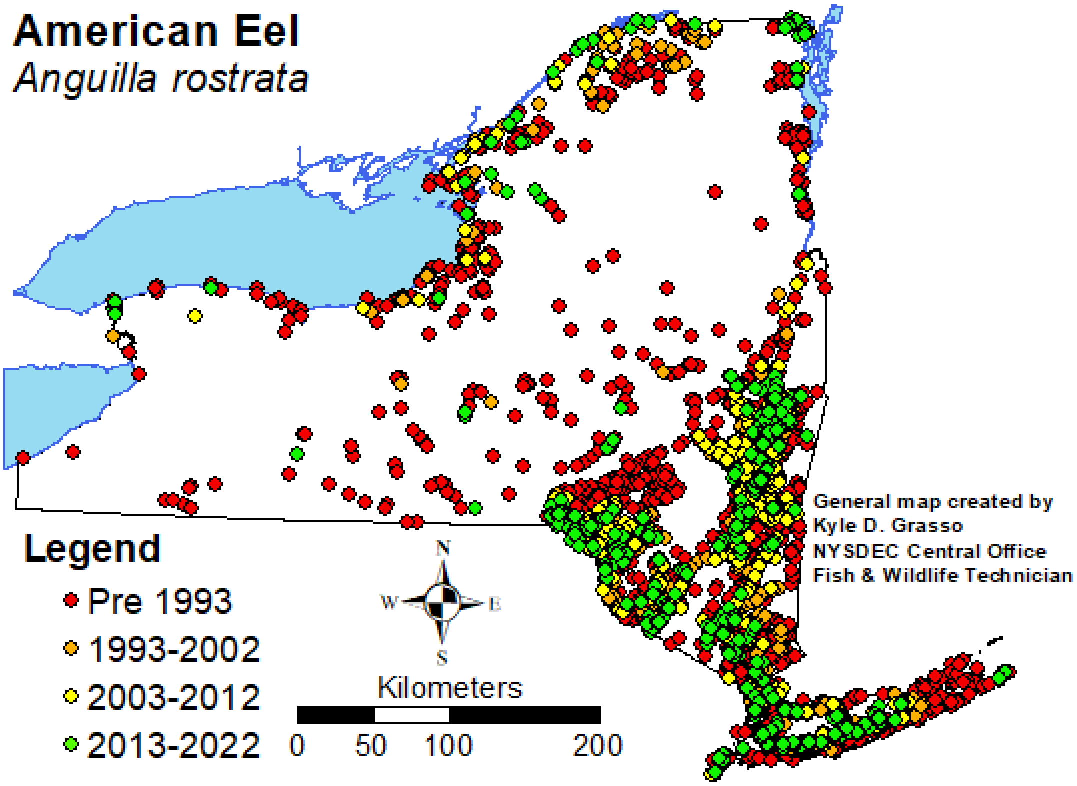
**Habitat:** American Eels occupy the broadest diversity of habitats of any fish species, using fresh water, marine and brackish habitats. All freshwater systems are used including large rivers and their small tributaries as well as reservoirs, canals, farm ponds and subterranean springs. Habitat use varies depending on what life stage the American Eel is in.

**Life History:** The American Eel is a catadromous species, which spends the majority of their 20-30 year life in freshwater habitats. They are slow to mature (7-30+ years) and only reproduce once in their lives. However, females can often produce millions of eggs. As adults, they migrate up to thousands of kilometers around summer or fall to the Sargasso Sea to spawn before they die. Spawning occurs in winter and early spring. After hatching, the larvae are transported by currents to areas near the continental margin of North America where they metamorphose into unpigmented "glass eels" during the pelagic stage (8-12 months after hatching, sometimes a year) and actively move toward land. As they enter coastal areas, they begin to develop external pigmentation and are then referred to as “elvers”. Elvers develop into the "yellow eel" stage, which resemble the adult stage, usually by age 2. In the northeastern United States, young eels start moving upstream in river systems before pigmentation is complete. The timing and duration of this upstream migration of elvers and yellow eels varies with location. In the northeastern U.S. it may occur from March through October, with a May-July peak in many areas (July-August.in the St. Lawrence River). Upstream migration may extend for months or years. Some yellow eels move far into stream headwaters whereas others remain in estuaries. In general, eels in fresh water are all or almost all females. After the lengthy "yellow eel" stage, eels may undergo a physical and physiological transformation into a distinct, sexually mature "silver eel" stage, when they begin to move downstream and into the ocean to spawn, thus completing the cycle.

**Threats:** Threats to the American Eel include barriers to migration, habitat loss and alteration, hydro turbine mortality, oceanic conditions, overfishing (potentially poaching), parasitism, predation, and pollution.

**Population trend:** In New York, American Eels historically penetrated inland throughout much of the state. There are American Eel records in all 18 watersheds within New York; however, the highest frequencies of occurrence for American Eel are in the Long Island, Lower Hudson, and Delaware watersheds where there are fewer barriers to migration. Once highly abundant in Great Lakes and Atlantic watersheds, eel numbers have declined drastically. Compared to historic and even relatively recent abundances, numbers of American eel are significantly reduced in all of the inland watersheds of New York. In the Susquehanna, eel are absent except for a few recent transfers above the major dams. In the Delaware, lower Hudson and Long Island eel are still common, but reduced. In Lake Champlain, Lake Ontario, and the upper St. Lawrence River numbers have been reduced by at least 3 orders of magnitude. They are very rare in the Allegheny and Genesee watersheds. The last record for those watersheds is 1970 and 1992 respectively. This decrease in abundance in both recruitment and spawning stock has significantly reduced biomass in inland waters. See Dittman et al. (2010) for additional information on New York’s inland populations.

**Recommendation:** It is recommended that the American Eel be listed as Special Concern due to the declines in abundance and distribution seen within the inland populations across New York.


American Eel
*Anguilla rostrata*
Legend
● Pre 1993
● 1993-2002
● 2003-2012
● 2013-2022
N
W
E
S
Kilometers
0 50 100 200
General map created by
Kyle D. Grasso
NYSDEC Central Office
Fish & Wildlife Technician

# Species Status Assessment

**Common Name:** American Eel **Date Updated:** January 2023

**Scientific Name:** *Anguilla rostrata* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Anguillidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The American Eel is in the class Actinopterygii and the family Anguillidae (freshwater eels). The American Eel has a very large range extending from southern Greenland, Labrador, and Newfoundland southward along the Atlantic coast to southern Florida, along the coast of the Gulf of Mexico to the northern tip of the Yucatan Peninsula, and south along the Caribbean coast of Central America and the Atlantic coast of the Caribbean Islands. They are sometimes found as south as northern South America. Their native range also penetrates inland North America as far as the Mississippi River basin. In New York, American Eels historically penetrated inland throughout much of the state. There are American Eel records in all 18 watersheds within New York; however, the highest frequencies of occurrence for American Eel are in the Long Island, Lower Hudson, and Delaware watersheds where there are fewer barriers to migration. Once highly abundant in Great Lakes and Atlantic watersheds, eel numbers have declined drastically (ASMFC 2000; Haro et al. 2000). “Compared to historic and even relatively recent abundances, numbers of American eel are significantly reduced in all of the inland watersheds of New York. In the Susquehanna, eel are absent except for a few recent transfers above the major dams. In the Delaware, lower Hudson and Long Island eel are still common, but reduced. In Lake Champlain, Lake Ontario, and the upper St. Lawrence River numbers have been reduced by at least 3 orders of magnitude” (Dittman et al. 2010). They are very rare in the Allegheny and Genesee watersheds. The last record for those watersheds is 1970 and 1992 respectively. This decrease in abundance in both recruitment and spawning stock has significantly reduced biomass in inland waters. See Dittman et al. (2010) for additional information on New York’s inland populations. American Eels occupy the broadest diversity of habitats of any fish species (Helfman et al. 1987). Using fresh water, marine, and brackish habitats. All freshwater systems are used including large rivers and their small tributaries as well as reservoirs, canals, farm ponds and subterranean springs (USFWS 2011).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – HPSGCN

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** S2S3 **Tracked by NYNHP?:** Watchlist

### Other Ranks:

- IUCN Red List: Endangered
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)
- Atlantic State Marine Fisheries Commission: Depleted (2017)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Threatened (5/4/2012)

**Status Discussion:**

The American Eel is not currently federally listed or listed in the state of New York. However, they are currently listed as a HPSGCN in New York. The American Eel is globally ranked as Apparently Secure by NatureServe.

“On July 6, 2005, the USFWS announced a 90-day finding on a petition to list the American Eel under the ESA. They found the petition presented substantial information indicating that listing may be warranted and initiated a status review. On February 2, 2007, the USFWS announced a 12-month finding on a petition to list this species under the ESA. They found listing the American Eel as either threatened or endangered is not warranted at this time. On 29 September 2011, USFWS announced a 90-day finding on a petition to list the American Eel as threatened under the Endangered Species Act of 1973, as amended (Act). Based on their review, USFWS found that the petition presented substantial scientific or commercial information indicating that listing this species may be warranted (based primarily on changes in oceanic conditions due to climate change). In a 2015 finding, USFWS found that no portion of the American Eel's range warrants further consideration of possible endangered or threatened status under the Act and found that listing the American Eel as a threatened or endangered species throughout all or a significant portion of its range is not warranted at this time” (NatureServe 2022).

# II. Abundance and Distribution Trends

## a. North America

### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

## b. Northeastern U.S. (USWFS Region 5)

### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

## c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S5 **SGCN?:** Yes

**MASSACHUSETTS** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**_✓_

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S3S4 **SGCN?:** Yes

**NEW JERSEY** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**_✓_

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – SU **SGCN?:** Yes

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Declines since the 1940s

**Listing Status:** Not Listed – S5 **SGCN?:** Yes

**VERMONT** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**_✓_

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Special Concern – S2 **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**_✓_

**Time Frame Considered:** Reassessed as Threatened in 2012

**Listing Status:** Threatened – S1S2 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:** Reassessed as Threatened in 2012

**Listing Status:** Threatened – S1S2 **SGCN?:** N/A

**d. New York**

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. The NYSDEC Division of Marine Resources carries out an annual young-of-the-year survey on Long Island which is used in ASMFC stock assessments. Since 2008, the DEC Hudson River Estuary Program and the Hudson River National Estuarine Research Reserve, in partnership with NEIWPCC and the Water Resources Institute at Cornell University has managed the Hudson River Citizen Science Eel Project. During this project, teams of scientists, students, and volunteers collect glass eels using specialized nets and traps on Hudson River tributaries each spring. Regular sampling (electrofishing, seining, etc.) is also done for a variety of reasons in many of the waterbodies where American Eel are found.

**Trends Discussion** *(insert map of North American/regional):*

In New York, American Eels historically penetrated inland throughout much of the state. There are American Eel records in all 18 watersheds within New York; however, the highest frequencies of occurrence for American Eel are in the Long Island, Lower Hudson, and Delaware watersheds where there are fewer barriers to migration. Once highly abundant in Great Lakes and Atlantic watersheds, eel numbers have declined drastically (ASMFC 2000; Haro et al. 2000). “Compared to historic and even relatively recent abundances, numbers of American eel are significantly reduced in all of the inland watersheds of New York. In the Susquehanna, eel are absent except for a few recent transfers above the major dams. In the Delaware, lower Hudson and Long Island eel are still common, but reduced. In Lake Champlain, Lake Ontario, and the upper St. Lawrence River numbers have been reduced by at least 3 orders of magnitude” (Dittman et al. 2010). They are very rare in the Allegheny and Genesee watersheds. The last record for those watersheds is 1970 and 1992 respectively. This decrease in abundance in both recruitment and spawning stock has significantly reduced biomass in inland waters. See Dittman et al. (2010) for additional information on New York’s inland populations. Glass eel and elver surveys on Long Island have shown a fluctuating trend for glass eel abundance and a decreasing trend for elver abundance (Caitlin Craig, NYSDEC, Personal Communication). Charts of glass eel and elver abundance on Long Island can be found below:

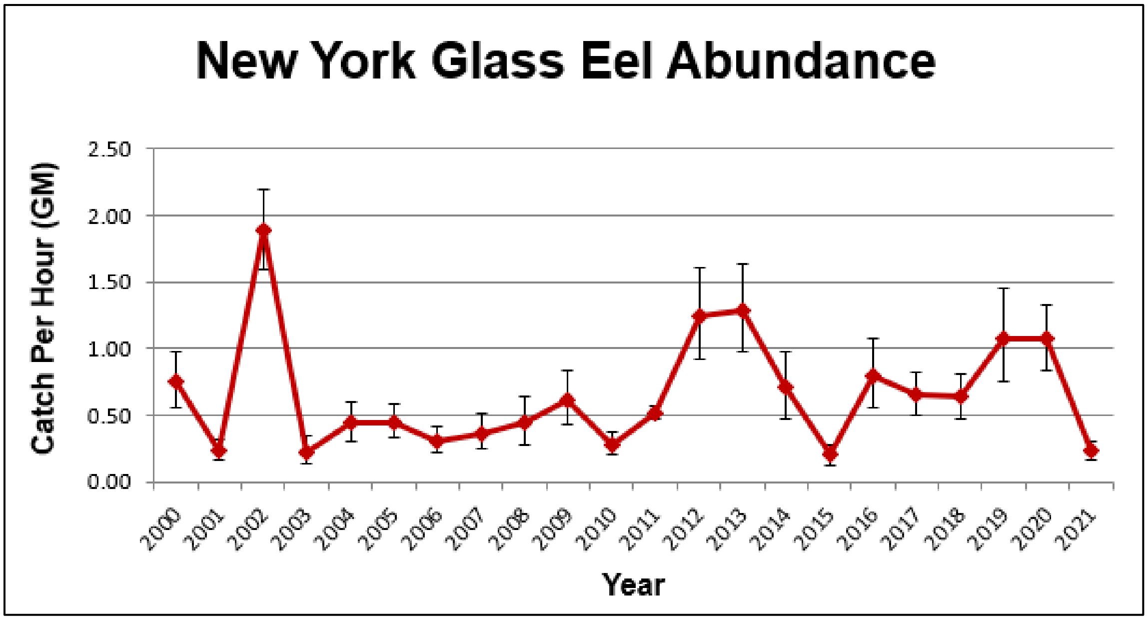


**Figure 1:** Glass Eel Abundance (Geometric Mean) on Long Island, New York from 2000-2021 (Source: Caitlin Craig, NYSDEC).

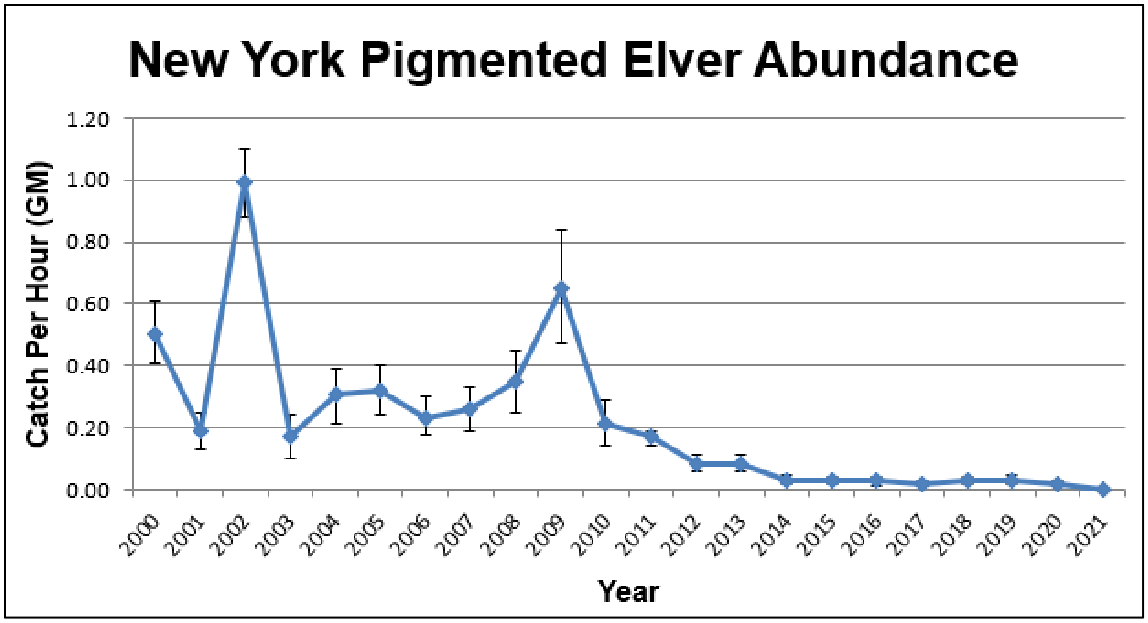


**Figure 2:** Elver Abundance (Geometric Mean) on Long Island, New York from 2000-2021 (Source: Caitlin Craig, NYSDEC).

“The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) stated that the species is widespread in eastern Canada but has experienced dramatic declines over a significant portion of its distribution (e.g., Lake Ontario and the upper St. Lawrence River). Although trends in abundance in other areas are highly variable, strong declines are apparent in several indices” (NatureServe 2022).

“The 2017 American Eel Stock Assessment Update updates the 2012 American Eel Benchmark Stock Assessment with data from 2010-2016. The trend analysis results in this stock assessment update are consistent with the 2012 results, with few exceptions. Despite downward trends in the indices, commercial yellow American Eel landings have been stable in recent decades along the Atlantic coast (U.S. and Canada), although landings still remain much lower than historical levels. The trend analysis and stable low landings support the Assessment Update’s conclusion that the

American Eel population in the assessment range is similar to five years ago and remains depleted. Therefore, the resource is considered depleted and no stock status specific to overfishing determination can be made based on the trend analyses performed (ASMFC 2017)" (ASMFC 2021).

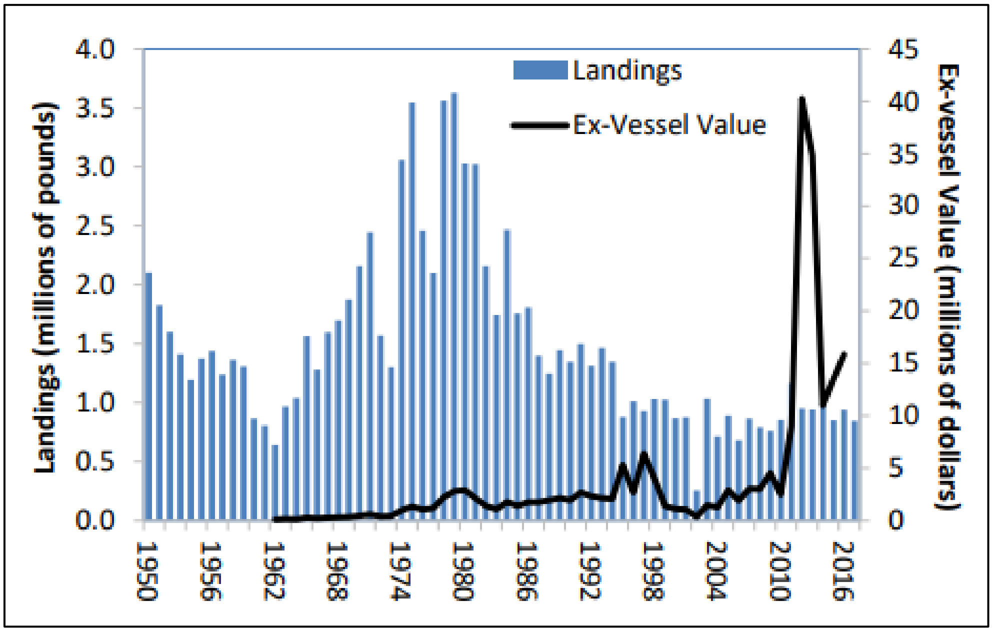


**Figure 3:** American Eel Commercial Landings and Ex-Vessel Value from 1950-2016 (Source: Atlantic Coastal Cooperative Statistics Program Data Warehouse 2019).

| Region | Life Stage | Time Period | 2012 Trend | 2017 Trend |
|---|---|---|---|---|
| Gulf of Maine | YOY | 2001-2016 | NS | NS |
| Southern New England | YOY | 2000-2016 | NS | NS |
|  | Yellow | 2001-2010 | NS | - |
| Hudson River | YOY | 1974-2009 | ↓ | - |
|  | Yellow | 1980-2016 | ↓ | ↓ |
| Delaware Bay/Mid-Atlantic Coastal Bays | YOY | 2000-2016 | NS | NS |
|  | Yellow | 1999-2016 | NS | NS |
| Chesapeake Bay | YOY | 2000-2016 | NS | NS |
|  | Yellow | 1990-2009 | ↑ | ↑ |
| South Atlantic | YOY | 2001-2015 | NS | ↓ |
|  | Yellow | 2001-2016 | ↓ | ↓ |
| Atlantic Coast | YOY (short-term) | 2000-2016 | NS | NS |
|  | YOY (long-term) | 1987-2013 | NS | NS |
|  | Yellow (40+ year) | 1974-2016 | NS | ↓ |
|  | Yellow (30-year) | 1987-2016 | ↓ | ↓ |
|  | Yellow (20-year) | 1997-2016 | NS | NS |

**Table 1:** Results of the Mann-Kendall trend analysis applied to regional and coastwide indices of American Eel abundance by young-of-the-year (YOY) and yellow eel life stages. The arrows indicate the direction of the trend if a statistically significant trend was detected (P-value < α; α = 0.05). NS = No significant trend detected. A dash (-) = indices that data were not updated (Source: ASMFC 2017).

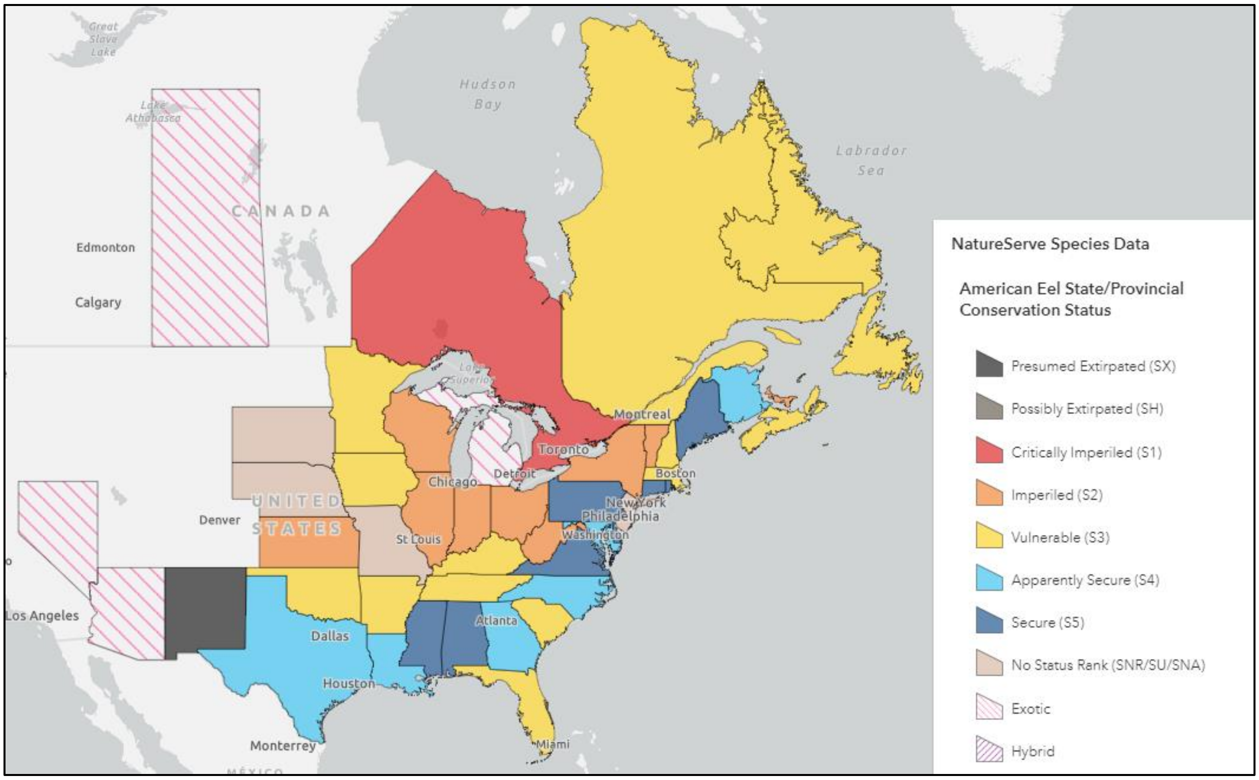


**Figure 4:** American Eel distribution and status (Source: NatureServe 2022).

**Figure 5:** American Eel distribution (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

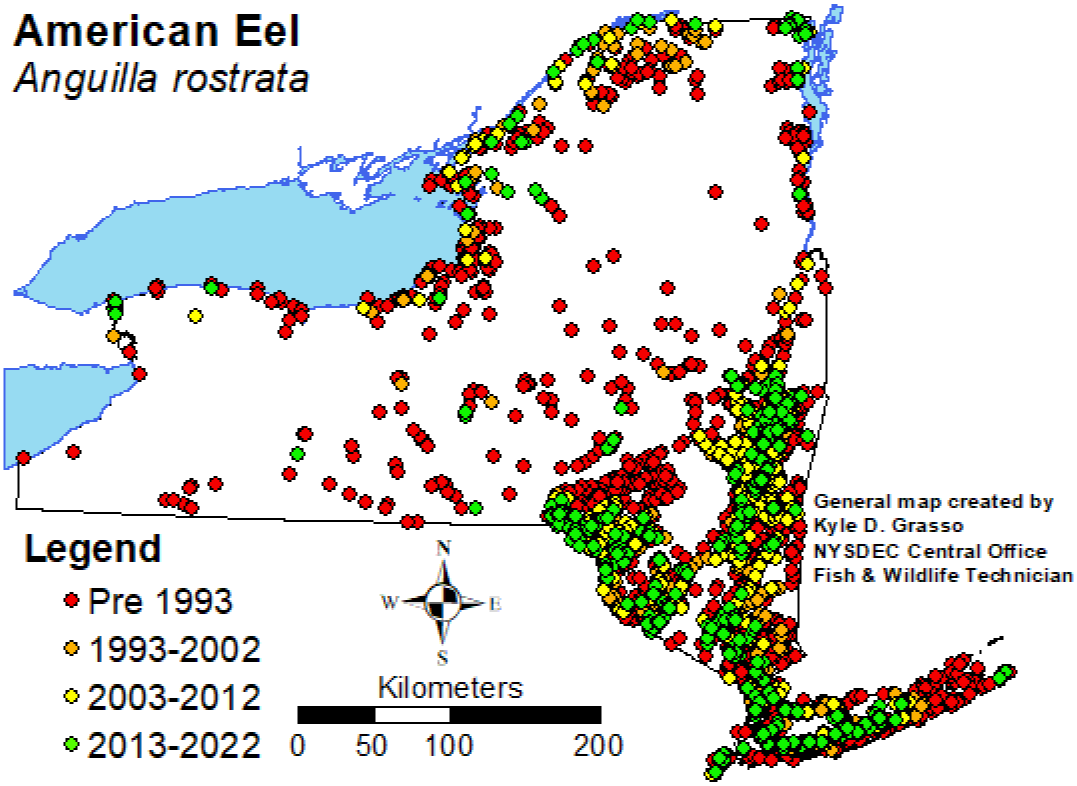


**Figure 6:** Records of American Eel in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 3245 | 787 | >50% |
| **1993-2002** | 822 | 223 | >50% |
| **2003 - 2012** | 876 | 248 | >50% |
| **2013 - 2022** | 917 | 203 | >50% |

**Table 2:** Records of American Eel in New York.

### Details of historic and current occurrence:

In New York, American Eels historically penetrated inland throughout much of the state. There are American Eel records in all 18 watersheds within New York; however, the highest frequencies of occurrence for American Eel are in the Long Island, Lower Hudson, and Delaware watersheds where there are fewer barriers to migration. Once highly abundant in Great Lakes and Atlantic watersheds, eel numbers have declined drastically (ASMFC 2000; Haro et al. 2000). "Compared to historic and even relatively recent abundances, numbers of American eel are significantly reduced in all of the inland watersheds of New York. In the Susquehanna, eel are absent except for a few recent transfers above the major dams. In the Delaware, lower Hudson and Long Island eel are still common, but reduced. In Lake Champlain, Lake Ontario, and the upper St. Lawrence River numbers have been reduced by at least 3 orders of magnitude" (Dittman et al. 2010). They are very rare in the Allegheny and Genesee watersheds. The last record for those watersheds is 1970 and 1992 respectively. This decrease in abundance in both recruitment and spawning stock has significantly reduced biomass in inland waters. See Dittman et al. (2010) for additional information on New York's inland populations.

**New York's Contribution to Species North American Range:**

**% of NA Range in New York**

**100% (endemic):**_____
**76-99%:**_____
**51-75%:**_____
**26-50%:**_____
**1-25%:** ✓

**Classification of New York Range**

**Core:** ✓
**Peripheral:**_____
**Disjunct:**_____
**Distance to core population:**
_________________________________

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** From creeks to large/great rivers, lakes, estuaries, and the Atlantic Ocean

**b. Geology:** Low/moderately buffered to assume moderately buffered

**c. Temperature:** Cold to warm

**d. Gradient:** Low to high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:** ✓

**Time frame of decline/increase:**_________________________________

**Habitat Specialist?** **Yes:**_____ **No:** ✓

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

American Eels occupy the broadest diversity of habitats of any fish species (Helfman et al. 1987). Using fresh water, marine, and brackish habitats. All freshwater systems are used including large rivers and their small tributaries as well as reservoirs, canals, farm ponds and subterranean springs (USFWS 2011). Habitat use varies depending on what life stage the American Eel is in. As stated in the life history section, "larvae drift and swim in prevailing currents (Antilles Current, Florida Current, and Gulf Stream) that take them to areas near continental coasts or continental slope waters. Some elvers travel upstream to spend the majority of their life growing as yellow eels in rivers, streams, ponds, and the shallow, more productive areas of lakes; other eels remain in estuaries for their entire development prior to migration to the ocean" (NatureServe 2022). Based on otolith microchemistry, Secor et al. (2002) found three modes of habitat use by yellow-phase eels in the Hudson River: freshwater (only freshwater use since elver stage), "mixed" modes (use of freshwater for 2-19 years), and brackish water (no evidence of freshwater use), followed by migration to environments with brackish salinities. "Soft, undisturbed bottom sediments may be important to migrating elvers for shelter (Facey and Van Den Avyle 1987). Post larval eels tend to be bottom dwellers and hide in burrows, tubes, snags, plant masses, other types of shelter, or in the substrate; they are inactive in bottom mud in winter in the north" (Van Den Avyle 1984; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The American Eel is a catadromous species, which spends the majority of their 20-30 year life in freshwater habitats. They are slow to mature (7-30+ years) and only reproduce once in their lives. However, females can often produce millions of eggs. Spawning has never been directly observed, and suitable conditions for it remain speculative (NatureServe 2022). As adults, they migrate up to thousands of kilometers around summer or fall to the Sargasso Sea to spawn before they die. Spawning occurs in winter and early spring (McCleave et al. 1987). After hatching, the larvae are transported by currents to areas near the continental margin of North America where they metamorphose into unpigmented "glass eels" during the pelagic stage (8-12 months after hatching, sometimes a year) and actively move toward land. As they enter coastal areas, they begin to develop external pigmentation and are then referred to as “elvers”. Elvers develop into the "yellow eel" stage, which resemble the adult stage, usually by age 2. In the northeastern United States, young eels start moving upstream in river systems before pigmentation is complete. The timing and duration of this upstream migration of elvers and yellow eels varies with location. In the northeastern U.S. it may occur from March through October, with a May-July peak in many areas (July-August.in the St. Lawrence River) (Casselman et al. 1997). Upstream migration may extend for months or years (Haro and Krueger 1991). Some yellow eels move far into stream headwaters whereas others remain in estuaries. In general, eels in fresh water are all or almost all females (Facey and Labar 1981; Helfman et al. 1987). After the lengthy "yellow eel" stage, eels may undergo a physical and physiological transformation into a distinct, sexually mature "silver eel" stage, when they begin to move downstream and into the ocean to spawn, thus completing the cycle (NatureServe 2022).

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the American Eel include barriers to migration, habitat loss and alteration, hydro turbine mortality, oceanic conditions, overfishing (potentially poaching), parasitism, predation, and pollution (Haro et al. 2000; Richkus and Whalen 2000).

“Dams are frequently mentioned as a factor in the apparent declines in American Eel abundance. Dams that reduce or restrict upstream movements limit the amount of habitat available to eels. Many surveys indicate that density and population size of American Eels tend to decrease with increasing distance inland and with increasing severity of obstructions to movement” (NatureServe 2022). There is evidence that dam removals have led to increased numbers in American Eel in upstream habitats that were previously inaccessible (O'Donnell et al. 2001). “Dams are not only barriers to movement but also may alter streamflow patterns. Elvers and young eels are small and not powerful swimmers and seemingly might be affected by alterations in stream flow caused by dams and other structures. However, they successfully move through strong marine, estuarine, and riverine currents, and so altered stream flows may not have much effect on upstream movements” (NatureServe 2022).

Hydro turbines associated with dams may cause mortality to out-migrating adults (Peterson 1997). “Turbine-induced mortality ranges from 5 to 60%, depending on turbine type, flow rate, and the length of the fish (Hadderingh 1990)” (NatureServe 2022).

Oceanic effects (ocean temperature, salinity, and upper-ocean transport conditions) on American Eel recruitment are poorly understand but could play a role in the abundance of eels along the east coast of North America (Peterson 1997). “The decline in recruitment of the American Eel occurred at the same time as that of the European eel (*Anguilla anguilla*). Both species spawn in the Sargasso Sea and migrate as larvae to continental waters, so the coincidence in recruitment failure suggests the likelihood of a common, Atlantic-wide cause” (NatureServe 2022). Wider temporal and spatial disruption of ocean currents like the Gulf Stream may adversely affect eel recruitment in New York.

Overfishing has also been identified as a possible threat to American Eels. The American commercial fishery has typically supplied American Eels at a variety of life cycles for the regional, European, and Asian food markets, as well as bait for domestic sport fisheries (NatureServe 2022). The worldwide demand for eels is greater than what can be supplied by wild populations, so eel farming-has become common in areas of Europe and Asia (Jessop 2000). “The bulk of the commercial eel catch in the United States (80%) occurs in central coastal (mid-Atlantic) states, with less from northern (19%) and southern (1%) states (Casselman 2001)” (NatureServe 2022). Although not frequently reported, poaching of glass eels throughout their range has occurred and may contribute to overfishing.

“An exotic, parasitic swim-bladder nematode (*Anguillicola crassus*) appears to have recently invaded the Hudson River ecosystem and may represent a stress to eels in the Hudson River and elsewhere (Secor et al. 2002)” (NatureServe 2022). This nematode has been documented in Susquehanna River eels as well.

“Increased populations of striped bass (*Morone saxatilis*) since the 1980s (Richards and Rago 1999) could be a factor in the decline in American Eel abundance. Bass predation on blueback herring has been proposed as a contributing factor in the recent herring decline in the Connecticut River (Savoy and Crecco 2004)” (NatureServe 2022).

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

**Yes:** ✓     **No:** _____     **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

New York has several recreational and commercial fishing regulations in place for the harvest of American Eels (NYSDEC 2022). Statewide regulations are subject to change. For the most up to date American Eel regulations check the New York Codes, Rules, and Regulations (NYCRR).

Recreational

As of April 1, 2022, freshwater and marine recreational fishing for American Eel is open all year with a 9” size limit and a daily limit of 25 eels per individual or 50 for party/charter boats. However, there are some exceptions to this regulation. For example, possession is prohibited, and maximum size limits are enforced on some waterbodies. There are also special baitfish regulations associated with American Eel.

Commercial

New York allows commercial harvest of American Eels in state waters. Harvesters are required to report landings to the state. These data are tracked in annual compliance reports to the Atlantic States Marine Fisheries Commission and used in updates to the fishery management plan and stock assessments. All harvested eels must have a minimum total length of 9". Commercial eel season is open all year and there are no trip limits. Harvest takes place in both the marine district of New York and the Delaware and Hudson Rivers. Most eels are harvested using eel pots, but there is also an eel weir fishery in the Delaware River watershed that is limited through ASMFC FMPs to nine participants. New York DEC collects length data from commercial markets and bait and tackle shops for eels caught in New York marine and coastal waters.

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

The main management goal is to provide migratory passage and access to historic eel freshwater habitat by mitigating the various hazards to the upstream and downstream migration of American Eel. Such mitigation should include, but not be limited to support of fish passage research, requirements for the construction of fish (eel) passage facilities upon construction of dams, power generating facilities and relicensing of same, as well as outright removal of identified hazards to eel passage (ASMFC 2000).

Although knowledge of downstream migration behavior (e.g., environmental cues that trigger migration, depth of migration, effects of light and water currents) is limited, changes in turbine design should also be investigated to improve downstream fish passage and continue efforts to direct eel away from turbine passage to other higher survival passage opportunities using different devices. Investigations should also include feasibility of dam shutdowns during off-peak/nighttime hours to encourage passive escapement of migrating adult eels (ASMFC 2000).

The goals of the ASMFC American Eel FMP (ASMFC 2021) are to protect and enhance the abundance of American Eel in inland and territorial waters of the Atlantic states and jurisdictions and contribute to the viability of the American Eel spawning population with the aim to provide sustainable commercial, subsistence, and recreational fisheries by preventing over-harvest of any eel life stage.

The following objectives will be used to achieve this goal:

1. Improve knowledge of eel utilization at all life stages through mandatory reporting of harvest and effort by commercial fishers and dealers and enhanced recreational fisheries monitoring.

2. Increase understanding of factors affecting eel population dynamics and life history through research and monitoring.

3. Protect and enhance American Eel abundance in all watersheds where eel now occur.

4. Where practical, restore American Eel to those waters where they had historical abundance but may now be absent by providing access to inland waters for glass eel, elvers, and yellow eel and adequate escapement to the ocean for pre-spawning adult eel.

5. Investigate the abundance level of eels at the various life stages necessary to provide adequate forage for natural predators to support ecosystem health and food chain structure.

See Dittman et al. (2010) for additional information on possible management actions for New York’s inland populations.

The 2015 State Wildlife Action Plan included recommendations based on watersheds:

-*Delaware:* Evaluate American Eel population, life history, and harvest.

-*Lake Ontario:* Restore aquatic habitat connectivity for American Eel migration.

-*Lower Hudson/Long Island:* Remove barriers to the migration of Alewife and American Eel.

-*Susquehanna:* Restore aquatic habitat connectivity for American Eel migration.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Habitat & Natural Process Restoration |
| **3.** Species Management | Harvest Management |
| **4.** Species Management | Species Recovery |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 3:** Recommended conservation actions for American Eel.

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# Species Status Assessment

**Common Name:** Atlantic salmon **Date Updated:**

**Scientific Name:** *Salmo salar* **Updated by:**

**Class:** Actinopterygii

**Family:** Salmonidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Atlantic salmon are most closely related to and often confused with brown trout in New York. The tail of the salmon is more forked than brown trout with a narrower caudal peduncle, smaller mouth, larger pectoral fins, and one row of vomerine teeth (Smith 1985). In New York Atlantic salmon were native to the St. Lawrence River, Lake Champlain and Lake Ontario watersheds including the Finger Lakes. Parsons (1973) concluded that both anadromous and landlocked populations existed in New York. By the late 1800s, dams, pollution, overharvesting, nonnative species and other anthropogenic changes led to their extirpation (Miller and Ringler 1996, NatureServe 2012).

New York currently maintains landlocked populations by stocking at 48 locations throughout the state including Lake Ontario. Efforts to establish self-sustaining populations of Atlantic salmon are constrained mostly by reproductive impairment. Atlantic salmon experience thiamine deficiency and low reproductive success from eating alewife and rainbow smelt in Lake Ontario, Lake Champlain and the Finger Lakes. Some evidence of limited natural reproduction has been observed in tributaries of Lake Ontario. Atlantic salmon recovery is also constrained by available habitat (low quality habitat or barriers preventing access to high quality habitat), and non-native species (either through direct competition from other non-native salmon and trout, and indirectly through competing interest of anglers for other trout and salmon).

## I. Status

### a. Current legal protected Status

i. **Federal:** Endangered (GOM DPS) **Candidate:**

ii. **New York:** Nos listed

### b. Natural Heritage Program

i. **Global:** G5

ii. **New York:** S3 **Tracked by NYNHP?:** No

**Other Ranks:**

NYNHP: Watch List
Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Endangered
IUCN Red List Category: Least Concern

**Status Discussion:**

This species is ranked as globally secure due to its large breeding range in streams draining into the North Atlantic; many populations in the U.S. have been extirpated or are in decline, but there are many occurrences and large numbers elsewhere, especially in commercial aquaculture. The anadromous population in Maine, whose range once extended to the Long Island Sound, were declared federally endangered in 2009 (Kocik and Sheehan 2006). Anadromous Atlantic salmon are extirpated from New York State; however, there are populations of landlocked fish in Lake Ontario, other coldwater lakes, and their tributaries as a result of stocking programs (Hulbert et al. 1990, NatureServe 2012). Ontario is currently (2013) conducting an Atlantic salmon restoration program in three Lake Ontario tributaries in which various strains and life stages are being stocked and evaluated. The USGS Geological Survey is also experimenting with strains and life stages to establish runs on the Salmon River near Altmar, NY.

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Declining | Declining | Past 20 years | | Choose an item. |
| **Northeastern US** | Yes | Declining | Declining | Past 20 years | | Choose an item. |
| **New York** | Yes | Stable | Stable | Past 20 years | | Yes |
| **Connecticut** | Yes | Unknown | Unknown | Past 20 years | Not listed | Yes |
| **Massachusetts** | Yes | Declining | Declining | Past 20 years | Not listed | Yes |
| **New Jersey** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Pennsylvania** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Vermont** | Yes | Stable | Increasing | Past 20 years | Not listed | Yes |
| **Ontario** | Yes | Increasing | Increasing | Past 20 years | Previously extirpated | Choose an item. |
| **Quebec** | Yes | Stable | Unknown | Past 20 years | Secure | Choose an item. |

*Column options*
**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item
**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

NYSDEC has conducted an annual lakewide creel survey on Lake Ontario since 1984 (Lantry 2012). Periodic creel surveys have also been conducted on the Salmon River and other Lake Ontario tributaries (Prindle and Bishop 2013).

**Trends Discussion** *(insert map of North American/regional):*

Anadromous Atlantic salmon are no longer present in NY watersheds. The last reports of native Atlantic salmon were in 1852 for Lake Champlain and in 1898 for Lake Ontario (Smith 1985). In an effort to save the species, anadromous and landlocked salmon were released at different times between 1873 and 1917, but with little success (Smith 1985). Atlantic salmon have been planted in New York's inland lakes since 1948 and some have produced fishable populations  (Smith 1985) There are reports of some natural reproduction in the tributaries of Lake Ontario. The NYSDEC released approximately 648,000 hatchery-bred Atlantic salmon in 2013. (Table 1).

Wild recruitment of Atlantic salmon has been noted in the Salmon River of Oswego since 2009 (Johnson et al. 2010) but it is felt to be substantially less than able to sustain itself without continued stocking. There is also thought to be some wild recruitment in a population in the Adirondacks, outside of its native range (Schroon Lake; Preall 1997). This population is also supported by annual stocking.

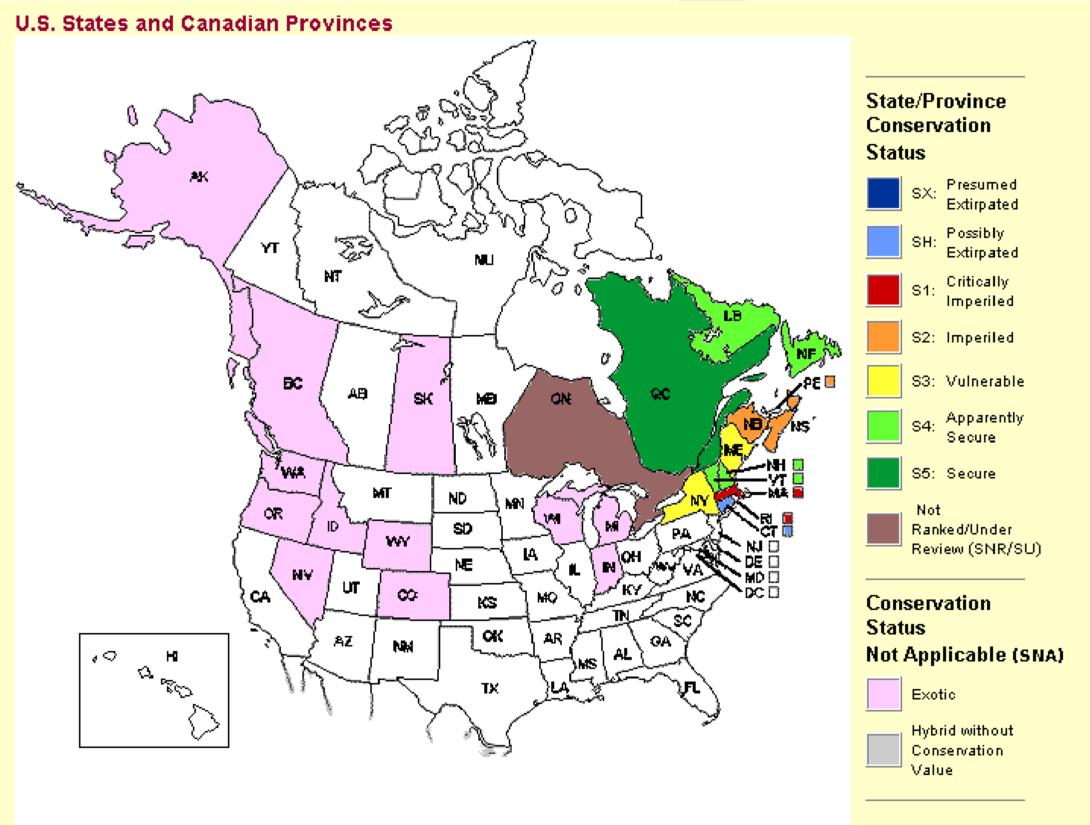

**Figure 1.** Conservation status of the Atlantic salmon in North America (NatureServe 2012).

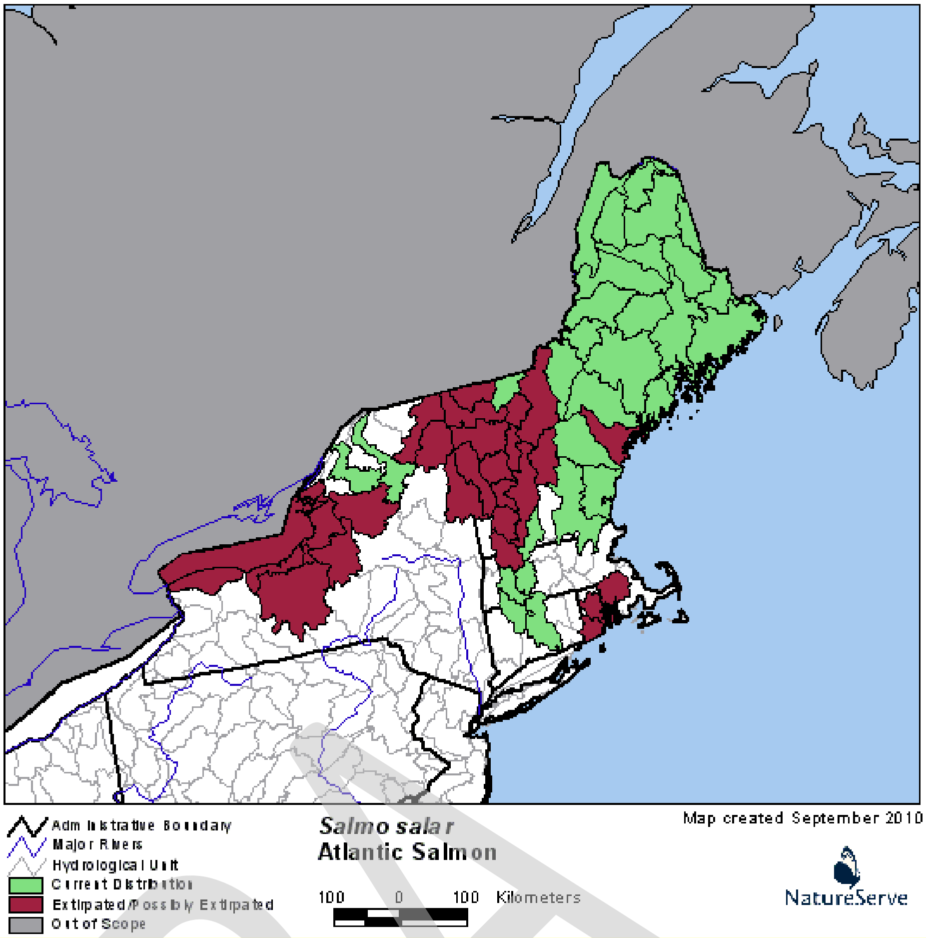

**Figure 2.** Atlantic salmon distribution in Northeastern U.S. (NatureServe 2012).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

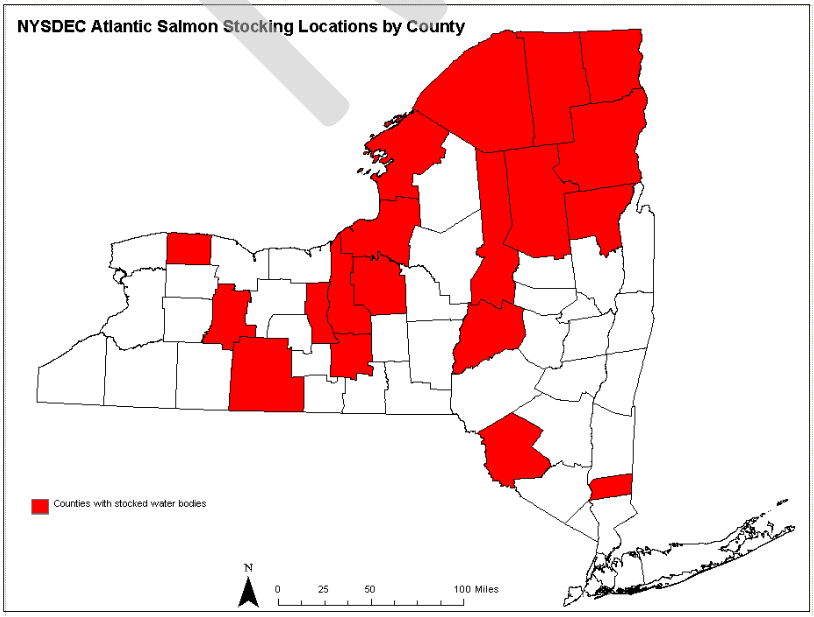

**Figure 3**: New York State Counties stocked by the NYSDEC Atlantic salmon stocking program.

| County | # of water bodies | # of salmon stocked in 2012 (fry and yearlings) |
|---|---|---|
| Cayuga | 1 | 15,000 |
| Clinton | 3 | 110,600 |
| Essex | 12 | 343,950 |
| Franklin | 7 | 6,530 |
| Hamilton | 5 | 6,000 |
| Herkimer | 1 | 4,300 |
| Jefferson | 3 | 1,500 |
| Livingston* | 1 | 0 |
| Onondaga | 1 | 9,000 |
| Orleans | 1 | 20,000 |
| Oswego | 1 | 30,000 |
| Otsego* | 1 | 0 |
| Putnam | 1 | 1,500 |
| Seneca | 1 | 24,000 |
| St. Lawrence | 2 | 2,000 |
| Steuben | 1 | 22,300 |
| Sullivan | 1 | 3,000 |
| Tompkins | 2 | 28,000 |
| Warren | 3 | 37,000 |

*counties with no fish stocked have stocking policies, but managers are waiting for a niche to open to allow for introduction of the Atlantic salmon (P. Hulbert, personal communication).

**Table 1.** Number of water bodies and Atlantic salmon stocked per county.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| Pre 1993 | | | <1% |
| 1993-2002 | | | |
| 2003 - 2012 | | | 30% |
| 2013 - 2022 | | | |

**Table 2.** Records of Atlantic salmon in New York.

## Details of historic and current occurrence:

Historically occurred in Lake Champlain Lake Ontario and the St. Lawrence River drainages but native populations were extirpated prior to 1900.

Ongoing stocking programs have provided a fishery in coldwater lakes and streams (Lakes Ontario, Champlain, Cayuga, and Seneca) which would otherwise be gone due to a lack of natural reproduction (Hulbert et al. 1990, Miller and Ringler 1996).

## New York's Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 1-25% | Peripheral | ~550 miles |

*Column options*

**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item

**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

1. Great Lakes Deepwater Community
2. Summer-stratified Monomictic Lake
3. Small River, Cold

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| No | No | Stable | |

*Column options*
**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item
**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

Atlantic salmon are found in a variety of aquatic habitats. In New York, landlocked populations occur in large deep lakes and ponds and their tributaries. In the spring, warmer temperatures and abundant food attract salmon to near shore waters and even into the lower portions of rivers. Once water temperatures reach the mid-50s, Atlantic salmon move offshore and into deeper portions of the lake. They are active predators throughout the summer, generally being found where water temperatures are 65˚F or less. Atlantic salmon feed on other fish, with rainbow smelt being their preferred food (NatureServe 2012). Other prey fish include alewife, cisco, or yellow perch. If prey fish are lacking, salmon will eat insects and large zooplankton. In the fall, sexually mature fish move back toward shore in search of their home stream or the site where they were stocked. Juvenile fish will remain in fast moving streams for 1-5 years (Hulbert et al. 1990).

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Yes | Yes | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

### Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Atlantic salmon spawn in the fall. They are known to deposit approximately 500 eggs per pound of body weight into a redd, or nest (Smith 1985, NASCO 2013). Eggs hatch in the spring and juvenile fish remain in the stream for 1-3 years. The fish will then move to the sea or large lake to feed for 1 to 4 winters (NatureServe 2012). Fish can migrate up to thousands of miles between freshwater spawning and marine habitats, returning to the stream they hatched in. Atlantic salmon can grow to be up to 55 inches in length and adult fish prey on smaller fish, invertebrates, and even large plankton while in-stream juveniles eat aquatic and terrestrial invertebrates (NatureServe 2012). It appears that natural reproduction is not occurring or is too low to maintain a stable population in New York, even with aide from stocking hatcheries.

## VI. Threats *(from NY 2015 SWAP or newly described)*

Dams blocking spawning streams, polluted waters, widespread deforestation in headwater streams, sedimentation of spawning and holding habitat, and changes in water temperature regimes have all contributed to the decline in the abundance and accessibility of breeding, foraging, and rearing habitat areas (Hulbert et al. 1990, NatureServe 2012). Overharvesting stresses the anadromous population (Miller and Ringler 1996). Climate change may pose a threat to this species in the future; unpredictable weather patterns could lead to drought, flooding, or extreme temperatures. This could affect stream ecology as these habitats are highly influenced by precipitation and temperature (Poff et al. 1996). Changing temperatures could also bring on a change in thermocline location or large algal blooms in lakes, decreasing oxygen concentration to lethal level for fish (Mortsch and Quinn 1996).

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

**Yes:** ✓ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

There are fishing regulations in place for the Atlantic salmon in NY. The regulation varies depending on the location.

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

Work is underway to identify a successful strain of Atlantic salmon. Low natural reproduction of Atlantic salmon continues to be a major impediment to recovery in its native New York range. Although hatchery stocking can maintain fishable populations, diversifying prey sources and reducing alewife abundance in the lakes is necessary for alleviating reproductive impairment and developing self-sustaining Atlantic salmon populations. Restoring stream habitat and mitigating barriers may also facilitate increased production potential of wild/hatchery smolts.

Conservation actions following IUCN taxonomy are categorized in the table below.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| Land/Water Management | Habitat/Natural Process Restoration |

| | |
|---|---|
| Species Management | Species Recovery |
| Species Management | Species Reintroduction |
| External Capacity Building | Alliance & Partnership Development |

**Table 3.** Recommended conservation actions for Atlantic salmon.

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for extirpated fishes, which includes the Atlantic salmon.

**Habitat Monitoring:**

---- Inventories will be completed in all areas where restoration might be practical.

**Relocation/reintroduction:**

---- Re-establish, if feasible, populations of those endangered fish species now believed to be extirpated from New York.

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SUNY ESF. 2005. The Salmon River Project. Available at: <http://www.esf.edu/salmon/default.htm>. (Accessed February 4, 2013).

| | |
|---|---|
| **Originally prepared by** | Jim Katz |
| **Date first prepared** | February 5, 2013 |
| **First revision** | November 20, 2013 (K. Corwin) |
| **Latest revision** | Transcribed March 2024 |

# Species Status Assessment Cover Sheet

**Species Name:** Banded Sunfish
**Date Updated:** January 2023
**Current Status:** Threatened – SGCN
**Updated By:** Kyle Grasso
**Current NHP Rank:** S1

**Distribution:** Banded Sunfish are found along the Atlantic coast from southern Maine down to Florida and west along the Florida panhandle into Alabama. In New York, Banded Sunfish have historically been found in 37 waterbodies in the Newark Bay and Long Island watersheds. They are only found within the Peconic River watershed on Long Island.

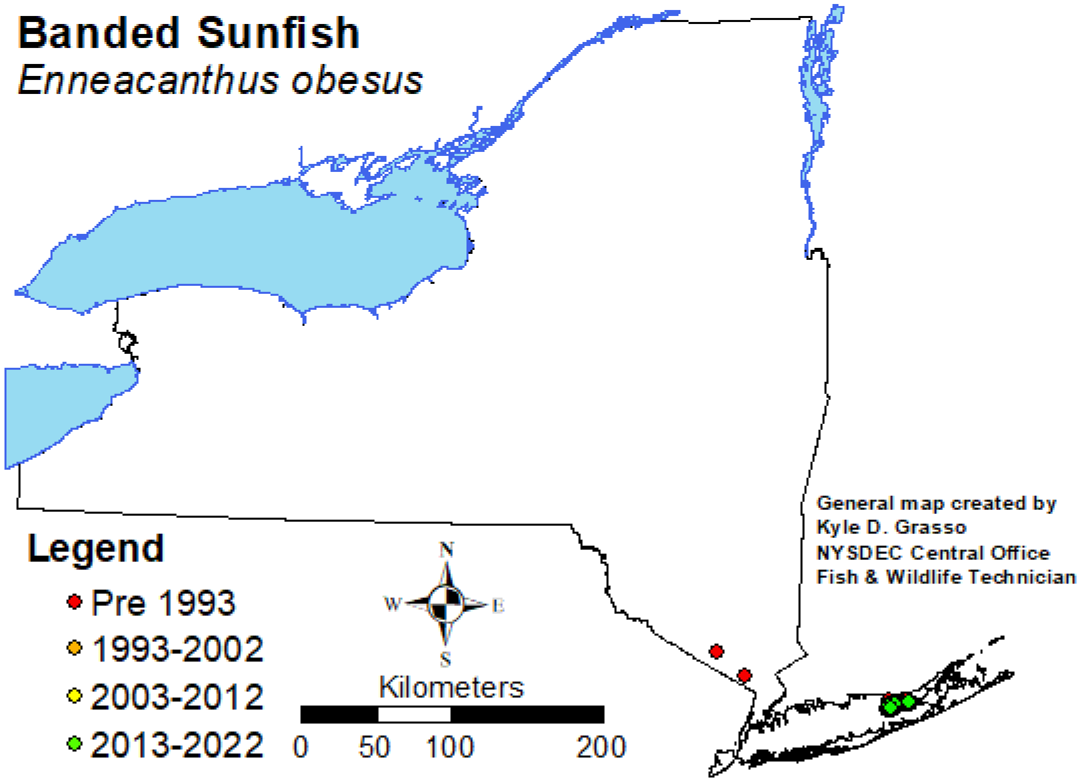
**Habitat:** Banded Sunfish inhabit calm, darkly stained ponds, lakes, bogs, and sluggish backwaters of medium-sized rivers with abundant vegetation and substrates consisting of sand, mud, silt, or detritus. Preferred areas are often shallow with vegetation over detritus-laden bottoms and water as acidic as 3.7 (pH) has been inhabited.

**Life History:** Banded Sunfish typically live about 3 to 4 years, but age 5 and 6 specimens have been recorded. Age of sexual maturity is unknown, but some females have been recorded spawning at 1 year of age. Spawning typically occurs from April to July depending on the location. Spawning occurred in June and July in Connecticut at surface temperatures of 23-27 °C, while spawning in New Jersey occurred in May and June. Males will construct a nest made of gravel or sand in aquatic vegetation where females will lay their eggs. Eggs are not guarded, and the buoyant eggs sometimes drift into the water column from the nest. Fecundities ranging from 802 to 1,400 depending on size and age have been reported. The Banded Sunfish has a very restricted home range and will not swim great distances.

**Threats:** Threats to the Banded Sunfish include groundwater pumping/dewatering, environmental catastrophes, habitat removal/alteration from development, predation, and loss of preferred vegetative cover to invasive plant species.

**Population trend:** In New York, Banded Sunfish have historically been found in 37 waterbodies in the Newark Bay and Long Island watersheds. Banded Sunfish have only been reported from Spruce Pond and the Hackensack River in the Newark Bay watershed. They have not been seen in these waterbodies since 1936 and are considered extirpated from the watershed. The Banded Sunfish is only found within the Peconic River watershed on Long Island. Range and abundance appear to be stable there, except for years when the water table goes down and ponds dry up.

**Recommendation:** It is recommended that the Banded Sunfish remain listed as Threatened due to their restricted range and vulnerability to low water conditions and environmental catastrophes on Long Island.



# Species Status Assessment

**Common Name:** Banded Sunfish **Date Updated:** January 2023

**Scientific Name:** *Enneacanthus obesus* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Centrarchidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Banded Sunfish is in the class Actinopterygii and the family Centrarchidae (sunfishes). Banded Sunfish are found along the Atlantic coast from southern Maine down to Florida and west along the Florida panhandle into Alabama (NatureServe 2022; NYNHP 2022). They can easily be confused with the Bluespotted Sunfish (*Enneacanthus gloriosus*); however, their distributions do not overlap. In New York, Banded Sunfish have historically been found in 37 waterbodies in the Newark Bay and Long Island watersheds. Banded Sunfish have only been reported from Spruce Pond and the Hackensack River in the Newark Bay watershed. They have not been seen in these waterbodies since 1936 and are considered extirpated from the watershed (Carlson et al. 2016). Banded Sunfish are only found within the Peconic River watershed on Long Island. Range and abundance appear to be stable there, except for years when the water table goes down and ponds dry up. Banded Sunfish inhabit calm, darkly stained ponds, lakes, bogs, and sluggish backwaters of medium-sized rivers with abundant vegetation and substrates consisting of sand, mud, silt, or detritus (Smith 1985; Stauffer et al. 2016; NatureServe 2022). Preferred areas are often shallow with vegetation over detritus-laden bottoms and water as acidic as 3.7 (pH) has been inhabited (Graham and Hastings 1984; Stauffer et al. 2016).

## I. Status

### a. Current legal protected Status

**i. Federal:** Not Listed **Candidate:** No

**ii. New York:** Threatened – SGCN

### b. Natural Heritage Program

**i. Global:** Secure – G5

**ii. New York:** S1 **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)

**Status Discussion:**

In New York, the Banded Sunfish is currently listed as Threatened and SGCN. They are globally ranked as Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**VERMONT** **Not Present:** ✓ **No Data:**_____

**ONTARIO** **Not Present:** ✓ **No Data:**_____

**QUEBEC** **Not Present:** ✓ **No Data:**_____

**CONNECTICUT** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Disappeared from a few large lakes since 1950s

**Listing Status:** Special Concern – S3 **SGCN?:** Yes

**MASSACHUSETTS** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

**NEW JERSEY** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Have not been recorded in PA since 1977

**Listing Status:** Presumed extirpated – SX **SGCN?:** Yes

## d. New York

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. Extensive surveys have been conducted to locate this fish in both the Newark Bay and Long Island watersheds in the last 20 years. Region 1 fisheries staff have conducted repeated surveys for Banded Sunfish (Enneacanthus obesus) and Swamp Darter (Etheostoma fusiforme) in 30+ ponds since 2018.

**Trends Discussion** *(insert map of North American/regional):*

According to NatureServe, the short-term trend in the last 10 years is uncertain but likely relatively stable (≤10% change). Long-term declines have occurred where habitat has been drained for development, but the overall extent of habitat may not be very large (NatureServe 2022).

In New York, Banded Sunfish have historically been found in 37 waterbodies in the Newark Bay and Long Island watersheds. Banded Sunfish have only been reported from Spruce Pond and the Hackensack River in the Newark Bay watershed. They have not been seen in these waterbodies since 1936 and are considered extirpated from the watershed (Carlson et al. 2016). Banded Sunfish are only found within the Peconic River watershed on Long Island. Range and abundance appear to be stable there, except for years when the water table goes down and ponds dry up. Region 1 staff surveyed 25 waterbodies in 2019, resulting in Banded Sunfish records for 13 waterbodies (up from 8 of 29 waterbodies in 2018).

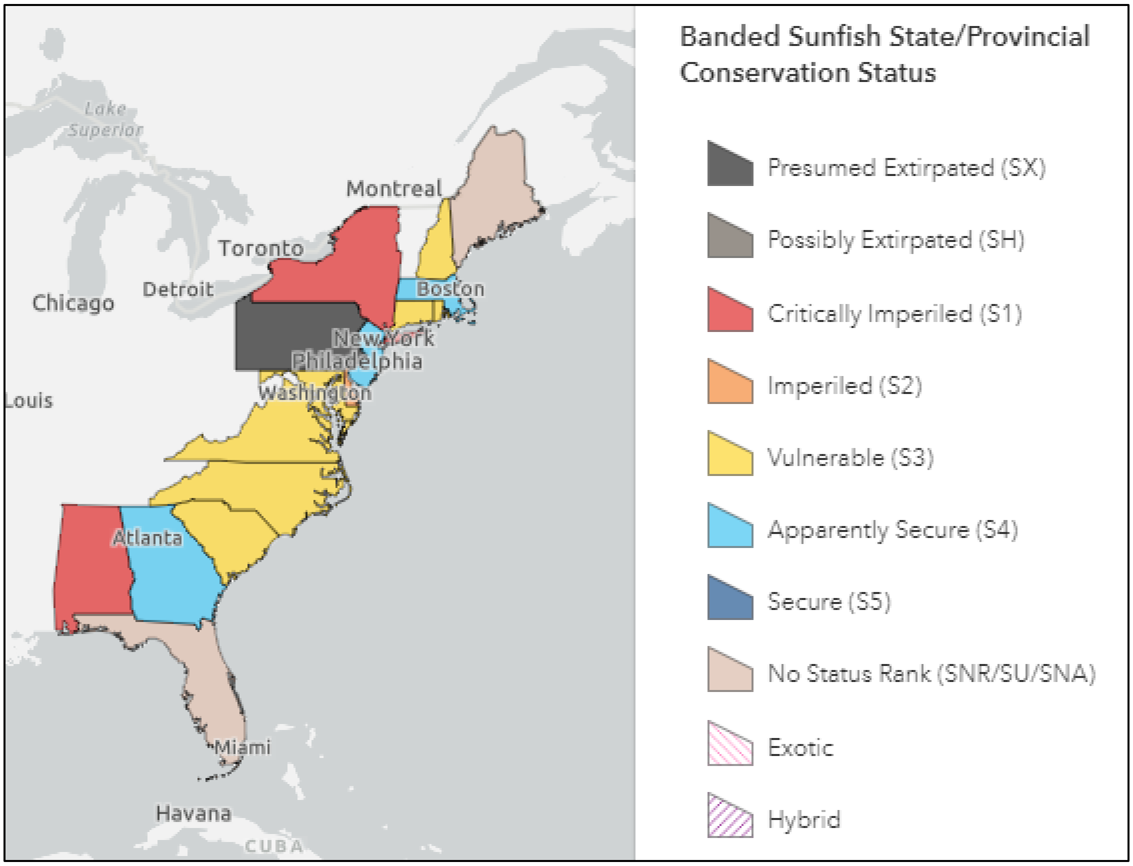


**Figure 1:** Banded Sunfish distribution and status (Source: NatureServe 2022).

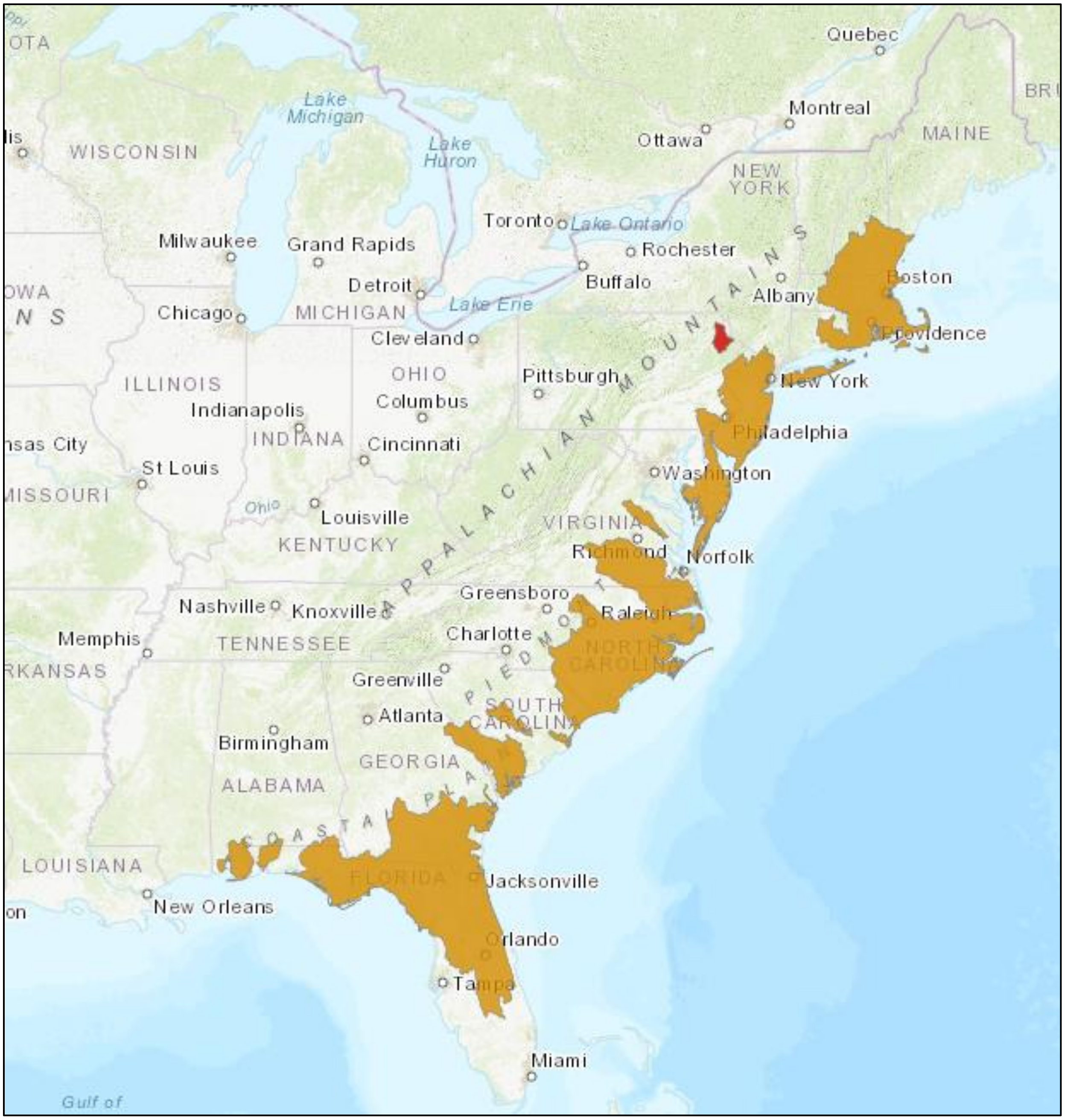


**Figure 2:** Banded Sunfish distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

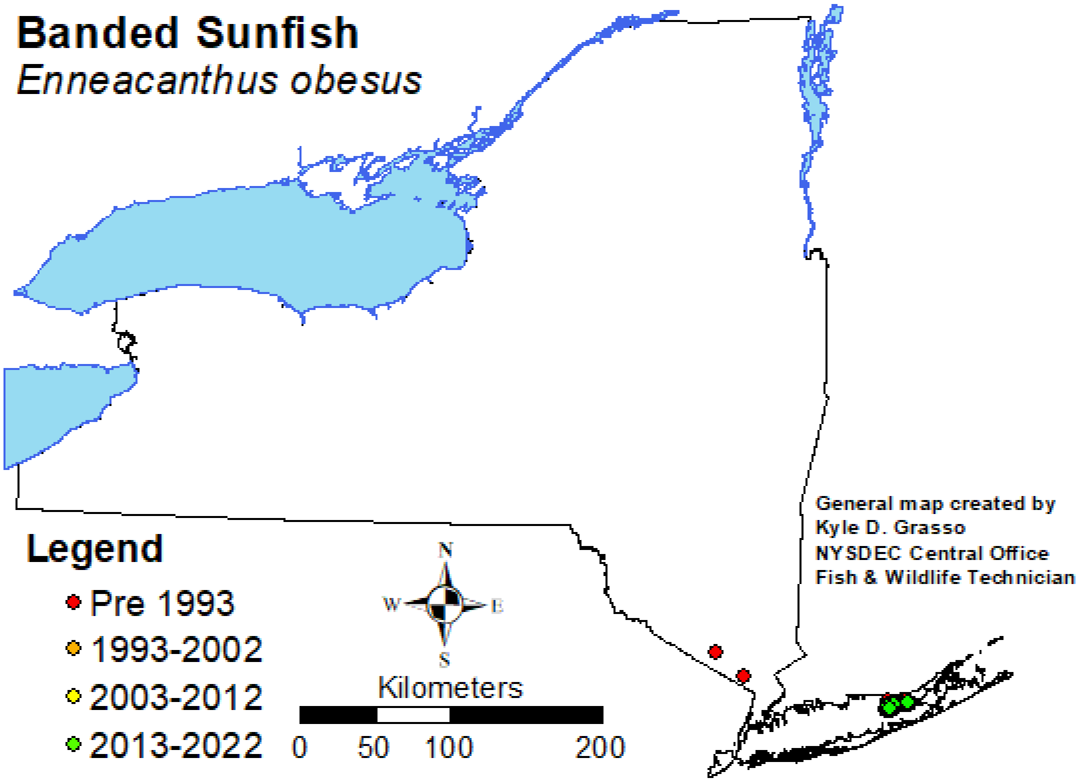


**Figure 3:** Records of Banded Sunfish in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 33 | 21 | 0-5% |
| **1993-2002** | 22 | 15 | 0-5% |
| **2003 - 2012** | 82 | 26 | 0-5% |
| **2013 – 2022** | 46 | 18 | 0-5% |

**Table 1:** Records of Banded Sunfish in New York.

### Details of historic and current occurrence:

In New York, Banded Sunfish have historically been found in 37 waterbodies in the Newark Bay and Long Island watersheds. They have only been reported from Spruce Pond and the Hackensack River in the Newark Bay watershed. They have not been seen in the Newark Bay watershed since 1936 and are considered extirpated from the watershed (Carlson et al. 2016). Banded Sunfish were historically found in the Passaic drainage and two lakes in the Palisades Interstate Park. These last two areas have been doubted for authenticity because they are not at all typical of coastal lowlands. Specimens were recently reexamined by an expert for this genus and were confirmed.

Based on historic sampling and extensive sampling in the last 20 years, Banded Sunfish have inhabited 35 total waterbodies on Long Island. Banded Sunfish are only found within the Peconic River watershed on Long Island. Range and abundance appear to be stable there, except for years when the water table goes down and ponds dry up. Region 1 staff surveyed 25 waterbodies in 2019, resulting in Banded Sunfish records for 13 waterbodies (up from 8 of 29 waterbodies in 2018). “The most notable changes from 2018 to 2019 is the recolonization of Banded Sunfish in the western most chain of ponds within their known range (Survey #s 119012, 119013, 119014, 119015, 119019, and 119020). In 2018, this chain of ponds had water levels return after 2016/2017 drought conditions, however, neither target species were caught or observed in those years. Additionally, Linus Pond had Banded Sunfish in 2019 for the first time since 1994. This pond was dry for most of those years and has since developed a shoreline almost completely dominated by phragmites" (O'Riordan 2019). In 1938, there was an additional pond on Long Island containing this species, but the ponds no longer exist.

**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%: _____ | Peripheral: ✓ |
| 51-75%: _____ | Disjunct: _____ |
| 26-50%: _____ | Distance to core population: |
| 1-25%: ✓ | Core pop. along Atlantic Coast |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to small rivers and vegetated coastal ponds

**b. Geology:** Low-moderately buffered

**c. Temperature:** Warm

**d. Gradient:** Low gradient

### Habitat or Community Type Trend in New York

**Declining:** ✓ **Stable:** _____ **Increasing:** _____ **Unknown:** _____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:** _____ **No:** ✓

**Indicator Species?** **Yes:** _____ **No:** ✓

### Habitat Discussion:

Banded Sunfish inhabit calm, darkly stained ponds, lakes, bogs, and sluggish backwaters of medium-sized rivers with abundant vegetation and substrates consisting of sand, mud, silt, or detritus (Smith 1985; Stauffer et al. 2016; NatureServe 2022). Preferred areas are often shallow with vegetation over detritus-laden bottoms and water as acidic as 3.7 (pH) has been inhabited (Graham and Hastings 1984; Stauffer et al. 2016).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Banded Sunfish typically live about 3 to 4 years, but age 5 and 6 specimens have been recorded (MDF&W 2015; Stauffer et al. 2016). Age of sexual maturity is unknown, but Cohen (1977) reported some females were capable of spawning at 1 year of age. Spawning typically occurs from April to July depending on location. Cohen (1977) reported spawning occurring in June and July in Connecticut at surface temperatures of 23-27°C, while Graham (1986) reported spawning occurring in May and June in New Jersey. Males will construct a nest made of gravel or sand in aquatic vegetation where females will lay their eggs. Eggs are not guarded, and the buoyant eggs sometimes drift into the water column from the nest (PNHP 2015; NYNHP 2022). Cohen (1977) reported fecundities ranging from 802 to 1,400 depending on size and age (Stauffer et al. 2016). The Banded Sunfish has a very restricted home range and will not swim great distances (Cooper 1983).

## VI. Threats *(from NY CWCS Database or newly described)*

Due to their restricted range, Banded Sunfish are vulnerable to environmental catastrophes. Fortunately, several of the occupied ponds are isolated and without surface water connections to the Peconic system. Ground water pumping can lower water levels and threaten these waters during drought conditions (NYNHP 2022). Low water conditions in Zeeks Pond (at Brookhaven National Lab) in 2002 was thought to cause the Banded Sunfish to die, but they recovered from a tiny wet hole refugia. “Banded Sunfish and Swamp Darter have been reported by the DEC to recover from drought conditions in past years (1990s) recolonizing connected ponds within the drainage area, therefore changes in their range are likely to be related to the water table levels” (O’Riordan 2019). Other possible threats include habitat removal/alteration from development, predation, and loss of preferred vegetative cover to invasive plant species such as of phragmites, which can outcompete native vegetation such as sweet pepper bush (*Clethra alnifolia*) and smartweed (*Polygonum* spp) (O’Riordan 2019). Banded Sunfish were classified as moderately vulnerable to predicted climate change in an assessment of vulnerability conducted by the New York Natural Heritage Program (Schlesinger et al. 2011).

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

**Yes:**__✓__ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Banded Sunfish is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

Those regulatory mechanisms will not address drought, invasive species, or groundwater withdrawals.

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

Regular sampling for presence and abundance should continue to occur in historic, current, as well as neighboring waterbodies on Long Island. Water levels and ground water pumping activities should be monitored especially on dry years to avoid adverse effects to Banded Sunfish (Carlson 2005; Keeler 2006; NYNHP 2022). Permit reviews may be necessary for existing and new ground water wells on Long Island to avoid excessive drawdown and ensure ponds provide adequate habitat (NYSDEC 2005 SWAP). Land use should be controlled to protect habitat from development and prevent the destruction of occupied waterbodies on Long Island. Some ponds that experienced severe water withdrawals may need to be restored in order to reestablish populations of Banded Sunfish where this species once occurred (Keeler 2006). A better understanding of Banded Sunfish ecology on Long Island may be needed to guide future restoration (including stocking of historic locations) and protection of the Banded Sunfish.

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat monitoring:

-Complete surveys on submerged aquatic vegetation and floating woody mats in areas still inhabited by this species and monitor water level depths on dry years.

Habitat research:

-Define preferred habitat in order to guide future restoration efforts and focus habitat protection efforts.

Population monitoring:

-Continued monitoring of the Long Island populations.

The 2015 State Wildlife Action Plan included the following recommendations:

-Monitor population and assess spawning habitat of Banded Sunfish in the Long Island watershed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):* *https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Invasive/Problematic Species Control |
| **5.** Land/Water Management | Habitat & Natural Process Restoration |

| | |
|---|---|
| **6.** Species Management | Ex-situ Conservation |
| **7.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Banded Sunfish.

## VII. References

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Schlesinger, M. D., J. D. Corser, K. A. Perkins, and E. L. White. 2011. Vulnerability of at-risk species to climate change in New York. New York Natural Heritage Program. Albany, New York.

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Stauffer, J. R., Jr., R. W. Criswell, and D. P. Fischer. 2016. The fishes of Pennsylvania. Cichlid Press. El Paso, Texas. 556 pp.

# Species Status Assessment Cover Sheet

**Species Name:** Bigeye Chub

**Date Updated:** January 2023

**Current Status:** Not Listed – HPSGCN

**Updated By:** Kyle Grasso

**Current NHP Rank:** S1S2

**Distribution:** The Bigeye Chub is found from New York southward to Georgia and westward to Oklahoma and Michigan in the north. In New York, they are native to 4 of 18 watersheds (Allegheny, Erie-Niagara, Ontario, and Oswego).

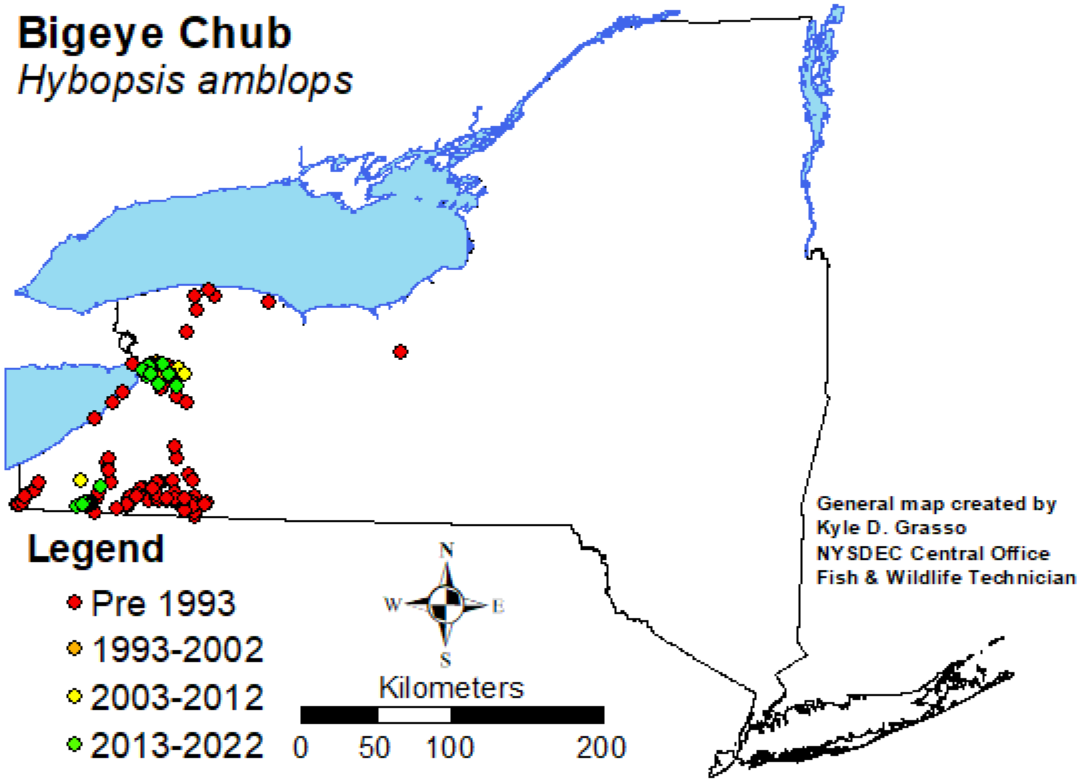
**Habitat:** The Bigeye Chub is found in small to moderate size clear-water streams with clean sand, gravel, or rock bottoms. They are abundant in pools and runs with low to moderate flows that are well vegetated, usually near riffles in quiet water. They are not found in areas of high turbidity and are exceptionally intolerant of siltation, making them a good indicator of water quality.

**Life History:** Very little is known of the life history of this species, but it is likely similar to other chubs. Most individuals mature in one year in the southern portion of their range. Tennessee specimens reach sexual maturity at approximately 55 mm. Spawning typically occurs from late spring to early summer. Tarver (2015) reported spawning in Alabama from March-June with peaks in April and May. Pflieger (1975) collected breeding adults in June in Missouri. Fecundities of females from Alabama ranged from 90-2566 oocytes.

**Threats:** Threats to the Bigeye Chub include siltation, pollution, and water impoundment. Trautman (1981) noted that populations of the Bigeye Chub declined in prairie streams of west central Ohio due to increased siltation of stream bottoms.

**Population trend:** In New York, they are native to 4 of 18 watersheds (Allegheny, Erie-Niagara, Ontario, and Oswego). Surveys since 1977 have shown fewer catches of this species in streams of the Allegheny and Erie-Niagara watersheds, and substantial range loss is noted in the Allegheny watershed. Populations have shown a more moderate decline in the Erie watershed. Bigeye Chub have not been caught in the Ontario or Oswego watersheds since 1957 and 1886 respectively. Since 2003, the Bigeye Chub has only been recorded in 7 total waterbodies across New York.

**Recommendation:** It is recommended that the Bigeye Chub be listed as Threatened due to their rarity and the decreases in abundance and distribution seen across their New York range.



# Species Status Assessment

**Common Name:** Bigeye Chub **Date Updated:** January 2023

**Scientific Name:** *Hybopsis amblops* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Bigeye Chub is in the class Actinopterygii and the family Cyprinidae (minnows and carps). Bigeye Chubs are found from New York southward to Georgia and westward to Oklahoma and Michigan in the north. In New York, they are native to 4 of 18 watersheds (Allegheny, Erie-Niagara, Ontario, and Oswego). In New York, surveys since 1977 have shown fewer catches of this species in streams of the Allegheny and Erie-Niagara watersheds, and substantial range loss is noted in the Allegheny watershed (NYSDEC 2013). Populations have shown a more moderate decline in the Erie watershed. Bigeye Chub have not been caught in the Ontario or Oswego watersheds since 1957 and 1886 respectively (Carlson et al. 2016). Since 2003, the Bigeye Chub has only been recorded in 7 total waterbodies across New York. The Bigeye Chub is found in small to moderate size, clear-water streams with clean sand, gravel, or rock bottoms. They are abundant in areas that are well vegetated with minimum current, usually near riffles in quiet water (Smith 1979; Page and Burr 2011).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – HPSGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S1S2 **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern

**Status Discussion:**

The Bigeye Chub is not currently federally listed or listed in the state of New York. However, they are currently listed as a HPSGCN in New York. The Bigeye Chub is globally ranked as Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

ii. **Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:**__✓__ **No Data:**_____

**MASSACHUSETTS** **Not Present:**__✓__ **No Data:**_____

**NEW JERSEY** **Not Present:**__✓__ **No Data:**_____

**VERMONT** **Not Present:**__✓__ **No Data:**_____

**ONTARIO** **Not Present:**__✓__ **No Data:**_____

**QUEBEC** **Not Present:**__✓__ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** No

### d. New York

**i. Abundance**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 50 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

The short-term trend for this species over the past 10-20 years is uncertain but probably relatively stable or slowly declining (<30%). Long-term trends show that distribution and abundance have declined greatly in the north. They are common to abundant in the south, but abundance has decreased, and they've been extirpated from many agricultural areas in the northern portion in their range (Page and Burr 2011; NatureServe 2022). "Trautman (1981) reported that the Bigeye Chub has decreased significantly in Ohio since 1900" (Stauffer et al. 2016). The Ohio DNR website notes that, "Bigeye Chubs were once common throughout Ohio but today are almost entirely absent from the Northwest part of the state and have disappeared from many other river systems as well." They are currently ranked as S5 in Pennsylvania, however there are significant concerns regarding their status in the state (Stauffer et al. 2016). Bigeye Chubs are possibly extirpated from Michigan where they are ranked as SH. This species is listed as endangered in Illinois. Other states throughout the range note steep declines.

In New York, the Bigeye Chub is native to 4 of 18 watersheds (Allegheny, Erie-Niagara, Ontario, and Oswego). In New York, surveys since 1977 have shown fewer catches of this species in streams of the Allegheny and Erie-Niagara watersheds, and substantial range loss is noted in the Allegheny watershed (NYSDEC 2013). Populations have shown a more moderate decline in the Erie watershed. Bigeye Chub have not been caught in the Ontario or Oswego watersheds since 1957 and 1886 respectively (Carlson et al. 2016). Since 2003, the Bigeye Chub has only been recorded in 7 total waterbodies across New York.

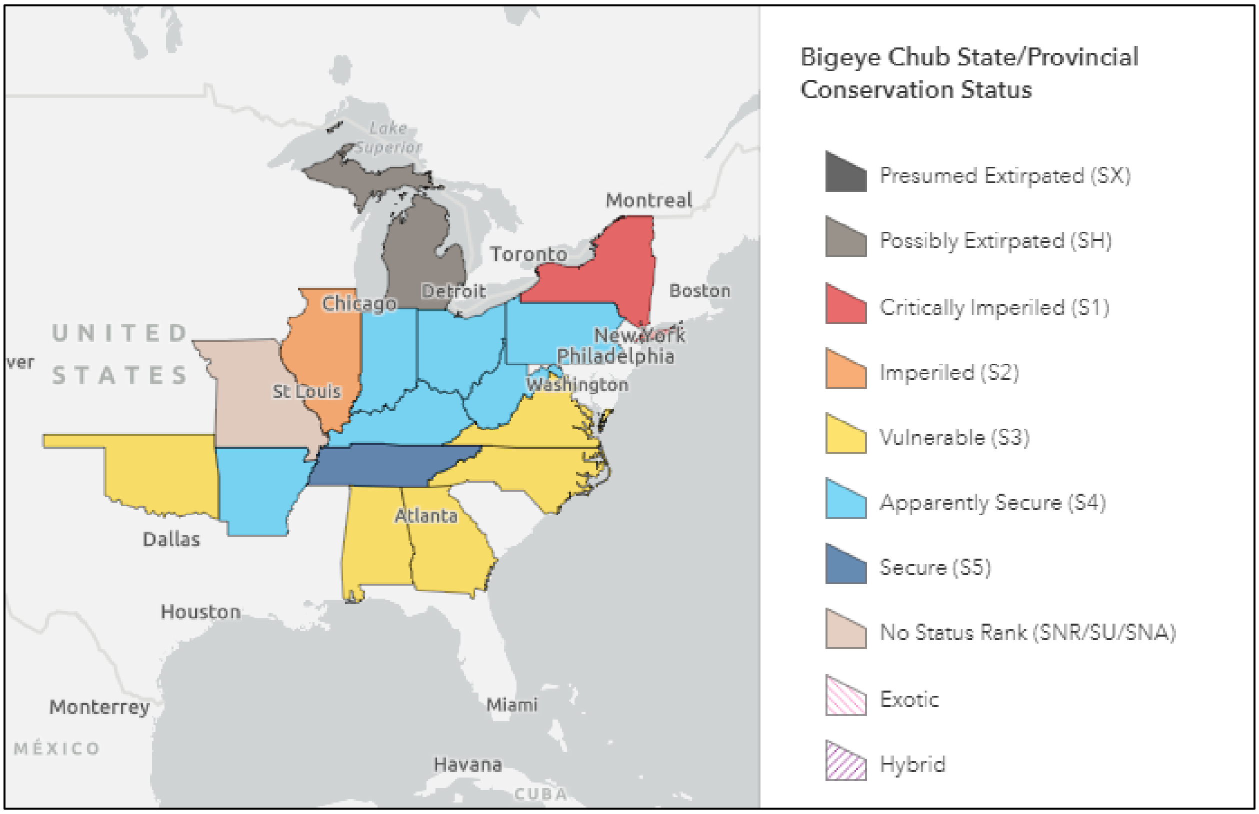


**Figure 1:** Bigeye Chub distribution and status (Source: NatureServe 2022).

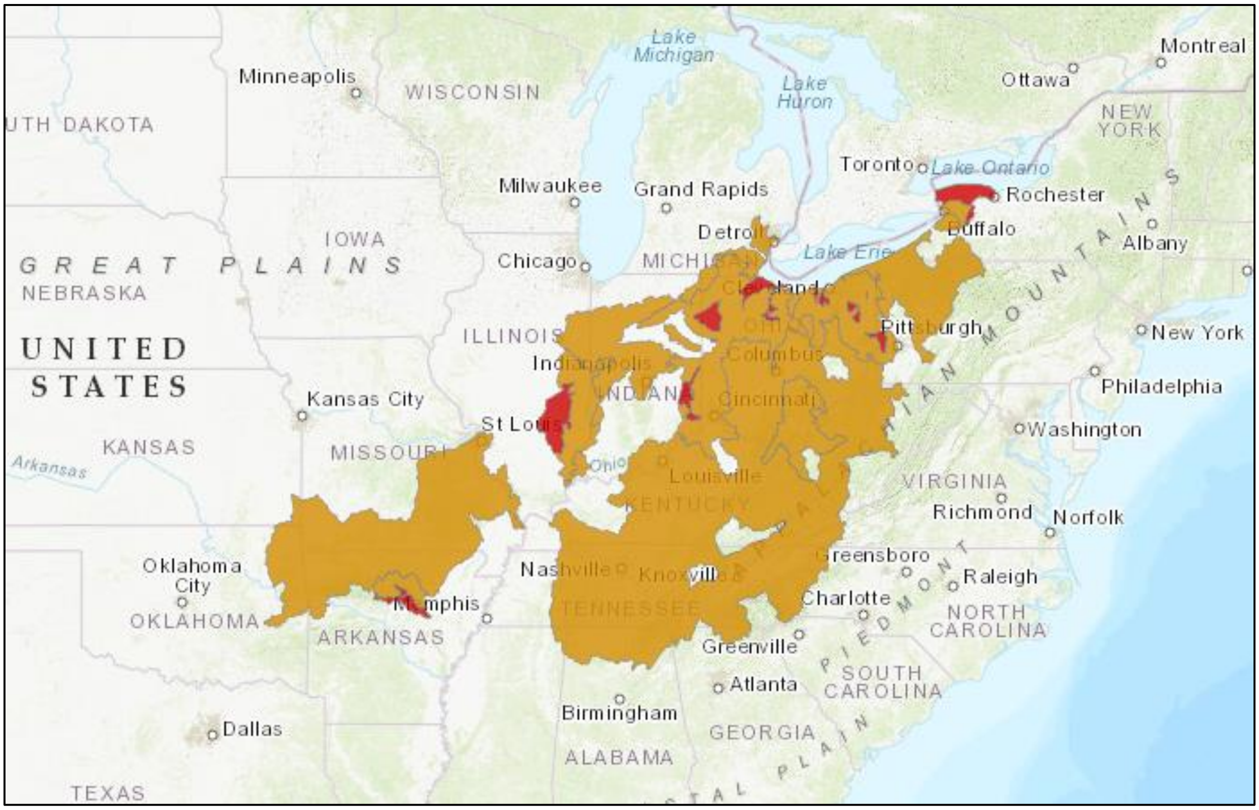


**Figure 2:** Bigeye Chub distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

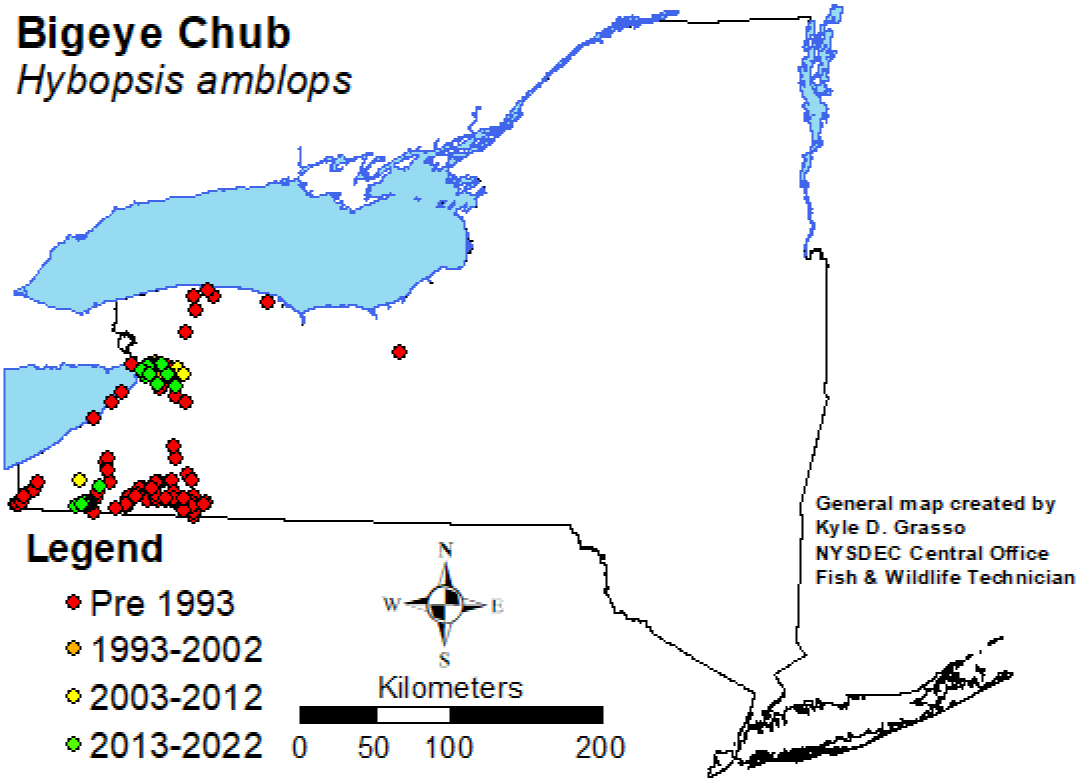


**Figure 3:** Records of Bigeye Chub in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 120 | 33 | 6-10% |
| **1993-2002** | 5 | 3 | 6-10% |
| **2003 - 2012** | 17 | 5 | 6-10% |
| **2013 - 2022** | 31 | 6 | 6-10% |

**Table 1:** Records of Bigeye Chub in New York.

### Details of historic and current occurrence:

In New York, the Bigeye Chub is native to 4 of 18 watersheds (Allegheny, Erie-Niagara, Ontario, and Oswego). In the 1930s, Bigeye Chubs were collected in more than 13% of the Allegheny stream sites. Other watersheds in the 1930s contained fewer: 1.1% in the Erie, 0.6% in the Ontario. The only catch in the Oswego watershed was near Montezuma Marsh in 1886. They were less commonly caught in extensive surveys of the Allegheny watershed during the 1950s and after 1979. Additional areas where they appear to have declined or disappeared include French Creek (Hansen 1983; NYS Museum 1985-2000) and Little Conewango Creek (Daniels 1989).

Surveys since 1977 have shown fewer catches of this species in streams of the Allegheny and Erie-Niagara watersheds, and substantial range loss is noted in the Allegheny watershed (NYSDEC 2013). Populations have shown a more moderate decline in the Erie watershed. Bigeye Chub have not been caught in the Ontario or Oswego watersheds since 1957 and 1886 respectively (Carlson et al. 2016). Since 2003, the Bigeye Chub has only been recorded in 7 total waterbodies across New York.

**New York's Contribution to Species North American Range:**

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:**_✓___

**Classification of New York Range**

**Core:**_____

**Peripheral:**_✓___

**Disjunct:**_____

**Distance to core population:**

_Core pop. to the south and west______

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Small river to medium mainstem river

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to moderate-high gradient

**Habitat or Community Type Trend in New York**

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:**_✓___

**Time frame of decline/increase:**__________________________________________

**Habitat Specialist?** **Yes:**_____ **No:**_✓___

**Indicator Species?** **Yes:**_✓___ **No:**_____

**Habitat Discussion:**

The Bigeye Chub is found in small to moderate size clear-water streams with clean sand, gravel, or rock bottoms. They are abundant in pools and runs with low to moderate flows that are well vegetated, usually near riffles in quiet water (Smith 1979; Smith 1985; Page and Burr 2011; Stauffer et al. 2016). They are not found in areas of high turbidity and are exceptionally intolerant of siltation, making them a good indicator of water quality (Smith 1985; NatureServe 2022).

## V. 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 *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Very little is known on the life history of this species, but it is likely similar to other chubs (Smith 1985; Werner 2004). Most individuals mature in one year in the southern portion of their range (Jenkins and Burkhead 1994). “Tennessee specimens reach sexual maturity at approximately 55 mm (Etnier and Starnes 1993)” (Stauffer et al. 2016). Spawning typically occurs from late spring to early summer (Jenkins and Burkhead 1994; NatureServe 2022). Tarver (2015) reported spawning in Alabama from March-June with peaks in April and May (Stauffer et al. 2016). “Pflieger (1975) collected breeding adults in June in Missouri” (Stauffer et al. 2016). “Fecundities of females from Alabama ranged from 90-2566 oocytes (Tarver 2015)” (Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

The Bigeye Chub is intolerant of water impoundment, siltation, and pollution (NatureServe 2022). Trautman (1981) noted that populations of the Bigeye Chub declined in prairie streams of west central Ohio due to increased siltation of stream bottoms. Undoubtedly this has occurred in New York waters as well, but no studies to assess this or other problems, threats, limiting factors or overall vulnerability of this species or their essential habitat have been conducted. The loss of quality habitat when the Montezuma Marsh was drained in the early 1900s was poorly documented, but the elimination of Bigeye Chub there was echoed with the elimination of Redfin Shiner, Pugnose Shiner, and Sauger from the same areas.

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

**Yes:** _✓_ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

The seven waterbodies where they have been recorded in the last 20 years should be a priority to protect. Targeted sampling of historic sites should continue to occur in order to locate remaining populations and obtain further life history and other ecological information. Stocking may be beneficial across their historic New York range.

The 2005 State Wildlife Action Plan included the following recommendations:

<u>Habitat research:</u>

-Inventory and assess losses of habitat and this species in tributaries of western Lake Ontario. Follow up with remediation efforts.

<u>Population monitoring:</u>

-More sampling is needed in these basins, like Olean/Ischua Creeks and Buffalo River system.

The 2015 State Wildlife Action Plan included the following recommendations:

-Assess the population and restore habitat of Bigeye Chub in the Ontario watershed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |
| **4.** Species Management | Species Recovery |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Bigeye Chub.

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# Species Status Assessment

**Common Name:** Bigmouth shiner **Date Updated:**

**Scientific Name:** *Notropis dorsalis* **Updated by:**

**Class:** Osteichthyes

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Bigmouth shiner occurs in medium-sized streams with clean gravel and is native to 5 of 18 watersheds in the western half of the state. It has also become established as a non-native species in the Chemung watershed, with records only since 1981. This species still inhabits most of its range in the Genesee watershed, while there may be decreases in the Erie watershed. Bigmouth shiner appears to be gone from the Oswego and Ontario watersheds where it was thought to have been a relict. It can still be caught in about half of its former range, since 1977.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** Not listed as SGCN

### b. Natural Heritage Program

i. **Global:** G5

ii. **New York:** S2 **Tracked by NYNHP?:** Yes

**Other Ranks:**

Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Not at Risk (01Nov2003)

**Status Discussion:**

Bigmouth shiner is globally ranked as “Secure” and is common over much of its range. Its state rank is “Vulnerable” (NatureServe 2004).

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Stable | Stable | | | Choose an item. |
| **Northeastern US** | Yes | Choose an item. | Choose an item. | | | Choose an item. |
| **New York** | Yes | Declining | Declining | | | Yes |
| **Connecticut** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Massachusetts** | No | Choose an item. | Choose an item. | | | Choose an item. |

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **New Jersey** | No | Choose an item. | Choose an item. |  |  | Choose an item. |
| **Pennsylvania** | Yes | Choose an item. | Choose an item. |  | Threatened (S2) | Yes |
| **Vermont** | No | Choose an item. | Choose an item. |  |  | Choose an item. |
| **Ontario** | No | Choose an item. | Choose an item. |  |  | Choose an item. |
| **Quebec** | No | Choose an item. | Choose an item. |  |  | Choose an item. |

*Column options*
**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item
**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs carried out by the NYSDEC Rare Fish Unit, 1998-2012.

**Trends Discussion** *(insert map of North American/regional):*

Bigmouth shiner is found in the northern Midwest and extending as far east as Oneida Lake in New York (Figure 1).

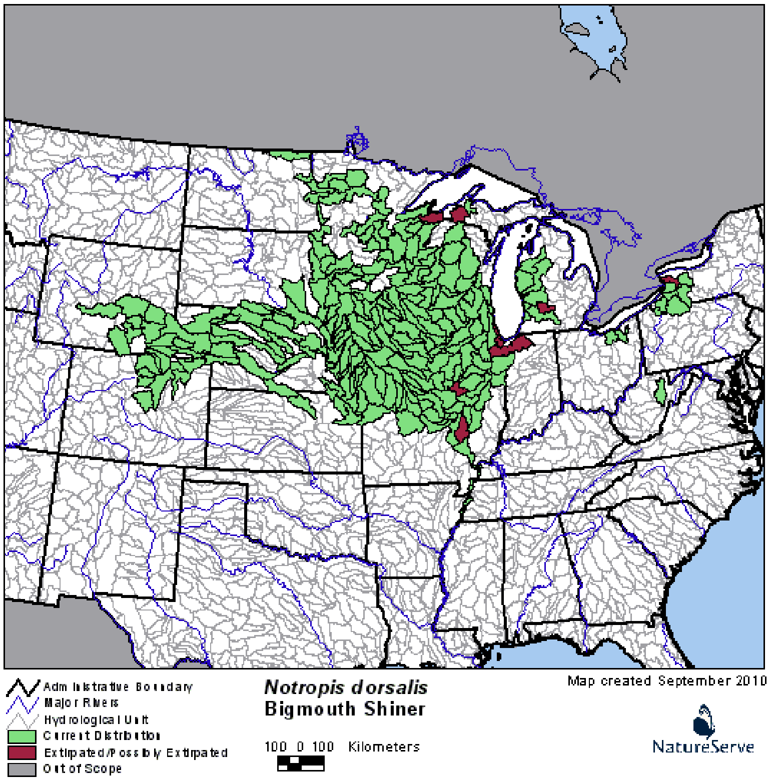

**Figure 1.** U.S. distribution of bigmouth shiner by watershed (NatureServe 2012).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

In New York, bigmouth shiner is still found in 3 of the 5 watersheds where it is native (possibly never established in the Ontario watershed, with only 2 records from 1950-51), and captures in recent years are relatively infrequent in Allegheny, Erie and Genesee (Figure 2). The Canisteo River of the Chemung watershed has a sustained population that is recognized as non-native.

The three watersheds with substantive populations are still well represented, while the species appears to be extirpated from Ontario and Oswego watersheds. The small, isolated area in Chemung watershed (likely an introduced population) remains intact and was reported in 1981 and 2003. Frequency occurrence of catches in the four watersheds (including the one where non-native) is relatively low but stable. The Allegheny population had significantly lower catch frequencies in stream samples in the 2000s than 1930s (from 12% to 5%) but they were caught in several new areas in the 2000s.

The distribution of this species among subbasins (HUC 10) within the 5 watersheds where it is native has changed in a similar pattern, with no discernable trend in three watersheds, but absence from the two others.  Overall there are records from 34 of the HUC units for all time periods, and from recent times they are from only 25 units. Statewide, the number of individual site records for this species has been 245 for all time periods, 143 in the last 30 years, and 37 since 1993. In both the early and recent periods most records are for the Allegheny and Genesse watersheds.

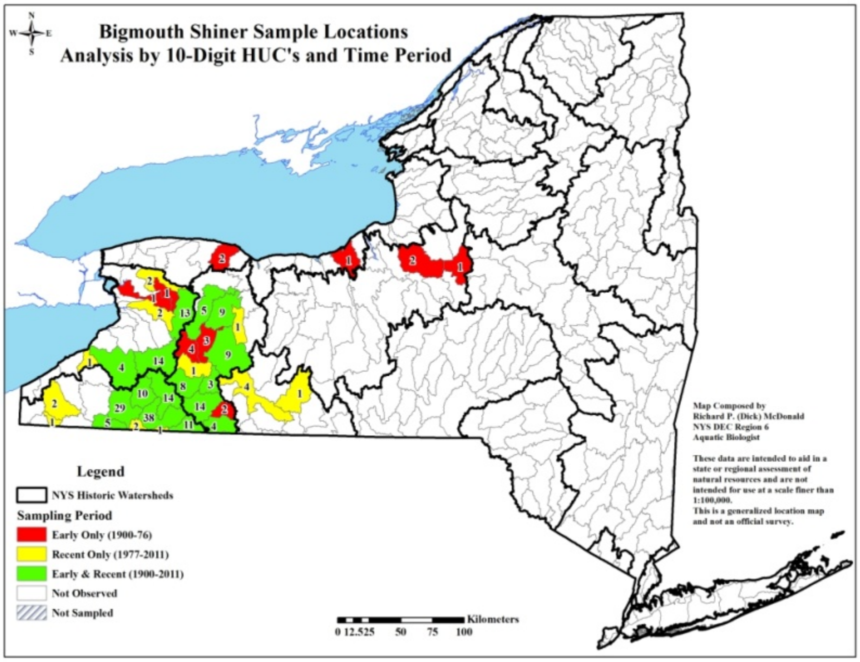

**Figure 2.** Bigmouth shiner distribution in New York, depicting fish sampled before 1977 and from 1977 to current time, is shown the corresponding  HUC-10units where they were found, along with the number of records.

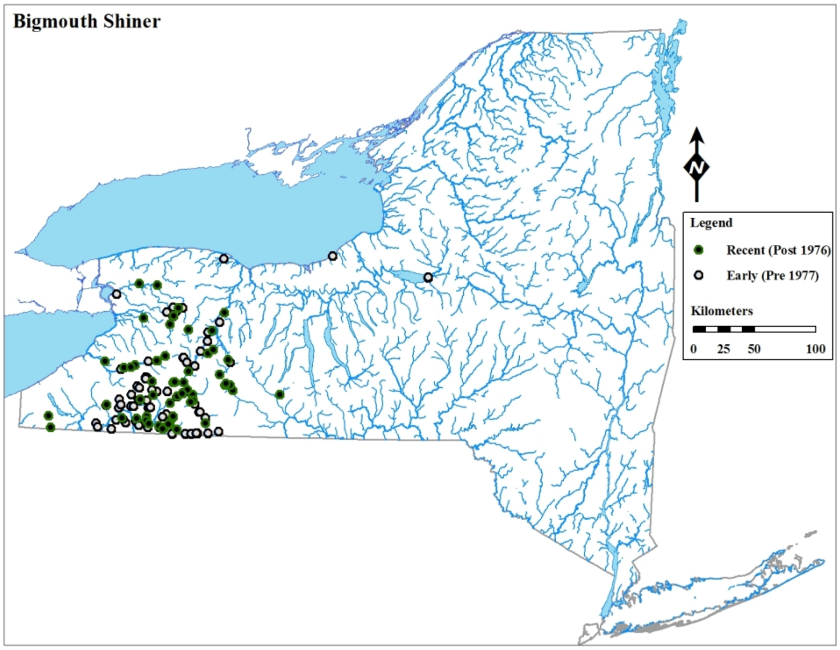

**Figure 3.** New York range map of bigmouth shiner.

| Watershed name | Total # HUC10 | Early only | Recent only | both | Watershed status |
|---|---|---|---|---|---|
| Allegheny | 10 | 0 | 4 | 6 | |
| Erie-Niagara | 8 | 2 | 3 | 3 | |
| Genesse | 12 | 3 | 2 | 7 | |
| Oswego | 2 | 2 | 0 | 0 | |
| Ontario | 2 | 2 | 0 | 0 | loss |
| sum | 34 | 9 | 9 | 16 | |
| | | | | | |
| Chemung | 1 | | 1 | | Non-native |

**Table 1.** Records of rare fish species in hydrological units (HUC-10) are shown according to their watersheds in early and recent time periods (before and after 1977) to consider loss and gains. Further explanations of details are found in Carlson (2012).

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | | 215 | 5/18 watersheds |
| **1993-2002** | | | |
| **2003 - 2012** | | 143 | 4/18 watersheds |
| **2013 - 2022** | | | |

**Table 2.** Records of bigmouth shiner in New York.

**Details of historic and current occurrence:**

Historically, this species was found in the Allegheny, Erie, and Genesee watersheds. In addition, there were few captures in the Lake Ontario near-shore areas in 1950-51 and in Oneida Lake in 1927.

This species is still found in the Allegheny, Erie and Genesee watersheds. The species appears to be extirpated from Ontario and Oswego watersheds. The small, isolated area in Chemung watershed (likely an introduced population) was reported in 1981 and 2003.

### New York's Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 1-25% | Disjunct | 700 miles |

*Column options*
**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

1. Small River, Low Gradient, Moderately Buffered, Neutral Warm
2. Medium River, Low Gradient, Moderately Buffered, Neutral, Warm
3. Headwater/Creek, Low Gradient, Moderately Buffered, Neutral, Warm

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| Yes | No | Unknown | |

*Column options*
**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item
**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

Bigmouth shiner is found in runs and pools of shallow open headwaters, creeks, and small to medium rivers with bottom predominantly sand, often overlain with silt; sometimes also in lakes. It spawns probably in mid-water, with eggs drifting downstream (NatureServe 2012). Habitat specializations were measured in the Allegheny basin (Morse et al. 2009).

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

**Species Demographics and Life History Discussion** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Very little is known about the life history of bigmouth shiner. It reaches sexually maturity at the age of one or two and it spawns in late spring and summer (Werner 2004, NatureServe 2012).

## VI. Threats *(from NY 2015 SWAP or newly described)*

Siltation of gravel areas is likely a problem. Perhaps increases in trout abundances coincide with decreases in catches of this shiner in some areas. Habitat specializations were measured in Allegheny basin (Morse et al. 2009). The species is otherwise quite durable in most parts of its range. If the subspecies becomes adopted as a species, the small size of its range in PA and NY (Daniels in review) make it further in need of special protection.

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

**Yes:** _ü___ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law.

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

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| | |
|---|---|
| | |
| | |
| **1.** | |

**Table 3.** Recommended conservation actions for bigmouth shiner.

## VII. References

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| | |
|---|---|
| **Originally prepared by** | Doug Carlson and Amy Mahar |
| **Date first prepared** | April 10, 2012 |
| **First revision** | June 12, 2012 |
| **Latest revision** | Transcribed March 2024 |

# Species Status Assessment Cover Sheet

**Species Name:** Black Bullhead
**Date Updated:** January 2023
**Current Status:** Not Listed – SGCN
**Updated By:** Kyle Grasso
**Current NHP Rank:** S1

**Distribution:** Black Bullheads are native to the Great Lakes, Hudson Bay, and Mississippi River basins in most of eastern and central U.S. from south-central Canada south to the Gulf Coast. They've been widely introduced and established outside their native range in the western U.S., Atlantic coastal states, and parts of Europe.

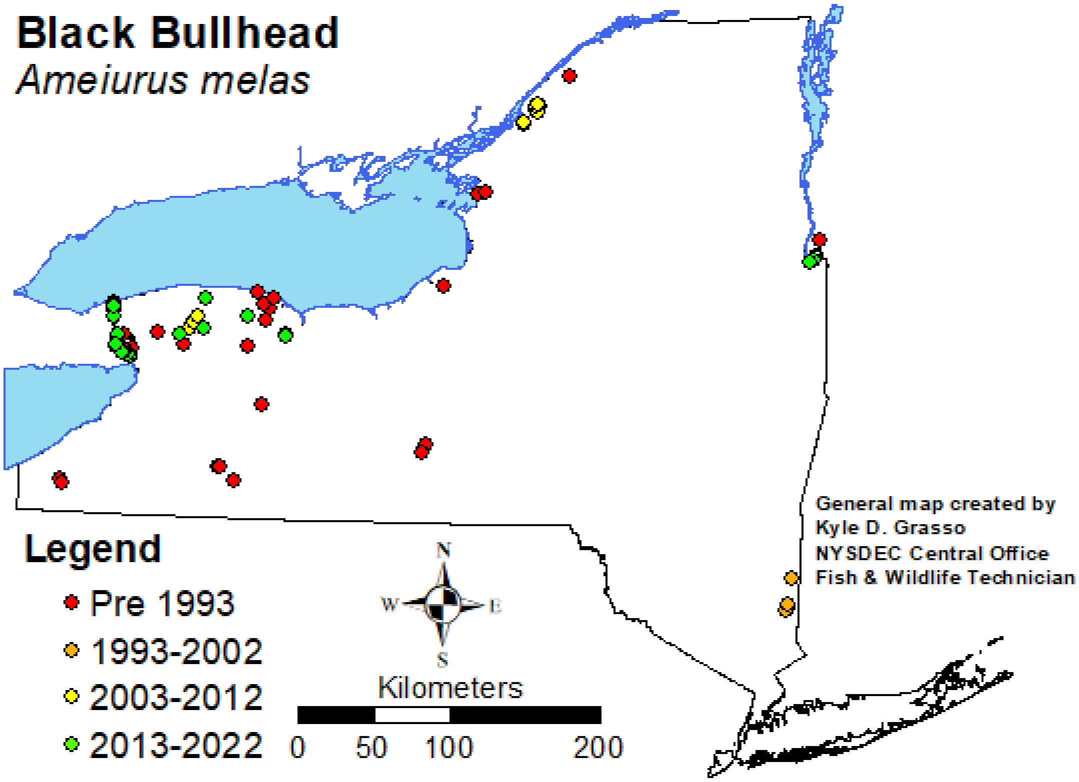
**Habitat:** Black Bullheads inhabit backwaters, oxbows, impoundments, swamps, ponds, lakes, and low-gradient streams (including pools of intermittent creeks). They prefer stagnant, slow-moving, warm, and turbid (muddy) waters with a preference for mud or silt substrates. They are very tolerant of siltation, industrial and domestic pollution, warm water, and low oxygen. Adults tend to be nocturnal and inactive in congregations or schools in aquatic vegetation during daylight hours. It is often associated with a lack of diversity in the fish community due to the poor conditions that they tolerate.

**Life History:** Black Bullheads don't typically live longer than 5 years and they reach sexual maturity between their 2nd and 4th summer depending on location and conditions. The date of spawning is variable, but Smith (1985) reported dates ranging from May and June to July. Eggs are laid in nests excavated by females in mud or sand often under some sort of cover (logs or aquatic vegetation) in shallow water. Nests are guarded by adults and water is fanned over the eggs until they hatch within 5-10 days. Egg counts of 3,000 to 7,000 have been reported. Hatchlings will swim in compact ball-like schools and are guarded by parents for several weeks until they reach 1 inch.

**Threats:** No threats have been identified, but it is possible that the Black Bullhead has declined as a result of improvements in water quality. Their habitat requirements today are apparently more restrictive than previously known. There may be competition with Brown Bullhead when conditions become tolerable for them to co-occur.

**Population trend:** There is uncertainty regarding Black Bullhead distribution within New York due to their rarity, confusion for brown bullhead, lack of vouchered specimens, and the different stocking programs that took place in the 1900s. According to Carlson et al. (2016), the Black Bullhead is believed to be native to at least 7 of 18 watersheds (Allegheny, Champlain, Erie-Niagara, Genesee, Ontario, Oswegatchie, and Oswego). Within their native watersheds, they are still found in about half of their historic range. Although rare, they appear stable in their remaining locations.

**Recommendation:** It is recommended that the Black Bullhead be listed as Special Concern due to their rarity and unknown distribution in New York.



# Species Status Assessment

**Common Name:** Black Bullhead **Date Updated:** January 2023

**Scientific Name:** *Ameiurus melas* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Ictaluridae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Black Bullhead is in the class Actinopterygii and the family Ictaluridae (North American catfishes). Two subspecies are sometimes recognized: *Ameiurus melas melas* in the north and *Ameiurus melas catulus* in the Gulf Coast states and northern Mexico (NatureServe 2022). Black Bullheads are easily mistaken for brown bullhead, but Black Bullheads lack the saw-like serrae on the rear margin of the pectoral spine that brown bullhead have. Anal fin ray and gill raker counts can also be used to differentiate the two species (MDC; Smith 1985; Stauffer et al. 2016). This is made even more difficult with the possibility of hybrids of the two (Dumke et al. 2020).

Black Bullheads are native to the Great Lakes, Hudson Bay, and Mississippi River basins in most of eastern and central U.S. from south-central Canada south to the Gulf Coast. They've been widely introduced and established outside their native range in the western U.S., Atlantic coastal states, and parts of Europe (Page and Burr 1991; NatureServe 2022). Black Bullhead distribution in New York from early years is poorly understood. There is uncertainty regarding the native range within New York due to their rarity, confusion for brown bullhead, lack of vouchered specimens, and the different stocking programs that took place in the 1900s (Smith 1985). Smith (1985) stated that because of the variety of stocking programs in the 1900s, it may be possible to find Black Bullhead in most parts of the state. According to Carlson et al. (2016), the Black Bullhead is believed to be native to at least 7 of 18 watersheds (Allegheny, Champlain, Erie-Niagara, Genesee, Ontario, Oswegatchie, and Oswego). Within their native watersheds, they are still found in about half of their historic range. Although rare, they appear stable in their remaining locations. Black Bullheads inhabit backwaters, oxbows, impoundments, swamps, ponds, lakes, and low-gradient streams (including pools of intermittent creeks) (Stauffer et al. 2016). They prefer stagnant, slow-moving, warm, and turbid (muddy) waters with a preference for mud or silt substrates (MDC; Wright 2006; NatureServe 2022). They are very tolerant of siltation, industrial and domestic pollution, warm water, and low oxygen (Trautman 1981; Becker 1983; Smith 1985; Pflieger 1997).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern

**Status Discussion:**

The Black Bullhead is not currently federally listed or listed in the state of New York. However, they are currently listed as an SGCN in New York. The Black Bullhead is globally ranked as Secure by NatureServe.

# II. Abundance and Distribution Trends

## a. North America

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

## b. Northeastern U.S. (USWFS Region 5)

### i. Abundance

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

## c. Adjacent States and Provinces

**VERMONT** **Not Present:**__✓__ **No Data:**_____

**QUEBEC** **Not Present:**__✓__ **No Data:**_____

**CONNECTICUT** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

**Time Frame Considered:**_______________

**Listing Status:** Introduced – SNR **SGCN?:** N/A

**MASSACHUSETTS** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

**Time Frame Considered:**_______________

**Listing Status:** Introduced – SNR **SGCN?:** N/A

**NEW JERSEY** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

**Time Frame Considered:**_____________________________________________

**Listing Status:** Introduced – SNR **SGCN?:** N/A

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last record was a Lake Erie tributary in 1985

**Listing Status:** Endangered – SU **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** N/A

## d. New York

**i. Abundance**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Since the 1920s

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

According to NatureServe, the short-term trend in the last 10 years is uncertain but likely relatively stable (≤10% change). In the long-term, their range and population size have increased as a result of introductions outside their native range (relatively stable to increase >25%).

The Black Bullhead is extremely rare in Pennsylvania, and they are listed as Endangered. “It’s rarity is perplexing, given its reported tolerance for degraded conditions” (Stauffer et al. 2016). The last known record in Pennsylvania came from a Lake Erie tributary in 1985. A 2014 resurvey of historic sites in Pennsylvania failed to yield a single individual and they may be extirpated from the state (Stauffer et al. 2016). “During the period 1955-80, with rare exceptions, the Black Bullhead maintained or increased its numbers throughout its range in Ohio (Trautman 1981)” (Stauffer et al. 2016).

Black Bullhead distribution in New York from early years is poorly understood. There is uncertainty regarding the native range within New York due to their rarity, confusion for brown bullhead, lack of vouchered specimens, and the different stocking programs that took place in the 1900s (Smith 1985). Many of the earlier Black Bullhead records were not verified and are suspect. Smith (1985) stated that because of the variety of stocking programs in the 1900s, it may be possible to find Black Bullhead in most parts of the state. According to Carlson et al. (2016), the Black Bullhead is believed to be native to at least 7 of 18 watersheds (Allegheny, Champlain, Erie-Niagara, Genesee, Ontario, Oswegatchie, and Oswego). From 1996-2017, there were museum verified records from the Champlain, Erie-Niagara, Genesee, Lower Hudson, Ontario, and Oswegatchie watersheds. The last verified records in the Allegheny and Oswego watersheds are from 1935 and 1946 respectively, and they may be extirpated from these watersheds. Within their native watersheds, they are still found in about half of their historic range. Although rare, they appear stable in their remaining locations. See historic and current occurrence section for more detail.

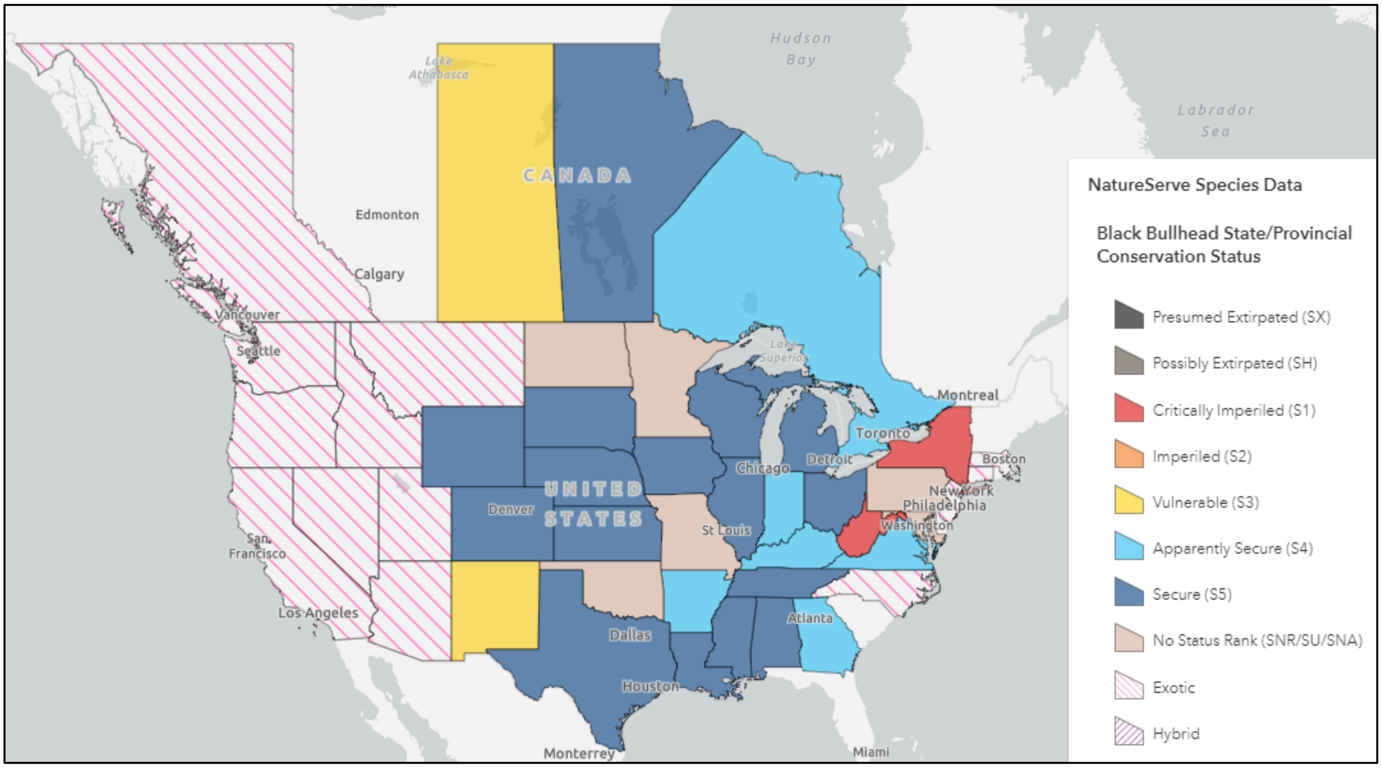


**Figure 1:** Black Bullhead distribution and status (Source: NatureServe 2022).

**Figure 2:** Black Bullhead distribution (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

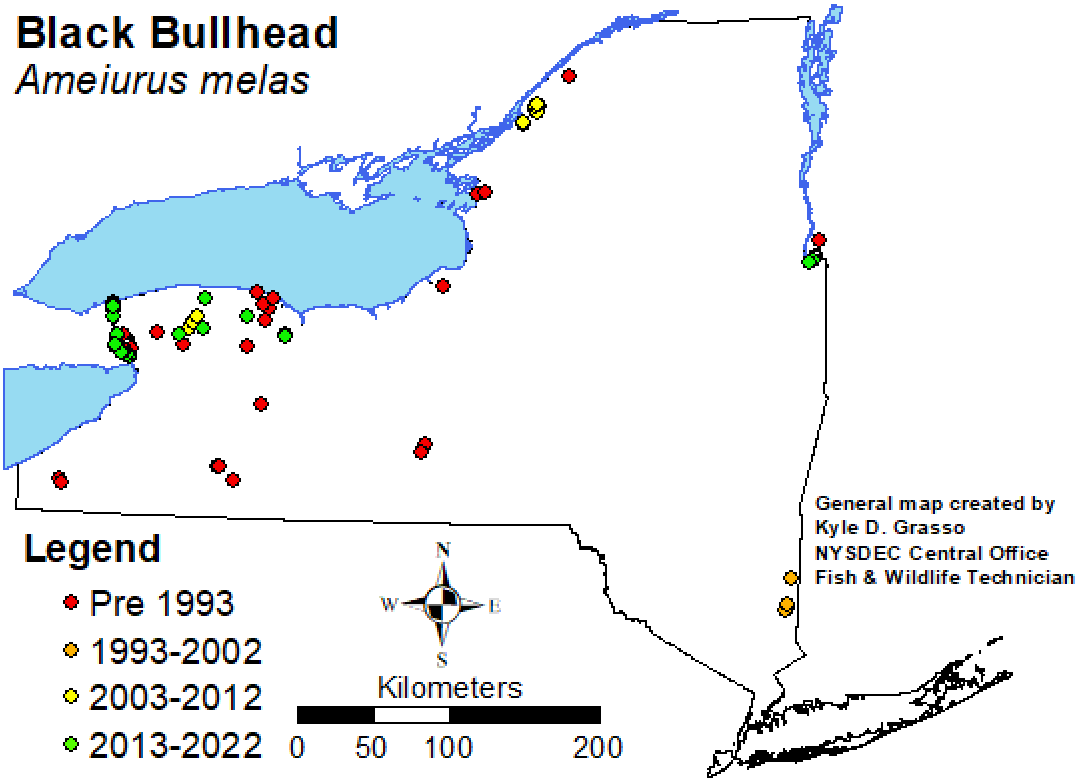


**Figure 3:** Records of Black Bullhead in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 28 | 24 | 11-25% |
| **1993-2002** | 4 | 4 | 11-25% |
| **2003 - 2012** | 22 | 6 | 11-25% |
| **2013 - 2022** | 85 | 6 | 11-25% |

**Table 1:** Records of Black Bullhead in New York.

### Details of historic and current occurrence:

Black Bullhead distribution in New York from early years is poorly understood. There is uncertainty regarding the native range within New York due to their rarity, confusion for brown bullhead, lack of vouchered specimens, and the different stocking programs that took place in the 1900s (Smith 1985). Many of the earlier Black Bullhead records were not verified and are suspect. Smith (1985) stated that because of the variety of stocking programs in the 1900s, it may be possible to find Black Bullhead in most parts of the state. From 1978-1980, NYSDEC operated an Urban Fishing Program that stocked Black Bullhead in ponds in New York City, Buffalo, Rochester, and the Capital District for urban fishing opportunities.

According to Carlson et al. (2016), the Black Bullhead is believed to be native to at least 7 of 18 watersheds (Allegheny, Champlain, Erie-Niagara, Genesee, Ontario, Oswegatchie, and Oswego). From 1996-2017, there were museum verified records from the Champlain, Erie-Niagara, Genesee, Lower Hudson, Ontario, and Oswegatchie watersheds. The last verified records in the Allegheny and Oswego watersheds are from 1935 and 1946 respectively, and they may be extirpated from these watersheds. Within their native watersheds, they are still found in about half of their historic range. Although rare, they appear stable in their remaining locations. See historic and current occurrence section for more detail. Records by watersheds with museum verified records based on Carlson et al. 2016:

### Allegheny

The only verified records of Black Bullhead in the Allegheny watershed are from Chautauqua Lake in 1935 and 1937. They are believed to be extirpated from the watershed.

### Champlain

The earliest Black Bullhead record from this watershed comes from an unknown location in Lake Champlain in the mid-1800s. They have been caught as recently as 2017 in Mud Brook. “Lee et al. (1980) and Page and Burr (1991) classify this species as non-native to this watershed but give no rationale for doing so. Because this catfish has been reported from this watershed and because it is regarded as native in other Saint Lawrence River drainage watersheds, we favor treating it as native” (Carlson et al. 2016).

### Erie-Niagara

The earliest record from this watershed comes from Sheridan Park (in Buffalo) in 1928. Since 2013, Black Bullheads have been caught in Murder Creek and several areas of the Niagara River.

### Genesee

The earliest record from this watershed comes from the Genesee River below the dam at Belmont in 1926. Black Bullheads have been caught as recently as 2013 in East Branch Red Creek near Rochester.

### Ontario

The earliest record from this watershed comes from Mill Creek near Sacketts Harbor in 1894 (Evermann and Kendall 1901). Black Bullheads have been caught as recently as 2018 in Oak Orchard Creek.

### Oswegatchie

The earliest record from this watershed comes from Lisbon Creek in 1931. Black Bullheads have been caught as recently as 2012 in Black Creek and Black Lake.

### Oswego

The earliest record from this watershed comes from Black Creek near Fulton in 1927. Black Bullhead have been caught as recently as 2016 in Greene Pond, but it is uncertain if those identifications were confirmed so this record is not included.

### Lower Hudson

In 1997, four records were verified in Muddy Brook, Swamp River, and two unnamed tributaries (AMNH 223985, 224054, 224155, 224166). There are no previous or subsequent verified records for this watershed.

### Other Watersheds

There are records for 8 other watersheds, but the identifications have not been confirmed and therefore may be misidentified. These records are not represented on the map in Figure 3 or the table in Table 1. More sampling should be done at these locations and vouchers should be taken and identified.

## 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%:_____** | **Peripheral:** ✓ |

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Disjunct:**_____

**Distance to core population:**

Core pop. to the west

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to medium tributary rivers, lakes, swamps, oxbows, etc.

**b. Geology:** Low-moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to occasional moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:** ✓

**Time frame of decline/increase:**_____

**Habitat Specialist?** **Yes:**_____ **No:** ✓

**Indicator Species?** **Yes:**_____ **No:** ✓

### Habitat Discussion:

Black Bullheads inhabit backwaters, oxbows, impoundments, swamps, ponds, lakes, and low-gradient streams (including pools of intermittent creeks) (Stauffer et al. 2016). They prefer stagnant, slow-moving, warm, and turbid (muddy) waters with a preference for mud or silt substrates (MDC; Wright 2006; NatureServe 2022). They are very tolerant of siltation, industrial and domestic pollution, warm water, and low oxygen (Trautman 1981; Becker 1983; Smith 1985; Pflieger 1997). Adults tend to be nocturnal and inactive in congregations or schools in aquatic vegetation during daylight hours (NatureServe 2022). It is often associated with a lack of diversity in the fish community due to the poor conditions that they tolerate (MDC; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Black Bullheads don't typically live longer than 5 years and they reach sexual maturity between their 2nd and 4th summer depending on location and conditions (MDC; TPWD; Moyle 1976; Becker 1983; NatureServe 2022). According to FishBase and the Texas Parks and Wildlife Department, some individuals may live for 10 years. The date of spawning is variable, but Smith (1985) reported dates ranging from May and June to July. Stauffer et al. (2016) stated that spawning occurs from April through June but may extend through most of the summer in some areas. Eggs are laid in nests excavated by females in mud or sand often under some sort of cover (logs or aquatic vegetation) in shallow water. Nests are guarded by adults and water is fanned over the eggs until they hatch within 5-10 days. Egg counts of 3,000 to 7,000 have been reported. Hatchlings will swim in compact ball-like schools and are guarded by parents for several weeks until they reach 1 inch (MDC; TPWD; Smith 1985; Sublette et al. 1990; Stauffer et al. 2016; NatureServe 2022).

## VI. Threats *(from NY CWCS Database or newly described)*

No threats have been identified, but it is possible that the Black Bullhead has declined as a result of improvements in water quality. Their habitat requirements today are apparently more restrictive than previously known. There may be competition with Brown Bullhead when conditions become tolerable for them to co-occur.

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

**Yes:** ✓ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

Historic locations should be verified and resurveyed to better determine the status of the Black Bullhead, and why this species is so rare given their tolerance for degraded waters (Stauffer et al. 2016). Verified populations should continue to be monitored for changes in abundance and potential new occurrences should be identified and verified with a voucher. Stocking may be beneficial across their native range in New York.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Management | Site/Area Management |

| | |
|---|---|
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Species Management | Ex-situ Conservation |
| **5.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Black Bullhead.

## VII. References

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# Species Status Assessment Cover Sheet

**Species Name:** Blackchin Shiner **Date Updated:** January 2023

**Current Status:** Not Listed – SGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** S2

**Distribution:** Blackchin Shiners can be found from Minnesota and Iowa east to Vermont, southeastern Ontario, and southern Quebec. They are native to 10 of the 18 watersheds in New York (Allegheny, Champlain, Erie-Niagara, Genesee, Ontario, Oswegatchie, Oswego, St. Lawrence, Susquehanna, and Upper Hudson).

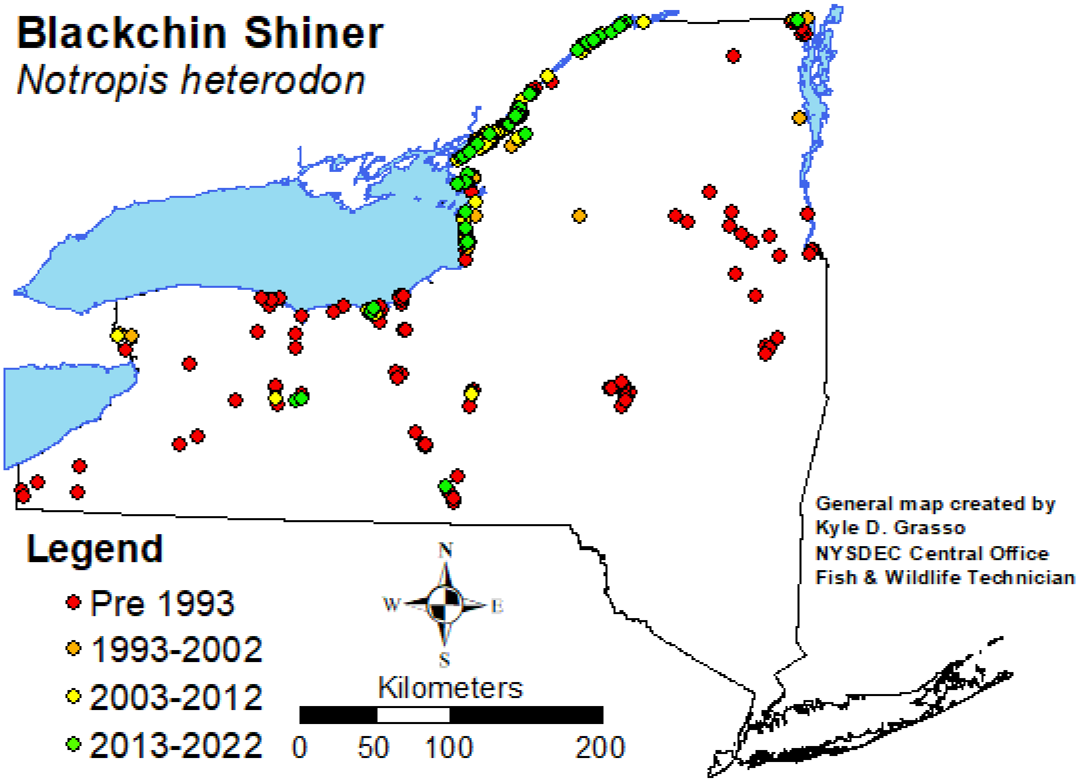
**Habitat:** Blackchin Shiners inhabit the cool, clear, and quiet waters of streams (pools and runs) and the nearshore areas of lakes with abundant vegetation and sandy or gravel substrate. They are often found in narrow (1–3 m wide) and wide (12–24 m wide) streams. In Wisconsin, they were found in lakes more of the time (67%) than in flowing waters (33%). Among all New York records, about half the Blackchin Shiner occurrences are in lakes. They are sensitive to siltation and are a good indicator of environmental quality.

**Life History:** Little is known about the life history of the Blackchin Shiner. They don't typically survive beyond 2 years and will sexually mature at age 1. Spawning was recorded in May and June in Illinois and from June to August in Wisconsin. Three female Blackchin Shiners in Wisconsin had egg counts ranging from 675-1070.

**Threats:** Threats to the Blackchin Shiner include habitat loss and degradation (from increased turbidity and siltation), fluctuating water levels, pollution, and introductions of sport fishes.

**Population trend:** Blackchin shiners are native to at least 10 of the 18 watersheds in New York (Allegheny, Champlain, Erie-Niagara, Genesee, Ontario, Oswegatchie, Oswego, St. Lawrence, Susquehanna, and Upper Hudson). They are most secure in the northern watersheds of New York (Champlain, Ontario, Oswegatchie, and St. Lawrence watersheds). They have declined in the Erie-Niagara, Genesee, and Susquehanna watersheds where they typically remain in headwater streams, and they've been extirpated from the Allegheny, Oswego, and Upper Hudson watersheds.

**Recommendation:** It is recommended that the Blackchin Shiner be listed as Special Concern due to the declines seen in the southern and eastern watersheds, as well as the uncertainty surrounding their life history.



# Species Status Assessment

**Common Name:** Blackchin Shiner **Date Updated:** January 2023

**Scientific Name:** *Notropis heterodon* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Blackchin Shiner is in the class Actinopterygii and the family Cyprinidae (minnows and carps). The Blackchin Shiner can be found from Minnesota and Iowa east to Vermont, southeastern Ontario, and southern Quebec (Lee et al. 1980; Page and Burr 2011; NatureServe 2022). They are native to at least 10 of the 18 watersheds in New York (Allegheny, Champlain, Erie-Niagara, Genesee, Ontario, Oswegatchie, Oswego, St. Lawrence, Susquehanna, and Upper Hudson). They are most secure in the northern watersheds of New York (Champlain, Ontario, Oswegatchie, and St. Lawrence watersheds). They have declined in the Erie-Niagara, Genesee, and Susquehanna watersheds where they typically remain in headwater streams, and they've been extirpated from the Allegheny, Oswego, and Upper Hudson watersheds (Carlson et al. 2016; NYNHP 2022). Blackchin Shiners inhabit the cool, clear, and quiet waters of streams (pools and runs) and the nearshore areas of lakes with abundant vegetation and sandy or gravel substrate (Becker 1983; Smith 1985; Page and Burr 2011; NatureServe 2022; NYNHP 2022). They are sensitive to siltation and are a good indicator of environmental quality (Kart et al. 2005).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S2 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)

### Status Discussion:

The Blackchin Shiner is not currently federally listed or listed in the state of New York. However, they are currently listed as an SGCN in New York. The Blackchin Shiner is globally ranked as Secure by NatureServe.

Comments from COSEWIC: This species is secure in Ontario and Quebec, but the disjunct Manitoba population is limited by the availability of suitable habitat. Designated Not at Risk in April 1994. Considered a medium priority candidate for re-assessment in 2015.

# II. Abundance and Distribution Trends

## a. North America

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_✓_ **Unknown:**_____

### ii. Distribution

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Dist. decline since 1900; secure in remaining waters

## b. Northeastern U.S. (USWFS Region 5)

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_✓_ **Unknown:**_____

### ii. Distribution

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Dist. decline since 1900; secure in remaining waters

## c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:**_✓_ **No Data:**_____

**MASSACHUSETTS** **Not Present:**_✓_ **No Data:**_____

**NEW JERSEY** **Not Present:**_✓_ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_✓_ **Unknown:**_____

### ii. Distribution

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Dist. decline since 1900; secure in remaining waters

**Listing Status:** Endangered – S1 **SGCN?:** Yes

**VERMONT** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**_✓_

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**_✓_

**Time Frame Considered:**_____________________________

**Listing Status:** Special Concern – S1 **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_✓_ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** N/A

## d. New York

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

According to NatureServe, the short-term trend in the last 10 years is uncertain but likely relatively stable or slowly declining. In Pennsylvania, “the Blackchin Shiner has not been collected in Presque Isle Bay since 1900, or from Conneaut Lake since 1940, and is presumed extirpated from those waters. It persists in Lake LeBouef and Lake Pleasant in Erie County, and is listed as endangered by PFBC” (Stauffer et al. 2016).

Blackchin Shiners are native to at least 10 of the 18 watersheds in New York (Allegheny, Champlain, Erie-Niagara, Genesee, Ontario, Oswegatchie, Oswego, St. Lawrence, Susquehanna, and Upper Hudson). They are most secure in the northern watersheds of New York (Champlain, Ontario, Oswegatchie, and St. Lawrence watersheds). They have declined in the Erie-Niagara, Genesee, and Susquehanna watersheds where they typically remain in headwater streams, and they’ve been extirpated from the Allegheny, Oswego, and Upper Hudson watersheds (Carlson et al. 2016; NYNHP 2022).

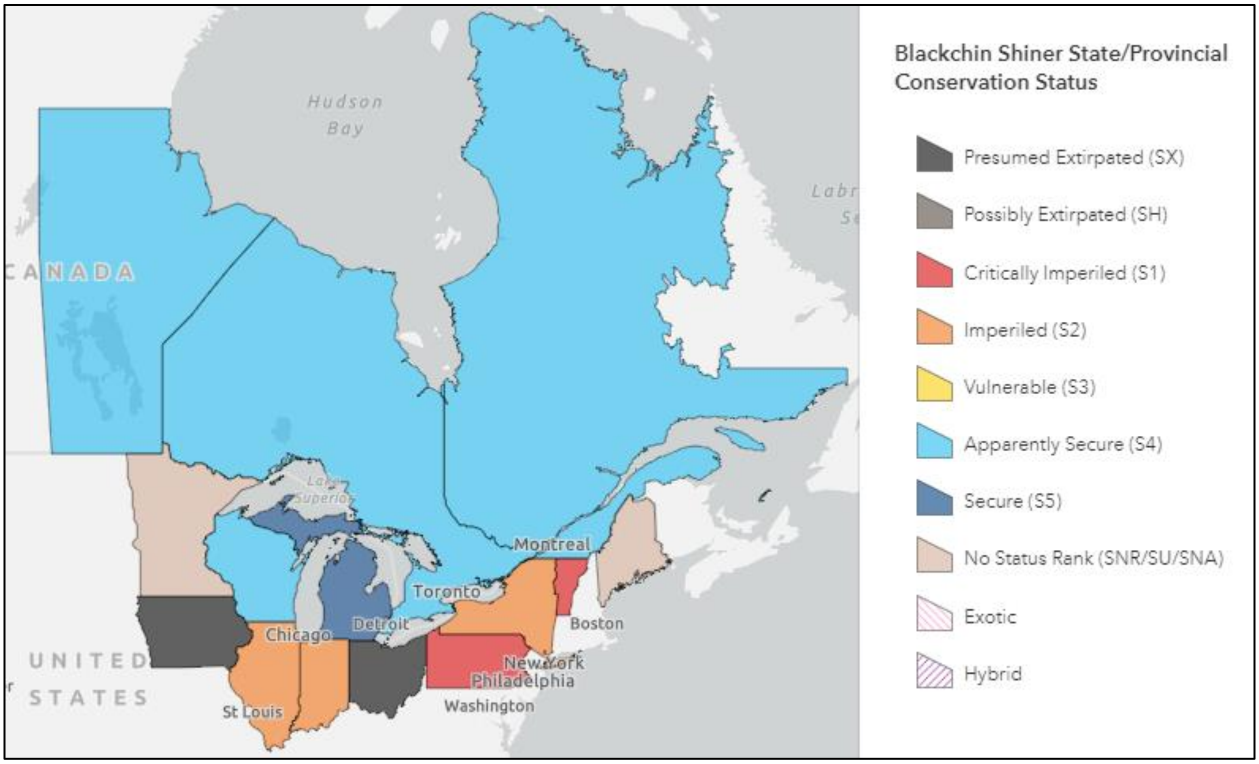


**Figure 1:** Blackchin Shiner distribution and status (Source: NatureServe 2022).

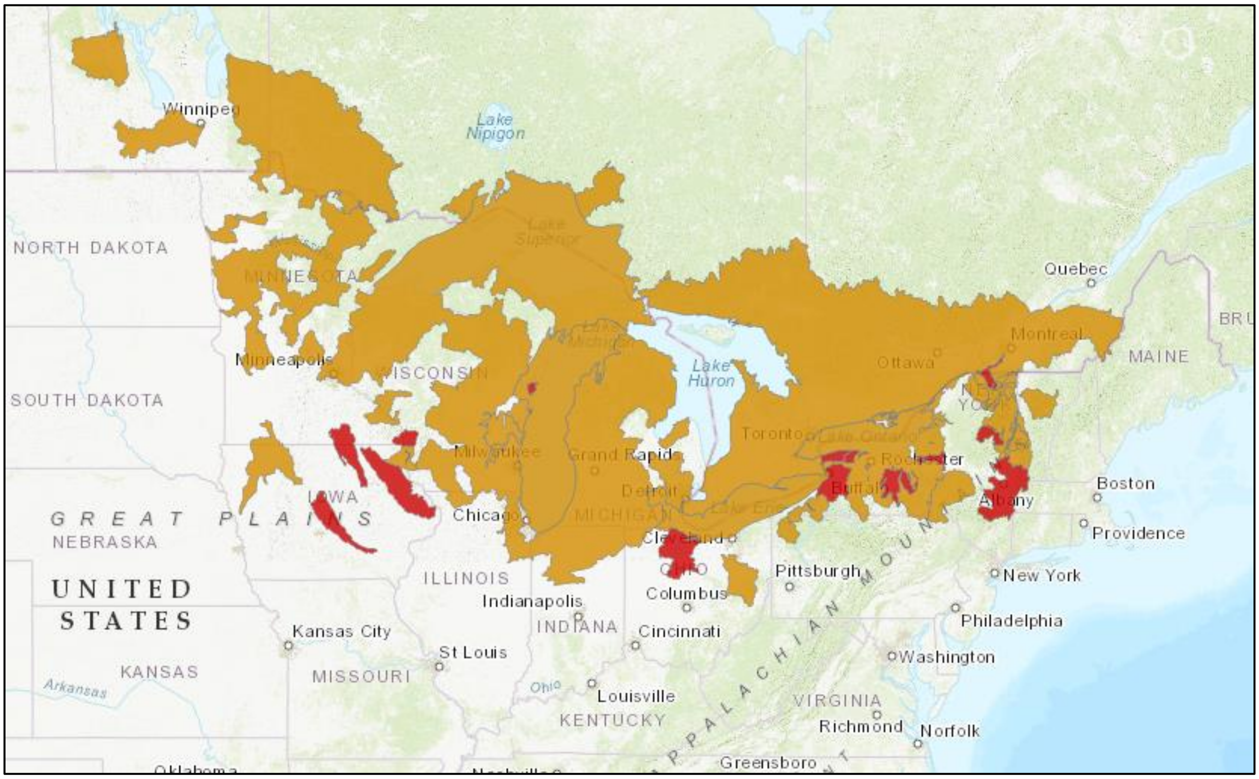


**Figure 2:** Blackchin Shiner distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

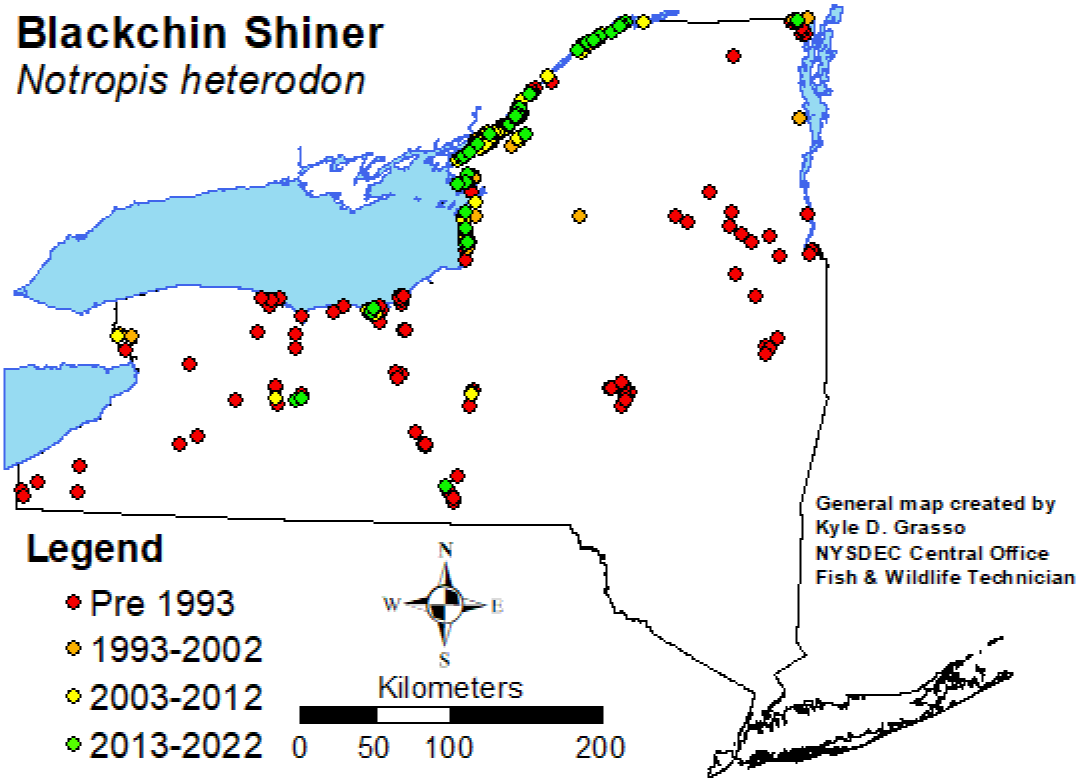


**Figure 3:** Records of Blackchin Shiner in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 181 | 82 | 26-50% |
| **1993-2002** | 96 | 23 | 26-50% |
| **2003 - 2012** | 186 | 18 | 26-50% |
| **2013 - 2022** | 151 | 13 | 26-50% |

**Table 1:** Records of Blackchin Shiner in New York.

### Details of historic and current occurrence:

Blackchin Shiners are native to at least 10 of the 18 watersheds in New York (Allegheny, Champlain, Erie-Niagara, Genesee, Ontario, Oswegatchie, Oswego, St. Lawrence, Susquehanna, and Upper Hudson). They are most secure in the northern watersheds of New York (Champlain, Ontario, Oswegatchie, and St. Lawrence watersheds). They have declined in the Erie-Niagara, Genesee, and Susquehanna watersheds where they typically remain in headwater streams, and they've been extirpated from the Allegheny, Oswego, and Upper Hudson watersheds (Carlson et al. 2016; NYNHP 2022). There are also four erroneous records from 1995-1996 in the Black watershed that are questionable.

| Last Record by Watershed | |
|---|---|
| **Watershed** | **Year of last record** |
| Allegheny | 1948 |
| Upper Hudson | 1974 |
| Oswego | 1983 (questionable record) |
| Black | 1996 (questionable record) |
| Erie-Niagara | 2007 |
| Oswegatchie | 2013 |
| Susquehanna | 2016 |
| Champlain | 2019 |
| Genesee | 2020 |
| Ontario | 2020 |
| St. Lawrence | 2020 |

**Table 2:** Last record of Blackchin Shiner by watershed. Red = Pre 1993, Orange = 1993 - 2002, Yellow = 2003 - 2012, Green = 2013 - 2022.

### New York's Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____
**76-99%:**_____
**51-75%:**_____
**26-50%:**_____
**1-25%:** ✓

**Classification of New York Range**

**Core:**_____
**Peripheral:**_____
**Disjunct:** ✓
**Distance to core population:**
St. Lawrence pop. part of core pop.

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Headwaters to large rivers and nearshore areas of lakes

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to cold

**d. Gradient:** Low to low-moderate gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:** ✓

**Time frame of decline/increase:**_____

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

Blackchin Shiners inhabit the cool, clear, and quiet waters of streams (pools and runs) and the nearshore areas of lakes with abundant vegetation and sandy or gravel substrate (Becker 1983; Smith 1985; Page and Burr 2011; NatureServe 2022; NYNHP 2022). They are often found in narrow (1–3 m wide) and wide (12–24 m wide) streams (Becker 1983). In Wisconsin, they were found in lakes more of the time (67%) than in flowing waters (33%) (Fago 1992). Among all New York records, about half the Blackchin Shiner occurrences are in lakes. They are sensitive to siltation and are a good indicator of environmental quality. Low oxygen conditions (<1 ppm) were

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Little is known about the life history of the Blackchin Shiner. They don't typically survive beyond 2 years and will sexually mature at age 1 (NatureServe 2022). Spawning was recorded in May and June in Illinois and from June to August in Wisconsin (Scott and Crossman 1973; Smith 1985; Stauffer et al. 2016; NatureServe 2022; NYNHP 2022). Three female Blackchin Shiners in Wisconsin had egg counts ranging from 675-1070 (Becker 1983).

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Blackchin Shiner include habitat loss and degradation (from increased turbidity and siltation) and fluctuating water levels (Smith 1985; NYNHP 2022). Local declines in Illinois were also attributed to pollution and introductions of sport fishes (Herkert 1992; NatureServe 2022). They are a good indicator of environmental quality due to their sensitivity to siltation (Kart et al. 2005).

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

**Yes:**_✓_ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

"More information is needed regarding life history, behavior, habitat, and ecological requirements of the Blackchin Shiner, and the reasons why this species is declining or absent from the southern watersheds of New York" (NYNHP 2022). Inland lakes and historical locations should be resurveyed to better determine the status of the Blackchin Shiner in New York and continue to monitor current populations for changes in abundance (NYNHP 2022). Land use should be controlled to maintain habitat, good water quality, and prevent habitat and water level changes.

Stocking could be a solution in historic sites but may not be viable in New York without eliminating the threat of siltation.

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat research:

-Inventory and assess losses of habitat and this species in the Allegheny and Erie watersheds. This would be followed by considering remediation efforts.

Population monitoring:

-The status of this species in New York needs to be determined in more inland lakes, and the records in the Susquehanna drainage near Pennsylvania needs further study to understand if this represents a range expansion.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Site/Area Management |
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Species Management | Ex-situ Conservation |
| **5.** Law & Policy | Policies and Regulations |

**Table 3:** Recommended conservation actions for Blackchin Shiner.

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Smith, C. L. 1985. The inland fishes of New York State. New York State Department of Environmental Conservation. Albany, New York. 522 pp.

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# Species Status Assessment

**Common Name:** Blacknose shiner **Date Updated:**

**Scientific Name:** *Notropis heterolepis* **Updated by:**

**Class:** Osteichthyes

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Blacknose shiner occurs in streams with submerged aquatic vegetation and is sometimes scattered among other low gradient areas inhabited by trout. It is native to 14 of 18 watersheds. It seems to be secure in St. Lawrence, Black, Oswegatchie, Raquette, Champlain, Erie and Ontario watersheds but has declined in the Genesee, Oswego, Upper Hudson, Mohawk, Allegheny and headwater areas of the Susquehanna and Chemung watersheds.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** Not listed as SGCN

### b. Natural Heritage Program

i. **Global:** G4

ii. **New York:** S2S3 **Tracked by NYNHP?:** Yes

**Other Ranks:**

**Status Discussion:**

Globally blacknose shiner is ranked as “Apparently Secure,” however, in New York this species has a state rank of “Vulnerable.” It occupies a large range from southcentral Canada to Nova Scotia, south to Kansas (formerly), Missouri, Ohio, and New York. It is extirpated or declining across most of the southern part of the range, yet it is still common in areas of Minnesota, Wisconsin, Michigan, and Canada. Threats include land alterations that result in turbidity, siltation, and loss of aquatic vegetation (NatureServe 2012).

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Unknown | Unknown | Past 10 years | | Choose an item. |
| **Northeastern US** | Yes | Choose an item. | Choose an item. | | | Choose an item. |
| **New York** | Yes | Unknown | Declining | | | Choose an item. |

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **Connecticut** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Massachusetts** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **New Jersey** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Pennsylvania** | Choose an item. | Choose an item. | Choose an item. | | Not listed (S1), possibly extirpated | No |
| **Vermont** | Yes | Choose an item. | Choose an item. | | Not listed (S1) | Yes |
| **Ontario** | Yes | Choose an item. | Choose an item. | | Not listed (S5) | Choose an item. |
| **Quebec** | Yes | Choose an item. | Choose an item. | | Not listed (S4S5) | Choose an item. |

*Column options*
**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item
**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

### **Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

There are monitoring programs carried out by the Rare Fish Unit, 1998-2012.

### **Trends Discussion** *(insert map of North American/regional):*

It ranges through Canada's Hudson Bay to the east, the Great Lakes and Mississippi drainages (Figure 1). Over the long-term, this species has declined by 50-70%. In Missouri, the species disappeared from several Ozark streams that were occupied prior to 1900. It was formerly widespread in Iowa and eastern South Dakota but is now quite restricted in distribution, and across the entire southern part of the range, from Pennsylvania to Kansas, the species has become scarce. This species has disappeared from several locations in southeastern Wisconsin where it occurred in the early 1900s. It was last observed in Kansas in the late 1800s (NatureServe 2012).
Blacknose shiner is distributed through the northern, western, and northeastern parts of New York, or in all watersheds except to the southeast.

The frequency occurrence in comprehensive stream surveys from these watersheds shows relatively low levels throughout, and declines in 3 of the 14 watersheds (Erie, Ontario and Allegheny). Blacknose shiner had declined to levels below detection in the Genesee watershed. Others of the northern watersheds had higher catch rates in recent times than in the 1930s, Raquette, St. Lawrence and Oswegatchie. There is no clear trend for this species.

The distribution of this species among subbasins (HUC 10) within the 14 watersheds has changed in a similarly uncertain pattern, with records from fewer units in the recent period. The greatest declines were in Genesee, Upper Hudson, Allegheny, Oswego and Erie. Overall there are records from 75 of the units for all time periods, and from recent times there are only 28 units, or a loss from its former range. The only watersheds with agreement between these two indicators of change (frequency occurrence and HUC-10's), were the gains for Raquette and St. Lawrence and the losses for Erie and Ontario.

Statewide, the number of individual site records for this species has been 392 for all time periods, 197 in the last 30 years, and 89 since 1993. It is not a commonly reported species and can be overlooked.

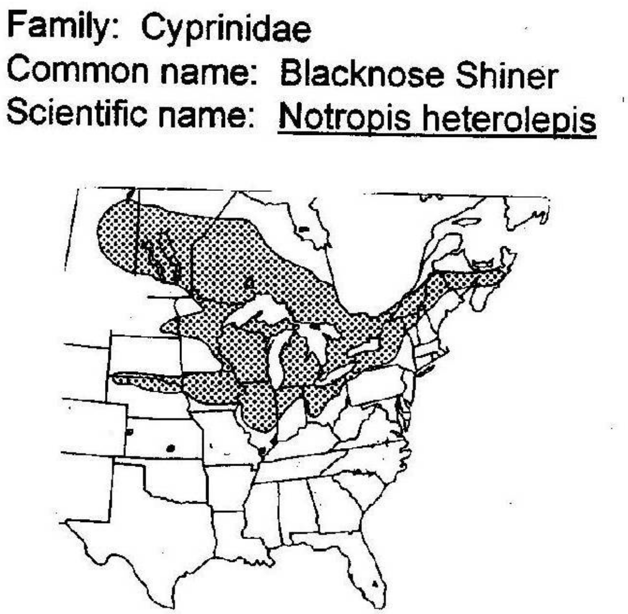

**Figure 1.** North America range map of blacknose shiner (Page and Burr 1991).

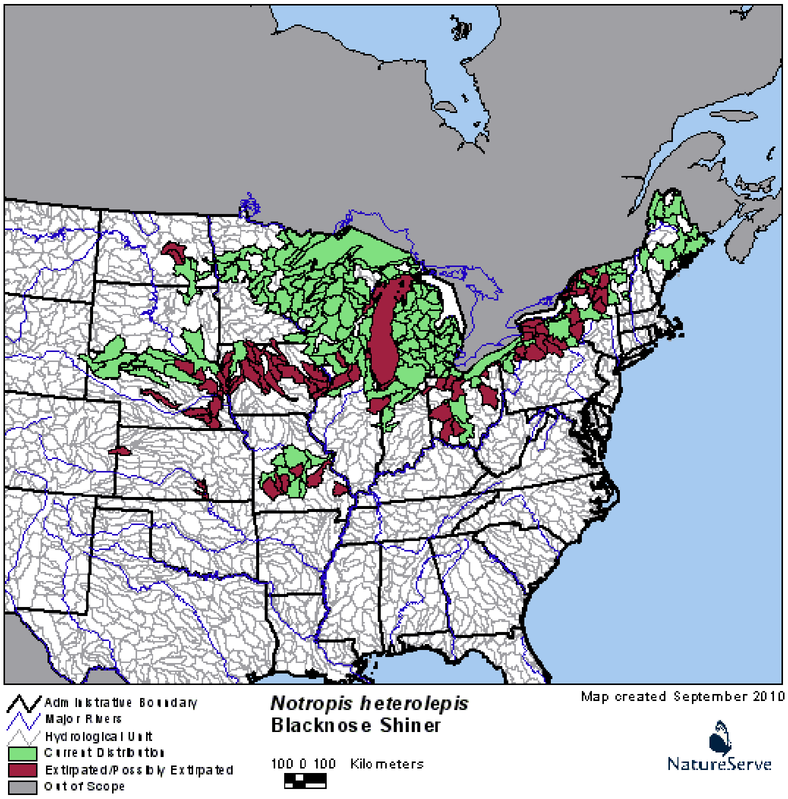

**Figure 2.** U.S. distribution of blacknose shiner by watershed (NatureServe 2012).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

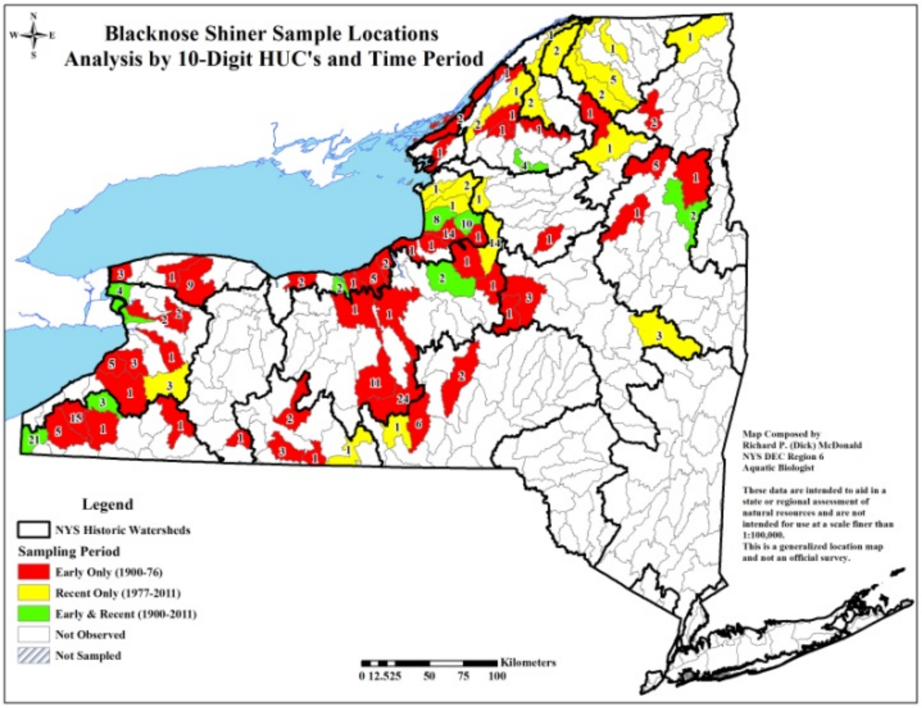

**Figure 3.** Blacknose shiner distribution in New York, depicting fish sampled before 1977 and from 1977 to current time, is shown with the corresponding HUC-10units where they were found, along with the number of records.

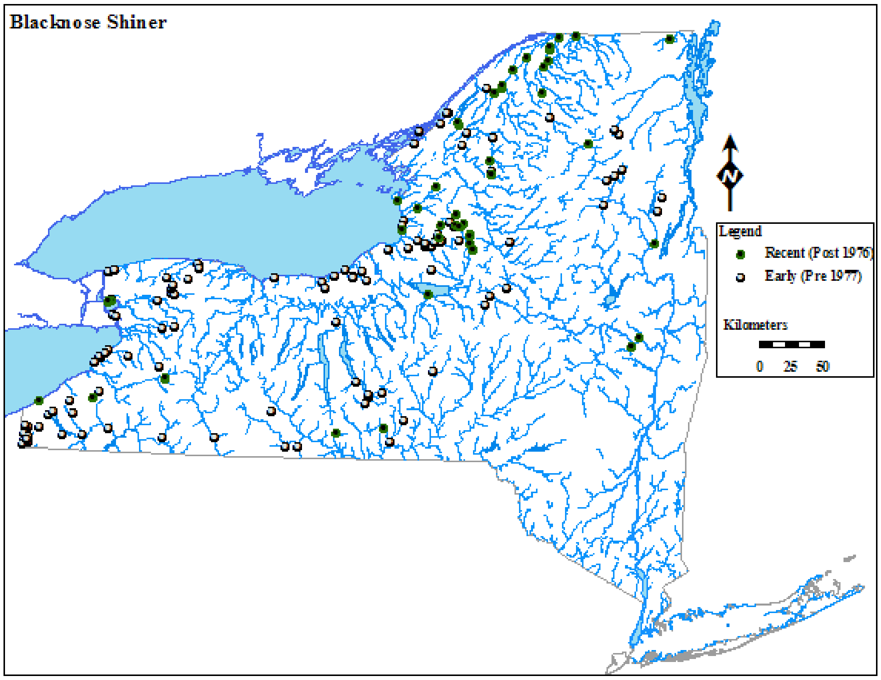

**Figure 4.** New York range map of blacknose shiner.

| Watershed | total HUCs | Early Only | Recent Only | both | watershed status |
|---|---|---|---|---|---|
| Allegheny River | 6 | 4 | 0 | 2 | |
| Black River | 2 | 1 | 1 | 0 | |
| Chemung River | 4 | 3 | 1 | 0 | |
| Genesee River | 1 | 1 | 0 | 0 | loss |
| Lake Champlain | 2 | 1 | 1 | 0 | |
| Lake Erie - Niagara R | 8 | 6 | 1 | 1 | |
| Lake Ontario | 18 | 12 | 3 | 3 | |
| Mohawk River | 3 | 2 | 1 | 0 | |
| Oswegatchie River | 7 | 4 | 2 | 1 | |
| Oswego River | 8 | 6 | 1 | 1 | |
| Raquette River | 3 | 1 | 2 | 0 | |
| St. Lawrence River | 6 | 1 | 5 | 0 | |
| Susquehanna River | 3 | 2 | 1 | 0 | |
| Upper Hudson River | 4 | 3 | 0 | 1 | |
| sum | 75 | 47 | 19 | 9 | |

**Table 1.** Records of rare fish species in hydrological units (HUC-10) are shown according to their watersheds in early and recent time periods (before and after 1977) to consider loss and gains. Further explanations of details are found in Carlson (2012).

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | | 195 | 14/18 watersheds |
| **1993-2002** | | | |
| **2003 - 2012** | | 197 | 13/18 watersheds |
| **2013 - 2022** | | | |

**Table 2.** Records of blacknose shiner in New York.

### Details of historic and current occurrence:

Blacknose shiner has been found in northern, western and northeastern watersheds including the Allegheny River, Black River, Chemung River, Genesee River, Lake Champlain, Lake Erie, Lake Ontario, Mohawk River, Oswegatchie River, Oswego River, Raquette River, St. Lawrence River, Susquehanna River, and Upper Hudson River HUC-10 watersheds.

Blacknose shiner is currently found in all historic HUC-10 watersheds except the Genesee River watershed.

### New York’s Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 1-25% | Core | |

*Column options*
**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

1. Small River, Low-Moderate Gradient, Moderately Buffered, Neutral, Transitional Cool
2. Medium River, Low-Moderate Gradient, Moderately Buffered, Transitional Cool
3. Large/Great River, Low-Moderate Gradient, Moderately Buffered, Transitional Cool
4. Summer-stratified Monomictic Lake

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| Yes | Yes | Choose an item. | |

*Column options*
**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item
**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

Blacknose shiner live in small creeks, medium-sized and large rivers and cool weedy shallows of lakes or impoundments, usually over sand, and are sometimes scattered among other low gradient areas inhabited by trout. One of the few places it can be consistently caught is the upper Niagara River. This species is tolerant of oxygen depletion in winterkill lakes and probably spawn over sandy places.

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

### Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Little is known concerning the life history of the blacknose shiner (Werner 2004). Individuals reach sexual maturity in 1 year and spawn in spring and summer (NatureServe 2012).

## VI. Threats *(from NY 2015 SWAP or newly described)*

Siltation of gravel areas is likely a problem. Decline in southern portions of its range have been attributed to increased turbidity, siltation of stream bottoms, and the resulting disappearance of aquatic vegetation. Land disturbance (clearing, logging, overgrazing) and subsequent siltation and loss of vegetated backwaters were cited as causes for the decline in the Ozarks of Missouri (NatureServe 2012).

Perhaps increases in trout abundances coincide with decreases in catches of this shiner in some areas. Lakeshore development may also be contributing to the decline (NatureServe 2012). The species is otherwise quite durable in most parts of its range.

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law.

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

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** | |

**Table 3.** Recommended conservation actions for blacknose shiner.

## VII. References

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| | |
|---|---|
| **Originally prepared by** | Doug Carlson and Amy Mahar |
| **Date first prepared** | April 10, 2012 |
| **First revision** | June 25, 2012 |
| **Latest revision** | Transcribed March 2024 |

# Species Status Assessment Cover Sheet

**Species Name:** Black Redhorse **Date Updated:** January 2023

**Current Status:** Special Concern – SGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** S2

**Distribution:** The Black Redhorse is found in the Mississippi River, Great Lakes, and Mobile Bay watersheds from New York west through Quebec to Minnesota and south to Mississippi, Alabama, and Georgia. In New York, the Black Redhorse is native to the Allegheny, Erie-Niagara, and Genesee watersheds.

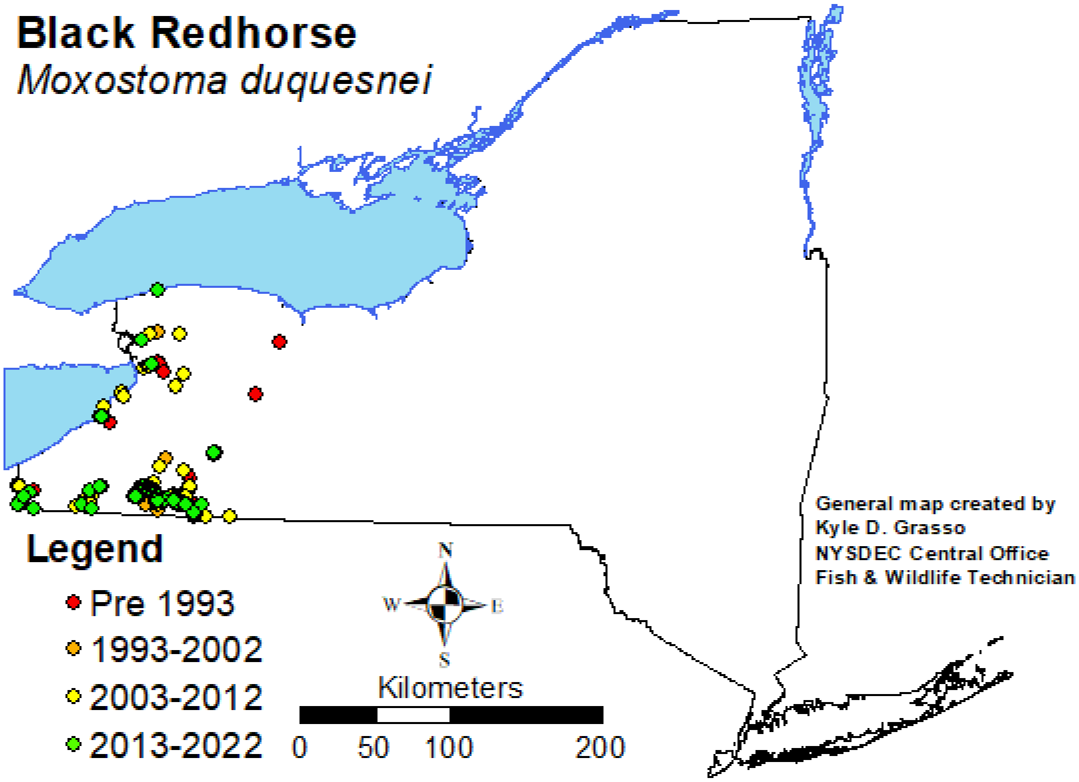
**Habitat:** The Black Redhorse inhabits the clear, moderate to fast flowing areas of medium to large warmwater streams and rivers. They are typically found over rubble, gravel, sand, boulders, or silt substrates, and are rarely associated with aquatic vegetation. A preference for pools adjacent to riffles and well-developed riffles has been observed. The Black Redhorse generally inhabits pools in the summer and will overwinter in deeper pools. They are sometimes found in lakes and impoundments, but Smith (1985) claimed that lakes were secondary habitat. Unlike adults, the juvenile Black Redhorse has been reported in the vegetated littoral zones with reduced flow.

**Life History:** The Black Redhorse reaches a maximum age of 8-16 and will sexually mature between ages 2-5 depending on their location. Spawning activities typically begin in early April when water temperatures reach 50°F and adults migrate up to 9 km to riffle habitats. Spawning then takes place in May and June when water temperatures reach 54-70°F. Nonadhesive eggs are laid and fertilized in riffles 0.1 to 0.6 meters deep with fine gravel to large cobble substrates. Kott and Rathman (1985) reported fecundities ranging from 4,000-11,500 eggs per female.

**Threats:** The main threats to the Black Redhorse are pollution and habitat degradation from increased urbanization and industrialization. Repeated spills, agricultural runoff, and storm effluent are the main contributors to this pollution. The presence of dams can adversely affect Black Redhorse populations by altering upstream and downstream habitat conditions, restricting the movements of individual fish, and limiting gene flow between populations.

**Population trend:** The distribution and abundance of the Black Redhorse has increased in the last 10-20 years, especially in the Allegheny and Erie-Niagara watersheds. In 2015, the Black Redhorse was caught in Rushford Lake which represented the first catch in the Genesee watershed in almost 100 years. In 2019, the species was reported from Eighteenmile Creek in the Ontario watershed, the first Black Redhorse record in this watershed.

**Recommendation:** It is recommended that the Black Redhorse be delisted due to the increases in distribution and abundance that have been seen in the last 20 years.



# Species Status Assessment

**Common Name:** Black Redhorse **Date Updated:** January 2023

**Scientific Name:** Moxostoma duquesnei **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Catostomidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Black Redhorse is in the class Actinopterygii and the family Catostomidae (suckers). The Black Redhorse is found in the Mississippi River, Great Lakes, and Mobile Bay basins from New York west through Quebec to Minnesota and south to Mississippi, Alabama, and Georgia (Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). In New York, the Black Redhorse is native to the Allegheny, Erie-Niagara, and Genesee watersheds (Carlson et al. 2016). Their distribution and abundance have increased in the last 10-20 years, especially in the Allegheny and Erie-Niagara watersheds. In 2015, the Black Redhorse was caught in Rushford Lake, representing the first record in the Genesee watershed in almost 100 years. In 2019, the species was reported from Eighteenmile Creek in the Ontario watershed, the first Black Redhorse record in this watershed. The Black Redhorse inhabits the clear, moderate to fast flowing areas of medium to large warmwater streams and rivers. They are typically found over rubble, gravel, sand, boulders, or silt substrates, and are rarely associated with aquatic vegetation (Bowman 1970; Trautman 1981; Smith 1985; COSEWIC 2015; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Special Concern – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S2 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Threatened (5/1/2015)

### Status Discussion:

In New York, the Black Redhorse is currently listed as Special Concern and SGCN. They are globally ranked as Secure by NatureServe.

Comments from COSEWIC: The species was designated Threatened in April 1988. The status was then re-examined and confirmed in May 2005 and 2015.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**b. Northeastern U.S. (USWFS Region 5)**

**i. Abundance**

**Declining:**_____ **Increasing:**_✓__ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_✓__ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**c. Adjacent States and Provinces**

**CONNECTICUT** **Not Present:**_✓__ **No Data:**_____

**MASSACHUSETTS** **Not Present:**_✓__ **No Data:**_____

**NEW JERSEY** **Not Present:**_✓__ **No Data:**_____

**VERMONT** **Not Present:**_✓__ **No Data:**_____

**QUEBEC** **Not Present:**_✓__ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S5 **SGCN?:** No

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Threatened – S2 **SGCN?:** N/A

**d. New York**

**i. Abundance**

**Declining:**_____ **Increasing:**_✓__ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_✓__ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

Scott and Crossman (1973) and Page and Burr (2011) reported the Black Redhorse as common and locally in abundant in some areas. In Pennsylvania, it is common in the Ohio and Allegheny Rivers and their associated tributaries (Stauffer et al. 2016). In Ontario, they have a limited extent of occurrence and area of occupancy. There is historic evidence of decreased distribution, however, Black Redhorse can be found in most historical sites as well as some new sites (COSEWIC 2015).

In New York, the Black Redhorse is native to the Allegheny, Erie-Niagara, and Genesee watersheds, and was first reported from these watersheds in 1921, 1937, and 1926 respectively (Carlson et al. 2016). The Black Redhorse historically inhabited up to 13 waters in the Allegheny watershed. That number has increased to 18 in the last 20 years. Carlson et al. (2009) reported that it was caught about seven times more frequently in the Allegheny watershed in comparison to the 1930s. They historically inhabited up to 6 waters in the Erie-Niagara watershed. That number has increased to 7 in the last 20 years. In 2015, Black Redhorse were caught in Rushford Lake, representing the first catch in the Genesee watershed in almost 100 years. Prior to 2015, there were only two records in the Genesee watershed. Both records were in the Genesee River in 1926 (Carlson et al. 2016). In 2019, the species was reported from Eighteenmile Creek in the Ontario watershed, the first Black Redhorse record in this watershed. Overall, their distribution and abundance has increased in the last 10-20 years, especially in the Allegheny and Erie-Niagara watersheds, with newly reported records in the Genesee and Ontario watersheds.

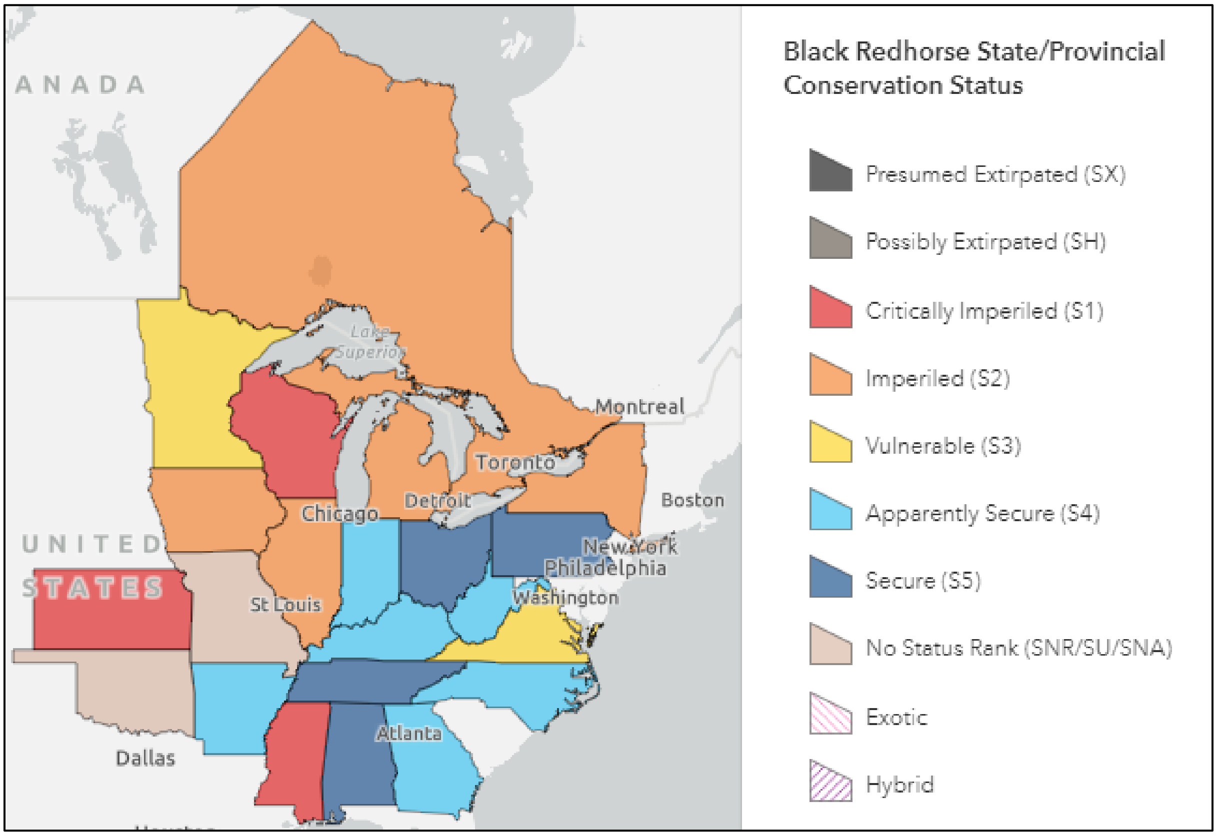


**Figure 1:** Black Redhorse distribution and status (Source: NatureServe 2022).

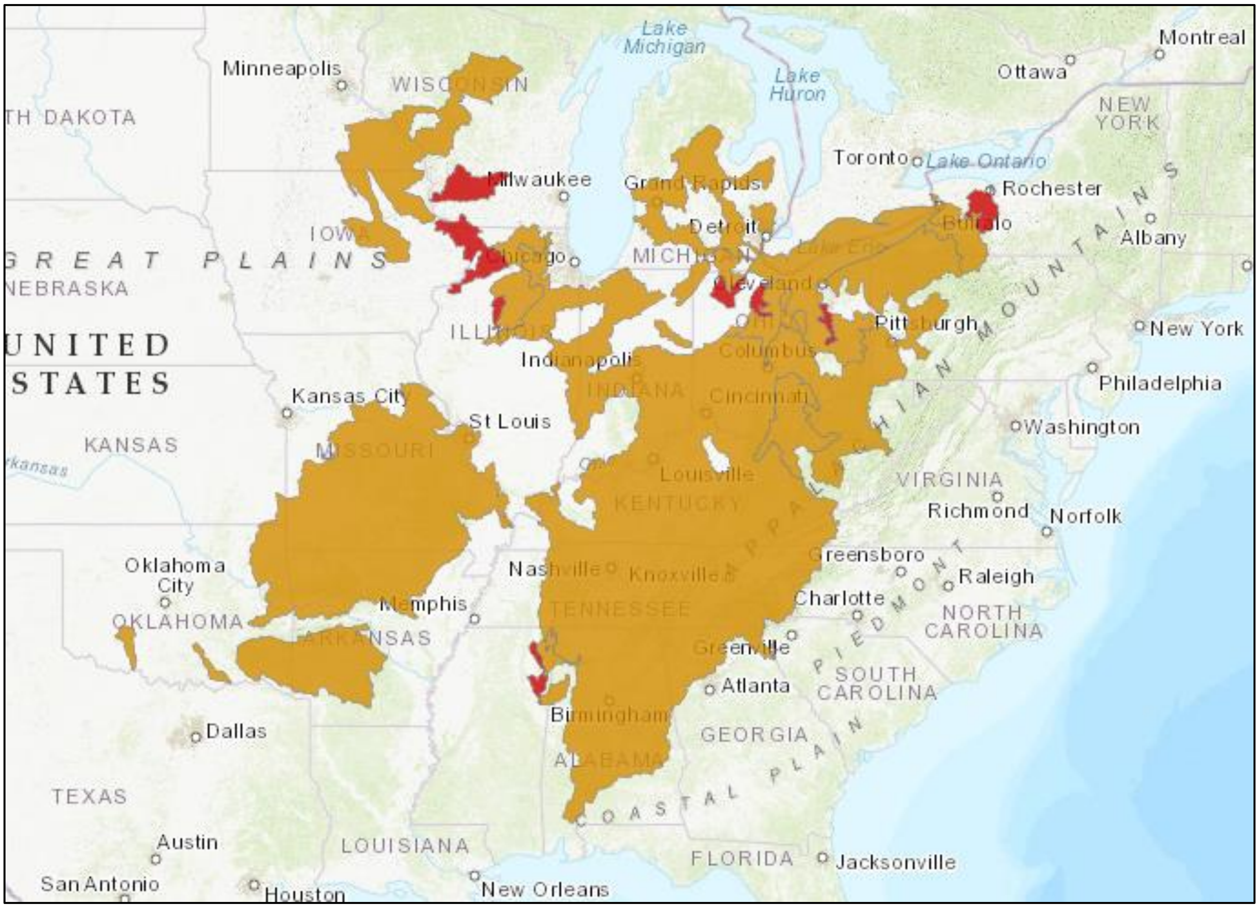


**Figure 2:** Black Redhorse distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

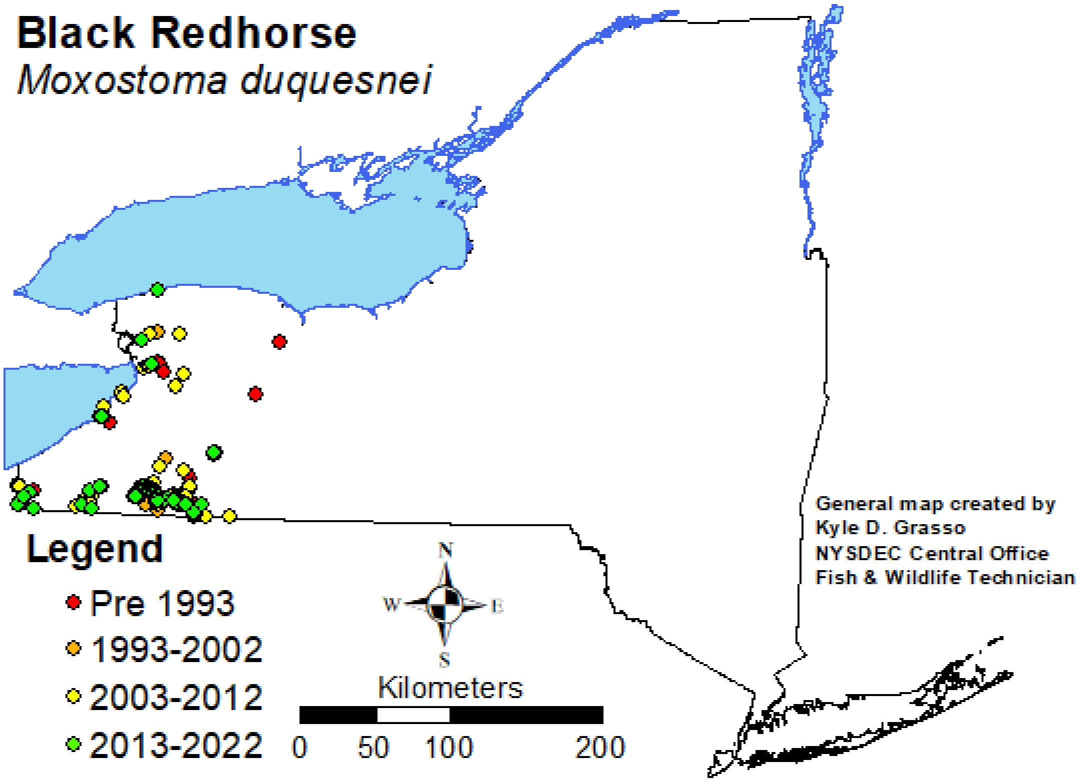


**Figure 3:** Records of Black Redhorse in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 48 | 20 | 11-25% |
| **1993-2002** | 28 | 13 | 11-25% |
| **2003 - 2012** | 83 | 21 | 11-25% |
| **2013 - 2022** | 65 | 14 | 11-25% |

**Table 1:** Records of Black Redhorse in New York.

### Details of historic and current occurrence:

In New York, the Black Redhorse is native to the Allegheny, Erie-Niagara, and Genesee watersheds, and was first reported from these watersheds in 1921, 1937, and 1926 respectively (Carlson et al. 2016). The Black Redhorse historically inhabited up to 13 waters in the Allegheny watershed. That number has increased to 18 in the last 20 years. Carlson et al. (2009) reported that it was caught about seven times more frequently in the Allegheny watershed in comparison to the 1930s. They historically inhabited up to 6 waters in the Erie-Niagara watershed. That number has increased to 7 in the last 20 years. In 2015, Black Redhorse were caught in Rushford Lake, representing the first catch in the Genesee watershed in almost 100 years. Prior to 2015, there were only two records in the Genesee watershed. Both records were in the Genesee River in 1926 (Carlson et al. 2016). In 2019, the species was reported from Eighteenmile Creek in the Ontario watershed, the first Black Redhorse record in this watershed. Overall, their distribution and abundance has increased in the last 10-20 years, especially in the Allegheny and Erie-Niagara watersheds, with newly reported records in the Genesee and Ontario watersheds.

**New York's Contribution to Species North American Range:**

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Classification of New York Range**

**Core:**_____

**Peripheral:** ✓

**Disjunct:**_____

**Distance to core population:**

Core pop. to the southwest

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to mainstem tributary rivers

**b. Geology:** Low moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:** ✓ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

The Black Redhorse inhabits the clear, moderate to fast flowing areas of medium to large warmwater streams and rivers. They are typically found over rubble, gravel, sand, boulders, or silt substrates, and are rarely associated with aquatic vegetation (Bowman 1970; Trautman 1981; Smith 1985; COSEWIC 2015; NatureServe 2022). In Canada, the Black Redhorse was only observed in rivers that were 25-130 m wide and 0.1-1.8 m deep (COSEWIC 2015). Smith (1985) suggested that they were not common in streams less than 10 feet wide. A preference for pools adjacent to riffles and well-developed riffles has been observed. The Black Redhorse generally inhabits pools in the summer and will overwinter in deeper pools (Bowman 1970; COSEWIC 2015; NatureServe 2022). They are sometimes found in lakes and impoundments, but Smith (1985) claimed that lakes were secondary habitat (Stauffer et al. 2016; NatureServe 2022). Unlike adults, the juvenile Black Redhorse has been reported in the vegetated littoral zones with reduced flow (Bunt et al. 2013; COSEWIC 2015). The Black Redhorse has a low tolerance for pollution, siltation, and turbidity and is therefore a good indicator of clean water (Smith 1985).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

“Black Redhorse longevity increases with increasing latitude. In Tennessee, Shumate (1988) reported Black Redhorse maximum age to be 8 years (Shumate 1988). In Missouri, maximum Black Redhorse age has been interpreted to be 10 or 11 years (Bowman 1970; Howlett 1999). Black Redhorse collected from the Grand River, Ontario included individuals as old as 16 years (Reid and Mandrak 2002)” (COSEWIC 2015). Sexual maturity is reached in 2-6 years depending on location (Bowman 1970; Becker 1993; COSEWIC 2015; Stauffer et al. 2016). Spawning activities typically begin in early April when water temperatures reach 50°F and adults migrate up to 9 km to riffle habitats (Bowman 1970; Lee et al. 1980; Becker 1983; Reid and Mandrak 2006; COSEWIC 2015). Spawning then takes place in May and June when water temperatures reach 54-70°F. Nonadhesive eggs are laid and fertilized in riffles 0.1 to 0.6 meters deep with fine gravel to large cobble substrates (Bowman 1970; Kwak and Skelly 1992; Reid and Mandrak 2006; Bunt et al. 2013; COSEWIC 2015; Stauffer et al. 2016). Kott and Rathman (1985) reported fecundities ranging from 4,000-11,500 eggs per female (COSEWIC 2015). According to Simon (1999), the Black Redhorse does not exhibit any guarding behavior (COSEWIC 2015).

## VI. Threats *(from NY CWCS Database or newly described)*

The main threats to the Black Redhorse are pollution and habitat degradation from increased urbanization and industrialization. Repeated spills, agricultural runoff, and storm effluent are the main contributors to this pollution (COSEWIC 2015). The Black Redhorse has a low tolerance for pollution, siltation, and turbidity and is therefore a good indicator of clean water (Smith 1985).

The presence of dams can “adversely affect Black Redhorse populations by altering upstream and downstream habitat conditions, restricting the movements of individual fish, and limiting gene flow between populations” (COSEWIC 2005). They can also prevent Black Redhorse from getting to their preferred spawning habitats (COSEWIC 2015). “Climate change and severe weather events that may result in habitat alteration and reductions” could exacerbate these flow-related threats (COSEWIC 2015).

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

**Yes:**__✓__ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

“Maintaining and creating riparian buffers along rivers is an important method of mitigating non-point source impacts such as excessive sedimentation and turbidity.” “Avoiding impacts to headwater streams and wetlands benefits all downstream habitats and species like Black Redhorse that rely on clear water and river substrates." "Remove barriers to fish migration such as dams that are no longer functioning and/or are not economically viable and restore natural river flow to impounded areas" (MSU).

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat research:

-Inventory and assess losses of habitat and this species in the Genesee basin. This would be followed by considering remediation efforts.

Population monitoring:

-Surveys should be done in the Buffalo River system and the Genesee River.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Management | Site/Area Management |
| **2.** Land/Water Management | Habitat & Natural Process Restoration |
| **3.** Species Management | Species Recovery |
| **4.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Black Redhorse.

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# Species Status Assessment Cover Sheet

**Species Name:** Bloater

**Date Updated:** January 2023

**Current Status:** Not Listed – HPSGCN

**Updated By:** Kyle Grasso

**Current NHP Rank:** SX

**Distribution:** The Bloater is native to the Great Lakes (except Lake Erie) and Lake Nipigon in Ontario. Prior to the 2012 restoration in Lake Ontario, the Bloater was considered extirpated from the lake.

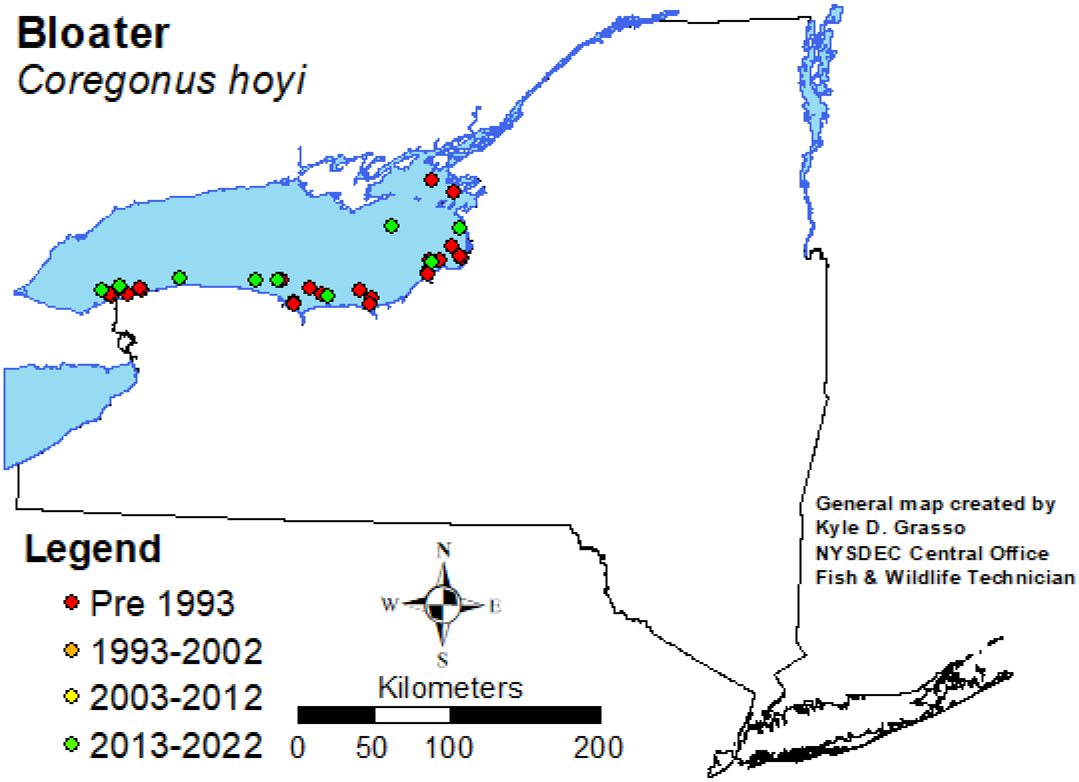
**Habitat:** The Bloater is a deepwater fish (benthic and pelagic) that inhabits the bottoms of large lakes at depths of 30-190 meters. Historic maximum abundances were observed between 75 and 90 m. Bloater are known to make vertical migrations at night to feed on Mysis and other invertebrates in the water column. However, benthic feeding may be more common now than in the past, potentially due to competition with Alewife.

**Life History:** The maximum recorded age of a Bloater is 11. They reach sexual maturity at the age of 2-3. Spawning typically occurs in the late fall and winter (November to January) but may occur in other months as well. Bloater spawn over a wide variety of substrates at about 50-100 meters. Preferred substrates are unknown. Eggs take about 4 months to hatch. Bloaters grow more slowly than other deepwater ciscoes, reaching about 144 mm in their second summer and 255 mm in their seventh summer.

**Threats:** The decline and disappearance of Lake Ontario Bloater has been attributed to anthropogenic impacts including degraded water quality, predation by Sea Lamprey, interactions with nonnative planktivores, and overfishing. Egg predation by slimy and deepwater sculpins (and potentially the Round Goby) may also be contributing to the reduced Bloater recruitment. The catchability of Bloater may have decreased in recent years, in response to the diet and habitat shift associated with the increased water quality caused by the proliferation of quagga mussels and decreased *Diporeia spp.* densities.

**Population trend:** The Bloater is native to the Great Lakes (except Lake Erie) and Lake Nipigon in Ontario. Prior to the 2012 restoration in Lake Ontario, the Bloater was considered extirpated from the lake. From 2012 to 2020, a restoration program involving USGS, NYSDEC, and the Ontario Ministry of Natural Resources stocked one million Bloater in Lake Ontario in various locations. This resulted in 10 catches in the same time period. Stocking has continued, although no reproduction has been observed in stocked Bloater as of 2022. See Weidel et al. (2021) for more information on the Bloater stocking program.

**Recommendation:** It is recommended that the Bloater be listed as Special Concern due to the ongoing restoration program in Lake Ontario.



# Species Status Assessment

**Common Name:** Bloater **Date Updated:** January 2023

**Scientific Name:** *Coregonus hoyi* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Salmonidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Bloater is in the class Actinopterygii and the family Salmonidae (salmonids). The Bloater is native to the Great Lakes (except Lake Erie) and Lake Nipigon in Ontario. Prior to the 2012 restoration in Lake Ontario, the Bloater was considered extirpated from the lake. From 2012 to 2020, a restoration program involving USGS, NYSDEC, and the Ontario Ministry of Natural Resources stocked one million Bloater in Lake Ontario in various locations. This resulted in 10 catches in the same time period (Weidel et al. 2021). Stocking has continued, although no reproduction has been observed in stocked Bloater as of 2022. The Bloater is a deepwater fish (benthic and pelagic) that inhabits the bottoms of large lakes at depths of 30-190 meters (Page and Burr 2011; NatureServe 2022). Connerton and Stewart (2013) reported that historic maximum abundances were observed between 75 and 90 m. Bloaters are known to make vertical migrations at night to feed on *Mysis* and other invertebrates in the water column (Weidel et al. 2021).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – HPSGCN

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** SX **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Vulnerable
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Not at Risk (4/1/1988)

**Status Discussion:**

The Bloater is not currently federally listed or listed in the state of New York. However, they are currently listed as a HPSGCN in New York. The Bloater is globally ranked as Apparently Secure by NatureServe.

Comments from COSEWIC: The Bloater has likely been extirpated from Lake Nipigon. It was designated Not at Risk in April 1988 and was considered a low priority candidate for re-assessment.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

## b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Prior to reintroduction, last record was in 1983

## c. Adjacent States and Provinces

| | | |
|---|---|---|
| **CONNECTICUT** | **Not Present:** ✓ | **No Data:** _____ |
| **MASSACHUSETTS** | **Not Present:** ✓ | **No Data:** _____ |
| **NEW JERSEY** | **Not Present:** ✓ | **No Data:** _____ |
| **PENNSYLVANIA** | **Not Present:** ✓ | **No Data:** _____ |
| **VERMONT** | **Not Present:** ✓ | **No Data:** _____ |
| **QUEBEC** | **Not Present:** ✓ | **No Data:** _____ |
| **ONTARIO** | **Not Present:** _____ | **No Data:** _____ |

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** N/A

## d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Prior to reintroduction, last record was in 1983

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. “Seasonally distinct bottom trawl surveys have been conducted annually in U.S. waters primarily in April, June, July, and October and target different Lake Ontario prey fishes and juvenile lake trout. Surveys differ in their spatial and temporal extent; however, all were conducted during the day, with tows oriented along depth contours, over depth from 5 to 225 m" (Weidel et al. 2021). These trawl surveys are used to help determine the success of the Bloater restoration project.

"An important consideration when interpreting the bottom trawl survey results is that Bloater catchability may have decreased in recent years, in response to the proliferation of quagga mussels and the associated increased water clarity and decreased *Diporeia spp.* densities, which could be responsible for a shift to the more pelagic calanoid copepods in their diets (Bunnell et al. 2015). Hence, one hypothesis is that Bloaters are less vulnerable to our daytime bottom trawls either because of behavioral changes (more pelagic during the day) or increased ability to avoid the net while on the bottom (due to clearer water)" (Bunnell et al. 2019).

### **Trends Discussion** *(insert map of North American/regional):*

The Lake Ontario whitefish fishery was "dominated by Bloater in 1942 because the other species had been depleted and the early maturity of this species provided a survival advantage (Stone 1947). By 1960, the deepwater fishery was gone. The last catch of Bloater in Ontario waters was near Toronto in 1972 (Connerton and Stewart 2013) and, in New York waters, near Rochester in 1983" (Carlson et al. 2016). "The decline and disappearance of Lake Ontario Bloater has been attributed to anthropogenic impacts including degraded water quality, predation by Sea Lamprey, interactions with nonnative planktivores, and overfishing (Christie 1973; Smith 1972)" (Weidel et al. 2021). Prior to the 2012 restoration in Lake Ontario, the Bloater was considered extirpated from the lake. From 2012 to 2020, a restoration program involving USGS, NYSDEC, and the Ontario Ministry of Natural Resources stocked one million Bloater in Lake Ontario in various locations. This resulted in 10 catches in the same time period (Weidel et al. 2021). Stocking has continued, although no reproduction has been observed in stocked Bloater as of 2022. See Weidel et al. (2021) for more information on the Bloater stocking program.

Compared to Lake Ontario, the Bloater is still abundant and frequently caught in lakes Huron, Superior, and Michigan (Evers 1994; Bunnell et al. 2006; Gorman et al. 2012; Harford et al. 2012; Weidel et al. 2021; NatureServe 2022). However, declines and variability in recruitment have been reported in Lake Superior and Michigan since the 1990s (Bunnell et al. 2019; Vinson et al. 2020). In Lake Huron, the Bloater has "exhibited multiple strong year-classes since 2005 and now are the most abundant benthopelagic offshore prey fish in Lake Huron, following the crash of nonnative Alewives *Alosa pseudoharengus* and substantial declines in nonnative Rainbow Smelt *Osmerus mordax*" (Prichard et al. 2016). In Lake Superior, "the lack of significant survival of Bloater and Cisco to age-1 over the past twenty years has resulted in lower adult prey fish biomass estimates than were observed during 1985-2000, when several large year-classes of Bloater and Cisco were present" (Vinson et al. 2020).

"Populations in Lake Michigan declined drastically after Alewife entered the lake in 1949. A ban on Bloater harvest and decline in Alewife numbers in the 1980s resulted in an increase in the lake's Bloater population such that the species is again open to commercial harvest" (NatureServe 2022). However, Bloater yield has declined sharply since the late 1990s (Bunnell et al. 2019). "Nevertheless, adult Bloater biomass has exceeded 2 kg/ha since 2017, a nearly fivefold increase over the record-low levels measured from 2012-2016. This increase in adult Bloater biomass was attributable to the relatively strong 2016 and 2017 year-classes. In 2018, however, densities of age-0 Bloater were only 3 fish/ha, more comparable to the low levels of recruitment observed from 2010-2015." (Bunnell et al. 2019). The exact mechanisms that caused the poor recruitment from 1992-2015 and low adult biomass since 2007 in Lake Michigan is unknown. "Madenjian et al. (2002) proposed that the Lake Michigan Bloater population may be cycling in abundance, with a period of about 30 years, although the exact mechanism by which recruitment is regulated remains unknown" (Bunnell et al. 2019). "Reductions in fecundity associated with poorer condition (Bunnell et al. 2009) and egg predation by slimy and deepwater sculpins (Bunnell et al. 2014) may be contributing to the reduced Bloater recruitment, but neither one is the primary regulating factor" (Bunnell et al. 2019). The widespread introductions of Round Goby, a known egg predator, may also contribute to this egg predation.

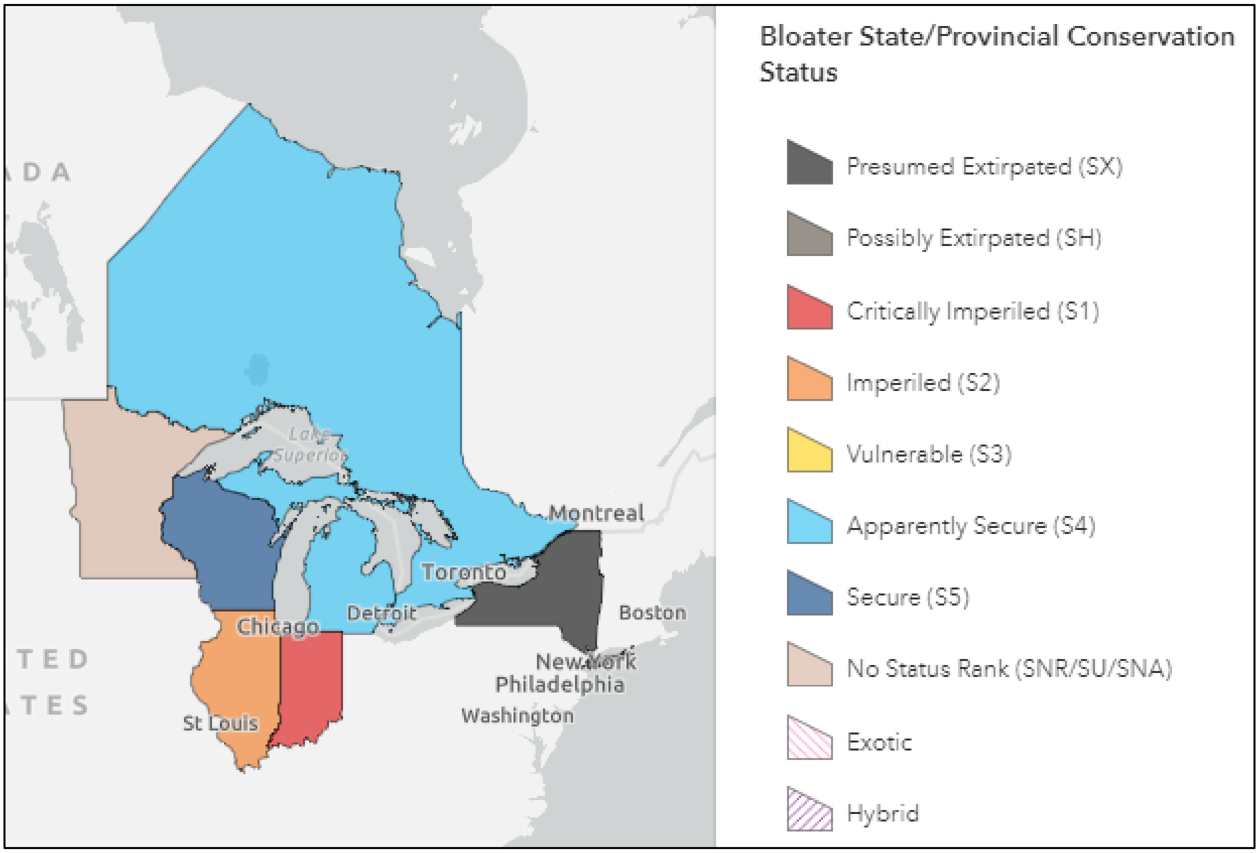


**Figure 1:** Bloater distribution and status (Source: NatureServe 2022).

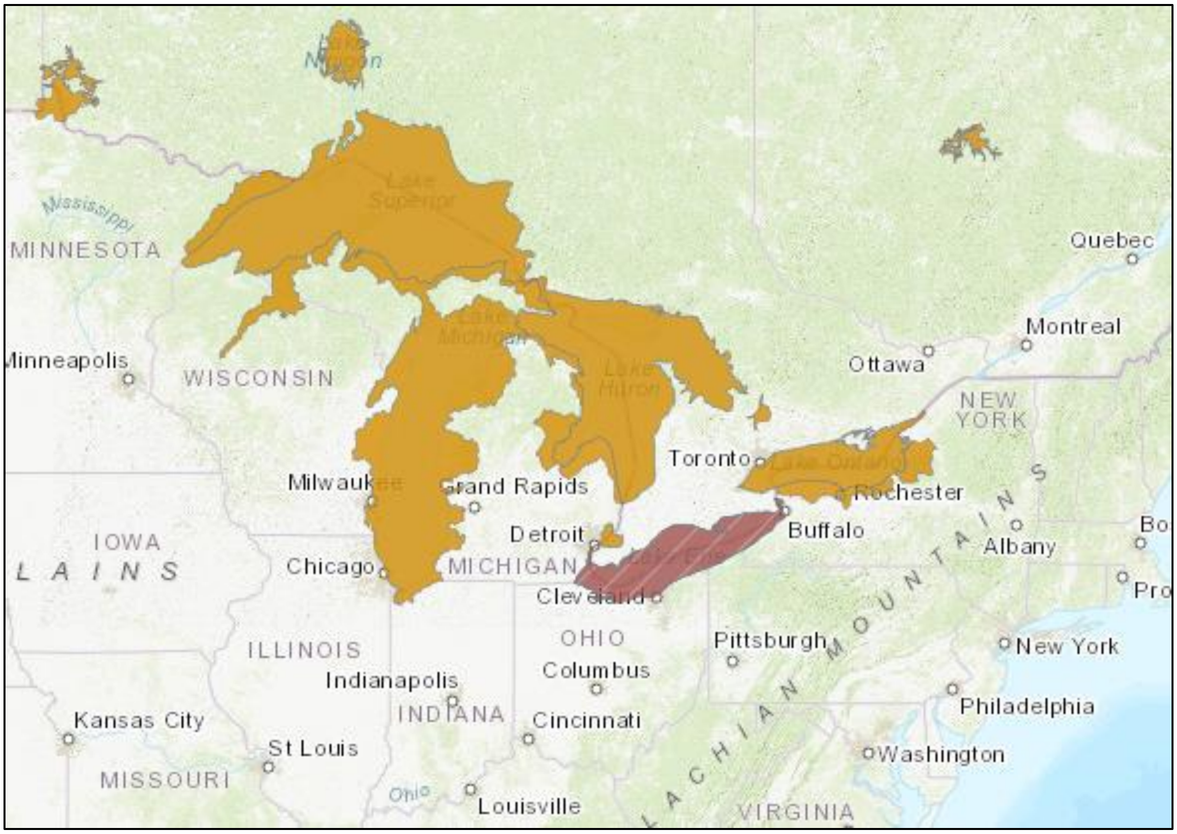


**Figure 2:** Bloater distribution. Brown=Extant, Maroon=Not Present.
Note: Quebec distribution may be an error (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

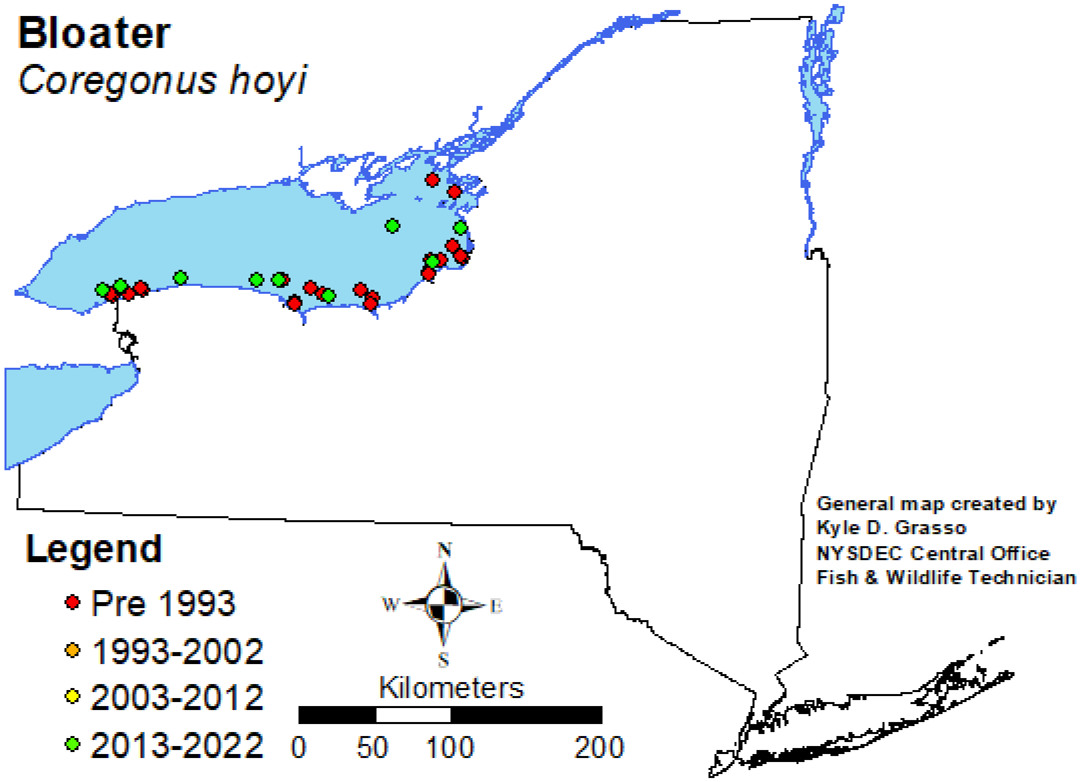


**Figure 3:** Records of Bloater in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 43 | 1 | 0-5% |
| **1993-2002** | 0 | 0 | 0% |
| **2003 - 2012** | 0 | 0 | 0% |
| **2013 - 2022** | 10 | 1 | 0-5% |

**Table 1:** Records of Bloater in New York.

### Details of historic and current occurrence:

Bloater were recorded in Lake Ontario as early as 1920 (Carlson et al. 2016). “The Lake Ontario whitefish fishery was dominated by Bloater in 1942 because the other species had been depleted and the early maturity of this species provided a survival advantage (Stone 1947). By 1960, the deepwater fishery was gone. The last catch of Bloater in Ontario waters was near Toronto in 1972 (Connerton and Stewart 2013) and, in New York waters, near Rochester in 1983” (Carlson et al. 2016). Prior to 2012 restoration in Lake Ontario, the Bloater was considered extirpated from Lake Nipigon and Lake Ontario. From 2012 to 2020, a restoration program involving USGS, NYSDEC, and the Ontario Ministry of Natural Resources led to 1,028,191 Bloater being stocked into Lake Ontario in various locations. This resulted in 10 catches in the same time period (Weidel et al. 2021). Stocking has continued, although no reproduction has been observed in stocked Bloater as of 2022. See Weidel et al. (2021) for more information on the Bloater stocking program.

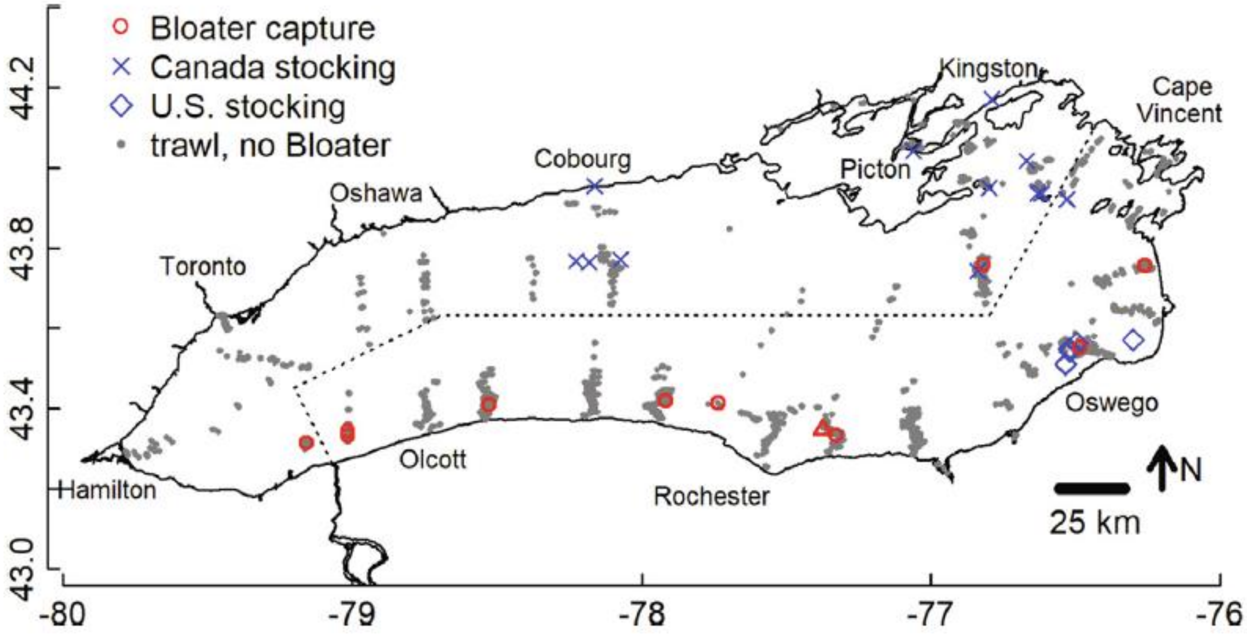


**Figure 4:** Lake Ontario Bloater stocking locations (blue symbols), bottom trawls that captured Bloater (red open circles), and trawls where Bloater were not captured (gray circles, n = 3380), 2013–2019. The red open triangle illustrates where the last native Bloater was captured in 1983 prior to restoration stocking. (Source: Weidel et al. 2021).

**New York's Contribution to Species North American Range:**

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:**_✓___

**Classification of New York Range**

**Core:**_____

**Peripheral:**_____

**Disjunct:**_✓___

**Distance to core population:**

Great Lakes

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Large lakes

**b. Geology:** Low-moderately buffered

**c. Temperature:** Cold to Transitional cool

**d. Gradient:** Low gradient

**Habitat or Community Type Trend in New York**

**Declining:**_____ **Stable:**_✓___ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_✓___ **No:**_____

**Indicator Species?** **Yes:**_____ **No:**_✓___

### Habitat Discussion:

The Bloater is a deepwater fish (benthic and pelagic) that inhabits the bottoms of large lakes at depths of 30-190 meters (Page and Burr 2011; NatureServe 2022). Connerton and Stewart (2013) reported historic maximum abundances were observed between 75 and 90 m. Larvae in Lake Michigan are often found near the bottom at about 100 meters (Scott and Crossman 1973; NatureServe 2022). Bloater are known to make vertical migrations at night to feed on *Mysis* and other invertebrates in the water column (Weidel et al. 2021). However, Crowder (1984) stated that benthic feeding may be more common now than in the past, potentially due to competition with Alewife. Eakins (2022) reports preferred temperatures of 39-52°F. Smith (1985) reported an upper lethal temperature of 80°F.

## V. 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** (*include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The maximum recorded age of a Bloater is 11 (Eakins 2022). They reach sexual maturity at the age of 2-3 (Smith 1985). Spawning typically occurs in the late fall and winter (November to January) but may occur in other months as well (Smith 1985; NatureServe 2022). Bloater spawn over a wide variety of substrates at about 50-100 meters. Preferred substrates are unknown (Becker 1983; Weidel et al. 2021; NatureServe 2022). Eggs take about 4 months to hatch (Scott and Crossman 1973; NatureServe 2022). “A 241-mm female contained 3,230 eggs; a 305-mm female contained 18,678 eggs” (Smith 1985). Bloater “grow more slowly than other deepwater ciscoes, reaching about 144 mm in their second summer and 255 mm in their seventh summer” (Smith 1985).

## VI. Threats *(from NY CWCS Database or newly described)*

“The decline and disappearance of Lake Ontario Bloater has been attributed to anthropogenic impacts including degraded water quality, predation by Sea Lamprey, interactions with nonnative planktivores, and overfishing (Christie 1973; Smith 1972)” (Weidel et al. 2021). Bloater are threatened by competition for food with the invasive Alewife and Rainbow Smelt, as well as predation by both (Miller et al. 1990; Baldwin 1999). The Bloater may also be a host species to the Sea Lamprey which may cause mortality (Miller et al. 1990). Although it is not a highly prized game species, the Bloater is a viable fishery in other Great Lakes and overfishing contributed to their decline and extirpation in Lake Ontario in the 20th century (Baldwin 1999).

In Lake Michigan “egg predation by slimy and deepwater sculpins (Bunnell et al. 2014) may be contributing to the reduced Bloater recruitment, but neither one is the primary regulating factor” (Bunnell et al. 2019). The widespread introductions of Round Goby, a known egg predator, may also contribute to this egg predation.

“An important consideration when interpreting the bottom trawl survey results is that Bloater catchability may have decreased in recent years, in response to the proliferation of quagga mussels and the associated increased water clarity and decreased *Diporeia spp.* densities, which could be responsible for a shift to the more pelagic calanoid copepods in their diets (Bunnell et al. 2015). Hence, one hypothesis is that Bloaters are less vulnerable to our daytime bottom trawls either because of behavioral changes (more pelagic during the day) or increased ability to avoid the net while on the bottom (due to clearer water)” (Bunnell et al. 2019).

“Lake Ontario’s downstream position and land use history result in the highest cumulative anthropogenic stress and habitat degradation among the Great Lakes (Allan et al. 2013)” (Weidel et al. 2021).

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

Bloater stocking should continue to occur in tandem with regular trawl surveys tracking the progress of the restoration effort. See Weidel et al. (2021) for more information on the Bloater stocking program.

The 2005 State Wildlife Action Plan included the following recommendations for extirpated fishes:

Habitat Monitoring:

-Inventories will be completed in all areas where restoration might be practical.

Relocation/reintroduction:

-Re-establish, if feasible, populations of those endangered fish species now believed to be extirpated from New York.

The 2015 State Wildlife Action Plan included the following recommendations:

-Develop and implement restoration plan for Bloater in Lake Ontario.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): [https://www.iucnredlist.org/resources/conservation-actions-classification-scheme](https://www.iucnredlist.org/resources/conservation-actions-classification-scheme)***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Management | Site/Area Management |
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Land/Water Management | Habitat & Natural Process Restoration |
| **5.** Species Management | Species Re-introduction |
| **6.** Species Management | Ex-situ Conservation |
| **7.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Bloater.

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# Species Status Assessment Cover Sheet

**Species Name:** Bluebreast Darter

**Current Status:** Endangered – HPSGCN

**Current NHP Rank:** S1

**Date Updated:** January 2023

**Updated By:** Kyle Grasso

**Distribution:** Bluebreast Darters are found in disjunct populations within the Ohio River Basin from southwestern New York, Ohio, and Indiana south to Tennessee and North Carolina. In New York, they are native to the Allegheny watershed where they have only been recorded in the Allegheny River and Oswayo Creek.

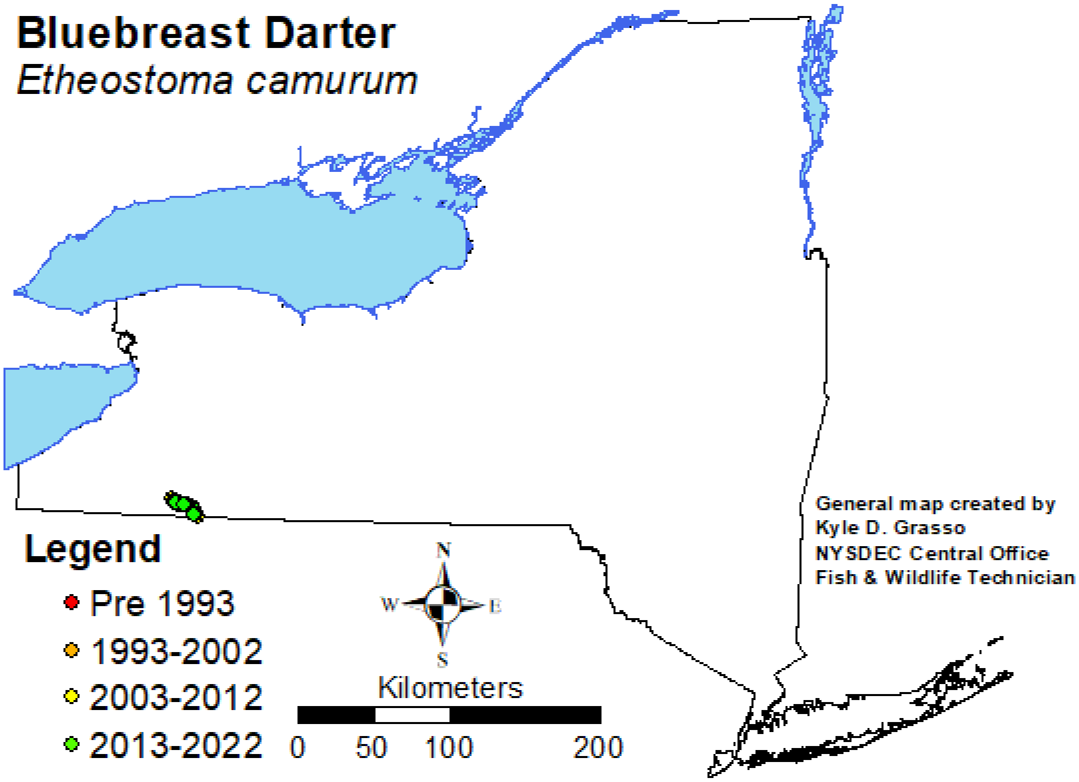
**Habitat:** Bluebreast Darters prefer the warm, typically clear, or slightly turbid, small to medium rivers with moderate to fast-flowing currents and substrate of coarse gravel, rubble, or boulders. This species is much less common in areas of large slab rock and in shallow runs over gravel.

**Life History:** Bluebreast Darters typically reach an age of 3 years and species within the genus usually mature by age 1. Spawning takes place from late spring to early summer (May-July) depending on geographic location. Mount (1959) stated that spawning occurred in central Ohio from the last 2 weeks of May and first two weeks in June (sometimes until the end of June) when water temperatures were 70-75°F. Bluebreast Darters tend to move upstream from their deeper water winter habitats to selected riffles in the spring to spawn. At the time of spawning, males become territorial and guard eddies and riffles in anticipation of the females. Once the females arrive, the females will select spawning sites in riffles with swift current beside large rocks, where they bury themselves in sand or fine gravel and lay eggs. Mount's studies suggested that most females spawned at least three times during the season. Post-spawn, males will defend the eggs until they hatch in 7-10 days. No parental care is displayed.

**Threats:** Threats to the Bluebreast Darter include siltation/turbidity, pollution, and impoundment. In addition, any alterations to water flow and temperature could reduce suitable spawning habitat. Removal of large boulders, rocks, or gravel could impact non-breeding and spawning populations.

**Population trend:** In New York, Bluebreast Darters are native to the Allegheny watershed where they have only been recorded in the Allegheny River and Oswayo Creek. Up until about 2012, Bluebreast Darters were sporadically caught in the Allegheny River and Oswayo Creek and considered rare. Since 2012, there's been an increase in Bluebreast Darter records, and they appear to be recovering in the state.

**Recommendation:** It is recommended that the Bluebreast Darter be downlisted from Endangered to Threatened due to increases in abundance in the last 10 years.



# Species Status Assessment

**Common Name:** Bluebreast Darter **Date Updated:** January 2023

**Scientific Name:** *Etheostoma camurum* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Percidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Bluebreast Darter is in the class Actinopterygii and the family Percidae (perches, walleyes, . Bluebreast Darters are found in disjunct populations within the Ohio River Basin from southwestern New York, Ohio, and Indiana south to Tennessee and North Carolina. In New York, they are native to the Allegheny watershed where they have only been recorded in the Allegheny River and Oswayo Creek. Up until about 2012, Bluebreast Darters were sporadically caught in the Allegheny River and Oswayo Creek and considered rare. Since 2012, there's been an increase in Bluebreast Darter records, and they appear to be recovering in the state. Bluebreast Darters prefer the warm, typically clear, or slightly turbid, small to medium rivers with moderate to fast-flowing currents and substrate of coarse gravel, rubble, or boulders (Kuehne and Barbour 1983; Terwilliger 1991; Page and Burr 2011; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Endangered – HPSGCN

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern

**Status Discussion:**

In New York, the Bluebreast Darter is currently listed as Endangered and HPSGCN. They are globally ranked as Apparently Secure by NatureServe. The Bluebreast Darter was formerly listed as a threatened species in Pennsylvania, but they have since been removed from the list. They still remain an SGCN in Pennsylvania.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

ii. **Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:**__✓__ **No Data:**_____

**MASSACHUSETTS** **Not Present:**__✓__ **No Data:**_____

**NEW JERSEY** **Not Present:**__✓__ **No Data:**_____

**VERMONT** **Not Present:**__✓__ **No Data:**_____

**ONTARIO** **Not Present:**__✓__ **No Data:**_____

**QUEBEC** **Not Present:**__✓__ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**__✓__ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4S5 **SGCN?:** Yes

### d. New York

**i. Abundance**

**Declining:**_____ **Increasing:**__✓__ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

The range wide trend over the last 10 years is unknown but probably relatively stable or slowly declining (NatureServe 2022). “It was previously listed as a threatened species in Pennsylvania. Recent sampling, however, has documented stable populations throughout much of French Creek and the Allegheny River, and expansion into other tributaries and downriver to now include the lock-and-damn section of the Allegheny River, as well as the Ohio River” (Stauffer et al. 2016).

In New York, Bluebreast Darters are native to the Allegheny watershed where they have only been recorded in the Allegheny River and Oswayo Creek. Up until about 2012, Bluebreast Darters were sporadically caught in the Allegheny River and Oswayo Creek and considered rare. Since 2012, there's been an increase in Bluebreast Darter records, and they appear to be recovering in the state. Even though the population is limited, their habitat, reproduction and general health appear stable (2005 SWAP).

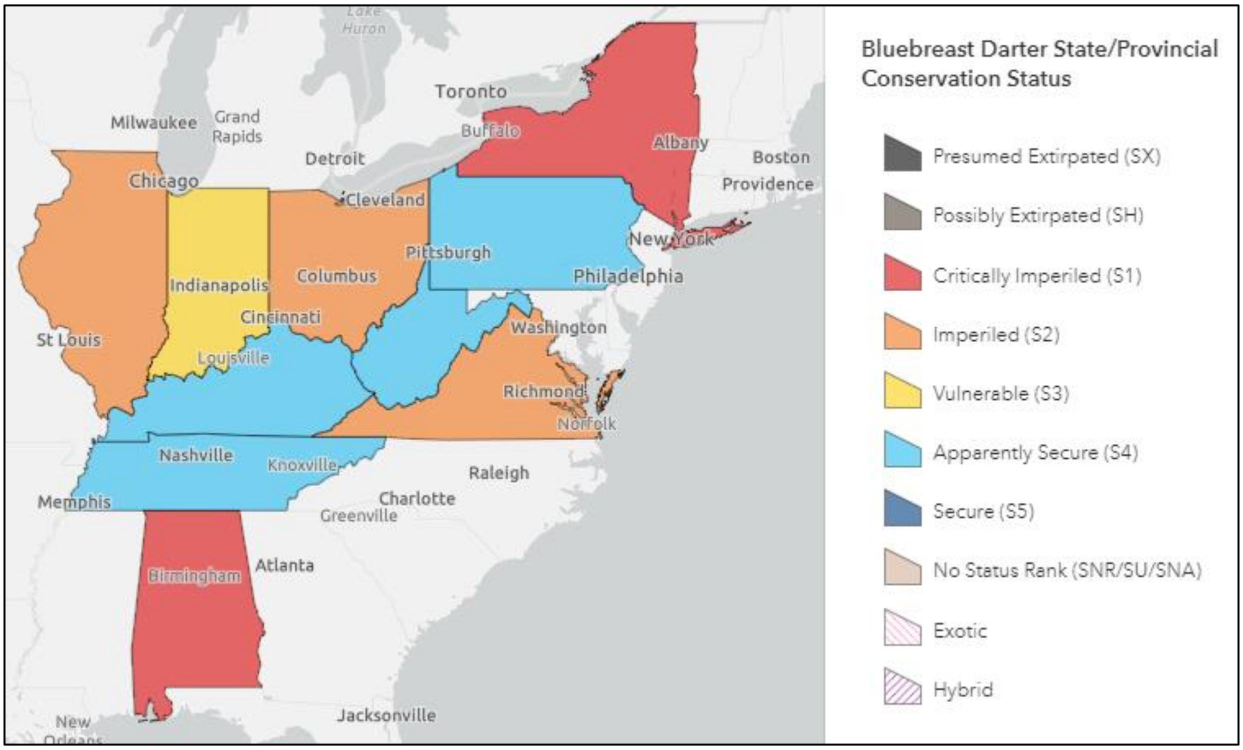


**Figure 1:** Bluebreast Darter distribution and status (Source: NatureServe 2022).

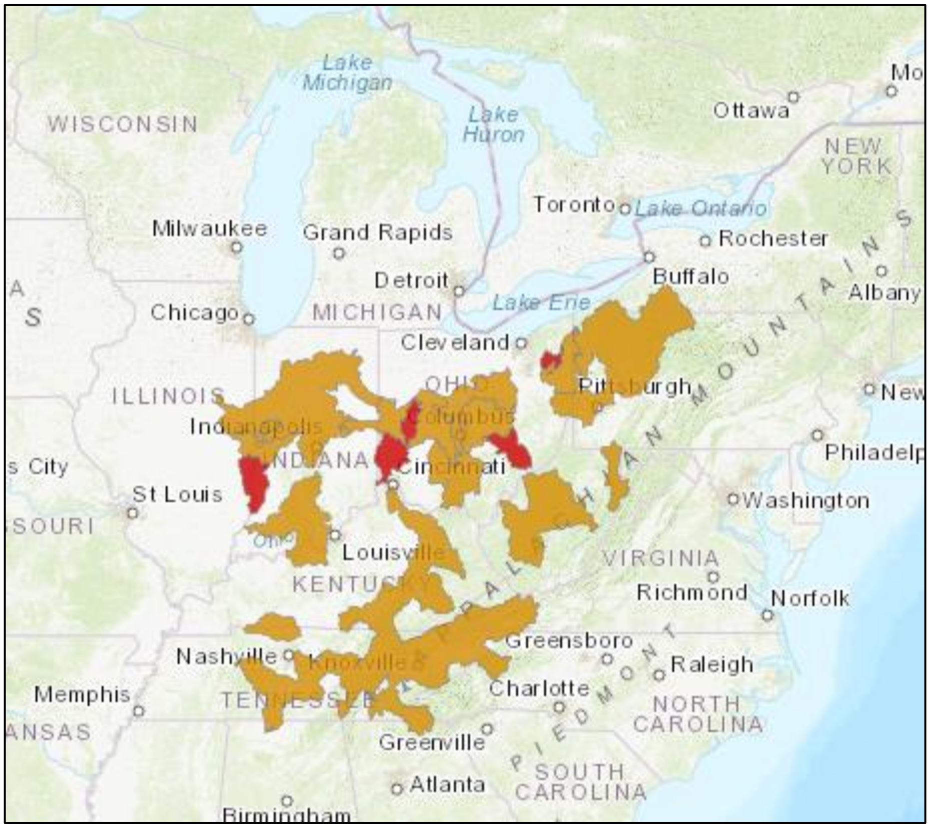


**Figure 2:** Bluebreast Darter distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

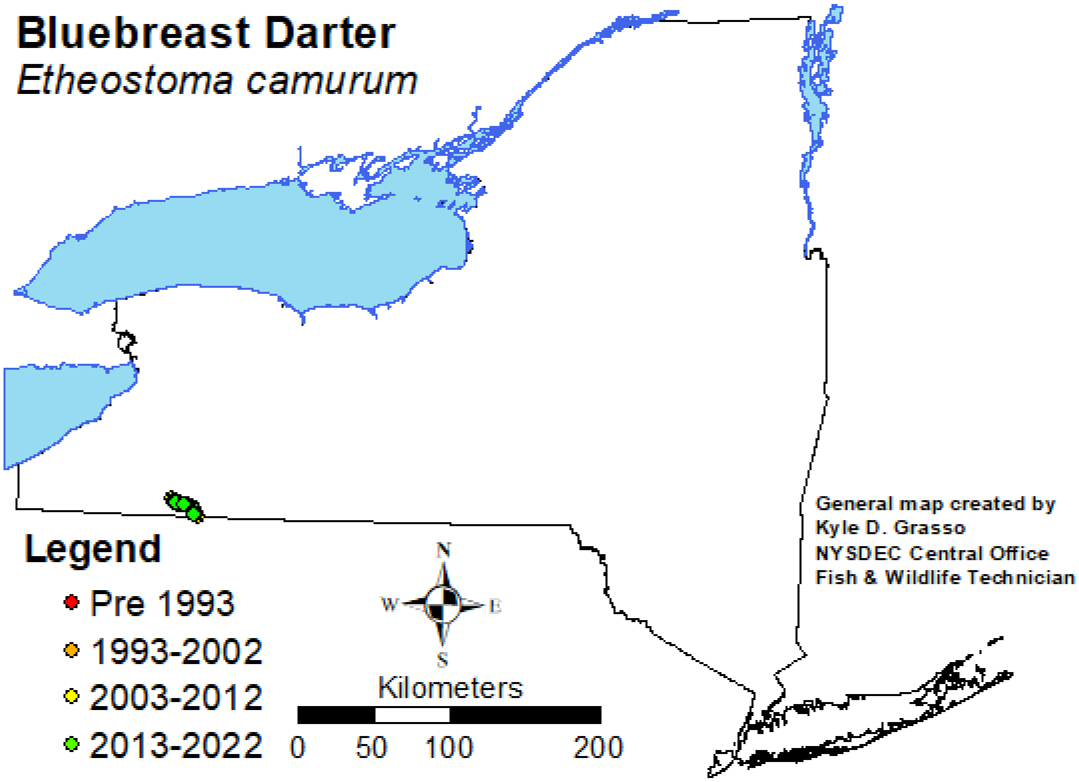


**Figure 3:** Records of Bluebreast Darter in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 4 | 2 | 0-5% |
| **1993-2002** | 1 | 1 | 0-5% |
| **2003 - 2012** | 10 | 2 | 0-5% |
| **2013 - 2022** | 58 | 2 | 0-5% |

**Table 1:** Records of Bluebreast Darter in New York.

### Details of historic and current occurrence:

There are no early collection sites in New York, but nearby sites in the Pennsylvania reaches of the Allegheny River and French Creek contained Bluebreast Darter (Raney 1938; Cooper 1983). Since then, this species has been caught in the Allegheny River from Portville to Allegany where it probably also lived historically, but individuals were not recorded until 1973 by Eaton (Eaton 1982; Carlson et al. 2016). Surveys from Oswayo Creek near the state line at Carroll, NY, contained Bluebreast Darter in 1989 (Daniels 1989), 1992 (contract studies by Penn State Univ., letter from Martin Gutowski, 1992), 2001, 2005, 2012, 2017. Up until about 2012, Bluebreast Darters were sporadically caught in the Allegheny River and Oswayo Creek and considered rare. Since 2012, there’s been an increase in Bluebreast Darter records, and they appear to be recovering in the state. Allegheny River records make up a large part of the Bluebreast Darter records in the state (90%), with only 6 of 73 total records in Oswayo Creek.

“It was previously listed as a threatened species in Pennsylvania. Recent sampling, however, has documented stable populations throughout much of French Creek and the Allegheny River, and expansion into other tributaries and downriver to now include the lock-and-damn section of the Allegheny River, as well as the Ohio River” (Stauffer et al. 2016).

### 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%:_____ | Peripheral:_✓___ |
| 51-75%:_____ | Disjunct:_✓___ |
| 26-50%:_____ | Distance to core population: |
| 1-25%:_✓___ | Core populations to the southwest |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Medium tributary and mainstem rivers

**b. Geology:** Assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to low-moderate gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_✓___ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_✓___ **No:**_____

**Indicator Species?** **Yes:**_✓___ **No:**_____

### Habitat Discussion:

Bluebreast Darters prefer the warm, typically clear, or slightly turbid, small to medium rivers with moderate to fast-flowing currents and substrate of coarse gravel, rubble, or boulders. This species is much less common in areas of large slab rock and in shallow runs over gravel. They have a low tolerance for siltation (Kuehne and Barbour 1983; Terwilliger 1991; Page and Burr 2011; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Bluebreast Darters typically reach an age of 3 years and species within the genus usually mature by age 1 (Stauffer et al. 1995; Tiemann 2008). Spawning takes place from late spring to early summer (May-July) depending on geographic location. Mount (1959) stated that spawning occurred in central Ohio from the last 2 weeks of May and first two weeks in June (sometimes until the end of June) when water temperatures were 70-75°F (Smith 1985). Bluebreast Darters tend to move upstream from their deeper water winter habitats to selected riffles in the spring to spawn (Smith 1985; Stauffer et al. 2016). At the time of spawning, males become territorial and guard eddies and riffles in anticipation of the females. Once the females arrive, the females will select spawning sites in riffles with swift current beside large rocks, where they bury themselves in sand or fine gravel and lay eggs. (Mount 1959; Smith 1985; Jenkins and Burkhead 1994). “Mount’s studies suggested that most females spawned at least three times during the season” (Smith 1985). Post-spawn, males will defend the eggs until they hatch in 7-10 days. No parental care is displayed (Werner 2004; NYNHP 2022).

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Bluebreast Darter include siltation/turbidity, pollution, and impoundment (Terwilliger 1991; NatureServe 2022). The Kinzua Dam in Pennsylvania prohibits upstream migrations of Bluebreast Darter from the lower section of the Allegheny River. In addition, any alterations to water flow and temperature could reduce suitable spawning habitat. Removal of large boulders, rocks, or gravel could impact non-breeding and spawning populations (                ).

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Bluebreast Darter is currently listed as an endangered species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Conservation strategies and management practices from New York Natural Heritage Program website (NYNHP 2022):

Measures are needed to reduce runoff in areas used by the fish. When construction is needed near water systems, measures should be taken to reduce siltation as much as possible. This could include disturbing only the work area to maintain as much vegetation as possible, working in phases to allow for more centralized control of sedimentation, using sediment traps, silt fences, or ditches to protect slopes and direct runoff away from the river, or stabilizing soil by seeding, mulching, or using blankets. Practices that maintain a riparian buffer to control pollution should be encouraged. Gravel and boulders should not be disturbed or removed from the river as they are necessary for spawning and provide refuge from predators. Water temperature and flow are important for Bluebreast Darters. Any alteration to the flow of water may affect upstream movement to spawning areas. Consider removing any barriers to allow free movement from non-breeding areas (deeper pools) to spawning areas (swift riffles).

The 2005 State Wildlife Action Plan included the following recommendations:

<u>Habitat research:</u>

-Inventory the habitat requirements of this species and its co inhabitants in the Allegheny and outside New York State, part of the same State Wildlife Grants project.

<u>Habitat restoration:</u>

-Habitat losses and restoration are part of a State Wildlife Grants project from 2003 that is directed at the Allegheny watershed.

<u>Population monitoring:</u>

-Extensive sampling will be part of a State Wildlife Grants project in 2004 on the Allegheny River near Weston Mills and in lower Oswayo Creek.

The 2015 State Wildlife Action Plan included the following recommendations:

-Inventory Bluebreast Darter population and habitat in the Allegheny watershed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***[https://www.iucnredlist.org/resources/conservation-actions-classification-scheme](https://www.iucnredlist.org/resources/conservation-actions-classification-scheme)***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Habitat & Natural Process Restoration |
| **5.** Species Management | Species Recovery |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Bluebreast Darter.

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# Species Status Assessment

**Common Name:** Bridle shiner **Date Updated:**

**Scientific Name:** *Notropis bifrenatus* **Updated by:**

**Class:** Osteichthyes

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Bridle shiner lives in nearshore areas of lakes and streams with submerged aquatic vegetation and is native to 16 of 18 watersheds. Its status in northern New York watersheds is relatively unchanged but it has declined in western and central watersheds and in the lower Hudson watershed.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** Not listed as SGCN

### b. Natural Heritage Program

i. **Global:** G3

ii. **New York:** S2? **Tracked by NYNHP?:** Yes

### Other Ranks:

Canadian Species at Risk Act (SARA) Schedule 1/Annexe 1 Status: SC (05Jun2003);
Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Special Concern (01Nov2001)
American Fisheries Society Status: Vulnerable (01Aug2008)

### Status Discussion:

Bridle shiner is widely distributed in streams in eastern North America, but abundance and area of occupancy have declined greatly in recent decades. The causes of the decline include degraded habitat. The global ranking for this species is “Vulnerable” and its state rank is “Secure” (NatureServe 2012).

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Declining | Declining | | | Choose an item. |
| **Northeastern US** | Yes | Choose an item. | Choose an item. | | | Choose an item. |
| **New York** | Yes | Declining | Declining | | | Yes |
| **Connecticut** | Yes | Declining | Declining | | Special Concern (S3) | Yes |

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **Massachusetts** | Yes | Declining | Declining | | Special Concern (S3) | Yes |
| **New Jersey** | Yes | Choose an item. | Choose an item. | | Not listed (S4) | Yes |
| **Pennsylvania** | Yes | Choose an item. | Choose an item. | | Endangered (S1) | Yes |
| **Vermont** | Yes | Declining | Declining | | Special Concern (S1) | Yes |
| **Ontario** | Yes | Choose an item. | Choose an item. | | Special Concern (S2) | Choose an item. |
| **Quebec** | Yes | Choose an item. | Choose an item. | | Not rare (S3) | Choose an item. |

*Column options*
**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item
**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

### Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

There are monitoring programs carried out by the Rare Fish Unit, 1998-2012.

### Trends Discussion *(insert map of North American/regional):*

Bridle shiners occur in waters from southeastern Quebec and New England, westward through Ontario and New York to Niagara Falls and southward through Pennsylvania to Virginia and South Carolina. New York is at the center of the range (Figure 1). **The short-term trend for this species shows a d**ecline of 10-30%. Currently, area of occupancy, number of subpopulations, and abundance appear to be widely declining, but up-to-date information is lacking for many areas. Long-term trends have shown a decline of 30-70%. This species has undergone a range-wide decline in abundance, number of subpopulations, and area of occupancy. For example, it has been found recently in only 1 of 31 historical locations in Pennsylvania and in a small percentage of several dozen historical locations in Massachusetts (NatureServe 2012).

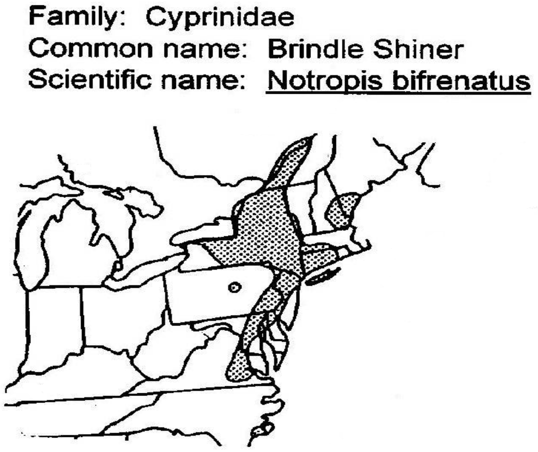

**Figure 1.** North America range map of bridle shiner (*Notropis bifrenatus*) distribution. (Page and burr 1991).

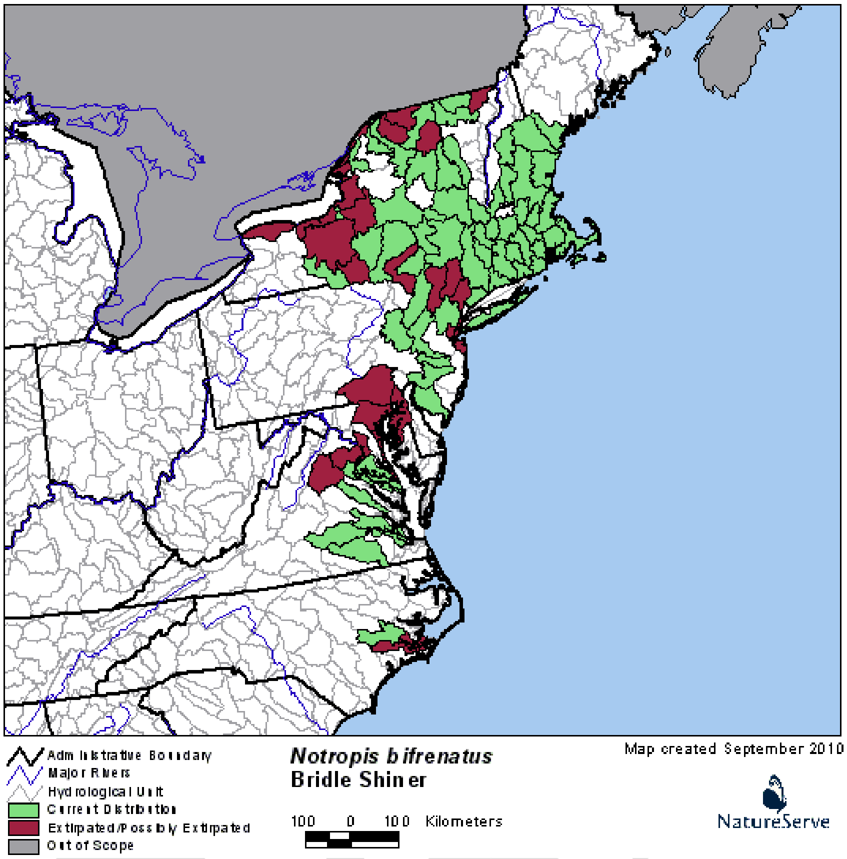

**Figure 2**. U.S. distribution of bridle shiner by watershed (NatureServe 2102).

Bridle shiner has been found in the St. Lawrence River, in bays of Lake Ontario and a in scattering of lakes and streams in 16 of the 18 watersheds, all but Allegheny (Figure 3). Unlike areas farther east in New England (Whittier et al. 1997), this species seems to be maintaining itself in most areas of New York State. Five of the 18 watersheds appear to show no declines, there are possible declines in six watersheds and the western-most watershed may have been once inhabited and is now extirpated. The only record from the Erie-Niagara watershed was from a tributary of Tonawanda Creek. Low-gradient stream habitats in this suburb of Buffalo have become even more disturbed.

The Great Lakes watersheds are less affected by decline than the Atlantic drainages. Bridle shiner distribution north of Syracuse appears today to be similar to the historic range, or in the Thousand Islands area of the St. Lawrence River, in bays of eastern Lake Ontario and lakes in or near Jefferson County. However, there has apparently been decline in bays on the south shore of Lake Ontario and in several inland lakes. Only one bay to the west—Sodus Bay, on the south shore of Lake Ontario from Port Ontario to Rochester—still contains this species. In contrast, twelve bays north of Port Ontario contained bridle shiner between 1997-2002. In the Genesee watershed, they still occur in Conesus Lake. In the Champlain watershed they were known in 22 waters earlier and are still in 13 waters, since 1976.

Atlantic drainages contained bridle shiner at about the same levels as the Great Lakes in the 1930s, but levels are now lower. The only areas of the Chemung where they were recently caught were downstream of Waneta Lake. There were historic records for 59 waters of the Mohawk/Upper Hudson/Lower Hudson, and this species has been collected in only 18 waters since 1976. Only five records have come from the lower Hudson since the 1930s. The majority of the losses were seen in the upper Hudson, Newark Bay, and possibly the Oswego and lower Hudson. Comparing the subbasins with HUC 10 showed a similar pattern, with records from fewer units in the recent period. Overall, there are records from 118 of the units (all time periods), and from recent times there were 58. Statewide, the number of individual site records for this species is 881 for all time periods, 347 in the last 30 years, and 316 from 1993-2007.

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

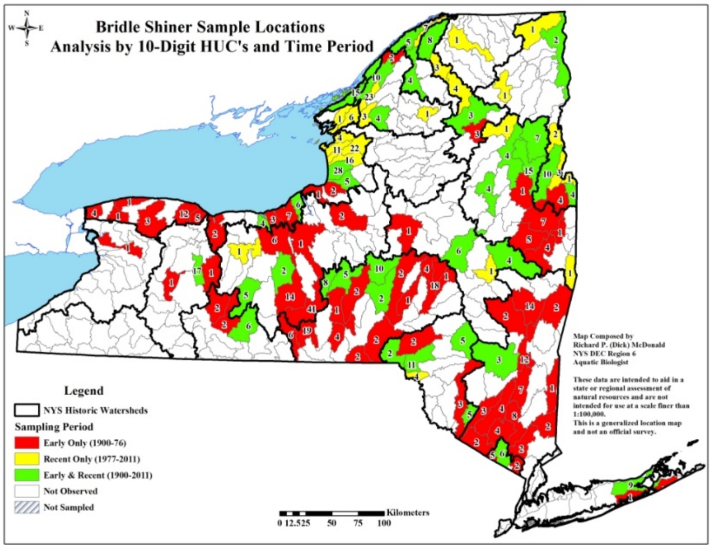

**Figure 3**. Bridle shiner distribution in New York, depicting fish sampled before 1977 and from 1977 to current time, is shown with the corresponding HUC-10units where they were found, along with the number of records.

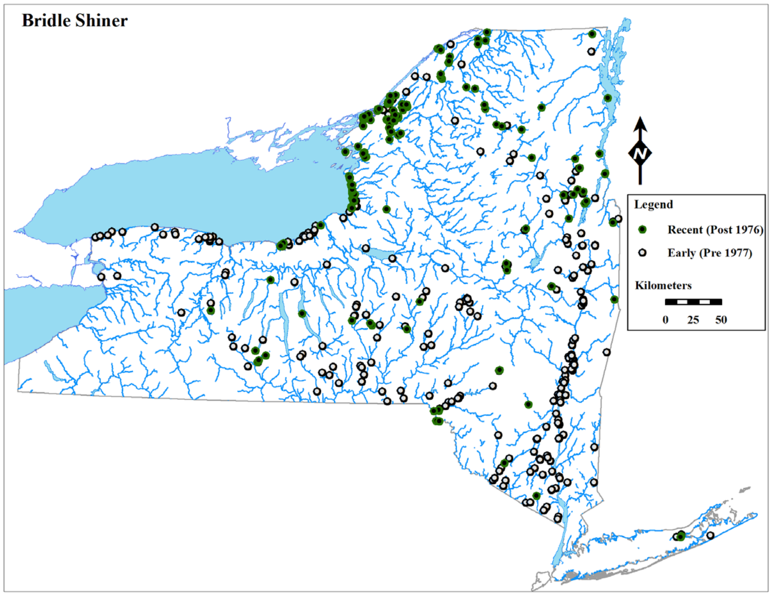

**Figure 4.** New York range map of bridle shiner.

| Watershed name | Total # HUC10 | Early only | Recent only | both | Watershed status |
|---|---|---|---|---|---|
| Chemung | 3 | 2 | 0 | 1 | |
| Delaware | 7 | 2 | 1 | 4 | |
| Genesse | 3 | 2 | 0 | 1 | |
| L Champlain | 9 | 1 | 5 | 3 | |
| L.Erie-Niagara | 1 | 1 | 0 | 0 | loss |
| Long Island | 2 | 1 | 0 | 1 | |
| Lower Hudson | 14 | 13 | 0 | 1 | |
| Mohawk | 4 | 1 | 1 | 2 | |
| Newark Bay | 3 | 2 | 0 | 1 | |
| Ontario | 21 | 11 | 6 | 4 | |
| Oswegatchie | 6 | 1 | 3 | 2 | |
| Oswego | 8 | 5 | 1 | 2 | |
| Raquette | 5 | 1 | 2 | 2 | |
| St. Law&SLC | 5 | 0 | 2 | 3 | |
| Susquehanna | 16 | 12 | 0 | 4 | |
| Upper Hudson | 11 | 5 | 2 | 4 | |
| sum | 118 | 60 | 23 | 35 | |

**Table 1**. Records of rare fish species in hydrological units (HUC-10) are shown according to their watersheds in early and recent time periods (before and after 1977) to consider loss and gains. Further explanations of details are found in Carlson (2012).

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | | 534 | 16/18 watersheds |
| **1993-2002** | | | |
| **2003 - 2012** | | 347 | 15/18 watersheds |
| **2013 - 2022** | | | |

**Table 2.** Records of bridle shiner in New York.

### Details of historic and current occurrence:

Bridle shiner has been found in the St. Lawrence River, bays of Lake Ontario and a scattering of lakes and streams in 16 of the 18 watersheds, all but Allegheny (Figure 3). Some of these waters include Lake Champlain, Raquette River and Cayuga, Keuka, Brandt, Conesus, Sandford and Millsite Lakes. The western-most site was reported for Ellicott Creek in 1920 (Hankinson 1924), and southernmost are from Long Island and Newark Bay tributaries.

Bridle shiner is still found in all historic HUC-10 watersheds except the Lake Erie watershed.

### New York's Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 26-50% | Core | |

*Column options*

**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

1. Large/Great River, Low-Moderate Gradient, Assume Moderately Buffered, Transitional Cool
2. Summer-stratified Monomictic Lake
3. Unconfined River
4. Great Lakes Aquatic Bed

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| Yes | Yes | Choose an item. | |

*Column options*
**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item
**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

The bridle shiner prefers quiet waters of large streams and shallow parts of lakes although this species is closely associated with submerged aquatic vegetation and is often more common in lakes or ponds than in streams. It usually occurs in clear-water, moderately to abundantly vegetated areas in sluggish pools, in slow current near moderate flow in streams, or in slackwater side areas with sandy gravel or organic debris bottom types. Spawning areas are in still shallow water near shore where vegetation is present (NatureServe 2012). Changes in their primary habitat, submerged aquatic vegetation, is poorly studied here.

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

### Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Bridle shiner spawns between May to August in the north. It typically matures in one year. Life span is thought to be a little longer than two years, although some have been found to live to age 4 (NatureServe 2012).

## VI. Threats *(from NY 2015 SWAP or newly described)*

Bridle shiner is sensitive to environmental perturbations including being vulnerable to changes from nonnative species. Additional threats include factors that degrade or destroy the required vegetated waters. Agricultural pollution also may negatively impact the habitat. Causes of decline are unknown in some areas (NatureServe 2012).

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

**Yes:** ✓ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law.

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

Investigate causes of the decline.
The status of this species in New York needs to be determined in more inland lakes, and the records in the eastern, western, and southern drainages need further study to understand if this represents a range reduction.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** | |

**Table 2.** Recommended conservation actions for bridle shiner.

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| | |
|---|---|
| **Originally prepared by** | Doug Carlson and Amy Mahar |
| **Date first prepared** | April 10, 2012 |
| **First revision** | August 8, 2012 |
| **Latest revision** | Transcribed March 2024 |

# Species Status Assessment

**Common Name:** Brook trout (wild) **Date Updated:**

**Scientific Name:** *Salvelinus fontinalis* **Updated by:**

**Class:** Osteichthyes

**Family:** Salmonidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Wild brook trout reside in cold-water ponds and smaller and medium-sized streams with cold water and clean gravel. The taxonomic status of wild brook trout populations currently considered as strains of *Salvelinus fontinalis* is ambiguous. However, this assessment concerns itself with populations of brook trout that are wild, self-sustaining and genetically distinct and for which the best available genetic or historic information indicates minimal influence from the introduction of exogenous individuals.

This species is endemic to the eastern United States, but dams, over-fishing, invasive fish species, logging, and acidifying waters have caused this native trout to disappear from a wide variety of lakes, rivers and streams. There are currently over 400 lakes and ponds managed by the NYSDEC for native and stocked brook trout, in which 100 or so contain naturally-reproducing brook trout. Thousands of miles of streams in the Adirondacks, Tug Hill Region, Catskill Mountains, western New York, east of the Hudson River, on Long Island and in the Upper Susquehanna watershed support self-sustaining populations of brook trout. However, only 5% of the watersheds in NY that historically contained stream populations are considered intact (meaning >90% of habitat occupied).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** SGCN

### b. Natural Heritage Program

i. **Global:** G5

ii. **New York:** S5 **Tracked by NYNHP?:** No

**Other Ranks:**

None

**Status Discussion:**

Brook trout were once widespread throughout the state but many populations have been lost over the years. Eleven well-documented heritage strains are still extant in their natal waters. Beyond this, naturally reproducing wild brook trout occur in remote wilderness areas in the Adirondacks and Catskills, in a few coastal streams on Long Island, and in headwater streams in other NY watersheds. While the genetic distinctiveness of the heritage strains from Adirondack ponds has been well documented, the genetic status of the stream populations is largely unknown but likely represents an important contribution to the overall diversity of the species.

Populations of stream-dwelling brook trout are greatly reduced or have been extirpated from nearly half of the watersheds in their native range and the vast majority of historically occupied large rivers no longer support self-reproduction populations (USFWS 2012).

The Eastern Brook Trout Joint Venture (EBTJV) 2006 assessment entitled, *Eastern Brook Trout: Status and Threats* reported a general decline in the distribution and abundance of wild brook trout within in its historic range. Key findings in that report include the following:

- Intact stream populations of brook trout (where wild brook trout occupy 90-100% of their historical habitat) exist in only 5% of subwatersheds
- Wild stream populations of brook trout have vanished or are greatly reduced in nearly half of subwatersheds
- The vast majority of historically occupied large rivers no longer support self-reproducing populations of brook trout.
- Brook trout survive almost exclusively as fragmented populations relegated to the extreme headwaters of streams.
- Poor land management associated with agriculture ranks as the most widely distributed impact to brook trout across the eastern range.
- Non-native fish rank as the largest biological threat to brook trout.
- Intact subwatersheds of wild brook trout in lakes and ponds are almost exclusively located in Maine, but self reproducing populations remain in some lakes and ponds in New York, New Hampshire and Vermont.
- More data collection is needed to determine the status of brook trout in various parts of the eastern range, particularly in Maine, New Hampshire, New York, Massachusetts and Pennsylvania.

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Declining | Declining | Last 50 years | | Choose an item. |
| **Northeastern US** | Yes | Declining | Declining | Last 50 years | | Choose an item. |
| **New York** | Yes | Declining | Declining | Last 50 years | Not listed | Yes |
| **Connecticut** | Yes | Declining | Declining | Last 50 years | Not listed | Yes |
| **Massachusetts** | Yes | Declining | Declining | Last 50 years | Not listed | Yes |
| **New Jersey** | Yes | Declining | Declining | Last 50 years | Not listed | Yes |
| **Pennsylvania** | Yes | Declining | Declining | Last 50 years | Not listed | Yes |
| **Vermont** | Yes | Declining | Declining | Last 50 years | Not listed | Yes |
| **Ontario** | Yes | Stable | Stable | Last 50 years | Not listed | Choose an item. |

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **Quebec** | Yes | Stable | Stable | Last 50 years | Not listed | Choose an item. |

*Column options*

**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item

**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item

**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

### Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

Ongoing monitoring programs are conducted annually by Region 5 & 6 Fisheries Management Units. In addition, Regions 4, 7, 8 & 9 have conducted brook trout status surveys to produce a snapshot of brook trout distribution to update the 2006 EBTJV assessment.

### Trends Discussion *(insert map of North American/regional):*

The current number of wild, self-sustaining brook trout ponds in New York State is very low relative to historic conditions. Kretser (1989) found that less than 4% of the lakes and ponds in New York are thought to contain unstocked, wild populations of brook trout. Primarily as the result of management actions, the number of known heritage populations has recently increased. Gordon et. al. (2003) reported 85 known, self-sustaining populations in the Adirondacks compared to the 39 populations reported by Pfeiffer in 1979. Management actions have included the liming of acidified brook trout waters, chemical removal of competitor and predator fishes, and restocking. As an example of the success of these methods, Gordon et. al. (2003) reported that 25 years of pond reclamation had resulted in self-sustaining brook trout populations in 10 of 50 reclaimed ponds.

Keller (1979) listed eleven "heritage" brook trout strains still extant in their natal waters. Those included Dix Pond, Honnedaga Lake, Horn Lake, Little Tupper Lake, Nate Pond, Stink Lake, Tamarack Pond and Windfall Ponds in Franklin and Herkimer Counties in the Adirondacks. Keller also listed two Catskill waters, Balsam Lake and Tunis Lake. Recent data (June 2004) from fisheries managers and an academician indicate that all strains may still be present in their natal waters except the Tamarack Pond strain. Brook trout stocking data indicate that Horn Lake strain fish have been stocked in Tamarack Pond since 1996. There are no recent fisheries survey data available for Stink Lake. Genetic work performed by Perkins et. al. (1993) confirmed the unique genetic character of each of these populations. Furthermore, Perkins et. al. (1993) found significant genetic differences among river basins, among drainages within basins, and even among samples within minor drainages, and suggested that individual heritage populations should be the primary ecological units on which management strategies should be based. At a minimum, Perkins et. al. suggested that two populations be selected for preservation within each major drainage. Candidate populations could be selected based on their capability to contribute large sample sizes to restoration efforts, and on their degree of genetic uniqueness. Additional recent genetics work on New York’s heritage strains is found in King (2006) and Hare (2010).

Wild brook trout strains have been shown to live longer and have better survival than domesticated strains (Webster and Flick 1981). Heritage brook trout populations are important for the adaptive ability and long-term survival of the species, and represent an irreplaceable part of the brook trout resource in New York State. Thousands of generations of natural selection have resulted in genetically discrete, ecologically specialized populations specifically adapted to conditions in New York State.

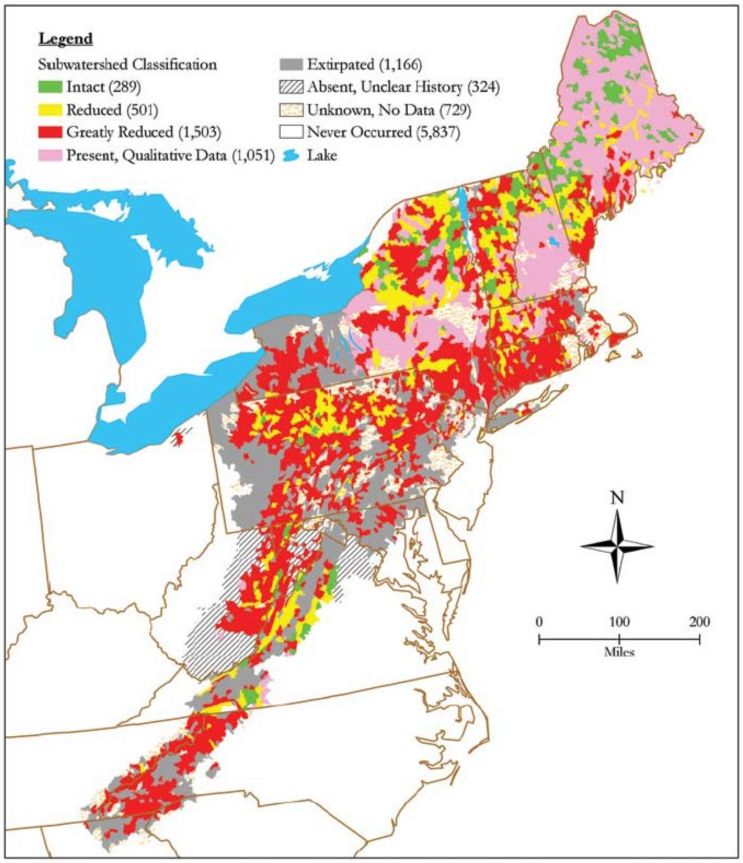

**Figure 1.** Brook trout population status in the eastern U.S. range by subwatershed. Map created on 2/24/06 by Nathaniel Gillespie, Trout Unlimited (EBTJV 2006)

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

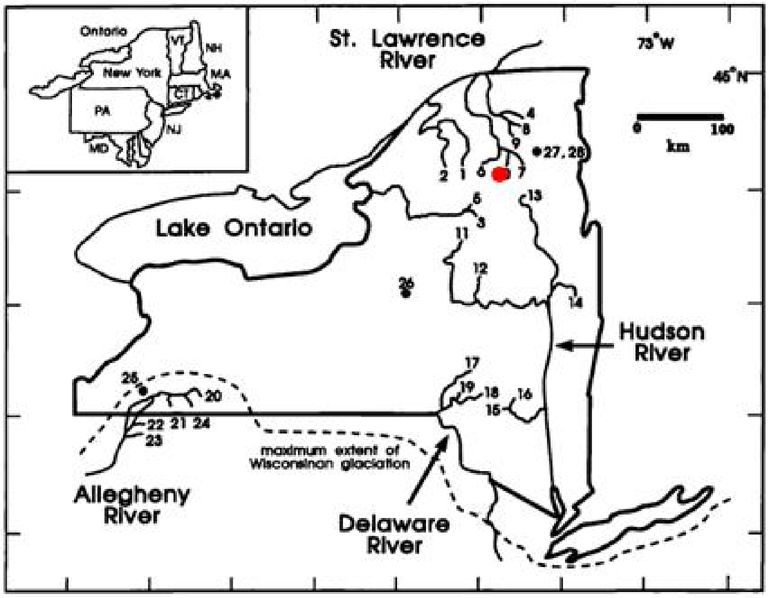

**Figure 2.** NY. distribution of Heritage strain brook trout (Perkins et al. 1993).

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| Pre 1993 | | | |
| 1993-2002 | | | |
| 2003 - 2012 | | | |
| 2013 - 2022 | | | |

**Table 1.** Records of brook trout in New York.

### Details of historic and current occurrence:

Historic: 39 self-sustaining populations in the Adirondacks (Pfeiffer 1979).
Current: There are 85 known self-sustaining populations in the Adirondacks (Gordon et al. 2003).

Brook trout were once widespread throughout the state but over the years many populations have been lost due to habitat destruction and introduction of competing fish species, resulting in only eleven well documented "heritage" brook trout strains still extant in their natal ponds. Stream populations in NY are classified as extirpated or greatly reduced (<50% of habitat occupied) in 50 percent of the watersheds where they historically existed (EBTJV 2006).

### New York's Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 100% (endemic) | Core | |

*Column options*
**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

Small River, Low Gradient, Moderately Buffered, Neutral, Transitional Cool
Oligotrophic Pond
Oligotrophic Dimictic Lake

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| Yes | Yes | Declining | |

*Column options*
**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item
**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

Brook trout prefer small to moderate sized streams, lakes and ponds, wherever cool (below 72˚F), clean water is available. Brook trout are an excellent sentinel of water quality due to their preference of clean waters of high purity, narrow pH range, and sensitivity to poor oxygenation, pollution and changes in pH cause by environmental effects (USFWS 2012).

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Yes | Yes | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

### Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Brook trout are relatively short lived, rarely living longer than five years. Spawning occurs in late summer or fall and eggs hatch in about 47 days. Sexual maturity can be reached at 1 to 3 years depending on genetics and environmental conditions (NatureServe 2012). Some longer-lived strains have been documented to live eight years or longer. The diet includes crustaceans, frogs and other amphibians, insects, mollusks, smaller fish, and even smaller aquatic mammals such as voles (USFWS 2012).

## VI. Threats *(from NY 2015 SWAP or newly described)*

Threats to wild brook trout in New York include land use changes that increase water temperatures (through decreased shade or decreased groundwater baseflow) or increase fine sediment inputs to streams, barriers to migration (such as perched culverts), competition from other fish species (particularly introduced fishes with more greater thermal tolerances).  Additional threats include acidification of watersheds (primarily in the Adirondack region) and climate change. Increased water temperatures from climate change are likely to pose a threat to brook trout due to their reliance on cold water refugia (USFWS 2012). Acidification is somewhat less of a threat today thanks to emissions control regulations but climate change is becoming a serious concern because of higher water temperatures and a greater frequency of floods and associated human efforts to mitigate floods by stream channelization.

Brook trout was classified as “highly vulnerable” to predicted climate change in an assessment of vulnerability conducted by the New York Natural Heritage Program (Schlesinger et al. 2011).

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

**Yes:** ✓____ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

Article 15 of Environmental Conservation Law provides protection of rivers, streams, lakes and ponds through the Protection of Waters permit program.

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

Conservation actions following IUCN taxonomy are categorized in the following table.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| Land/Water Protection | Resource/Habitat Protection |
| Land/Water Management | Site/Area Management |
| Land/Water Management | Invasive/Problematic Species Control |
| Land/Water Management | Habitat/Natural Process Restoration (remediation of stream habitat) |
| Species Management | Species Recovery Manipulation |
| Species Management | Ex-situ Conservation |
| Law/Policy Action | Policy Regulation Change/Implementation |

**Table 2.** Recommended conservation actions for brook trout.

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for the brook trout heritage strains.

**Captive Breeding:**

---- Selected strains of heritage strain brook trout have been propagated in fish hatcheries and used to create naturally sustained wild populations. This work needs to continue, and be refined pending an updating of the management plan.

**Habitat Management:**

---- Select 2 stream populations for each watershed (major drainage) to designate as heritage riverine stocks – to protect from stocking and habitat loss.

---- Construct and maintain fish barriers to prevent undesirable fish from populating reclaimed ponds, or ponds that are naturally recovering from acid precipitation.

**Habitat Restoration:**

---- Liming of selected ponds, followed by restocking with heritage strain brook trout, should continue. Target ponds and strains should be identified in the updated management plan.

**Invasive Species Control:**

---- Reclamation of selected ponds to remove non-native and native but widely introduced fish species, followed by restocking with heritage strain brook trout, should continue. Target ponds and strains should be identified in the updated management plan.

**Population Monitoring:**

---- Complete an inventory of known stream and coastal populations of “never stocked” brook trout.

**Statewide Management Plan:**

---- Keller’s 1979 plan “Management if wild and hybrid brook trout in New York lakes, ponds and coastal streams” needs to be updated to include current status of known heritage strains, and updated conservation plans and research needs. Potential new research includes the characterization of additional heritage strains, and the broad-scale identification of lakes that may be suitable for the restoration of self-sustaining heritage brook trout populations (ex- lakes likely to have suitable groundwater springs or coldwater inlets).

A meaningful discussion of the status of this species in North America is problematic because *Salvelinus fontinalis* is an introduced invasive species in western North America. Its gains in distribution, occurrence and abundance outside of its native range are happening simultaneously with ongoing declines in its native range.

Presently, the Eastern Brook Trout Joint Venture (a National Fish Habitat Partnership) is engaged in a cachement level assessment of status of the species within its historic range. A prior assessment was completed on a coarser scale. However, it has been shown that the coarser scale assessment has a tendency to overstate the number of ‘intact’ watersheds (Mark Hudy, personal communication via Fred Henson). NYSDEC is actively participating in the cachement level assessment, and an improved status assessment will be available in 2014.

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| | |
|---|---|
| **Originally prepared by** | Douglas Carlson and Fred Hanson |
| **Date first prepared** | May 2013 |
| **First revision** | October 20, 2013 (K. Corwin) |
| **Latest revision** | Transcribed March 2024 |

# Species Status Assessment Cover Sheet

**Species Name:** Burbot

**Date Updated:** January 2023

**Current Status:** Not Listed

**Updated By:** Kyle Grasso

**Current NHP Rank:** S3

**Distribution:** Burbot have a global distribution along and north of 40°N latitude. In North America, their distribution stretches south to Pennsylvania, Kentucky, Missouri, Wyoming, and Oregon and all the way north to northern Canada. In New York, Burbot have a sporadic distribution across the different lakes and streams that contain cold-water habitat.

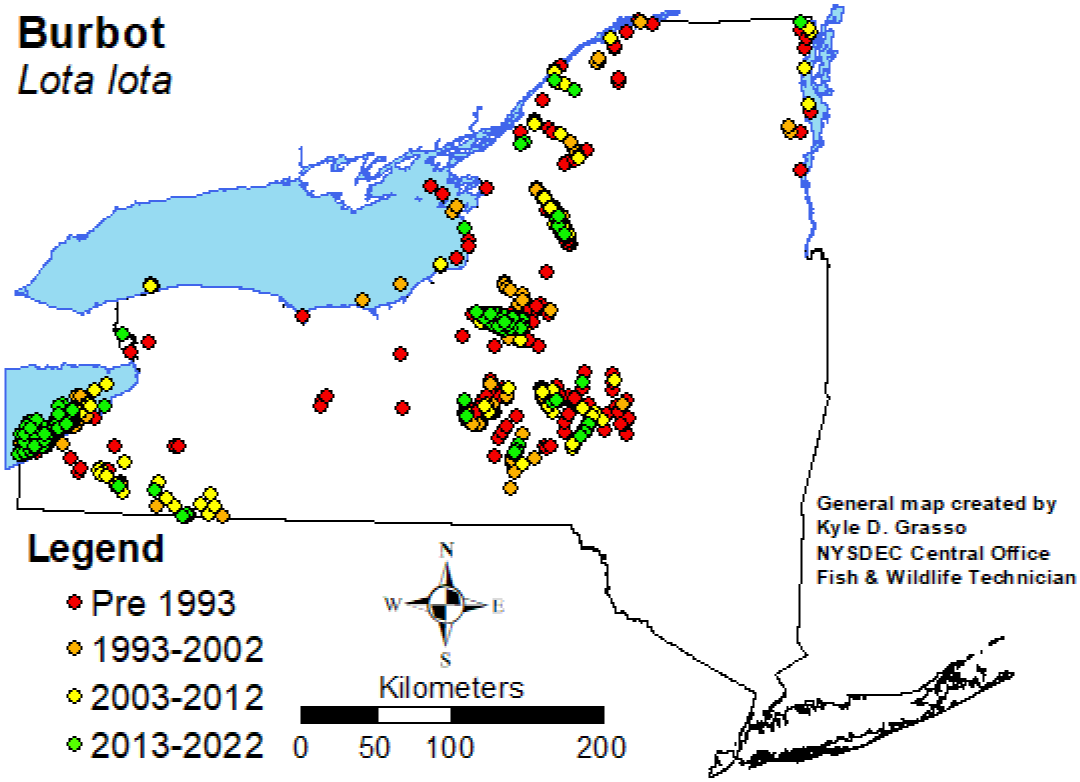
**Habitat:** Burbot prefer the cold-water habitats of deep lakes and medium to large, cool rivers that contain a variety of substrates. Riverine populations inhabit deep, slow pools with abundant cover in cool or cold streams. Burbot are thought to be more active at night and are often associated with daytime shelter. In Lake Superior, Burbot have been reported to excavate trenches in clay substrate for use as cover.

**Life History:** Burbot can reach ages of 12+ in certain systems. They reach sexual maturity between 3-8 years of age depending on the system. Riverine populations tend to grow slower and die younger than lake populations. Burbot typically spawn from mid to late winter to early spring (December to April) often under ice in water temperatures of 33 to 35°F. Around then, Burbot will move onto sand and gravel shoals of lakes to begin spawning. Lake populations typically spawn within the lakes they inhabit, while riverine populations often exhibit some form of migration, spawning under the ice of slow-moving water. They are iteroparous, broadcast spawners that can spawn in pairs or in groups of dozens or more. Juvenile Burbot are pelagic until they reach adulthood and become almost entirely benthic.

**Threats:** Threats to the Burbot include increased water temperatures, pollution (leading to acidification, eutrophication, and lower water quality), overfishing, habitat changes (e.g., changes from damming), Sea Lamprey predation on adult Burbots, Alewife predation on the Burbot's pelagic fry, and competition for food among juvenile Burbot. Lake drawdowns and dams can negatively affect spawning conditions or the ability to spawn.

**Population trend:** Current distribution is stable, while abundance has decreased in some waterbodies. In Oneida Lake, long-term trends in catches of burbot in bottom trawls, gill nets, and trap nets since the 1960s have exhibited significant declines. High occurrence of empty stomachs and reduction in energy density of livers during the summer months suggest that high summer water temperatures may limit burbot in Oneida Lake. It is unknown how many Burbot populations are undergoing similar circumstances, but that number is likely to increase in the coming years. The southernmost Burbot populations in New York may currently be most at risk of these warming conditions.

**Recommendation:** It is recommended that the Burbot be listed as Special Concern due to the decreases in abundance within the state and their vulnerability to warming water temperatures.



# Species Status Assessment

**Common Name:** Burbot **Date Updated:** January 2023

**Scientific Name:** *Lota lota* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Gadidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Burbot is the only freshwater member of the family Gadidae (cod family). They are one of two freshwater fishes with a circumpolar distribution. The other being the northern pike (Stapanian et al. 2010). Burbot have a global distribution along and north of south to Pennsylvania, Kentucky, Missouri, Wyoming, and Oregon, and all the way north to Canada into Alaska (NatureServe 2022). In New York, Burbot have a sporadic distribution across the different lakes and medium to large sized rivers that contain cold-water habitat. They are native to 10 of 18 watersheds in the state (Allegheny, Black, Champlain, Erie-Niagara, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, and Susquehanna). Current distribution is stable, while abundance has decreased in some waterbodies (e.g., Oneida Lake). “High occurrence of empty stomachs and reduction in energy density of livers during the summer months suggest that high summer water temperatures may limit burbot in Oneida Lake” (Jackson et al. 2008). It is unknown how many Burbot populations are undergoing similar circumstances, but that number is likely to increase in the coming years. The Allegheny and Susquehanna watershed make up the southernmost Burbot populations in New York. These populations may currently be most at risk of these warming conditions. Burbot prefer the cold-water habitats of deep lakes and large, cool rivers containing variety of substrates (cobble, mud, sand, rubble, boulder, silt, and gravel substrates) (

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S3 **Tracked by NYNHP?:** Watchlist

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)

### Status Discussion:

The Burbot is not currently federally listed or listed in the state of New York. They are not currently listed as an SGCN in New York either. The Burbot is globally ranked as Secure by NatureServe.

“USFWS (2001) found that a petition to list lower Kootenai River Burbot (Idaho, Montana, British Columbia) as an endangered or threatened species pursuant to the U.S. Endangered Species Act presented substantial information indicating that listing may be warranted. A status review was initiated. USFWS (2003) found that the lower Kootenai River Burbot is not a distinct population segment and therefore is not a listable entity” (NatureServe 2022).

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**NEW JERSEY** **Not Present:** ✓ **No Data:** _____

**CONNECTICUT** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Endangered – S1 **SGCN?:** Yes

**MASSACHUSETTS** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Special Concern – S1 **SGCN?:** Yes

**VERMONT** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S3S4 **SGCN?:** No

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Endangered – S3 **SGCN?:** Yes

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S5 **SGCN?:** N/A

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S5 **SGCN?:** N/A

### d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. The Cornell Biological Field Station at Shackleton Point samples and monitors Burbot populations in Oneida Lake in tandem with their other programs using trawls, gillnets, and fry fishing nets.

**Trends Discussion** *(insert map of North American/regional):*

The range wide trend over the past 10 years or three generations is uncertain but likely relatively stable or slowly declining (NatureServe 2022). Burbot are extirpated or vulnerable to extirpation along large parts of 40°N latitude in North America. And as global waters continue to warm it is likely that their entire southern range in North America will continue to shrink, and extirpations will become more and more common (Stapanian et al. 2010).

In New York, Burbot have a sporadic distribution across the different lakes and medium to large sized rivers that contain cold-water habitat. They are native to 10 of 18 watersheds in the state (Allegheny, Black, Champlain, Erie-Niagara, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, and Susquehanna). The first Burbot record in the state comes from Cayuga Lake in 1875. They were commonly caught throughout surveys in the 1900s. Current distribution is stable, while abundance has decreased in some waterbodies. In Oneida Lake, "long-term trends in catches of burbot in bottom trawls, gill nets, and trap nets since the 1960s have exhibited significant declines" (Jackson et al. 2008). "High occurrence of empty stomachs and reduction in energy density of livers during the summer months suggest that high summer water temperatures may limit burbot in Oneida Lake" (Jackson et al. 2008). It is unknown how many Burbot populations are undergoing similar circumstances, but that number is likely to increase in the coming years. The Allegheny and Susquehanna watershed make up the southernmost Burbot populations in New York. These populations may currently be most at risk of these warming conditions.

"The Burbot population in Lake Erie has experienced drastic changes since the mid-twentieth century. Clemens (1951) stated that Burbot often recruited to fishermen's nets in quantities considered to be nuisance level. Subsequently, a population collapse occurred during the 1950s and 1960s due to poor water quality, habitat degradation, and overexploitation. Improved water quality in the 1970s and control of the Sea Lamprey, Petromyzon marinus, beginning in 1986 allowed a recovery in the 1990s (Stapanian et al. 2008). Since the early 2000s, fisheries data indicate that the population has continually declined, recruitment has been low, and mean age has increased (CWTG 2015)" (Stauffer et al. 2016).

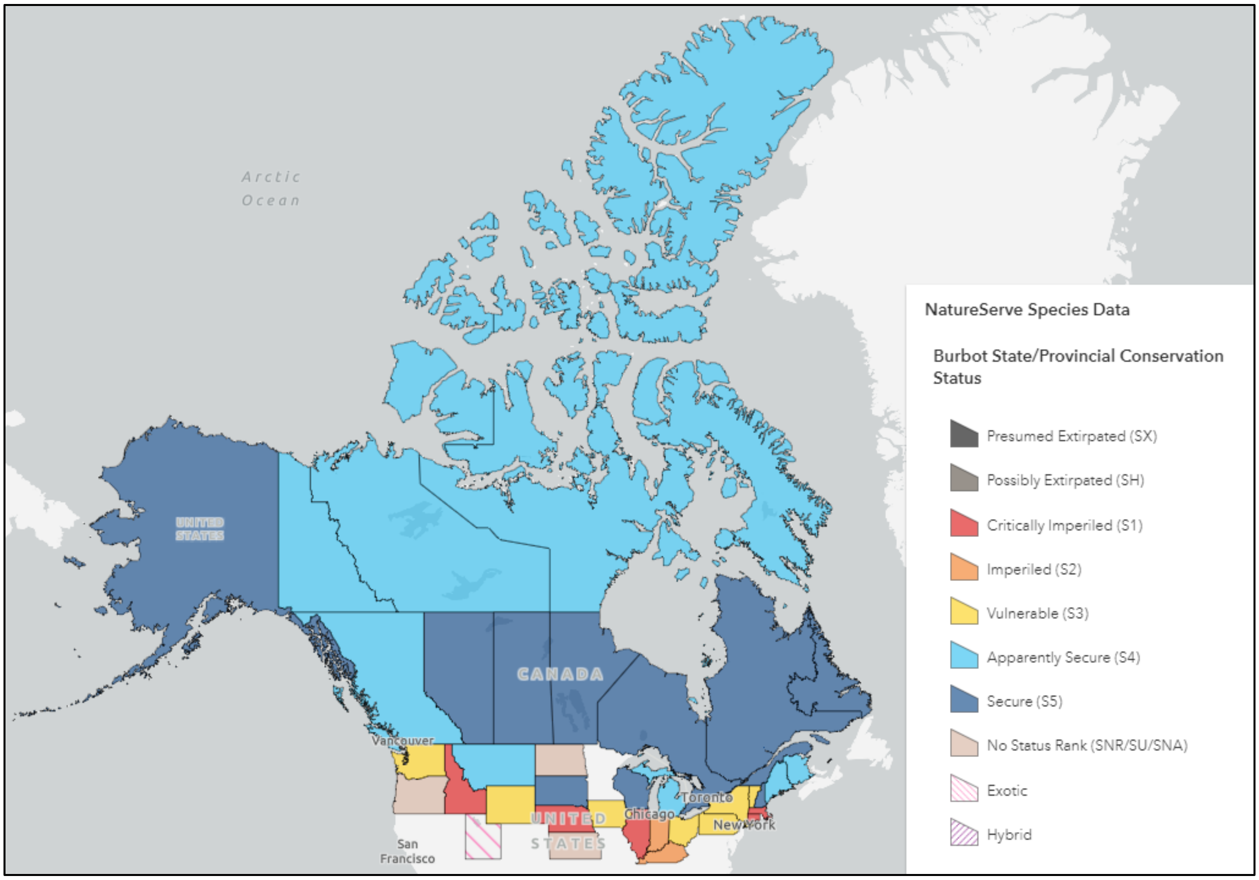


**Figure 1:** Burbot distribution and status in North America (Source: NatureServe 2022).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

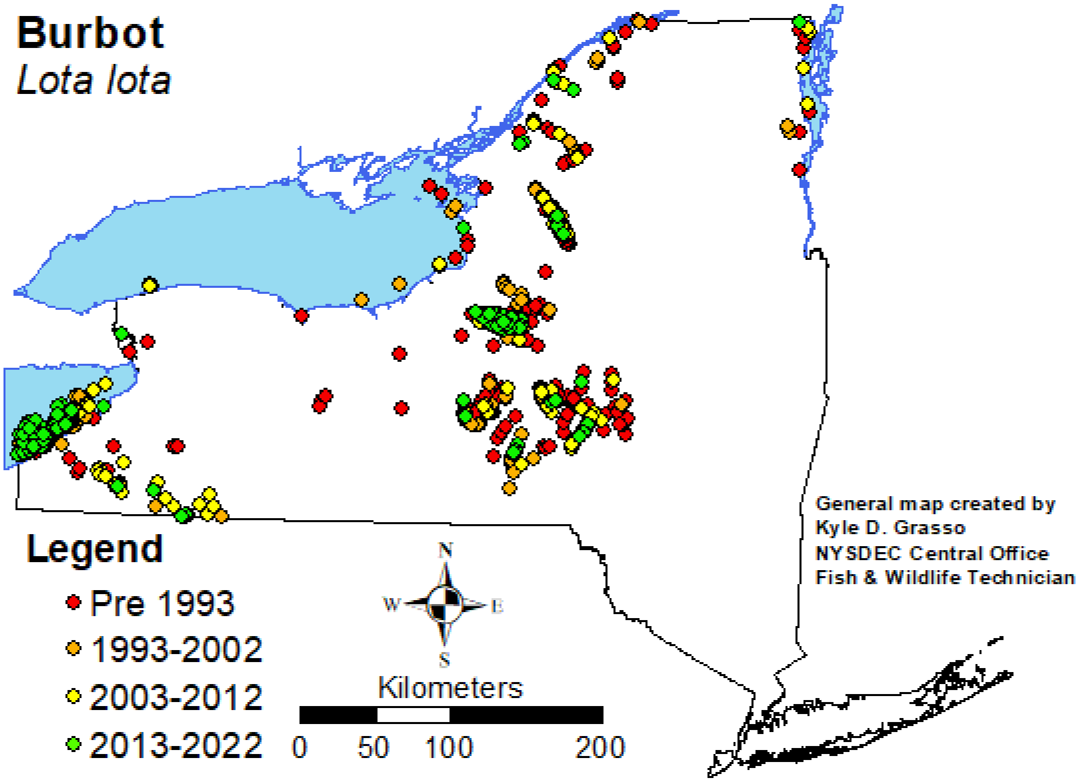


**Figure 2:** Records of Burbot in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 1516 | 116 | 25-50% |
| **1993-2002** | 712 | 39 | 25-50% |
| **2003 - 2012** | 781 | 52 | 25-50% |
| **2013 - 2022** | 340 | 22 | 25-50% |

**Table 1:** Records of Burbot in New York.
Note: # of records is skewed by Oneida Lake and Lake Erie Sampling

### Details of historic and current occurrence:

In New York, Burbot have a sporadic distribution across the different lakes and medium to large sized rivers that contain cold-water habitat. They are native to 10 of 18 watersheds in the state (Allegheny, Black, Champlain, Erie-Niagara, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, and Susquehanna). The first Burbot record in the state comes from Cayuga Lake in 1875. They were commonly caught throughout surveys in the 1900s. Current distribution is stable, while abundance has decreased in some waterbodies. In Oneida Lake, "long-term trends in catches of burbot in bottom trawls, gill nets, and trap nets since the 1960s have exhibited significant declines" (Jackson et al. 2008). "High occurrence of empty stomachs and reduction in energy density of livers during the summer months suggest that high summer water temperatures may limit burbot in Oneida Lake" (Jackson et al. 2008). It is unknown how many Burbot populations are undergoing similar circumstances, but that number is likely to increase in the coming years. The Allegheny and Susquehanna watershed make up the southernmost Burbot populations in New York. These populations may currently be most at risk of these warming conditions.

**New York's Contribution to Species North American Range:**

**% of NA Range in New York**

**100% (endemic):**_____
**76-99%:**_____
**51-75%:**_____
**26-50%:**_____
**1-25%:**_✓___

**Classification of New York Range**

**Core:**_____
**Peripheral:**_✓___
**Disjunct:**_____
**Distance to core population:**
Core population in Canada

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Medium tributary/mainstem and large rivers as well as sporadic cool, deep lakes

**b. Geology:** Low/moderately buffered to assume moderately buffered waters

**c. Temperature:** Cool to transitional cool

**d. Gradient:** Low to low/moderate gradient

### Habitat or Community Type Trend in New York

**Declining:**_✓___ **Stable:**_____ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_✓___ **No:**_____

**Indicator Species?** **Yes:**_✓___ **No:**_____

### Habitat Discussion:

Burbot prefer the cold-water habitats of deep lakes and medium to large, cool rivers that contain a variety of substrates (cobble, mud, sand, rubble, boulder, silt, and gravel substrates) ( r et al. 2016 rine populations inhabit deep, slow pools with abundant cover in cool or cold streams. Types of cover include boulders, concrete slabs, rip-rap, large woody debris, and undercut banks (Smith 1985; Stauffer et al. 2016). rbot are thought to be more active at night and are often associated with daytime shelter (Fischer 2000). "In Lake Superior, Burbot have been reported to excavate trenches in clay substrate for use as cover (Boyer et al. 1989)" (Stauffer et al. 2016).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Burbot are long-living and relatively slow growing. They can reach ages of 12+ in certain systems but ages of 8-12 are much more common. They reach sexual maturity between 3-8 years of age depending on their geographical location and the system that they're found in. Riverine populations tend to grow slower and die at younger ages than lake populations. For example, Susquehanna stream Burbot often die before they reach age 5 (Smith 1985; Fischer 2008). Burbot typically spawn from mid to late winter to early spring (December to April) often under the ice in water temperatures of 33 to 35°F (Smith 1985). Around those times, Burbot will move onto sand and gravel shoals (1.5 - 10 m deep) of lakes to begin spawning. Lake populations typically spawn within the lakes they inhabit, while most riverine populations often exhibit some form of migration, spawning under the ice of slow-moving water (Robins and Deubler 1955; Sorokin 1971; Stauffer et al. 2016). They are iteroparous, broadcast spawners that can spawn in pairs or in groups of dozens or more (sometimes forming a writhing ball). There is no nest preparation or parental care. Eggs and milt are released in the water column, later sinking to the bottom (Scott and Crossman 1973; Smith 1985). Fecundity can range from 45,000 to more than 1 million eggs (Smith 1985; Stauffer et al. 2016). Preferred spawning substrates in rivers are fine gravel, sand, or even fine silt. Whereas course gravel, sand, and cobble are preferred in lakes. Not all adults spawn every year. Various studies found that 1-30% of adult Burbot sampled would not have spawned in the year they were caught. Juvenile Burbot are pelagic until they reach adulthood and become almost entirely benthic with occasional trips into the shallows and rivers ( .

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Burbot include increased water temperatures, pollution (leading to acidification, eutrophication, and lower water quality), overfishing, habitat changes (e.g., changes from damming), Sea Lamprey predation on adult Burbots, Alewife predation on pelagic fry, and competition for food among juvenile Burbot (Kjellman 2003; Stapanian et al. 2010). Lake drawdowns and dams can negatively affect spawning conditions or the ability to spawn (Stapanian et al. 2010; Stauffer et al. 2016). Stauffer at al. (2016) reported an emerging issue of gonad anomalies of Burbot in Lake Erie.

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

**Yes:**__✓__ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

Targeted sampling for presence and abundance of Burbot should occur in locations where Burbot have been previously located. The Allegheny and Susquehanna watershed make up the southernmost Burbot populations in New York. These populations may currently be most at risk of these warming conditions. Decreasing Burbot populations within those watersheds would be the first sign of southern range shrinkage in New York. Research into the interspecific interactions between Burbot, Alewife, and Sea Lamprey in the various waterbodies where they co-occur may provide important details regarding threats to Burbot. Educating the public of the status and fragility of Burbot in connection with warming waters due to climate change may be fruitful. Stocking has been used in other states but may not be viable in New York without eliminating many of the threats that Burbot face (Hardy and Paragamian 2013). And as waters continue to warm, stocking to prevent extirpations may be ineffective.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Invasive/Problematic Species Control |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |
| **4.** Species Management | Ex-situ Conservation |
| **5.** Education & Awareness | Awareness & Communications |
| **6.** Law & Policy | Polices and Regulation |

**Table 2:** Recommended conservation actions for Burbot.

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# Species Status Assessment

**Common Name:** Cisco **Date Updated:**

**Scientific Name:** *Coregonus artedi* **Updated by:**

**Class:** Actinopterygii

**Family:** Salmonidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Cisco, also known as lake herring and tullibee, inhabits cold lakes and remains in deeper areas during the summer. It is native to ten watersheds in Great Lakes drainage, the Finger Lakes, lower elevations of the Adirondacks, and Chautauqua Lake. Abundance has declined in the westernmost watersheds and lower elevation lakes, including Lake Erie. Specifically it is extirpated from Chautauqua Lake, and has declined below detection in New York portions of Lake Erie (Carlson and Daniels, in prep.).

It is not native in six other watersheds mostly on the southern tier and many waters were stocked in the late 1800s and early 1900s.

Ciscoes occur in pelagic, cold-water Great Lakes and inland lake environments. During the winter months, they move into shallow coastal waters to spawn, but then return to deeper waters in the spring. Ciscoes are rarely found in waters above 17 to 18ºC. They can live in lakes with surface areas ranging from 20 to 19,000 acres, but are mostly found in lakes with an average surface area of 100 acres and depths of at least 10 m. Cisco-rich lakes tend to be oligotrophic (Joel 2014).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** Not listed

### b. Natural Heritage Program

i. **Global:** G5

ii. **New York:** S3 **Tracked by NYNHP?:** No

**Other Ranks:**

None

**Status Discussion:**

The status of the cisco was discussed at the SGCN Expert Meeting in the fall of 2014, even though it had not been nominated for consideration as SGCN at that time. The meeting attendees agreed that it should not be evaluated for listing as SGCN (Note by K. Corwin, April 2015).

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Unknown | Unknown | | | Choose an item. |
| **Northeastern US** | Yes | Stable | Stable | 1970s-2013 | | Choose an item. |
| **New York** | Yes | Unknown | Stable | | | Choose an item. |
| **Connecticut** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Massachusetts** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **New Jersey** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Pennsylvania** | Yes | Declining | Declining | | Not listed | No |
| **Vermont** | Yes | Stable | Stable | 2005-2013 | Not listed | Yes |
| **Ontario** | Yes | Stable | Stable | | Not listed | Choose an item. |
| **Quebec** | Yes | Unknown | Declining | | Special Concern | Choose an item. |

*Column options*
**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item
**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

## **Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

## **Trends Discussion** *(insert map of North American/regional):*

In North America, cisco are widely distributed throughout Canada and the Great Lakes region of the US and vary in their status across the range. This species seems to be in the most trouble at the edges of its range in British Columbia, Quebec, and the Maritimes.

Regionally in the U.S., Cisco are recovered only in Lake Superior; they are present in both Lake Huron and Lake Michigan but at lower levels of abundance. In the lower Great Lakes, Cisco are very rare in Lake Erie and at low abundance in Lake Ontario (J. Markham, personal communication, April 2015).

Cisco are rarely seen in Lake Erie, and mainly only in commercial netting in Ontario waters; only about 36 have been observed in the last 20 years (J. Markham personal communication, April 2015). This species has not been caught in the St. Lawrence River since 1989. It is still present in tributaries of the St. Lawrence River, Otsego Lake, and in various lakes in the Adirondacks including Lake Champlain. It is also present in the Finger Lakes area and Oneida Lake (Kraft et al. 2006). It was introduced by stocking to many waters in the late 1800s and early 1900s, both within and outside its native range. Many of the populations lost in the 20th century are likely failed introductions (Carlson and Daniels, in prep.).

Severe over-exploitation of ciscoes from 1930 to 1960 and competition with invasive rainbow smelt resulted in dramatic population declines; alewife is another competitor. However, rainbow smelt populations declined in Lake Erie during the 1970s and since that time, ciscoes have increased in some places. Since overfishing is no longer a problem, it is thought that competition with rainbow smelt and alewives has kept some cisco populations low. One of the motivations for restoring cisco populations is to control alewife populations. Alewives predate on the fry of fish like the economically important lake trout, and it is thought that more abundant cisco populations will help combat this (Joel 2014).

**Figure 1.** Cisco distribution

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

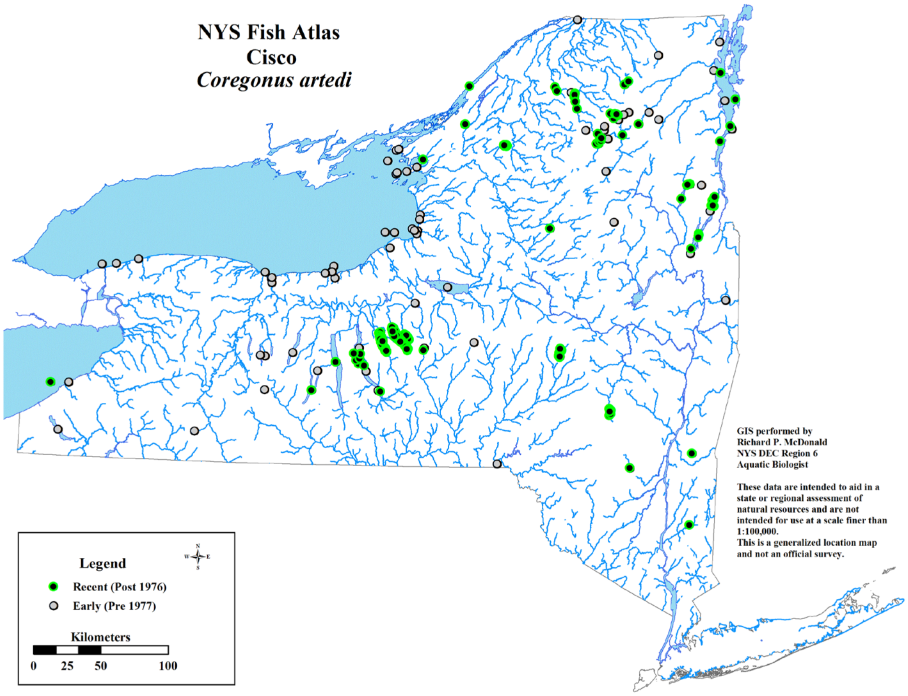

**Figure 2.** New York State Fish Atlas cisco locations.

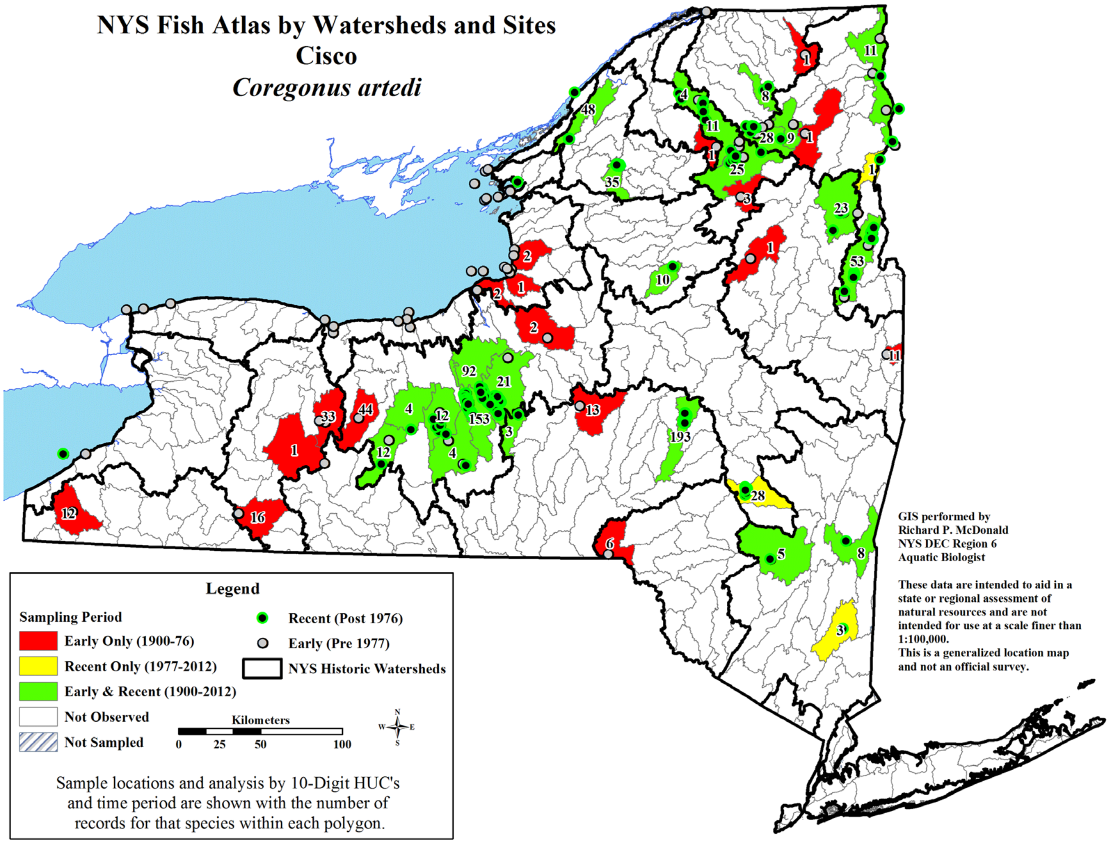

**Figure 3.** New York State Fish Atlas cisco locations by watershed.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| Pre 1993 | | 57 | |
| 1993-2002 | | | |
| 2003 - 2012 | | 37 | |
| 2013 - 2022 | | | |

**Table 1.** Records of cisco in New York.

### Details of historic and current occurrence:

### New York's Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 1-25% | Peripheral | |

*Column options*
**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

Summer-stratified Oligotrophic Lake

Winter-stratified Oligotrophic Lake

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| Yes | Yes | Declining | |

*Column options*
**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item
**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

Cisco are a pelagic, cold-water, lake species. They often form large schools at depths of 9- 91 m, and are most commonly found at depths ranging from 27-46 m (Wells 1968). They typically move into shallow waters in the winter to spawn and then move back to deeper waters, below the thermocline in spring (Scott and Crossman 1998). Of all the ciscos, *artedi* are most often found around inshore shoals and shallow water (Becker 1983). As young, their upper lethal water temperature is 26° C. In inland lakes they rarely occur in waters with temperatures above 17-18° C.

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Yes | Yes | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

### Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Cisco spawn in late November to mid-December and often arrive at spawning grounds when water temperatures are around 5-6° C. Spawning peaks when water temperatures fall below 4° C (Becker 1983). In inland lakes, spawning occurs in 1 to 3 m depths when ice begins to form around shores (Scott and Crossman 1998). In the Great Lakes spawning generally occurs in shallow waters (<20 m), but can occur at depths up to 64 m. Spawning has also been reported pelagically at 9-12 m below the water surface in much deeper water (Becker 1983, Scott and Crossman 1998). Generally, eggs are deposited at night over rocky substrates (Becker 1983). Cisco have been noted jumping and splashing during spawning.

Fecundity or reproductive capacity is directly related to the size of the female (Evers 1994). Since eggs are released in winter, they are slow to develop and often hatch in late April or early May after spring breakup (Becker 1983, Scott and Crossman 1998). Fry can be found in shallow, protected bays until they are about 1 month old (Becker 1983). Lake herring mature between 1 and 4 years and can reach 13 years of age. The scales of this fish are easy to age, especially ages 1 to 3 (Scott and Crossman 1998).

Cisco are plankivores and feed mainly on algae, Cladocera, copepods, and *Mysis* but may also feed on mollusks, insect larvae, and small fish. Young typically need light to feed. Cisco are a main food item for lake trout. Other predators include rainbow trout, northern pike, burbot, sea lamprey, yellow perch, and walleye (Scott and Crossman 1998). Many species predate upon cisco eggs including brown bullheads, yellow perch, lake whitefish, mudpuppies, and cisco (Becker 1983).

Cisco are susceptible to summer kills. Low oxygen levels in the hypolimnion may push this species into waters where temperatures are lethal (Becker 1983).

Cisco are constant movers. They have been shown to do vertical diurnal movements to feed directly under the ice at night. They tend to live out their life within a few kilometers of their hatching site (Becker 1983), though historically in Lake Michigan, fish that spawned around islands and the mouth of the Detroit River in the west basin migrated more than 200 miles to the east basin (J. Markham personal communication, April 2015). A tagging study in Lake Michigan found that individuals did not move greater than 81 km from the original tagging point (Smith and Van Oosten 1940).

## VI. Threats *(from NY 2015 SWAP or newly described)*

April 2015. Jim McKenna (jemckenna@usgs.gov) notes: “I’ve looked at the Cisco document and the only thing that rubs me the wrong way is the “L” rating on severity of Extreme Temperatures. I would have expected it to be higher, because warm winter can affect ice cover protection on spawning areas and may have strong effects on hatching success, and it is thought that spring temperature conditions can affect larval success. "

Historically, cisco have been one of the most important and productive commercial species in the Great Lakes (Becker 1983). Declines are attributed to over-exploitation, competition, and pollution. Smelt, alewife, and bloater have all been suggested as competitors of cisco (Anderson and Smith 1971, Becker 1983). The greatest threat to cisco populations of inland lakes is eutrophication (Becker 1983, Latta 1995). Enrichment of inland lakes causes oxygen depletion of deep waters and forces individuals to move into the upper strata where temperatures are unfavorable and cause summer kills. Hence, cisco are excellent indicators of eutrophication and global warming (Latta 1995).

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

**Yes:** ✓ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law.

The Adirondack Park was created by the New York State Legislature in 1892. State-owned Forest Preserve comprises 2.6 million acres (42%) and is protected by the state constitution as "forever wild." One million acres of the Forest Preserve is further classified as wilderness.

NYS DEC harvest regulations- size and creel limits.

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

** Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use green headings 1-7 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection). http://www.conservationmeasures.org/initiatives/threats-actions-taxonomies/actions-taxonomy

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| 3 Species Management | 3.4 Captive Breeding (stocking into newly recovered acid lakes) |
| 3 Species Management | 3.4 Captive Breeding (enhance existing populations) |
| 3 Species Management | 3.2 Recovery Plan Implementation (lakes Erie and Ontario) |
| 2 Land/Water Management | 2.2 Invasive Species/Pathogen Control (alewife, round goby, smelt, black bass, yellow perch, northern pike, sea lamprey, dreissenid mussels) |
| 2 Land/Water Management | 2.3 Habitat and Natural Process Restoration (restore spawning habitat) |

| | |
|---|---|
| 2 Land/Water Management | 2.3 Habitat and Natural Process Restoration (restore water quality; acid, eutrophication, sedimentation) |

**Table 2.** Recommended conservation actions for cisco.

## VII. References

Anderson, E.D. and L.L. Smith, Jr. 1971. Factors affecting abundance of lake herring (*Coregonus artedi* Lesueur) in western Lake Superior. Transactions of the American Fisheries Society 100(4): 691-707.

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| | |
|---|---|
| **Originally prepared by** | Jenny Murtaugh/Lisa Holst |
| **Date first prepared** | March 24, 2015 |
| **First revision** | April 1, 2015 |
| **Latest revision** | Transcribed March 2024 |

# Species Status Assessment Cover Sheet

**Species Name:** Comely Shiner **Date Updated:** January 2023

**Current Status:** Not Listed – HPSGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** S2?

**Distribution:** The Comely Shiner is found from the Lower Hudson and Susquehanna drainages in New York south to the Pee Dee drainage in South Carolina. In New York, they are native to the Chemung, Delaware, and Susquehanna watersheds, and are considered nonnative to the Lower Hudson, Mohawk, Newark Bay, and Oswego watersheds.

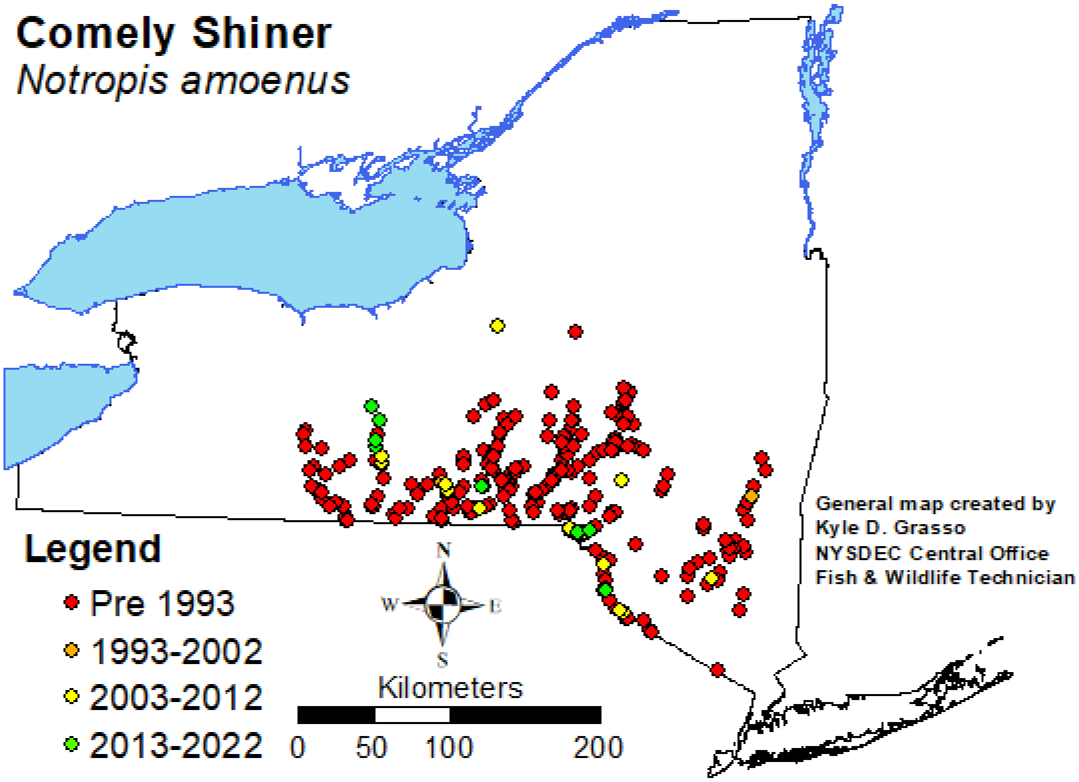
**Habitat:** Comely Shiners inhabit warm, low to moderate gradient, medium to large streams and rivers. They also inhabit lakes and reservoirs, however, Smith (1985) reported them as marginal habitats. Stauffer et al. (2016) stated that they are rarely present in headwaters. They can reportedly tolerate a wide range of currents but are most frequently collected in slow runs and pools 2 feet or deeper over sand, gravel, rubble, or silt substrate.

**Life History:** Very little is known about the life history of Comely Shiners. Maturity for both sexes is reached at approximately 50 mm SL, and females appear to attain larger sizes than males. Stauffer et al. (2016) found gravid females in the lower Susquehanna River in June. NatureServe reported that spawning largely occurs in July. This species is primarily a summer spawner, with most collections of tuberculate males and ripe or near ripe females occurring during late May-late August. The non-adhesive eggs are broadcast over abandoned nests of other species and settle into spaces between pebbles.

**Threats:** The introduction of Mimic Shiner in the Chemung and Susquehanna watersheds has been implicated in the decline of Swallowtail Shiner. This may also be the case for the Comely Shiner. Other threats to the Comely Shiner include pollution, deforestation and loss of riparian corridors, impoundment development, channelization, and siltation from poor land use practices and development. Because of their limited distribution, they are also vulnerable to habitat losses due to anthropogenic influences such as water withdrawals or environmental disturbances such as drought.

**Population trend:** In New York, the Comely Shiner is native to the Chemung, Delaware, and Susquehanna watersheds, and is considered nonnative to the Lower Hudson, Mohawk, Newark Bay, and Oswego watersheds. Historically found in up to 92 waterbodies across the state, there are only 23 records in 10 waterbodies since 2003. Their range and abundance have significantly declined in the Susquehanna watershed since the mid-1900s, and they may be extirpated from the Chemung watershed. Overall, current Comely Shiner populations appear to be most stable in the Delaware and Oswego watersheds.

**Recommendation:** It is recommended that the Comely Shiner be listed as Threatened due to the significant range declines in the Chemung and Susquehanna watersheds.



# Species Status Assessment

**Common Name:** Comely Shiner **Date Updated:** January 2023

**Scientific Name:** *Notropis amoenus* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Comely Shiner is in the class Actinopterygii and the family Cyprinidae (minnows and carps). The Comely Shiner is found from the Lower Hudson and Susquehanna drainages in New York south to the Pee Dee drainage in South Carolina (Self and Bettinger 2015; NatureServe 2022). There are only two records of Comely Shiners in South Carolina, and they may be a result of introduction (Jenkins and Burkhead 1994; Self and Bettinger 2015). In New York, they are native to the Chemung, Delaware, and Susquehanna watersheds, and are considered nonnative to the Lower Hudson, Mohawk, Newark Bay, and Oswego watersheds (Carlson et al. 2016). Although Comely Shiners are considered nonnative to the Lower Hudson, Mohawk, Newark Bay, and Oswego watersheds, they were likely introduced early (Carlson et al. 2016). Historically found in up to 92 waterbodies across the state, there are only 23 records in 10 waterbodies since 2003. Their range and abundance have significantly declined in the Susquehanna watershed since the mid-1900s, and they may be extirpated from the Chemung watershed. Overall, current populations appear to be most stable in the Delaware and Oswego watersheds (Carlson et al. 2016). Comely Shiners inhabit warm, low to moderate gradient, medium to large streams and rivers (Smith 1985; Stauffer et al. 2016). They also inhabit lakes and reservoirs, however, Smith (1985) reported them as marginal habitats. They can reportedly tolerate a wide range of currents but are most frequently collected in slow runs and pools 2 feet or deeper over sand, gravel, rubble, or silt substrate (Snelson 1968; Smith 1985; Stauffer et al. 2016; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – HPSGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S2? **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)

### Status Discussion:

The Comely Shiner is not currently federally listed or listed in the state of New York. However, they are currently listed as a HPSGCN in New York. The Comely Shiner is globally ranked as Secure by NatureServe.

# II. Abundance and Distribution Trends

## a. North America

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

## b. Northeastern U.S. (USWFS Region 5)

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

## c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:**__✓__ **No Data:**_____

**MASSACHUSETTS** **Not Present:**__✓__ **No Data:**_____

**VERMONT** **Not Present:**__✓__ **No Data:**_____

**ONTARIO** **Not Present:**__✓__ **No Data:**_____

**QUEBEC** **Not Present:**__✓__ **No Data:**_____

**NEW JERSEY** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

### ii. Distribution

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Special Concern – S3 **SGCN?:** Yes

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** May have been recent declines (2016)

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

## d. New York

### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Widespread declines since early to mid 1900s

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

The range wide trend over the last 10 years is unknown but probably relatively stable or slowly declining (NatureServe 2022). Stauffer et al. (2016) stated that in Pennsylvania, “there may have been recent declines in some waterways, and in all drainages from which it has been reported, but more survey work is needed.”

In New York, the Comely Shiner is native to the Chemung, Delaware, and Susquehanna watersheds, and is considered nonnative to the Lower Hudson, Mohawk, Newark Bay, and Oswego watersheds (Carlson et al. 2016). Historically found in up to 92 waterbodies across the state, there are only 23 records in 10 waterbodies since 2003. Their range and abundance have significantly declined in the Susquehanna watershed since the mid-1900s, and they may be extirpated from the Chemung watershed. Although Comely Shiners are considered nonnative to the Lower Hudson, Mohawk, Newark Bay, and Oswego watersheds, they were likely introduced early (Carlson et al. 2016). Records in the Lower Hudson watershed have declined since 1991 with only two records in the watershed since: Hudson River in 2000 and Shawangunk Kill in 2010 (Carlson et al. 2016). In the Mohawk watershed, “Greeley (1935) noted that two specimens were collected from the Erie Canal at Crane Creek.” “This species has not been collected in the watershed since 1934, suggesting that it is either extirpated or that the two specimens were misidentified” (Carlson et al. 2016). In the Newark Bay watershed, “Greeley (1937) reported the presence of Comely Shiners in the Ramapo River; this is the only record of the species in this watershed. The entire watershed has undergone severe channel modifications and intense urbanization over the last eight decades, which may explain the apparent extirpation of this minnow” (Carlson et al. 2016). Comely Shiners were reported in the Oswego watershed in Seneca Lake in 1939 and Catherine Creek in 1943. Populations in the Oswego watershed have persisted with catches in Catherine Creek in 2003, Oneida Lake in 2008, and Seneca Lake in 2010, 2015, and 2020 (Carlson et al. 2016). Overall, current populations appear to be most stable in the Delaware and Oswego watersheds (Carlson et al. 2016).

“Some of the shiner species are often under-reported in stream surveys, particularly when field procedures are not connected to archived samples and identifications are difficult. This is unfortunate when major declines in their populations go unnoticed. The southern watersheds of New York may have fallen victim to these kinds of oversights, particularly the Swallowtail Shiner, Comely Shiner, and Satinfin Shiner” (Carlson 2013).

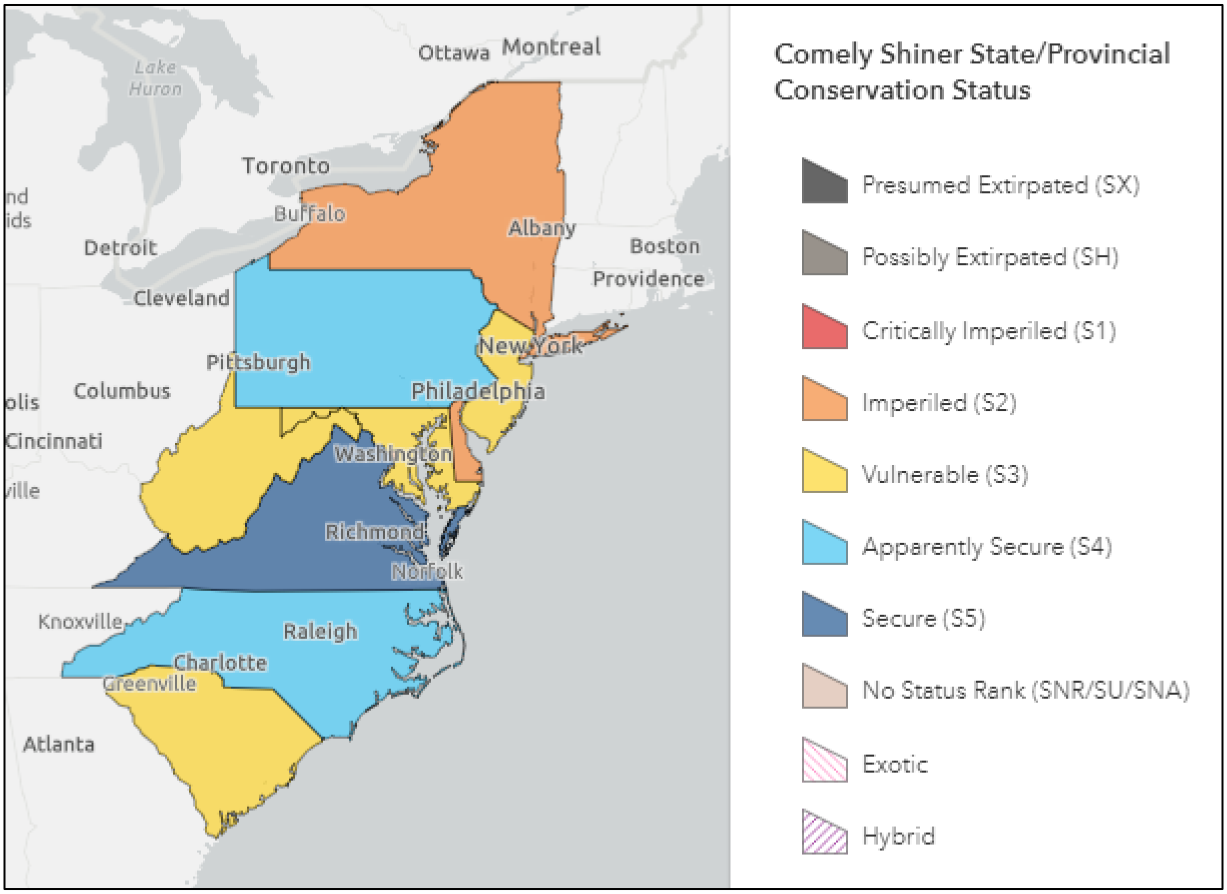


**Figure 1:** Comely Shiner distribution and status (Source: NatureServe 2022).

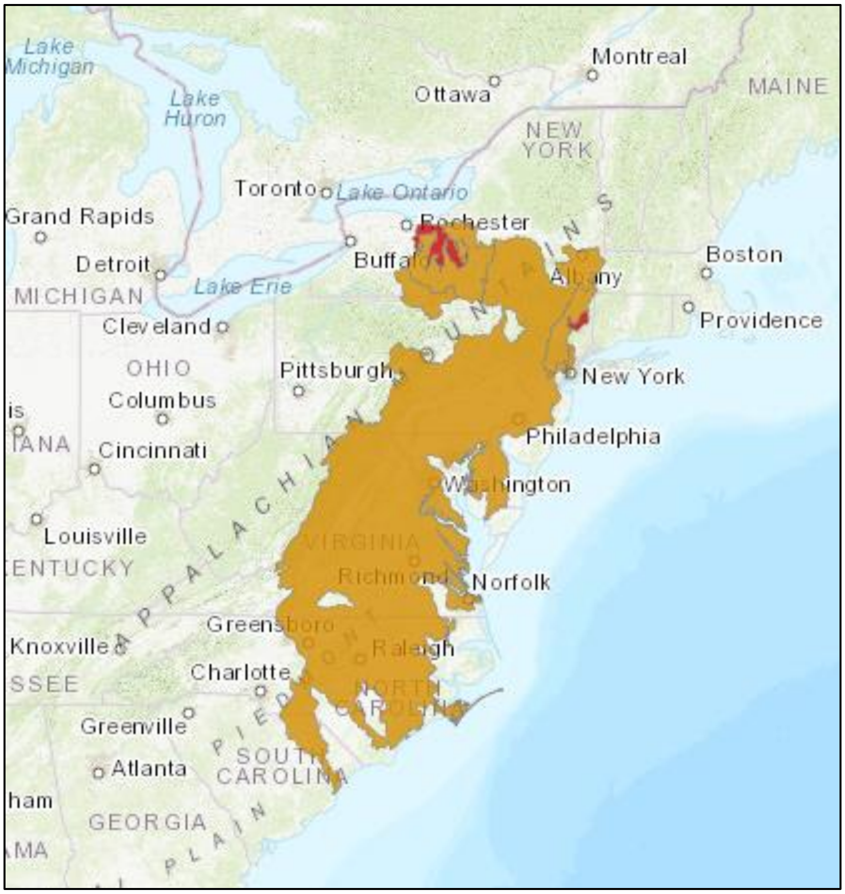


**Figure 2:** Comely Shiner distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

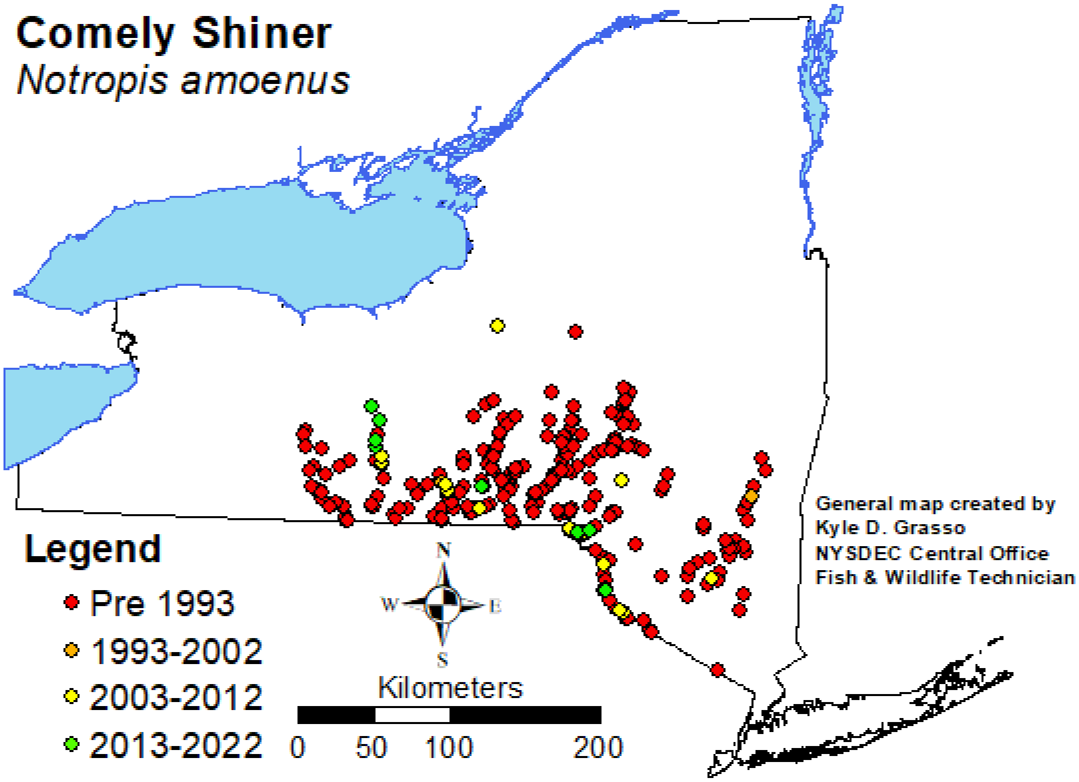


**Figure 3:** Records of Comely Shiner in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 281 | 92 | 11-25% |
| **1993-2002** | 4 | 4 | 11-25% |
| **2003 - 2012** | 15 | 9 | 11-25% |
| **2013 - 2022** | 8 | 4 | 11-25% |

**Table 1:** Records of Comely Shiner in New York.

### Details of historic and current occurrence:

In New York, the Comely Shiner is native to the Chemung, Delaware, and Susquehanna watersheds, and is considered nonnative to the Lower Hudson, Mohawk, Newark Bay, and Oswego watersheds (Carlson et al. 2016). Historically found in up to 92 waterbodies across the state, there are only 23 records in 10 waterbodies since 2003. Comely Shiners were first caught in the Chemung, Delaware, and Susquehanna watersheds in 1937, 1935, and 1931 respectively. The last Comely Shiner record in the Chemung watershed was from Sing Sing Creek in 1977 (Carlson et al. 2016). The last Comely Shiner records from the Delaware and Susquehanna watersheds are from 2017 and 2016 respectively. Their range and abundance have significantly declined in the Susquehanna watershed since the mid-1900s, and they may be extirpated from the Chemung watershed. Populations appear to be more stable in the Delaware watershed (Carlson et al. 2016).

Although Comely Shiners are considered nonnative in the Lower Hudson, Mohawk, Newark Bay, and Oswego watersheds, they were likely introduced early (Carlson et al. 2016). They were reported in the Lower Hudson watershed as early as 1934 in Coxsackie Creek and in several major tributaries (Wallkill River, Rondout Creek, and Esopus Creek) in 1936 (Greeley 1937; Carlson et al. 2016). Records in the Lower Hudson watershed have declined since 1991 with only two records in the watershed since: Hudson River in 2000 and Shawangunk Kill in 2010 (Carlson et al. 2016). In the Mohawk watershed, “Greeley (1935) noted that two specimens were collected from the Erie Canal at Crane Creek.” “This species has not been collected in the watershed since 1934, suggesting that it is either extirpated or that the two specimens were misidentified” (Carlson et al. 2016). In the Newark Bay watershed, “Greeley (1937) reported the presence of Comely Shiners in the Ramapo River; this is the only record of the species in this watershed. The entire watershed has undergone severe channel modifications and intense urbanization over the last eight decades, which may explain the apparent extirpation of this minnow” (Carlson et al. 2016). Comely Shiners were reported in the Oswego watershed in Seneca Lake in 1939 and Catherine Creek in 1943. Populations in the Oswego watershed have persisted with catches in Catherine Creek in 2003, Oneida Lake in 2008, and Seneca Lake in 2010, 2015, and 2020 (Carlson et al. 2016). Overall, current populations appear to be most stable in the Delaware and Oswego watersheds (Carlson et al. 2016).

“Some of the shiner species are often under-reported in stream surveys, particularly when field procedures are not connected to archived samples and identifications are difficult. This is unfortunate when major declines in their populations go unnoticed. The southern watersheds of New York may have fallen victim to these kinds of oversights, particularly the Swallowtail Shiner, Comely Shiner, and Satinfin Shiner” (Carlson 2013).

### New York’s Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Classification of New York Range**

**Core:**_____

**Peripheral:** ✓

**Disjunct:**_____

**Distance to core population:**

Core pop. to the south

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to large rivers

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:** ✓ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:**_____

**Habitat Specialist?** **Yes:**_____ **No:** ✓

**Indicator Species?** **Yes:**_____ **No:** ✓

### Habitat Discussion:

Comely Shiners inhabit warm, low to moderate gradient, medium to large streams and rivers (Smith 1985; Stauffer et al. 2016). They also inhabit lakes and reservoirs, however, Smith (1985) reported them as marginal habitats. Stauffer et al. (2016) stated that they are rarely present in headwaters. They can reportedly tolerate a wide range of currents but are most frequently collected in slow runs and pools 2 feet or deeper over sand, gravel, rubble, or silt substrate (Snelson 1968; Smith 1985; Stauffer et al. 2016; NatureServe 2022).

## V. 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 *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Very little is known about the life history of Comely Shiners (Smith 1985; Werner 2004; Stauffer et al. 2016). "Maturity for both sexes is reached at approximately 50 mm SL, and females appear to attain larger sizes than males (Jenkins and Burkhead 1994)" (Stauffer et al. 2016). Stauffer et al. (2016) found gravid females in the lower Susquehanna River in June. NatureServe reported that spawning largely occurs in July. "This species is primarily a summer spawner, with most collections of tuberculate males and ripe or near ripe females occurring during late May-late August (Snelson 1968). The non-adhesive eggs are broadcast over abandoned nests of other species and settle into spaces between pebbles (Loos et al. 1979)" (Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

Similar to the Swallowtail Shiner, there have been no studies to assess Comely Shiner threats, limiting factors, or overall vulnerability. Comely Shiners and Swallowtail Shiners have had similar patterns of decline in the Chemung and Susquehanna watersheds since the early 1900s. The introduction of Mimic Shiner in the Chemung and Susquehanna watersheds has been implicated in the decline of Swallowtail Shiner via competition for resources (Stauffer et al. 2016; NYNHP 2022). This may also be the case for the Comely Shiner. The Mimic Shiner has not been recorded in the Delaware watershed; however, further spread could endanger the more stable Comely Shiner populations in the Delaware watershed (Carlson et al. 2016).

According to Self and Bettinger (2015), "challenges to this species are similar to those of other aquatic fauna and include point and nonpoint source pollution, deforestation and loss of riparian corridors, impoundment development, channelization and siltation from poor land use practices and unplanned or poorly planned urban and suburban development. Because of its limited distribution, it is also vulnerable to habitat losses due to anthropogenic influences such as water withdrawals or environmental disturbances such as drought" (Self and Bettinger 2015).

"Some of the shiner species are often under-reported in stream surveys, particularly when field procedures are not connected to archived samples and identifications are difficult. This is unfortunate when major declines in their populations go unnoticed. The southern watersheds of New York may have fallen victim to these kinds of oversights, particularly the Swallowtail Shiner, Comely Shiner, and Satinfin Shiner" (Carlson 2013).

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

**Yes:** ✓ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

“Management needs are difficult to recommend until additional research addresses reasons for population declines.” “Research focusing on the effects of Mimic Shiner on native shiners may help guide management practices” (NYNHP 2022). Recommended actions include sample in all known watersheds, inventory habitat in streams currently and formerly occupied by the species, and work to restore water quality in the Susquehanna watershed. Stocking of Comely Shiners in the Chemung and Susquehanna watersheds may be a viable solution. However, the presence of Mimic Shiners in this watershed may make recovery difficult. Deepwater sampling in the Susquehanna is needed to confirm whether populations remain.

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat research:

-Inventory the habitat in streams currently and formerly occupied by the species.

Habitat restoration:

-Habitat losses and restoration are part of a State Wildlife Grants project from 2003 directed at the Susquehanna watershed.

Population monitoring:

-More sampling is needed in these watersheds.

The 2015 State Wildlife Action Plan included the following recommendations:

-Survey extant populations and restore historic habitat of Comely Shiner in the Delaware and Susquehanna watersheds.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Invasive/Problematic Species Control |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |

| | |
|---|---|
| **4.** Species Management | Species Recovery |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Comely Shiner.

## VII. References

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Stauffer, J. R., Jr., R. W. Criswell, and D. P. Fischer. 2016. The fishes of Pennsylvania. Cichlid Press. El Paso, Texas. 556 pp.

Werner, R. G. 2004. Freshwater fishes of the northeastern United States: A field guide. Syracuse University Press. Syracuse, New York. 335 pp.

# Species Status Assessment Cover Sheet

**Species Name:** Deepwater Sculpin **Date Updated:** January 2023

**Current Status:** Endangered – SGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** S1

**Distribution:** The Deepwater Sculpin is only found in the Great Lakes and a few deep, oligotrophic lakes in Canada.

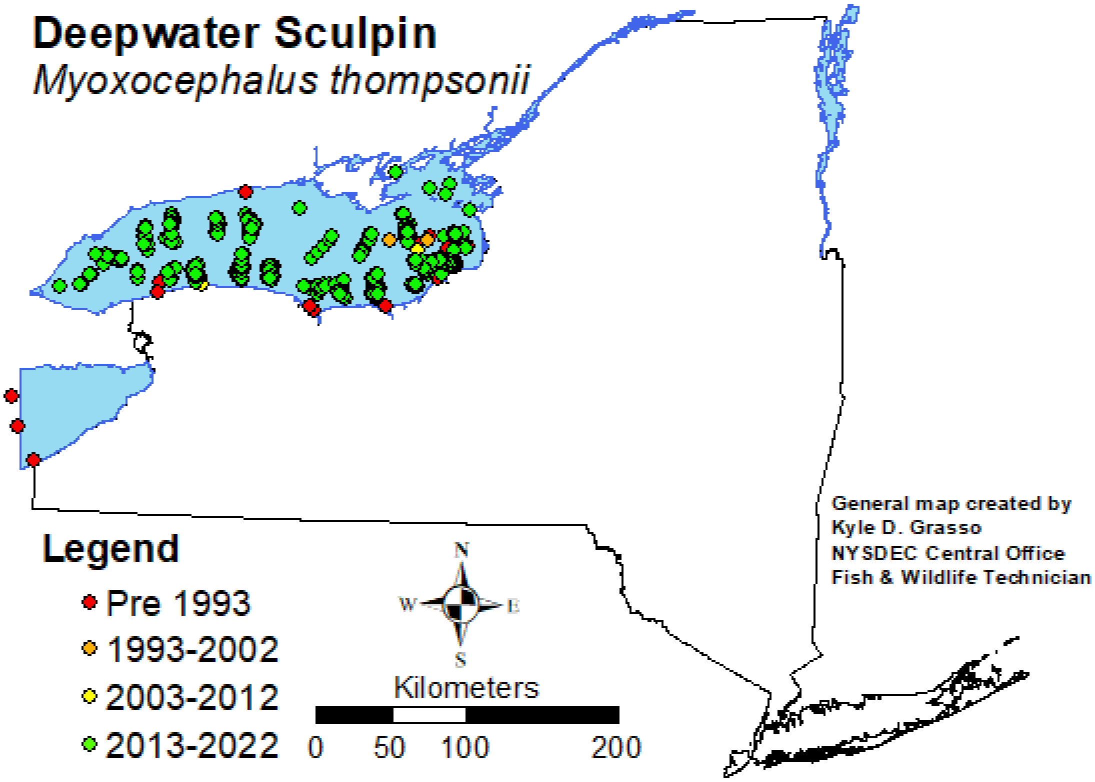
**Habitat:** Deepwater Sculpin inhabit the deep water of cold, deep lakes with highly oxygenated water. Smith (1985) reported preferred temperatures of 32-41°F. Deepwater Sculpin have been taken from 20 to 366 m. Adults and juveniles are benthic, while the larvae are pelagic. Smith (1985) and COSEWIC (2006) reported that adult Deepwater Sculpin preferred depths of 70-110 m, while Weidel et al. (2017) reported densities increased with depth from 120-200 m in Lake Ontario. Larval Deepwater Sculpin are most commonly observed in relatively shallow water (<50 m).

**Life History:** The life history of the Deepwater Sculpin is poorly understood. Selgeby (1988) reported a maximum age of 7 in Lake Superior, Black and Lankester (1981) reported a maximum age of 5 in Burchell Lake, Ontario, and COSEWIC (2017) reported they can live up to 9 years in Lake Ontario. Age at maturity in Burchell Lake, Ontario was estimated to be age 3 for females and age 2 for males, but this likely differs from Deepwater Sculpin in the Great Lakes. Spawning period is unknown and there are discrepancies among reported spawn timings. However, Selgeby (1988) suggested that spawning occurred in Lake Superior from late November to mid-May. The latter is similar to what Black and Lankester (1981) found in an inland Ontario lake, suggesting spawning occurred in late fall or early winter. Similar timing has been observed in Lake Michigan, with larvae hatching in March and then moving to shallower waters to return to deeper waters by late fall.

**Threats:** The primary threats to Deepwater Sculpin include eutrophication that reduces dissolved oxygen in deep water and predation by piscivores and nonnative planktivores. Other nonnative species including the quagga mussel may cause ecosystem wide effects in Lake Ontario. Increased water temperatures will likely be a concern.

**Population trend:** In New York, Deepwater Sculpin are currently only found in Lake Ontario, but some historic Lake Erie records do exist. Deepwater Sculpin were common in Lake Ontario in the late 1800s and early 1900s; however, by the mid-1900's the population in Lake Ontario had dramatically declined and the species was not caught in the lake from 1972-1998. In the past 25 years, their abundance has increased to where they are one of the most abundant Lake Ontario prey fishes captured.

**Recommendation:** It is recommended that the Deepwater Sculpin be downlisted from Endangered to Special Concern due to their recovery in Lake Ontario in the last 25 years.



# Species Status Assessment

**Common Name:** Deepwater Sculpin **Date Updated:** January 2023

**Scientific Name:** Myoxocephalus thompsonii **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cottidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Deepwater Sculpin is in the class Actinopterygii and the family Cottidae (sculpins). The Deepwater Sculpin is only found in the Great Lakes and a few deep, oligotrophic lakes in Canada (Sheldon et al. 2008; Weidel et al. 2017). In New York, they are currently only found in Lake Ontario, but some historic Lake Erie records do exist. Deepwater Sculpin were common in Lake Ontario in the late 1800s and early 1900s; however, by the mid-1900's the population in Lake Ontario had dramatically declined and the species was possibly extirpated from the lake (Stone 1947; Wells 1969; Christie 1973; Brandt 1986; Weidel et al. 2019). During this time, piscivore abundance declines coupled with increased nutrient inputs allowed populations of nonnative planktivores that feed on larval Deepwater Sculpin to flourish (Christie 1973; Schelske 1991; Sly 1991; Elrod et al. 1995; Estepp and Reavie 2015). In the late 1900s, large numbers of salmonids were stocked, the Clean Water Act was enacted, and filter feeding *Dreissenid* mussels proliferated (Mills et al. 2003). The combination of these factors increased predation on nonnative planktivores, decreased nutrient inputs, and increased light penetration (O'Gorman et al. 2000; Dove and Chapra 2015; Holeck et al. 2015; Weidel et al. 2019). As a result, Alewife and Rainbow Smelt populations began to decline and shift to deeper water in early spring away from larval Deepwater Sculpin habitat. This allowed for the survival of larval Deepwater Sculpin and recovery in Lake Ontario began and has continued to this day (Geffen and Nash 1992; Owens et al. 2003; Weidel et al. 2017). Deepwater Sculpin inhabit the deep water of cold, deep lakes with highly oxygenated water (Smith 1985; COSEWIC 2017). Adults and juveniles are benthic while the larvae are pelagic (NatureServe 2022; Weidel et al. 2017). Smith (1985) and COSEWIC (2006) reported that adult Deepwater Sculpin preferred depths of 70-110 m, while Weidel et al. (2017) reported densities increased with depth from 120-200 m in Lake Ontario. Larval Deepwater Sculpin are most commonly observed in relatively shallow water (<50 m) (Mansfield et al. 1983; Geffen and Nash 1992; Weidel et al. 2019).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Endangered – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): See Status Discussion

### Status Discussion:

In New York, the Deepwater Sculpin is currently listed as Endangered and SGCN. They are globally ranked as Secure by NatureServe.

Comments from COSEWIC: The species was considered a single unit until 1987, when the “Great Lakes Populations” unit was separated from the whole population and listed as Threatened. In April 2006, the species was made into two formal units and the "Great Lakes - Upper St. Lawrence populations" unit was designated as Special Concern and the “Western Populations” was designated as Not At Risk. In April 2017, their status was reexamined. The "Great Lakes - Upper St. Lawrence populations" unit was reconfirmed as Special Concern, and the “Western Populations” unit was split into five more units. The “Southern Hudson Bay-James Bay populations” unit was designated Data Deficient, the “Waterton Lake population” unit was designated Special Concern, and the “Saskatchewan-Nelson River populations”, “Western Hudson Bay populations”, and the “Western Arctic populations” units were designated Not At Risk.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:** ✓ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Rare larval catches in Lake Erie (1932, 1995)

**Listing Status:** Extirpated – SX **SGCN?:** No

**ONTARIO** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Special Concern – S4 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Special Concern – S1S2 **SGCN?:** N/A

### d. New York

**i. Abundance**

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Annual bottom trawl surveys are done in Lake Ontario by state and federal agencies.

**Trends Discussion** *(insert map of North American/regional):*

Deepwater Sculpin were common in Lake Ontario in the late 1800s and early 1900s; however, by the mid-1900's the population in Lake Ontario had dramatically declined and the species was possibly extirpated from the lake (Stone 1947; Wells 1969; Christie 1973; Brandt 1986; Weidel et al. 2019). During this time, mineral nutrient inputs increased from sewage inputs and phosphorus-laden fertilizers, and piscivore abundance was declining because of overfishing and Sea Lamprey predation. This resulted in the lake changing from oligotrophic to mesotrophic (Christie 1973; Schelske 1991; Sly 1991; Elrod et al. 1995; Estepp and Reavie 2015). As a result, populations of nonnative planktivores (Alewife and Rainbow Smelt) that prey on the pelagic Deepwater Sculpin larvae flourished. Deepwater Sculpin were not caught in the wide variety of Lake Ontario bottom trawl surveys from 1972-1995 and were listed as Endangered in New York in the mid-1980s (Weidel et al. 2019).

In the late 1900s, large numbers of salmonids were stocked, the Clean Water Act was enacted, and filter feeding *Dreissenid* mussels proliferated (Mills et al. 2003). The combination of these factors increased predation on nonnative planktivores, decreased nutrient inputs and productivity, and increased light penetration, returning Lake Ontario to an oligotrophic state (O'Gorman et al. 2000; Dove and Chapra 2015; Holeck et al. 2015; Weidel et al. 2019). As a result, Alewife and Rainbow Smelt populations began to decline and shift to deeper water in early spring away from larval Deepwater Sculpin habitat. Planktivore biomass decline in shallow water (20-50m) were estimated at about 90%, allowing for the survival of larval sculpin and recovery in Lake Ontario to begin (Geffen and Nash 1992; Owens et al. 2003; Weidel et al. 2017).

Deepwater Sculpin were officially redetected in 1996 and their density estimates have continually increased into 2017, when they were reported as the second most abundant prey fish in Lake Ontario (Weidel et al. 2018; Weidel et al. 2019). “Which events, or series of conditions, specifically aided Deepwater Sculpin recovery are difficult to determine because many of the changes occurred simultaneously and could have acted in concert” (Weidel et al. 2019). Population growth was estimated at roughly 61% per year and by 2016, Lake Ontario biomass and density was comparable to Lake Superior (Weidel et al. 2017). Weidel et al. (2017) found that condition did not decrease as densities increase suggesting that prey resources may not limit Deepwater Sculpin in Lake Ontario. “The decline and subsequent recovery of Lake Ontario Deepwater Sculpin over the past century provides an example where a species’ recovery resulted from changing ecological conditions rather than management actions specifically directed at their recovery.” “Whether the current Deepwater Sculpin population came from a remnant Lake Ontario population, from upstream Great Lakes’ populations, or from a combination of both is unknown” (Weidel et al. 2019).

In Lake Erie, Deepwater Sculpin are considered absent except for occasional catches of larvae. It has been hypothesized that these larval Deepwater Sculpin likely drifted into Lake Erie from upstream sources such as Lake Huron. Transportation via ballast water has also been suggested as a potential means of introduction into Lake Erie (Roseman et al. 1998; Briski et al. 2012; Weidel et al. 2019).

Annual trawl surveys in Lake Michigan, Huron, and Superior have commonly caught Deepwater Sculpin since the 1970s, however abundance indices suggest that declines have been observed in the past 30 years (Bronte et al. 2003; Madenjian et al. 2005; Riley and Adams 2010; Weidel et al. 2019). “Lake Ontario biomass estimates ranged between 2 and 2.5 kg/ha while Lake Superior have been 1–3 kg/ha. Lake Huron and Lake Michigan reported densities generally lower (<1. 0–1.0 kg/ha) than reported for Lake Superior and Lake Ontario” (Weidel et al. 2019). “While Lake Ontario abundance may be similar to currently reported estimates in Lakes Michigan and Huron, it is important to recognize trawl surveys in those lakes sample to a maximum depth of ~110 m, while maximum lake depths are 281 and 229 m, respectively. If Deepwater Sculpin densities are higher in deeper habitats of those lakes, as we observe in Lake Ontario, the current Lake Huron and Lake Michigan estimates may be biased low” (Weidel et al. 2017).

“According to fish survey and physical lake characteristics gathered in 2004 (T. Sheldon, unpubl. data), it is possible that populations in Lac des Iles and Heney Lake in Quebec may be declining, or have disappeared, due to changing lake conditions (eutrophication) in the past 20 years (Sheldon et al. unpubl. data.)” (COSEWIC 2006).

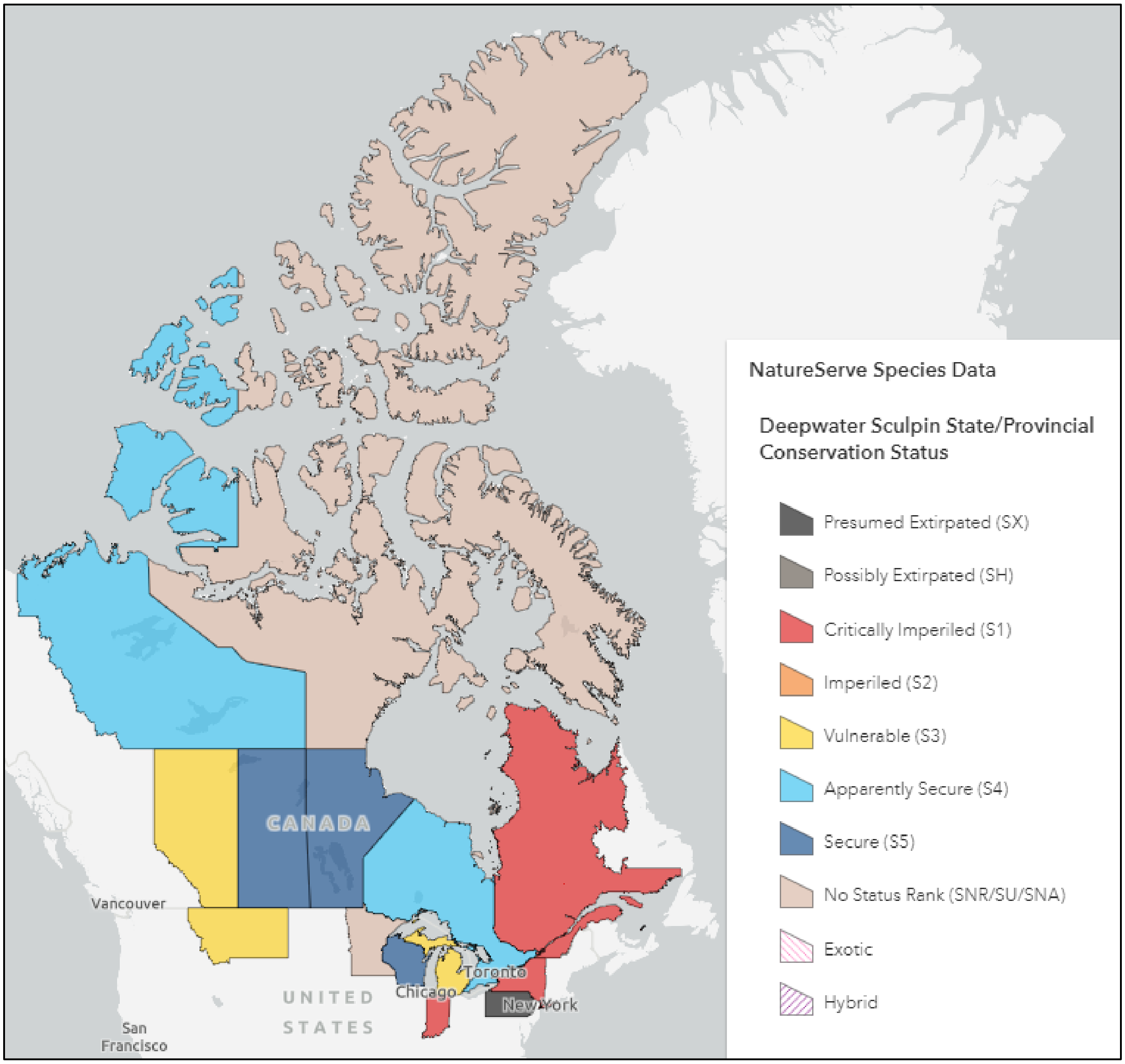


**Figure 1:** Deepwater Sculpin distribution and status (Source: NatureServe 2022).

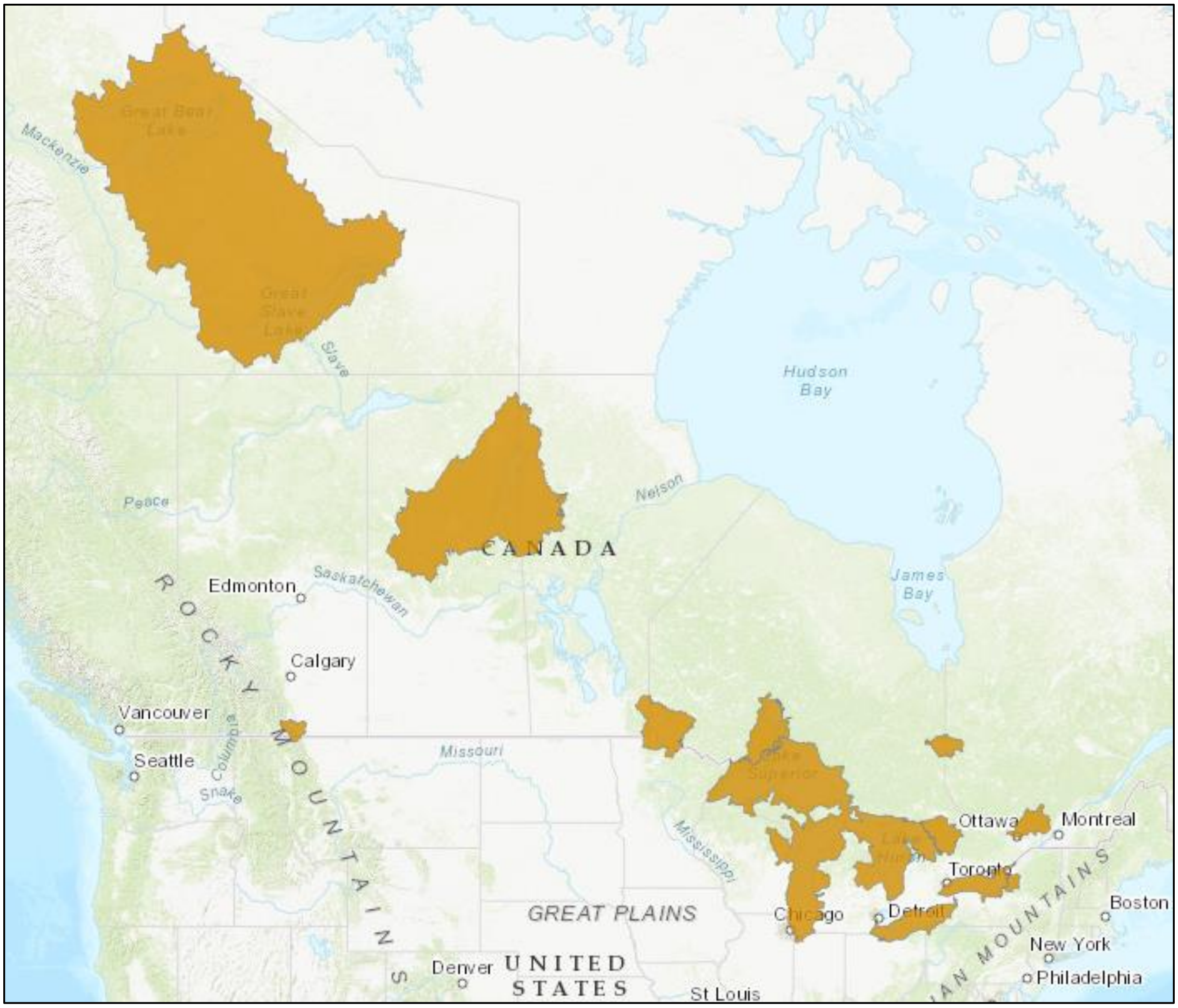


**Figure 2:** Deepwater Sculpin distribution (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

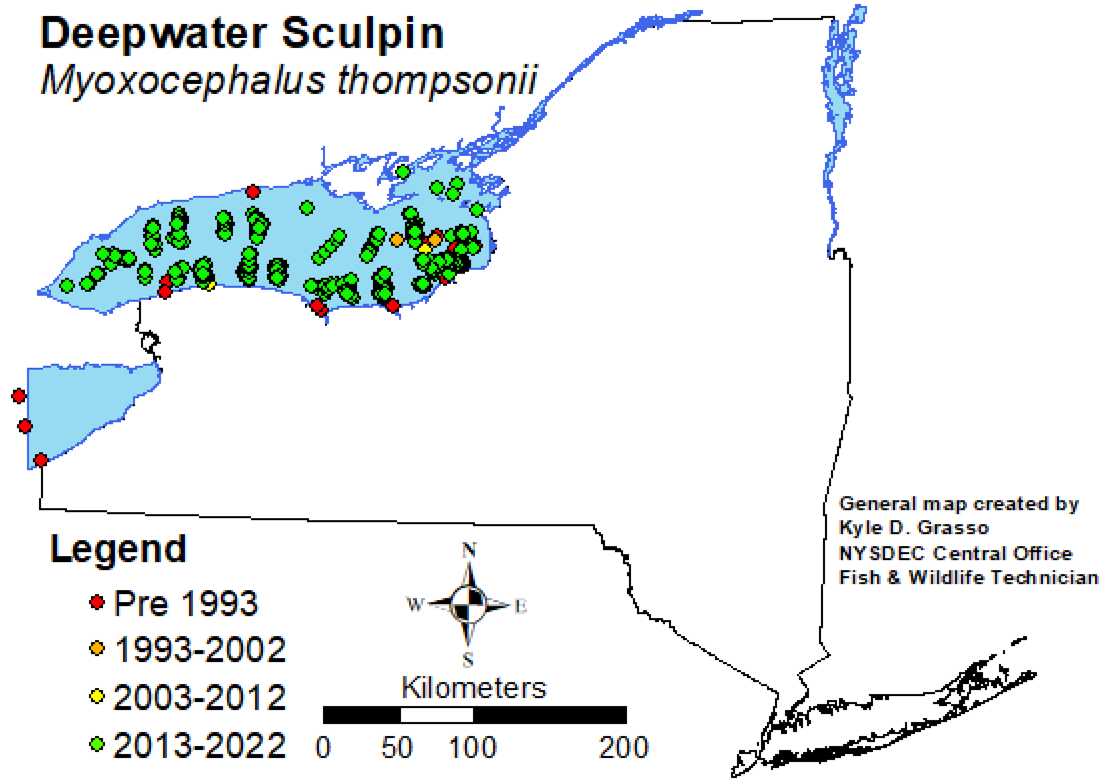


**Figure 3:** Records of Deepwater Sculpin in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 22 | 2 | 0-5% |
| **1993-2002** | 5 | 1 | 0-5% |
| **2003 - 2012** | 274 | 1 | 0-5% |
| **2013 - 2022** | 939 | 1 | 0-5% |

**Table 1:** Records of Deepwater Sculpin in New York.

### Details of historic and current occurrence:

“In Lake Ontario, native Deepwater Sculpin were common in the late-1800s, but by the mid-1900s, the species was possibly extirpated. No Deepwater Sculpin were captured from 1978 to 1995 and the species conservation status was elevated; however, no restoration actions were initiated. During that period, piscivore stocking and the Clean Water Act both served to reduce populations of nonnative Alewife and Rainbow Smelt, which prey on larval fishes including Deepwater Sculpin. Additionally, nonnative, filter-feeding, *Dreissenid* mussels substantially increased Lake Ontario water clarity in the 1990s. Increased water clarity and light penetration caused Alewife and Rainbow Smelt habitat use to shift deeper, away from larval Deepwater Sculpin habitats. In 1996, trawls caught three Deepwater Sculpin, and since then, their abundance has increased to where they are one of the most abundant Lake Ontario prey fishes captured” (Weidel et al. 2019).

Larval Deepwater Sculpin were reported in Lake Erie as early as 1928 (Greeley 1929). Roseman et al. (1998) reported a larval sculpin drifted in western Lake Erie in 1995 (Carlson et al. 2016). Deep water habitat is not as common in Lake Erie and Deepwater Sculpin are considered absent except for occasional catches of larvae. It has been hypothesized that these larval Deepwater Sculpin likely drifted into Lake Erie from upstream sources such as Lake Huron. Transportation via ballast water has also been suggested as a potential means of introduction into Lake Erie (Roseman et al. 1998; Briski et al. 2012; Weidel et al. 2019).

**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%:**_____ | **Peripheral:** ✓ |
| **51-75%:**_____ | **Disjunct:**_____ |
| **26-50%:**_____ | **Distance to core population:** |
| **1-25%:** ✓ | Core pop. in the Great Lakes |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Large lakes

**b. Geology:** Low-moderately buffered

**c. Temperature:** Cold

**d. Gradient:** Low gradient

**Habitat or Community Type Trend in New York**

**Declining:**_____ **Stable:** ✓ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:**_____________________________________________

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:**_____ **No:** ✓

**Habitat Discussion:**

Deepwater Sculpin inhabit the deep water of cold, deep lakes with highly oxygenated water where maximum summer temperatures are always below 46 . Smith (1985) reported preferred temperatures of 32-41 Deepwater Sculpin have been taken from 20 to 366 meters (Smith 1985; Steinhilber and Neely 2006; Stauffer et al. 2016). Adults and juveniles are benthic, while the larvae are pelagic (NatureServe 2022; Weidel et al. 2017). Smith (1985) and COSEWIC (2006) reported that adult Deepwater Sculpin preferred depths of 70-110 m, while Weidel et al. (2017) reported densities increased with depth from 120-200 m in Lake Ontario. Larval Deepwater Sculpin occur in the hypolimnion and are most commonly observed in relatively shallow water (<50 m) (Mansfield et al. 1983; Geffen and Nash 1992; Weidel et al. 2019). "Substrates at bottom trawl sites generally consisted of soft sediments including clay, sand, mud and silt (Thomas et al. 1972)" (Weidel et al. 2017). Weidel et al. (2017) reported a significant positive relationship between mean length and fishing depth.

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The life history of the Deepwater Sculpin is poorly understood due to their deep habitats. Most life history studies have focused on single lakes which is problematic because of the evidence of variability in biology among different populations (COSEWIC 2017). Selgeby (1988) reported a maximum age of 7 in Lake Superior, Black and Lankester (1981) reported a maximum age of 5 in Burchell Lake, Ontario, and COSEWIC (2017) reported they can live up to 9 years in Lake Ontario. Age at maturity in Burchell Lake, Ontario was estimated to be age 3 for females and age 2 for males, but this likely differs from Deepwater Sculpin in the Great Lakes (Black and Lankester 1981; COSEWIC 2017). The Deepwater Sculpin in the Great Lakes are reported to be larger than those of other smaller inland lakes even at the same latitude (COSEWIC 2006; Weidel et al. 2017).

Spawning period is unknown and there are discrepancies among reported spawn timings (COSEWIC 2017). “McAllister (1961) hypothesized that spawning occurred in late summer or early fall (based on presence of eggs). However, Selgeby (1988) suggested that spawning occurred in Lake Superior from late November to mid-May based on the appearance of eggs/ovaries and the presence of young-of-the-year Deepwater Sculpin caught in early spring. The latter is similar to what Black and Lankester (1981) found in an inland Ontario lake, suggesting spawning occurred in late fall or early winter. Similar timing has been observed in Lake Michigan, with larvae hatching in March and moving to shallow water, only to return to deeper waters by late fall (Geffen and Nash 1992). A gravid female was caught in shallower waters of Lake Ontario (30 m) on June 22, 1996 (COSEWIC 2006)” (COSEWIC 2017).

## VI. Threats *(from NY CWCS Database or newly described)*

The primary threats to Deepwater Sculpin include eutrophication that reduces dissolved oxygen in deep water and larval predation by nonnative planktivores such as the Alewife and Rainbow Smelt (Crowder 1980; Geffen and Nash 1992; Madenjian et al. 2005; Sheldon et al. 2008; Weidel et al. 2017; Weidel et al. 2019). Adult Deepwater Sculpin are also a prey fish for piscivores such as the Lake Trout and Burbot (Dymond 1928; Scott and Crossman 1973; Fratt et al. 1997; Madenjian et al. 1998; Gamble et al. 2011). “Dynamics in Lake Michigan suggest that their abundance is directly affected by predation by burbot (Madenjian et al. 2002) and probably by lake trout” (COSEWIC 2006).

“Quagga Mussel impacts are a possible threat to Deepwater Sculpin, in that it is forcing prey into deeper habitat. Increasing water temperatures are a threat to Deepwater Sculpin in all DUs. While the effect is yet unknown, we may expect greater impact in more southern and shallower lakes where coldwater habitat is more limited” (COSEWIC 2017).

“Brandt (1986) proposed that lake trout predation on Lake Ontario sculpins (both slimy and deepwater), promoted coexistence, such that when lake trout populations declined in the early 1900s (Christie 1973), Slimy Sculpin caused Deepwater Sculpin to decline through predation and or competition” (Weidel et al. 2017). However, this mechanism was not supported by observations in Lake Michigan (Madenjian et al. 2005; Weidel et al. 2019).

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

**Yes:** _✓_ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Deepwater Sculpin is currently listed as an endangered species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Deepwater Sculpin have continued to recover on their own in Lake Ontario. Continued sampling to monitor their index of abundance and obtain data on age, growth, maturity, fecundity, and timing of spawning is recommended. Weidel et al. (2017) recommends trawling at deep depths as these observations are critical for understanding the populations dynamics of Deepwater Sculpin.

The 2005 State Wildlife Action Plan included the following recommendations:

<u>Population monitoring</u>

-Continue sampling in Lake Ontario.

The 2015 State Wildlife Action Plan included the following recommendations:

-Continue cisco, Deepwater Sculpin, and lake trout restoration efforts in Lake Ontario

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Management | Site/Area Management |
| **2.** Land/Water Management | Invasive/Problematic Species Control |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |
| **4.** Species Management | Species Recovery |
| **5.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Deepwater Sculpin.

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# Species Status Assessment Cover Sheet

**Species Name:** Eastern Pirate Perch **Date Updated:** January 2023

**Current Status:** Not Listed **Updated By:** Kyle Grasso

**Current NHP Rank:** S1S2

**Distribution:** The Pirate Perch (both western and eastern) has a U-shaped distribution along the Atlantic Coast from New York to Florida, west along the Gulf Coast to Texas, and north along the Mississippi River to the Great Lakes. However, the Eastern Pirate Perch occurs along the Atlantic Coast from New York south to Georgia. In New York, the Eastern Pirate Perch is native to the Long Island watershed.

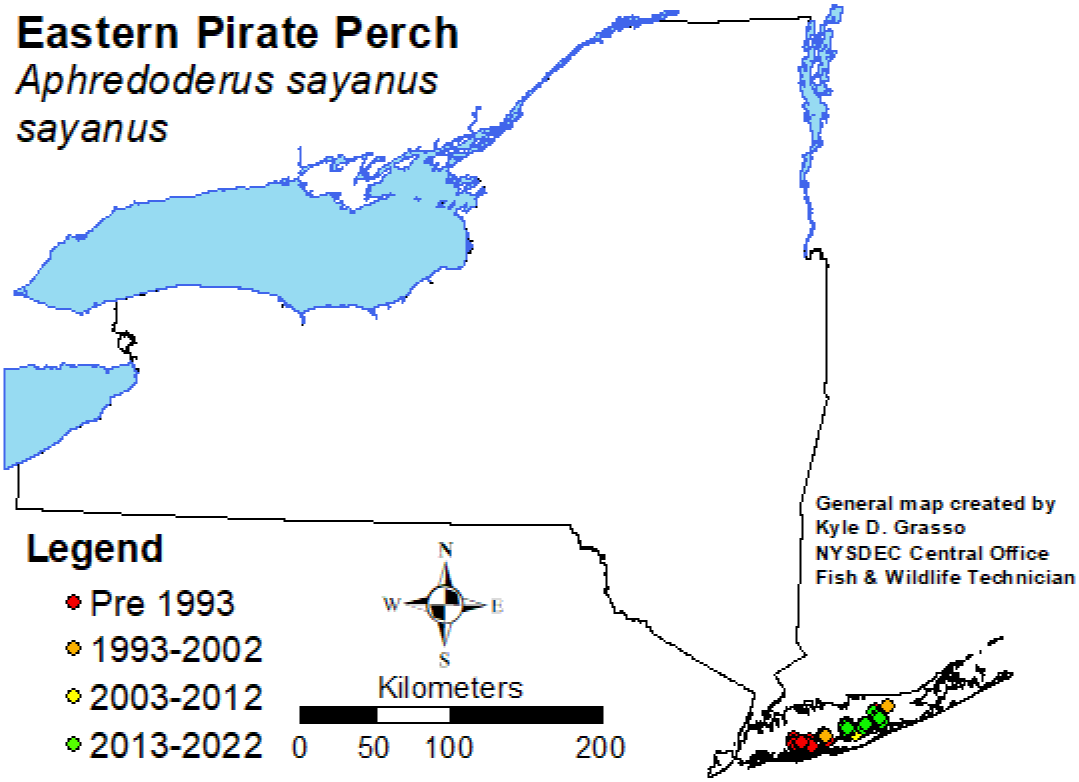
**Habitat:** Eastern Pirate Perch inhabit the quiet waters of rivers, ponds, swamps, marshes, and oxbows. They are often found in sluggish water with overhead cover and submerged aquatic vegetation over soft mud or muck substrates.

**Life History:** Hall and Jenkins (1954) reported individuals living up to age 5 in Oklahoma. Sexual maturity is believed to be reached at age 1-2. The spawning period of the pirate perch varies latitudinally from winter in southern states through the spring in the north. Spawning was reported in February and March in Louisiana, and March through early May in Illinois. The most notable attribute of the pirate perch is the migration of the anus and urogenital pore anteriad to a jugular position as young mature. This allows both sexes of pirate perch to pass gametes from the urogenital pore through their mouth onto the substrate. Fletcher et al. (2004) observed spawning and described nesting behavior conducted in underwater root masses where narrow, deep canals provided spawning sites for aggregations of adults.

**Threats:** As an inhabitant of marshes, swamps, and oxbows, the Eastern Pirate Perch may be subject to silting, draining, and dredging. In New York, they may be threatened by habitat loss due to the widespread development on Long Island. Guthrie (2017) reported that a dredging operation to address overgrowth of fanwort (*Cabomba carolinia*) on Upper Yaphank Lake may have displaced the Eastern Pirate Perch due to the lack of vegetated habitat post-dredge.

**Population trend:** In New York, the Eastern Pirate Perch is native to only the Long Island watershed. In the watershed, the Eastern Pirate Perch was historically caught in 33 waters. In the last 20 years, that number has declined to only 12 waterbodies. A large portion of those declines is attributed to the western side of Long Island where the most recent records were in the Carlls River in 1985 and 1995. Eastern Pirate Perch abundance appears to be stable and although their current distribution is restricted, they appear to be secure.

**Recommendation:** It is recommended that the Eastern Pirate Perch be listed as Special Concern due to their restricted range, rarity, and the range declines seen since the early 1900s.



# Species Status Assessment

**Common Name:** Eastern Pirate Perch **Date Updated:** January 2023

**Scientific Name:** *Aphredoderus sayanus sayanus* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Aphredoderidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Pirate Perch is in the class Actinopterygii and the family Aphredoderidae. The Pirate Perch is the only extant species in the family Aphredoderidae. Bailey et al. (1954) noted differences in a number of characters between Pirate Perch along the Atlantic States and those of the Mississippi Valley and Great Lakes. Boltz and Stauffer (1993) recognized two subspecies, the Eastern Pirate Perch (*Aphredoderus sayanus sayanus)* and the Western Pirate Perch (*Aphredoderus sayanus gibbosus*). However, April et al. (2011) found a maximal intraspecific genetic divergence of over 15%, which is closer to the level of divergence seen among genera (13.5%) and families (15.9%) than between sister species (5.7%). Burr and Warren (2020) stated that genetic evidence indicates “at least two highly diverged, undescribed cryptic species are now subsumed under the name A. sayanus.” Up to this date little genetic research has been done on the Eastern Pirate Perch vs. Western Pirate Perch, and New York may be one of few states that currently recognizes both (Burr and Warren 2020). There is an ongoing genetics study at the University of Minnesota that will hopefully shed more light on this. For the purpose of this assessment, the Eastern Pirate Perch and Western Pirate Perch will be largely treated as two species. The Pirate Perch (both Eastern Pirate Perch and Western Pirate Perch) has a U-shaped distribution along the Atlantic Coast from New York to Florida, west along the Gulf Coast to Texas, and north along the Mississippi River to the Great Lakes (Stauffer et al. 2016; NatureServe 2022). However, the Eastern Pirate Perch occurs along the Atlantic Coast from New York south to Georgia (Burr and Warren 2020). In New York, the Eastern Pirate Perch is native to the Long Island watershed. Eastern Pirate Perch abundance appears to be stable, however their range appears to be largely gone from western Long Island (Carlson et al. 2016). Although their current distribution is restricted, they appear to be secure. The Eastern Pirate Perch inhabits the quiet waters of creeks and rivers, backwaters, swamps, marshes, and oxbows. They are often found in sluggish water with overhead cover and submerged aquatic vegetation over soft mud or muck substrates (Lee et al. 1980; Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed

### b. Natural Heritage Program

i. **Global:** T5 – Secure Subspecies

ii. **New York:** S1S2 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)

**Status Discussion:**

The Eastern Pirate Perch is not currently federally listed or listed in the state of New York. They are not listed as an SGCN in New York either. The Eastern Pirate Perch is globally ranked as a Secure Subspecies by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Since the early 1900s

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:** _____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:** _____

**VERMONT** **Not Present:** ✓ **No Data:** _____

**ONTARIO** **Not Present:** ✓ **No Data:** _____

**QUEBEC** **Not Present:** ✓ **No Data:** _____

**NEW JERSEY** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

**PENNSYLVANIA** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Considered extirpated – Unsure of last record in PA

**Listing Status:** Extirpated – SX **SGCN?:** No

## d. New York

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Since the early 1900s

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** (*insert map of North American/regional*):

“The Pirate Perch is secure and stable throughout most of its range in the lower Mississippi River basin and on the Coastal Plain (Warren et al. 2000; Jelks et al. 2008), but somewhat disjunct and uncommon the northern periphery of its range in Iowa and the Lake Erie drainage, New York (Smith 1985)” (Burr and Warren 2020). Pirate Perch are extirpated from Ohio (Western Pirate Perch) and Pennsylvania (Eastern Pirate Perch) (Trautman 1981; Genoways and Brenner 1985; Burr and Warren 2020).

In New York, the Eastern Pirate Perch is native to only the Long Island watershed. Eastern Pirate Perch were first reported from the watershed in 1915. The Eastern Pirate Perch was historically caught in 33 waters. In the last 20 years, that number has declined to only 12 waterbodies. A large portion of those declines is attributed to the western side of Long Island where the most recent records were in the Carlls River in 1985 and 1995 (Carlson et al. 2016). Eastern Pirate Perch abundance appears to be stable and although their current distribution is restricted, they appear to be secure.

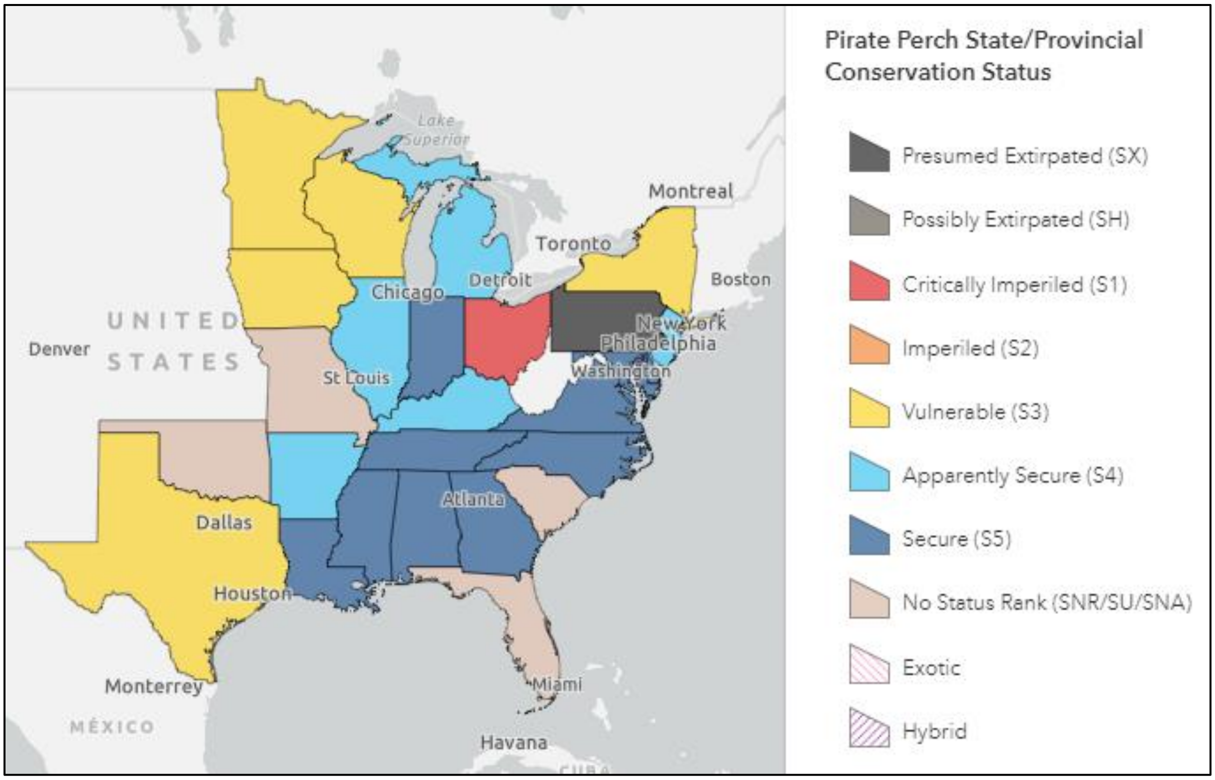


**Figure 1:** Pirate Perch (both eastern and western) distribution and status (Source: NatureServe 2022).

**Figure 2:** Pirate Perch (both eastern and western) distribution. Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

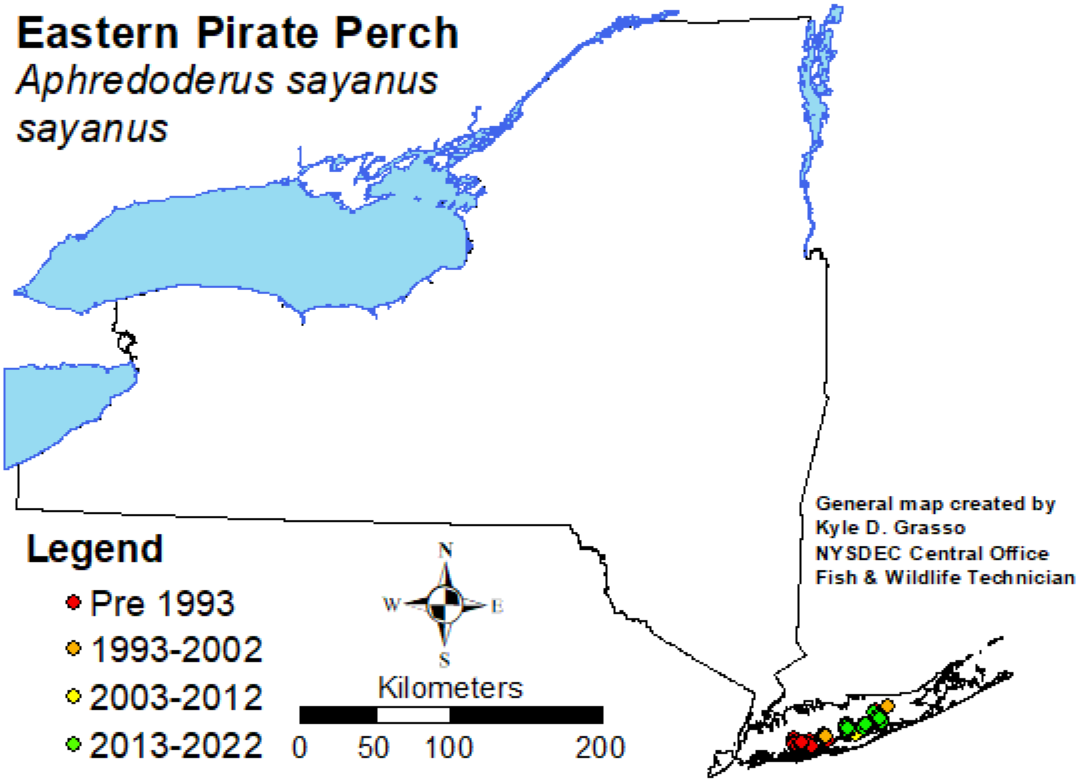


**Figure 3:** Records of Eastern Pirate Perch in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 71 | 33 | 0-5% |
| **1993-2002** | 34 | 8 | 0-5% |
| **2003 - 2012** | 33 | 9 | 0-5% |
| **2013 - 2022** | 35 | 9 | 0-5% |

**Table 1:** Records of Eastern Pirate Perch in New York.

### Details of historic and current occurrence:

In New York, the Eastern Pirate Perch is native to only the Long Island watershed. Eastern Pirate Perch were first reported from the watershed in 1915. The Eastern Pirate Perch was historically caught in 33 waters. In the last 20 years, that number has declined to only 12 waterbodies. A large portion of those declines is attributed to the western side of Long Island where the most recent records were in the Carlls River in 1985 and 1995 (Carlson et al. 2016). Eastern Pirate Perch abundance appears to be stable and although their current distribution is restricted, they appear to be secure.

### 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%:**_____ | **Peripheral:**__✓__ |
| **51-75%:**_____ | **Disjunct:**_____ |

**26-50%:**_____ **Distance to core population:**

**1-25%:**_✓__ Core pop. to the south

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to small rivers and oxbows, marshes, and ponds

**b. Geology:** Low-moderately buffered to highly buffered

**c. Temperature:** Transitional cool

**d. Gradient:** Low to low-moderate gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_✓__ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_✓__ **No:**_____

**Indicator Species?** **Yes:**_✓__ **No:**_____

### Habitat Discussion:

Eastern Pirate Perch inhabit the quiet waters of creeks and rivers, backwaters, swamps, marshes, and oxbows. They are often found in sluggish water with overhead cover and submerged aquatic vegetation over soft mud or muck substrates. Burr and Warren (2020) reported that Pirate Perch can tolerate periods of low dissolved oxygen and pHs as low as 4. During high flows, they seek refuge under overhanging banks and in weed beds (Lee et al. 1980; Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). They are nocturnal feeders and become more active at night (Becker 1983; Stauffer et al. 2016; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Life history differences between the Eastern Pirate Perch and Western Pirate Perch are unknown. As a result, this section will treat the Eastern Pirate Perch and Western Pirate Perch as one species. Hall and Jenkins (1954) reported individuals living up to age 5 in Oklahoma (Stauffer et al. 2016). Sexual maturity is believed to be reached at age 1-2 (Mansueti 1962; Becker 1983; Stauffer et al. 2016). “The spawning period of the Pirate Perch varies latitudinally from winter in southern states through the spring in the north. Spawning was reported in February and March in Louisiana (Fontenot and Rutherford 1999), and March through early May in Illinois (Poly and Wetzel 2003).” “The most notable attribute of the Pirate Perch is the migration of the anus and urogenital pore anteriad to a jugular position as young mature“ (Stauffer et al. 2016). This allows both sexes of Pirate Perch to pass gametes from the urogenital pore through their mouth onto the substrate (Martin and Hubbs 1973; Boltz and Stauffer 1986; Stauffer et al. 2016). “Fletcher et al. (2004) observed spawning in situ and described nesting behavior conducted in underwater root masses where narrow, deep canals provided spawning sites for aggregations of adults” (Stauffer et al. 2016). Fecundities can range from 100-400 (Fletcher et al. 2004). Eggs will take roughly 5-6 days to hatch (Martin and Hubbs 1973; NatureServe 2022). Smith (1985) reported that both sexes guard nests and the young. Poly and Wetzel (2003) and Fletcher et al. (2004) reported that parental care did not occur.

## VI. Threats *(from NY CWCS Database or newly described)*

As an inhabitant of marshes, swamps, and oxbows, the Eastern Pirate Perch may be subject to silting, draining, and dredging (MDNR 2016). In New York, they may be threatened by habitat loss due to the widespread development on Long Island. Guthrie (2017) reported that a dredging operation to address overgrowth of fanwort (*Cabomba carolinia*) on Upper Yaphank Lake may have displaced the Eastern Pirate Perch due to the lack of vegetated habitat post-dredge. “Pirate Perch abundance and presence-absence in the Coastal Plain of Maryland was strongly and negatively related to urbanization, showing steep abundance and presence-absence declines when urbanization affected ≥12 and ≥13.8% of the watershed, respectively” (Utz et al. 2009).

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

**Yes:** _✓_  **No:** _____  **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

Sampling of historic and modern waterbodies should be done to monitor and further understand Eastern Pirate Perch. MDNR (2016) suggests that water quality should be maintained or improved, and efforts to minimize siltation should be encouraged near Eastern Pirate Perch habitat. Stocking of Eastern Pirate Perch in their historic range on Long Island to bolster current populations may be an option.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |

| | |
|---|---|
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Invasive/Problematic Species Control |
| **5.** Land/Water Management | Habitat & Natural Process Restoration |
| **6.** Species Management | Species Re-introduction |
| **7.** Species Management | Ex-situ Conservation |
| **8.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Eastern Pirate Perch.

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# Species Status Assessment Cover Sheet

**Species Name:** Eastern Sand Darter

**Current Status:** Threatened – SGCN

**Current NHP Rank:** S2S3

**Date Updated:** January 2023

**Updated By:** Kyle Grasso

**Distribution:** The Eastern Sand Darter has a discontinuous range throughout the St. Lawrence River, Great Lakes, and Ohio River basins from southern Quebec and Vermont southwest to Kentucky and Illinois. In New York, they occur in the Allegheny, Champlain, Erie-Niagara, Oswegatchie, Raquette, and St. Lawrence watersheds.

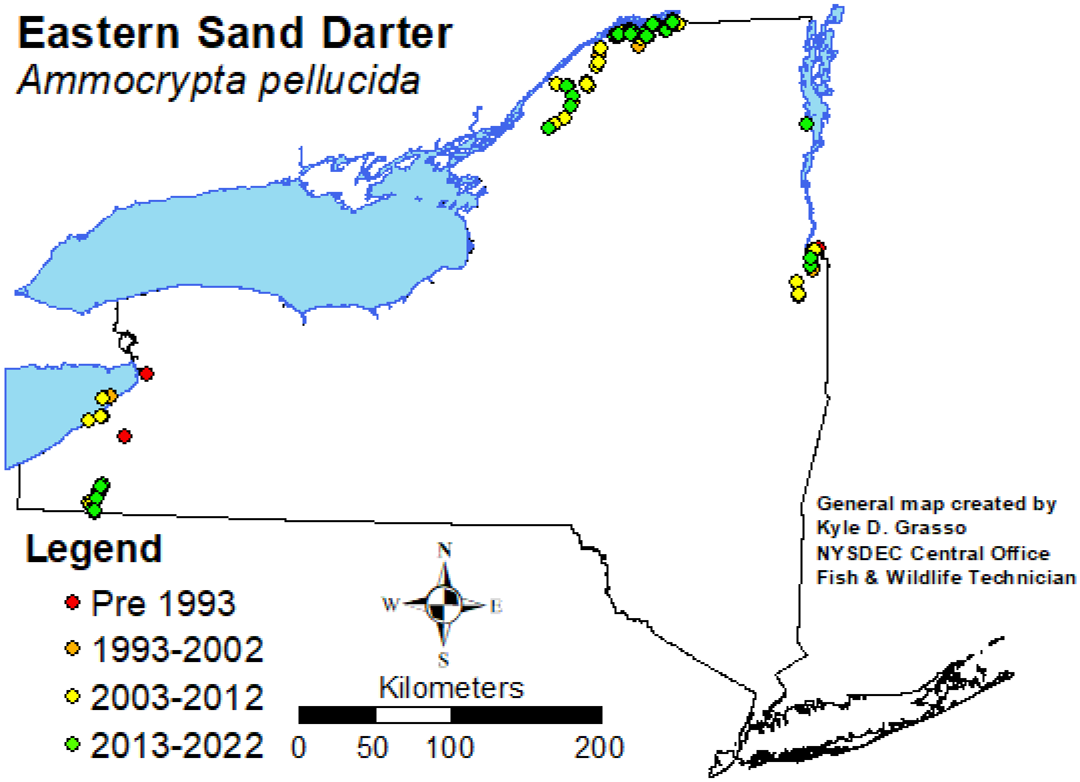
**Habitat:** The Eastern Sand Darter inhabits low gradient, medium to large rivers, as well as lakes. They usually occur over clean, sand substrate with very little vegetation and where currents are slow enough to retain sand but fast enough to prevent silt deposition. Daniels (1993) argued that the best predictor of Eastern Sand Darter abundance was the percent composition of sand substrate while water depth and velocity was also important. During a habitat study conducted in 1984 by Daniels (1993), a majority of Eastern Sand Darters were captured along the depositional side a short distance downstream of a riverbend. The Eastern Sand Darter is often observed burying themselves in sand.

**Life History:** Eastern Sand Darters can live 2-4 years and sexually mature at ages 1-2. Spawning typically occurs from May-July depending on the location. In the Ohio River basin, spawning occurs in June and July and likely 2-3 weeks later in the St. Lawrence and Great Lakes watersheds. Johnston (1989) observed spawning activities in water temperatures between 69-73.5°F. Eggs were deposited in aquarium sand and gravel. Egg survivorship is probably high in characteristic habitat, and the spawning season may be synchronized with low silt levels.

**Threats:** Threats to the Eastern Sand Darters include loss of habitat due to siltation, pollution associated with agriculture and urban development, changes in flow regimes, and introduced species (Round Goby). The use of lampricide in Lake Erie, Lake Champlain, and some rivers could also affect populations.

**Population trend:** In New York, early reports documented this species in the Erie-Niagara and Saint Lawrence watersheds. Since 1979, the Eastern Sand Darter has expanded into the Allegheny, Champlain, Oswegatchie, and Raquette watersheds. The Eastern Sand Darter is thought to have declined in the Erie-Niagara watershed in 2005 coinciding with habitat destruction and the arrival of Round Goby. They appear to be stable or increasing in the Allegheny, Champlain, Oswegatchie, Raquette, and St. Lawrence watersheds.

**Recommendation:** It is recommended that the Eastern Sand Darter be downlisted from Threatened to Special Concern due to their expansion and success in the Allegheny, Champlain, Oswegatchie, Raquette, and St. Lawrence watersheds.



# Species Status Assessment

**Common Name:** Eastern Sand Darter **Date Updated:** January 2023

**Scientific Name:** *Ammocrypta pellucida* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Percidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Eastern Sand Darter is in the class Actinopterygii and the family Percidae (perches, walleyes, . The Eastern Sand Darter has a discontinuous range throughout the St. Lawrence River, Great Lakes, and Ohio River basins from southern Quebec and Vermont southwest to Kentucky and Illinois (Page and Burr 2011; Stauffer et al. 2016). In New York, "early reports documented this species in the Erie-Niagara and Saint Lawrence watersheds" (Carlson et al. 2016). Since 1979, the Eastern Sand Darter has expanded into the Allegheny, Champlain, Oswegatchie, and Raquette watersheds (Carlson et al. 2016). The Eastern Sand Darter is thought to have declined in the Erie-Niagara watershed in 2005, coinciding with habitat destruction and the arrival of Round Goby (Poos et al. 2010; Carlson et al. 2016; NYNHP 2022). Populations appear to be stable or increasing in the Allegheny, Champlain, Oswegatchie, Raquette, and St. Lawrence watersheds (Carlson et al. 2016). The Eastern Sand Darter inhabits low gradient, medium to large rivers, as well as lakes (Scott and Crossman 1973; Smith 1985; Stauffer et al. 2016). They usually occur over clean, sand substrate with very little vegetation and where currents are slow enough to retain sand but fast enough to prevent silt deposition (Trautman 1981; Smith 1985; Facey 1998; Stauffer et al. 2016; NatureServe 2022; NYNHP 2022). In lakes they occupy clean, sandy shores and shoals in shallow bays (Langlois 1954; Van Meter and Trautman 1970; COSEWIC 2009; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Threatened – SGCN

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** S2S3 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)
- American Fisheries Society: Vulnerable (8/1/2008)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): See Status Discussion

### Status Discussion:

In New York, the Eastern Sand Darter is currently listed as Threatened and SGCN. They are globally ranked as Apparently Secure by NatureServe

Comments from COSEWIC: Eastern Sand Darter were considered a single unit and designated Threatened in April 1994 and November 2000. In November 2009, the species was split into separate units (Ontario and Quebec) and both the Quebec population and Ontario population were designated as Threatened. In May 2022, the Ontario population was further split into two units

(West Lake and Southwestern Ontario). Their status was also reexamined with both Ontario units being designated Threatened and the Quebec unit being designated Special Concern.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Endangered – S1 **SGCN?:** Yes

**VERMONT** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:**_____

**Listing Status:** Threatened – S1 **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:** See trends section for more information.

**Listing Status:** Threatened – S2 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:** See trends section for more information.

**Listing Status:** Special Concern – S2 **SGCN?:** N/A

### d. New York

**i. Abundance**

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Expanded in the last 4 decades

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

“Grandmaison reviewed the status of the Eastern Sand Darter and concluded that it has been experiencing a range-wide decline and is extirpated from much of its now fragmented original distribution, but a significant number of healthy populations still exist. They recommended it not be listed under the authority of the Endangered Species Act” (Stauffer et al. 2016). Jelks et al (2008) classified it as vulnerable, however they stated that their status is believed to have improved since 1990 (Stauffer et al. 2016; NatureServe 2022). Facey (1998) reported yearly population fluctuations may be due to reproductive success, variable habitat conditions, or yearly changes in sand bar locations (Edwards et al. 2007; COSEWIC 2009).

“In Ontario, Eastern Sand Darter populations have probably been extirpated from three river systems: the Ausable River (last seen in 1928); Big Otter Creek (last seen in 1955); and Catfish Creek (last seen in 1941). Populations are extant in four river systems (Big Creek, Grand River, Sydenham River, Thames River). Because of the lack of consistent sampling programs through time, it is not possible to identify fluctuations or trends with confidence. It is likely that the population in Big Creek has declined given the difficulty in detecting the species over the last couple of decades. Trends are unknown for the other three river systems, but it is clear that the population in the Thames River is fairly abundant over a large stretch of the lower river, and probably represents the largest population of this species in Canada. Although little can be said with certainty regarding population trends in Lakes Erie and St. Clair, available data suggest that populations in both lakes may have declined in recent years" (COSEWIC 2009).

"In Québec, trends in Eastern Sand Darter populations are largely unknown due to a lack of recent sampling in several river systems. It is likely that the species has been extirpated from Lac des Deux Montagnes (last seen in 1946), Rivière Saint-François (last seen in 1944), and Rivière Yamaska (last seen in 1967). The lack of records despite recent sampling in Rivière Châteauguay suggests that the Eastern Sand Darter may have declined in this river. The continued presence of Eastern Sand Darter has recently been confirmed in Lac Saint-Pierre and its archipelago, St. Lawrence River at Saint-Sulpice and Rivière des Mille Îles, Rivière à la Truite of the Châteauguay drainage, Rivière L'Assomption, and Rivière Richelieu. New locations have recently been discovered in Rivière Ouareau of the L'Assomption drainage, Missisquoi Bay of Lac Champlain in the Richelieu drainage, and Rivière aux Saumons. It is not possible to assess trends in five Québec rivers due to lack of recent sampling (Rivière Yamachiche, Rivière Bécancour, Rivière Gentilly, Rivière aux Orignaux, Petite Rivière du Chêne)" (COSEWIC 2009).

In Pennsylvania, targeted sampling occurred in the 2000s in Presque Isle Bay where Eastern Sand Darters were previously found. They were not recorded in any of these surveys. Small populations occur in Conneaut Creek and relatively stable populations in French Creek (Stauffer et al. 2016).

In New York, "early reports documented this species in the Erie-Niagara and Saint Lawrence watersheds" (Carlson et al. 2016). Since 1979, the Eastern Sand Darter has expanded into the Allegheny, Champlain, Oswegatchie, and Raquette watersheds (Carlson et al. 2016). The Eastern Sand Darter is thought to have declined in the Erie-Niagara watershed in 2005, coinciding with habitat destruction and the arrival of Round Goby (Poos et al. 2010; Carlson et al. 2016; NYNHP 2022). Populations appear to be stable or increasing in the Allegheny, Champlain, Oswegatchie, Raquette, and St. Lawrence watersheds (Carlson et al. 2016).

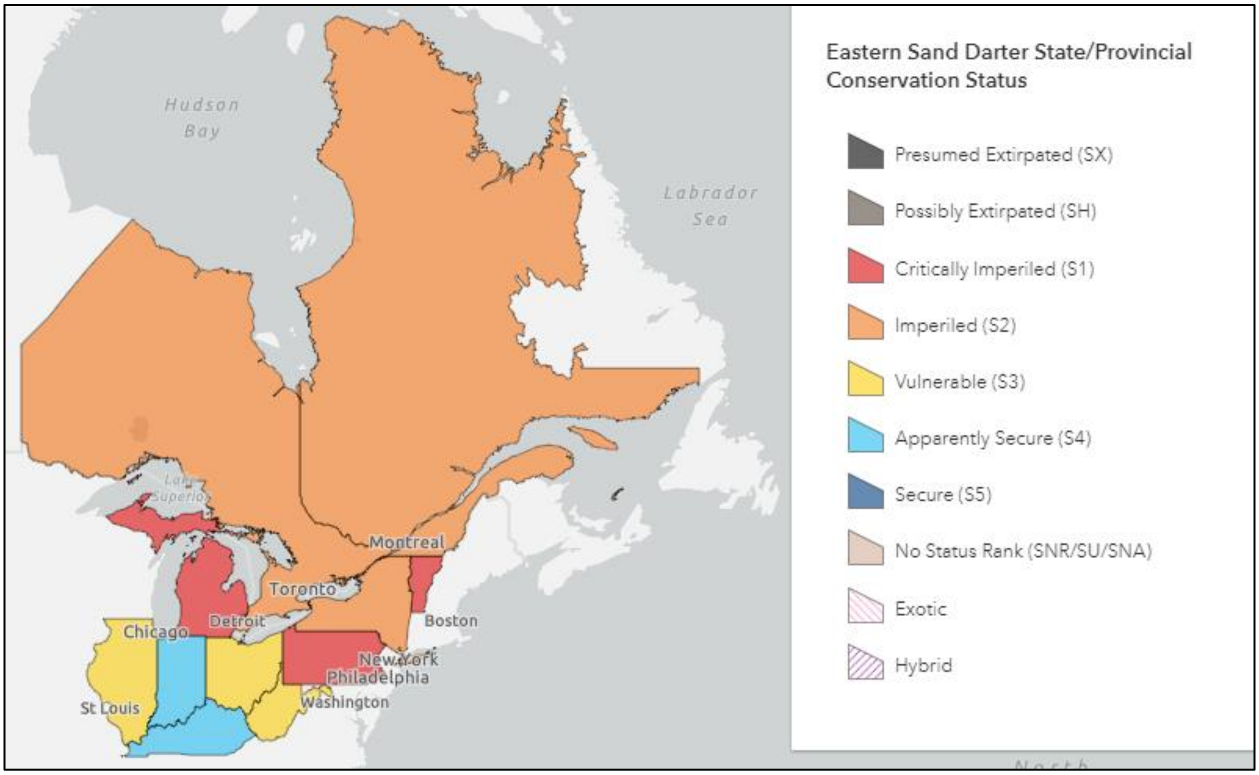


**Figure 1:** Eastern Sand Darter distribution and status (Source: NatureServe 2022).

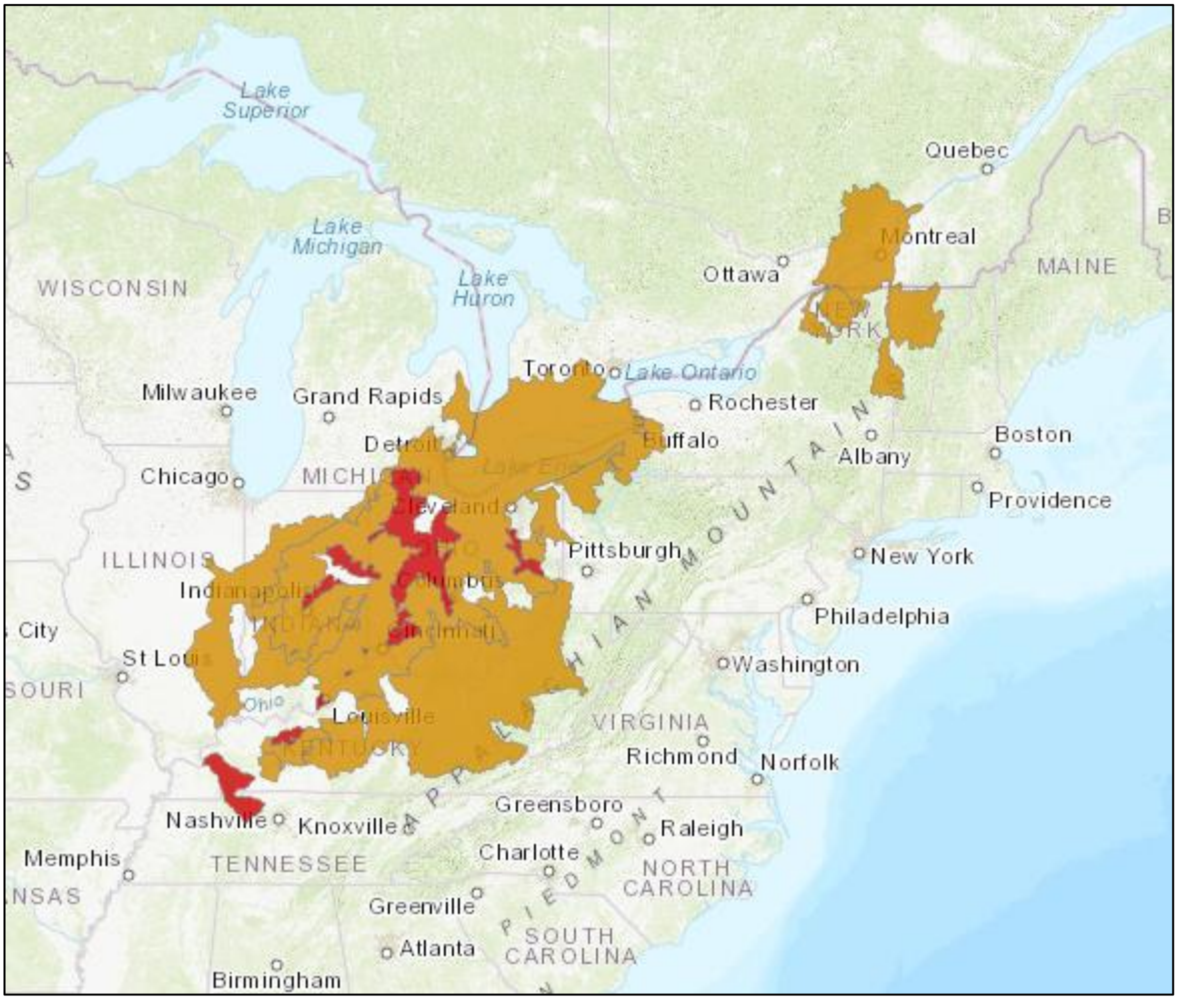


**Figure 2:** Eastern Sand Darter distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

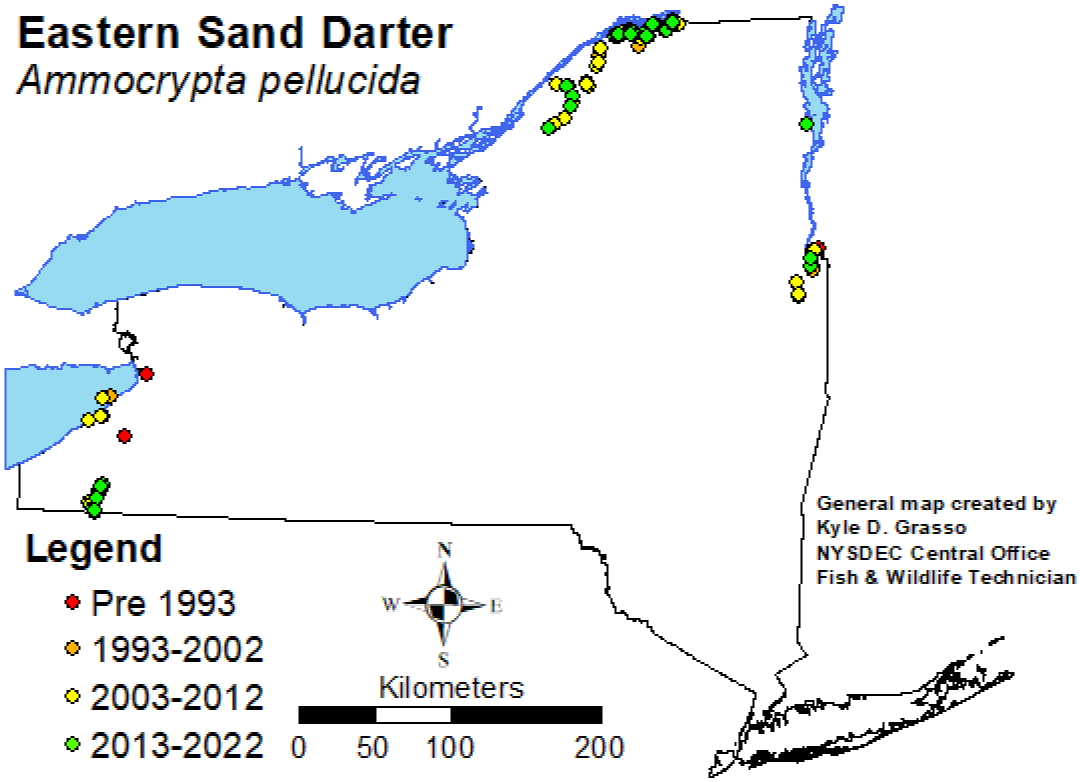


**Figure 3:** Records of Eastern Sand Darter in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 16 | 6 | 6-10% |
| **1993-2002** | 32 | 9 | 6-10% |
| **2003 - 2012** | 60 | 14 | 6-10% |
| **2013 - 2022** | 38 | 11 | 6-10% |

**Table 1:** Records of Eastern Sand Darter in New York.

### Details of historic and current occurrence:

In New York, “early reports documented this species in the Erie-Niagara and Saint Lawrence watersheds” (Carlson et al. 2016). Eastern Sand Darters were first reported in the Erie-Niagara watershed in 1893 in Cazenovia Creek near Buffalo and Cattaraugus Creek at Gowanda and Irving. “Greeley (1929) reported its absence from this watershed and speculated that pollution had caused its extirpation” (Carlson et al. 2016). They were reported in the New York portion of Lake Erie in 2001, the first record in the watershed since 1893. The only catches since were in 2005 and 2012, and the Eastern Sand Darter is thought to have declined in the watershed coinciding with habitat destruction and the arrival of Round Goby (Poos et al. 2010; Carlson et al. 2016; NYNHP 2022). They were first reported in the St. Lawrence watershed in 1930 in the Little Salmon River (Greeley and Greene 1931; Carlson et al. 2016). There are 47 records in the watershed in the last 20 years and they appear to be stable.

Since 1979, the Eastern Sand Darter has expanded into the Allegheny, Champlain, Oswegatchie, and Raquette watersheds. All four of these watersheds were “sampled extensively during the 1920s and 1930s and Eastern Sand Darters were not found, perhaps because they were actually absent or because the species was so rare that it was simply overlooked. As environmental conditions have changed in these watersheds over the decades, suitable habitat may have become available, allowing for short-distance range expansions and increases in abundance. There is little evidence that this species is a good disperser, so range expansion by invasion seems unlikely. The possibility of human-aided stocking cannot be ruled out although it seems unlikely" (Carlson et al. 2016).

Eastern Sand Darters were first recorded in Conewango Creek in 2004 and have been caught 7 times in the last 10 years in the Allegheny watershed. They were first reported in the Raquette River in 2014 and have been caught 3 times in the last 10 years in the Raquette watershed. They were first reported in the Oswegatchie River in 2007 and have been caught 4 times in the last 10 years in the Oswegatchie watershed (Carlson et al. 2016). In the Champlain watershed, Eastern Sand Darters were first reported from the Mattawee River in 1979 and the Poultney River in 1983. The agricultural land-uses of the Poultney River riparian areas may be causing erosion and habitat degradation. Habitat degradation studies have been underway in the Poultney River (Facey and O'Brien 2003). They continue to be caught in the Mattawee and Poultney Rivers and appear to be stable. "In 2013, individuals were caught in the lower Boquet River (NYSM 69634), 97 km north of previous records in the Lake Champlain basin. Facey (1998) reported a similar northward range extension on the Vermont side of the lake" (Carlson et al. 2016). They appear stable in each of these watersheds (Carlson et al. 2016).

### New York's Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Classification of New York Range**

**Core:**_____

**Peripheral:** ✓

**Disjunct:** ✓

**Distance to core population:**

Core pop. to the southwest

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Small rivers to medium mainstream rivers and large lakes

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:** ✓ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

The Eastern Sand Darter inhabits low gradient, medium to large rivers, as well as lakes (Scott and Crossman 1973; Smith 1985; Stauffer et al. 2016). They usually occur over clean, sand substrate with very little vegetation and where currents are slow enough to retain sand but fast enough to prevent silt deposition (Trautman 1981; Smith 1985; Facey 1998; Stauffer et al. 2016; NatureServe 2022; NYNHP 2022). In lakes they occupy clean, sandy shores and shoals in shallow bays (Langlois 1954; Van Meter and Trautman 1970; COSEWIC 2009; NatureServe 2022). They are often found at depths of roughly 1-2 feet, but Scott and Crossman (1973) captured one by trawling in Lake Erie in 14.6 m of water (Kuehne and Barbour 1983; Daniels 1993; Grandmaison et al. 2004; NatureServe 2022). COSEWIC (2009) also reported them being caught in trawls at depths of 2-3 m in the Thames River. “The Eastern Sand Darter has been found in waters that are clear, tea-coloured, and highly turbid (Secchi depth ≥7 cm), but a negative association with high turbidity has been demonstrated (Poos et al. 2008)” (COSEWIC 2009). “Substrate analyses in Ohio revealed compositions of 90-95 percent sand, with gravel compromising most of the remainder (Spreitzer 1979; Daniels 1993)” (Stauffer et al. 2016). Daniels (1993) argued that the best predictor of Eastern Sand Darter abundance was the percent composition of sand substrate while water depth and velocity was also important. “During a habitat study conducted in 1984 by Daniels (1993), a majority of Eastern Sand Darters were captured along the depositional side a short distance downstream of a riverbend” (NYNHP 2022). The Eastern Sand Darter is often observed burying themselves in sand, leaving their head sticking out (Jordan and Copeland 1877; Daniels 1989; Daniels 1993; Grandmaison et al. 2004). “The significance of this has been explained by the work done by Daniels (1989). He tested the three hypotheses as to why this species buries itself: to avoid predators, ease prey capture, and conserve energy. His experiments largely rejected the first two hypotheses and showed that the Eastern Sand Darter primarily buries itself to retain position in its uniform habitat” (NYNHP 2022). This is especially the case during changing velocity and turbulence, especially during high spring runoff and summer rains (Daniels 1993; Grandmaison et al. 2004). Simon (1991) also supported this hypothesis.

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Eastern Sand Darters can live for 2-4 years and sexually mature at ages 1-2 (Spreitzer 1979; Faber 2006; Drake et al. 2008; COSEWIC 2009; Stauffer et al. 2016). Finch et al. (2008) reported that most adults are 1-2 years old (COSEWIC 2009). Spawning typically occurs from May-July when water temperatures are between 58-78°F depending on the location (Spreitzer 1979; Johnston 1989; Facey 1998; Faber 2006; Simon and Wallus 2006; COSEWIC 2009; NatureServe 2022; NYNHP 2022). In the Ohio River basin, spawning occurs in June and July and likely 2-3 weeks later in the St. Lawrence and Great Lakes watersheds (Kuehne and Barbour 1983; Stauffer et al. 2016; NatureServe 2022). “Spreitzer (1979) reported the spawning period as extending from May through mid-August, based on female fecundity, with most spawning occurring in June and July” (NatureServe 2022). “Spawning behavior has not been observed in the wild for this species and only one published report has been made based on captive spawning” (Adams and Burr 2004). Eastern Sand Darters captured in the Tippecanoe River were observed spawning in captivity by Johnston (1989). Johnston (1989) observed males mounting females and fertilizing slightly adhesive eggs in water temperatures between 69-73.5°F. Eggs were deposited in the aquarium sand and gravel (Stauffer et al. 2016; NatureServe 2022). No nest was created, and parental care was not observed (Johnston 1989; Adams and Burr 2004). Eggs hatch in 4-5 days and grow rapidly in the first year, becoming benthic at roughly 7.4 mm (Simon et al. 1992; Simon and Wallus 2006; Drake et al. 2008; COSEWIC 2009; Stauffer et al. 2016; NYNHP 2022). Females likely spawn multiple times in one season (Johnston 1989; Simon and Wallus 2006; COSEWIC 2009; Stauffer et al. 2016). Fecundities ranged from 30-170 with an average of 71 (Spreitzer 1979; Adams and Burr 2004; COSEWIC 2009). “Egg survivorship is probably high in characteristic habitat, and the spawning season may be synchronized with low silt levels (Spreitzer 1979; Johnston 1989)” (Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

“The main threats to Eastern Sand Darters include loss of habitat due to siltation, pollution associated with agriculture and urban development, changes in flow regimes, and introduced species” (Stauffer et al. 2016). The use of lampricide in Lake Erie, Lake Champlain, and some rivers could also affect populations (Carlson 1998; NatureServe 2022; NYNHP 2022).

“Siltation appears to be the leading cause of significant loss of habitat in Canada (Holm and Mandrak 1996). Silt reduces the available substrate oxygen necessary for fossorial behaviour and egg survivorship. It has caused the decline and extirpation of the Eastern Sand Darter in some rivers where it was formerly abundant (Kuehne and Barbour 1983; Holm and Mandrak 1996).” “Contaminants associated with industrial activity, and urban and agricultural runoff have the potential to kill Eastern Sand Darter outright, or to affect their invertebrate food supply.” (COSEWIC 2009). Channelization and dam construction can “increase peak flows, decrease low flows, can lead to increased erosion, and interfere with natural sediment deposition processes that nourish sand bars (Paine and Watt 1994; Helfman 2007).” “Dams can also fragment populations by limiting gene flow and reducing the likelihood of recolonization” (COSEWIC 2009). The Round Goby has invaded a number of waterbodies that Eastern Sand Darters are known to inhabit and predation and competition from them may be a potential threat (Edwards et al. 2007; COSEWIC 2009). Lampricide practices in the Poultney River were considered a threat to Eastern Sand Darter, and reduced levels were used as a precaution (Plosila et al. 1986). Instream tests and laboratory bioassays indicated that treatments at normal concentrations would be appropriate (Neuderfer 2000).

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Eastern Sand Darter is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Conservation strategies and management practices from the New York Natural Heritage Program website (NYNHP 2022):

Protect the habitat occupied by Eastern Sand Darters by preventing the introduction of toxic pollutants and debris from run-off and prevent siltation as a result of altered hydrologic flow that could be created by impoundments or dams (Bouton 1989; Carlson 1998; Carlson 2005; Facey 1998). Monitor habitat conditions and current populations and consider reintroducing Eastern Sand Darters into historical locations, where suitable (Bouton 1989). More information regarding breeding and spawning behavior, year-to-year population variation, and microhabitat requirements is needed. Conduct genetic analysis on the disjunct populations of the St. Lawrence and Lake Champlain drainages to determine similarity between these and others in their range (Facey 1998). Additional rivers in the St. Lawrence drainage may remain to be surveyed. It is possible that the Cattaraugus and Cazenovia Creeks could have been recolonized from Lake Erie if the creeks are indeed recovering from earlier pollution, so resurveys of those creeks may be warranted. Some effort to standardize population estimates for the various rivers may be needed (Carlson 1998; Carlson 2005).

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat restoration:

-Habitat losses and recommendations for restoration in the Poultney River, as studied in Vermont, will be applied as appropriate.

Relocation/reintroduction:

-Examine possibilities for reintroducing to Cattaraugus Creek and for introducing to other St. Lawrence tributaries.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Site/Area Management |
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Land/Water Management | Habitat & Natural Process Restoration |
| **5.** Species Management | Species Recovery |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Eastern Sand Darter.

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# Species Status Assessment Cover Sheet

**Species Name:** Gilt Darter

**Date Updated:** January 2023

**Current Status:** Endangered – HPSGCN

**Updated By:** Kyle Grasso

**Current NHP Rank:** SH

**Distribution:** Gilt Darters are distributed throughout the Mississippi River basin and part of the Lake Erie basin from southwestern New York and northwestern Pennsylvania west to Minnesota and south to northern Alabama and Arkansas. In New York, the Gilt Darter has only been recorded in the Allegheny River.

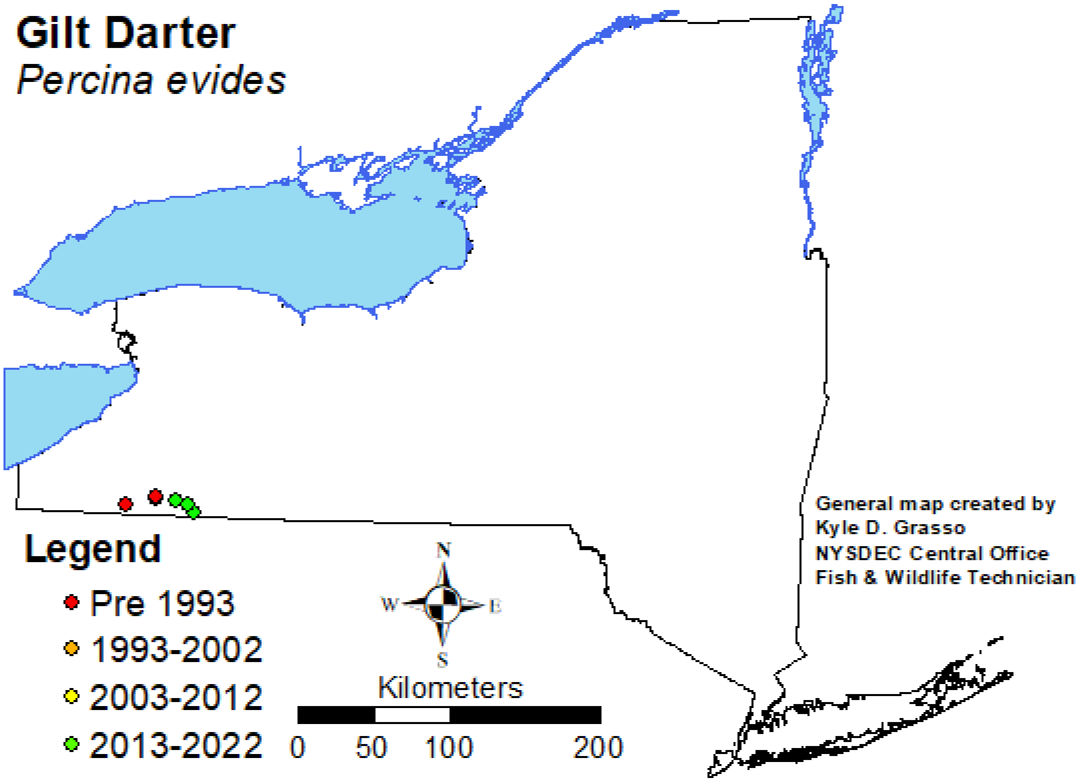
**Habitat:** The Gilt Darter inhabits medium to large rivers with strong flow, clear water, and clean, silt-free bottoms. They are typically found in moderate to fast, deep riffles and runs, over gravel, rubble, and small boulders. Gilt Darters will move into deep pools in the winter. They are intolerant of slow water and silt.

**Life History:** Gilt Darter life history has not been well research. Most female Gilt Darters will spawn between 2-3 years of age and only spawn twice per lifetime. Stauffer et al. (2016) reported that spawning in Pennsylvania likely occurs from May to late June based on field sampling of nuptial males in mid-May. Page et al. (1982) detailed spawning activity in the Little River, Tennessee, in June and early July, at water temperatures ranging from 17-20°C. Fish will spawn in fast riffles over sand and gravel interspersed with cobble and boulders. Males will closely follow females, and both will begin to intensely vibrate, displacing substrate and burying eggs as they are released and fertilized. Kellogg et al. (1997) reported fecundities ranging from 741-1,326 with a median fecundity of 976.

**Threats:** The main threat to the Gilt Darter is siltation from excess runoff and erosion. The Kinzua Dam in northern Pennsylvania prevents interaction and gene flow between fish populations and may also be a source of mortality. In addition, any alterations to the water flow and temperature could reduce suitable spawning habitat. Mortality can also be caused by extremely low or high flows. Due to the limited distribution of Gilt Darter, they could also be vulnerable to extirpation should a catastrophic event occur.

**Population trend:** In New York, the Gilt Darter has only been recorded in the Allegheny River. They were previously extirpated from New York with the last record in 1937. A partnership between NY and PA state agencies, and SUNY Cobleskill was formed in 2012 to restore Gilt Darter populations in New York. Allegheny River stocking in 2012-13 resulted in catches in 2013-14; however, no evidence of recruitment has been found and despite targeted effort, the last record was in 2014. Stocking is scheduled to restart ca. 2022 at a target of 2000 fish per year for 5 years.

**Recommendation:** It is recommended that the Gilt Darter remain listed as Endangered. Without stocking efforts, it is likely the Gilt Darter would again be extirpated from New York. Continued stocking efforts in combination with sampling will provide more information on how feasible a recovery is for Gilt Darter in the Allegheny River.



# Species Status Assessment

**Common Name:** Gilt Darter **Date Updated:** January 2023

**Scientific Name:** *Percina evides* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Percidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Gilt Darter is in the class Actinopterygii and the family Percidae (perches, walleyes, darters). Gilt Darters are distributed throughout the Mississippi River basin and part of the Lake Erie basin from southwestern New York and northwestern Pennsylvania west to Minnesota and south to northern Alabama and Arkansas (Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). In New York, the Gilt Darter has only been recorded in the Allegheny River (NYSDEC 2013). re . A partnership between New York and Pennsylvania state agencies, and SUNY Cobleskill was formed in 2012 to restore Gilt Darter populations in New York. In November 2012, NYSDEC and SUNY Cobleskill released 1,200 hatchery raised juveniles into the Allegheny River at 3 locations (near Olean, Portville, South Carrollton) (NYSDEC 2012). In addition, 500 juveniles were relocated from Pennsylvania to be stocked with the hatchery raised fish (Carlson and Foster 2012). Stocking occurred in 2012-13 and resulted in catches in 2013-14; however, no evidence of recruitment has been found and despite extensive targeted effort, the last record was in 2014 (Carlson et al. 2016). Stocking is scheduled to restart ca. 2022 at a target of 2000 fish per year for 5 years. The Gilt Darter inhabits medium to large rivers with strong flow, clear water, and clean, silt-free bottoms. They are typically found in moderate to fast, deep riffles and runs, over gravel, rubble, and small boulders (Skyfield and Grossman 2008; Stauffer et al. 2016; NatureServe 2022).

## I. Status

### a. Current legal protected Status

**i. Federal:** Not Listed **Candidate:** No

**ii. New York:** Endangered – HPSGCN

### b. Natural Heritage Program

**i. Global:** Apparently Secure – G4

**ii. New York:** SH **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern

**Status Discussion:**

In New York, the Gilt Darter is currently listed as Endangered and HPSGCN. They are globally ranked as Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:** _____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:** _____

**NEW JERSEY** **Not Present:** ✓ **No Data:** _____

**VERMONT** **Not Present:** ✓ **No Data:** _____

**ONTARIO** **Not Present:** ✓ **No Data:** _____

**QUEBEC** **Not Present:** ✓ **No Data:** _____

**PENNSYLVANIA** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** No

### d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. A partnership between New York and Pennsylvania state agencies, and SUNY Cobleskill was formed in 2012 to restore Gilt Darter populations in New York. In November 2012, NYSDEC and SUNY Cobleskill released 1,200 hatchery raised juveniles into the Allegheny River at 3 locations (near Olean, Portville, South Carrollton) (NYSDEC 2012). In addition, 500 juveniles were relocated from Pennsylvania to be stocked with the hatchery raised fish (Carlson and Foster 2012). Stocking occurred in 2012-13 and resulted in catches in 2013-14; however, no evidence of recruitment has been found and despite extensive targeted effort, the last record was in 2014 (Carlson et al. 2016). Stocking is scheduled to restart ca. 2022 at a target of 2000 fish per year for 5 years.

Field operations led by the Pennsylvania Fish & Boat Commission included locating and/or capturing Gilt Darters for habitat assessments, brood stock collection, and genetic analysis. The collaboration between PA and NY SWG-funded projects also afforded opportunities to assess additional species of greatest conservation need within PA that occupy habitats overlapping those of the Gilt Darter (PFBC 2012).

## Trends Discussion *(insert map of North American/regional):*

Population declines have resulted from pollution and habitat alteration. Population numbers are declining, and they are locally rare in many parts of their fragmented range (Stauffer et al. 2016; NatureServe 2022). “Until recently, the Gilt Darter was considered rare in northwestern Pennsylvania and listed as threatened by PBFC (2011). Recent benthic trawling efforts, however, have resulted in the collection of large numbers of Gilt Darters in the Allegheny River (Koryak et al. 2011)” (Stauffer et al. 2016).

In New York, the Gilt Darter has only been recorded in the Allegheny River (NYSDEC 2013). They were previously extirpated from New York with the last record in 1937. A partnership between New York and Pennsylvania state agencies, and SUNY Cobleskill was formed in 2012 to restore Gilt Darter populations in New York. In November 2012, NYSDEC and SUNY Cobleskill released 1,200 hatchery raised juveniles into the Allegheny River at 3 locations (near Olean, Portville, South Carrollton) (NYSDEC 2012). In addition, 500 juveniles were relocated from Pennsylvania to be stocked with the hatchery raised fish (Carlson and Foster 2012). Stocking occurred in 2012-13 and resulted in catches in 2013-14; however, no evidence of recruitment has been found and despite extensive targeted effort, the last record was in 2014 (Carlson et al. 2016). Stocking is scheduled to restart ca. 2022 at a target of 2000 fish per year for 5 years.

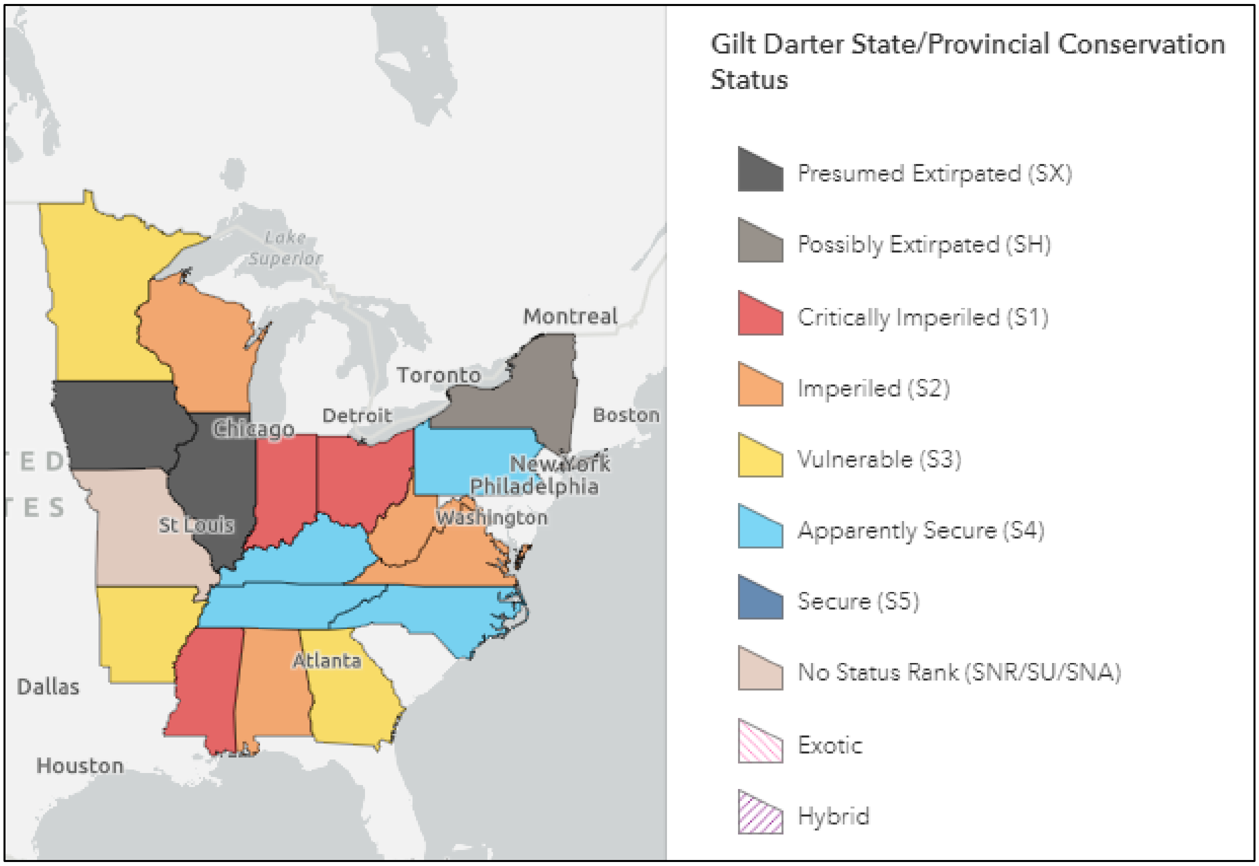


**Figure 1:** Gilt Darter distribution and status (Source: NatureServe 2022).

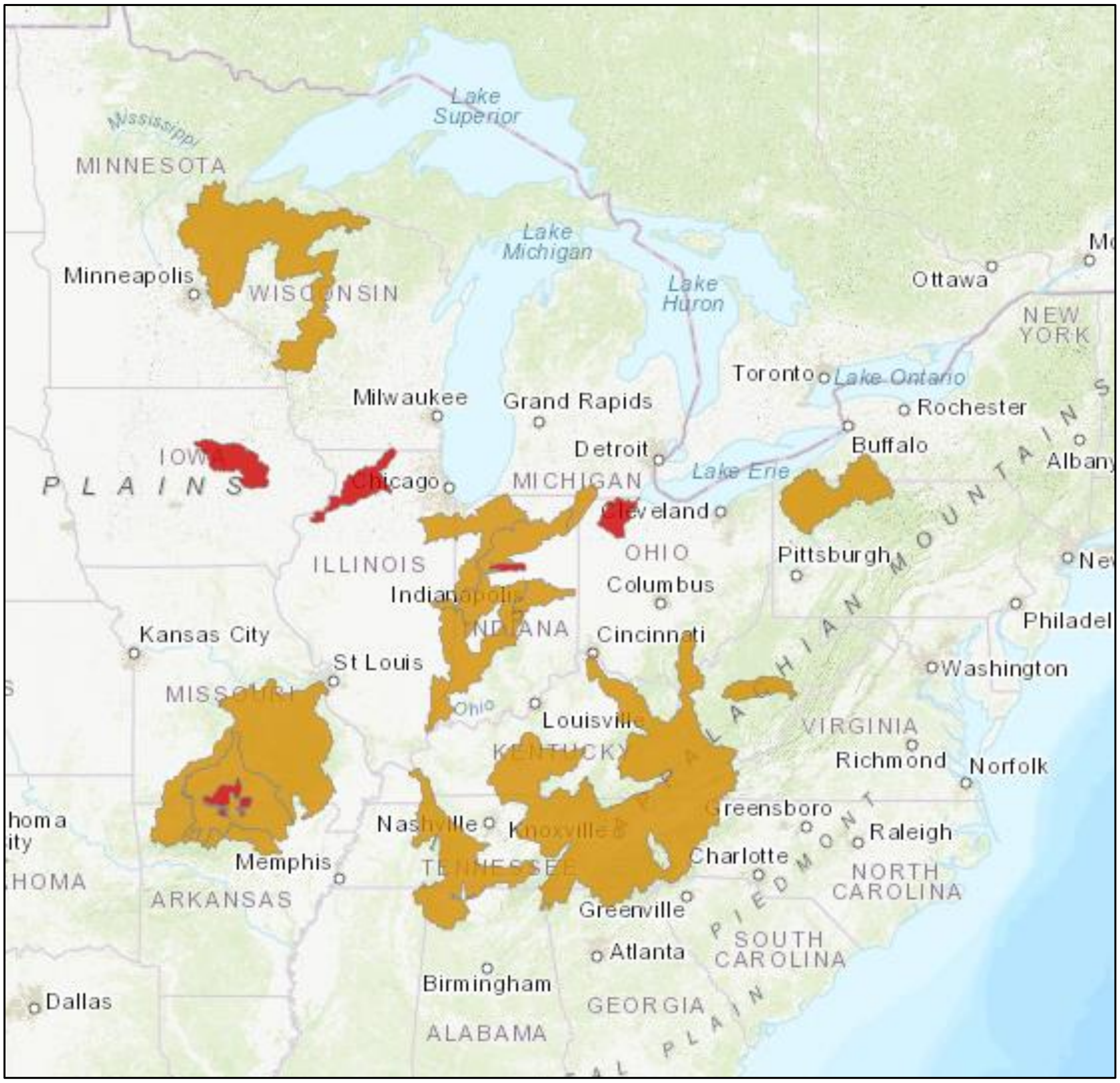


**Figure 2:** Gilt Darter distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

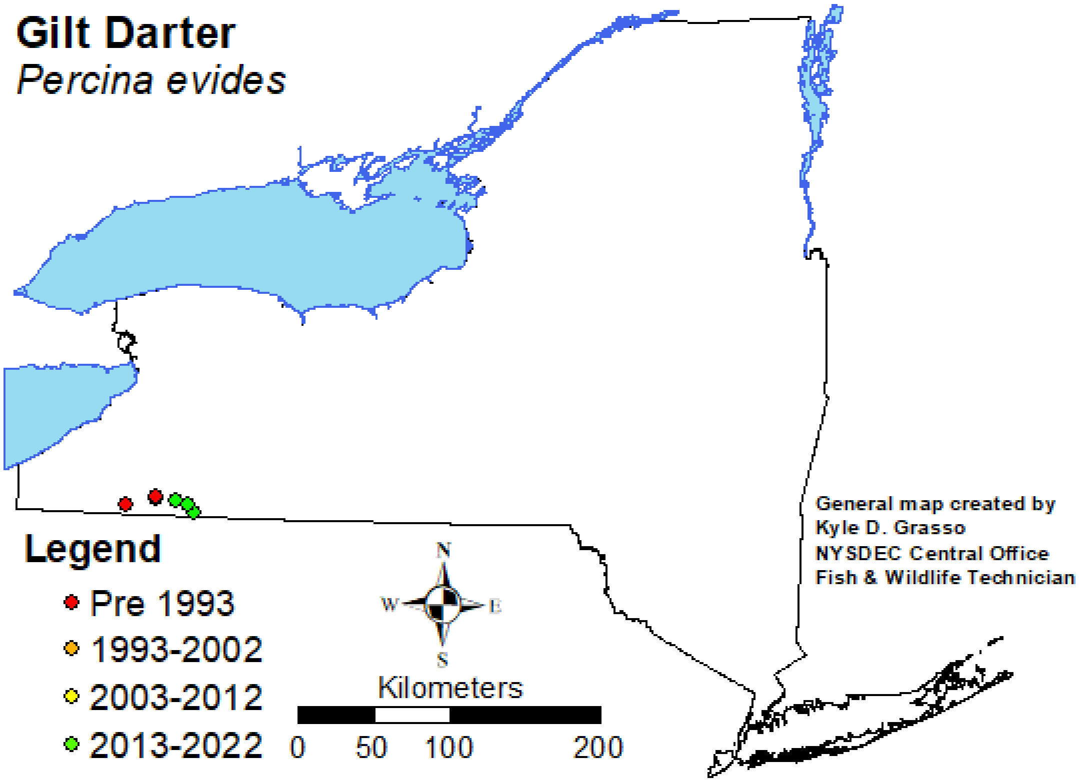


**Figure 3:** Records of Gilt Darter in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 6 | 1 | 0-5% |
| **1993-2002** | 0 | 0 | 0% |
| **2003 - 2012** | 0 | 0 | 0% |
| **2013 - 2022** | 3 | 1 | 0-5% |

**Table 1:** Records of Gilt Darter in New York.

### Details of historic and current occurrence:

In New York, the Gilt Darter has only been recorded in the Allegheny River (NYSDEC 2013). They were previously extirpated from New York with the last record in 1937. There are 6 records of Gilt Darters in the New York portion of the Allegheny River from 1931-1937. A partnership between New York and Pennsylvania state agencies, and SUNY Cobleskill was formed in 2012 to restore Gilt Darter populations in New York. In November 2012, NYSDEC and SUNY Cobleskill released 1,200 hatchery raised juveniles into the Allegheny River at 3 locations (near Olean, Portville, South Carrollton) (NYSDEC 2012). In addition, 500 juveniles were relocated from Pennsylvania to be stocked with the hatchery raised fish (Carlson and Foster 2012). Stocking occurred in 2012-13 and resulted in catches in 2013-14; however, no evidence of recruitment has been found and despite extensive targeted effort, the last record was in 2014 (Carlson et al. 2016). Stocking is scheduled to restart ca. 2022 at a target of 2000 fish per year for 5 years.

**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%:_____ | Peripheral: ✓ |
| 51-75%:_____ | Disjunct:_____ |
| 26-50%:_____ | Distance to core population: |
| 1-25%: ✓ | Core pop. to the south and west |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Medium mainstem river

**b. Geology:** Assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to low-moderate gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:** ✓

**Time frame of decline/increase:**_____

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

The Gilt Darter inhabits medium to large rivers with strong flow, clear water, and clean, silt-free bottoms. They are typically found in moderate to fast, deep riffles and runs, over gravel, rubble, and small boulders. Gilt Darters in the Allegheny River have been observed in pools, swimming over boulder-strewn substrates and hiding between rocks (Stauffer et a. 2016). They will move into deep pools in the winter. They are intolerant of slow water and silt, and thus a good indicator of environmental quality (Skyfield and Grossman 2008; Stauffer et al. 2016; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Gilt Darter life history has not been well studied (Smith 1985). Most female Gilt Darters will spawn between 2-3 years of age and only spawn twice per lifetime (Bart and Page 1992; NatureServe 2022). Stauffer et al. (2016) reported that spawning in Pennsylvania likely occurs from May to late June based on field sampling of nuptial males in mid-May. “Page et al. (1982) detailed spawning activity in the Little River, Tennessee, in June and early July, at water temperatures ranging from 17-20°C” (Stauffer et al. 2016). Fish will spawn in fast riffles over sand and gravel interspersed with cobble and boulders (Becker 1983; Stauffer et al. 2016; NatureServe 2022). Males will closely follow females, and both will begin to intensely vibrate, displacing substrate and burying eggs as they are released and fertilized. Kellogg et al. (1997) reported fecundities ranging from 741-1,326 with a median fecundity of 976. Denoncourt (1969) reported large males dying shortly after spawning.

## VI. Threats *(from NY CWCS Database or newly described)*

The main threat to the Gilt Darter is siltation from excess runoff and erosion (Skyfield and Grossman 2008; NatureServe 2022). The Kinzua Dam in northern Pennsylvania prevents interaction and gene flow between fish populations and may also be a source of mortality. In addition, any alterations to the water flow and temperature could reduce suitable spawning habitat (NYSDEC 2013). Mortality can also be caused by extremely low or high flows (Skyfield and Grossman 2008). Due to the limited distribution of Gilt Darter, they could also be vulnerable to extirpation should a catastrophic event occur.

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

**Yes:** ✓ **No:** ____ **Unknown:** ____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Gilt Darter is currently listed as an endangered species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

A partnership between New York and Pennsylvania state agencies, and SUNY Cobleskill was formed in 2012 to restore Gilt Darter populations in New York. In November 2012, NYSDEC and SUNY Cobleskill released 1,200 hatchery raised juveniles into the Allegheny River at 3 locations (near Olean, Portville, South Carrollton) (NYSDEC 2012). In addition, 500 juveniles were relocated from Pennsylvania to be stocked with the hatchery raised fish (Carlson and Foster 2012). Stocking occurred in 2012-13 and resulted in catches in 2013-14; however, no evidence of recruitment has been found and despite extensive targeted effort, the last record was in 2014 (Carlson et al. 2016). Stocking is scheduled to restart ca. 2022 at a target of 2000 fish per year for 5 years. Part of the tentative stocking plan is to stock Gilt Darters in the New York and Pennsylvania sections of the Allegheny River above the Kinzua Dam in hopes they remain in New York.

Field operations led by the Pennsylvania Fish & Boat Commission included locating and/or capturing Gilt Darters for habitat assessments, brood stock collection, and genetic analysis. The collaboration between PA and NY SWG-funded projects also afforded opportunities to assess additional species of greatest conservation need within PA that occupy habitats overlapping those of the Gilt Darter (PFBC 2012).

To compensate for siltation, potential conservation measures to improve water quality in the Allegheny River should be investigated (especially those which reduce erosion and excess runoff).

The 2015 State Wildlife Action Plan included the following recommendations:

-Evaluate the success of Gilt Darter restoration and continue trap and transfer as necessary in the Allegheny watershed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Habitat/Natural Process Restoration |
| **5.** Species Management | Species Recovery |
| **6.** Species Management | Species Re-introduction |
| **7.** Species Management | Ex-situ Conservation |
| **8.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Gilt Darter.

## VII. References

Bart, H. L., Jr., and L. M. Page. 1992. The influence of size and phylogeny on life history variation in North American percids. Pages 553-572 in R. L. Mayden, editor. Systematics, historical ecology, and North American freshwater fishes. Stanford University Press, Stanford, California. xxvi + 969 pp.

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Page, L. M., and B. M. Burr. 2011. Peterson field guide to freshwater fishes of North America north of Mexico. Second Edition. Houghton Mifflin Harcourt. Boston, Massachusetts. 663 pp.

Pennsylvania Fish & Boat Commission (PFBC). 2012. Pennsylvania Fish & Boat Commission 2012 Annual Summary. State Wildlife Grants Program. Available at : <fishandboat.com/promo/grants/swg/summary2012swg.pdf> (Accessed February 5, 2013).

Skyfield, J. P., and G. D. Grossman. 2008. Microhabitat use, movements and abundance of Gilt Darters (*Percina evides*) in southern Appalachian (USA) streams. Ecology of Freshwater Fish 17: 219-230.

Smith, C. L. 1985. The inland fishes of New York State. New York State Department of Environmental Conservation. Albany, New York. 522 pp.

Stauffer, J. R., Jr., R. W. Criswell, and D. P. Fischer. 2016. The fishes of Pennsylvania. Cichlid Press. El Paso, Texas. 556 pp.

# Species Status Assessment Cover Sheet

**Species Name:** Gravel Chub **Date Updated:** January 2023

**Current Status:** Threatened – Non-SGCN (due to presumed extirpation) **Updated By:** Kyle Grasso

**Current NHP Rank:** SH

**Distribution:** Historically, Gravel Chubs have had a spotty distribution from Arkansas, Oklahoma, and Kansas to southern Ontario eastward along the Ohio River drainage to southwestern New York. In New York, they were only known to occur in the Allegheny watershed, but they have not been recorded in the state since 1980 and are presumed extirpated.

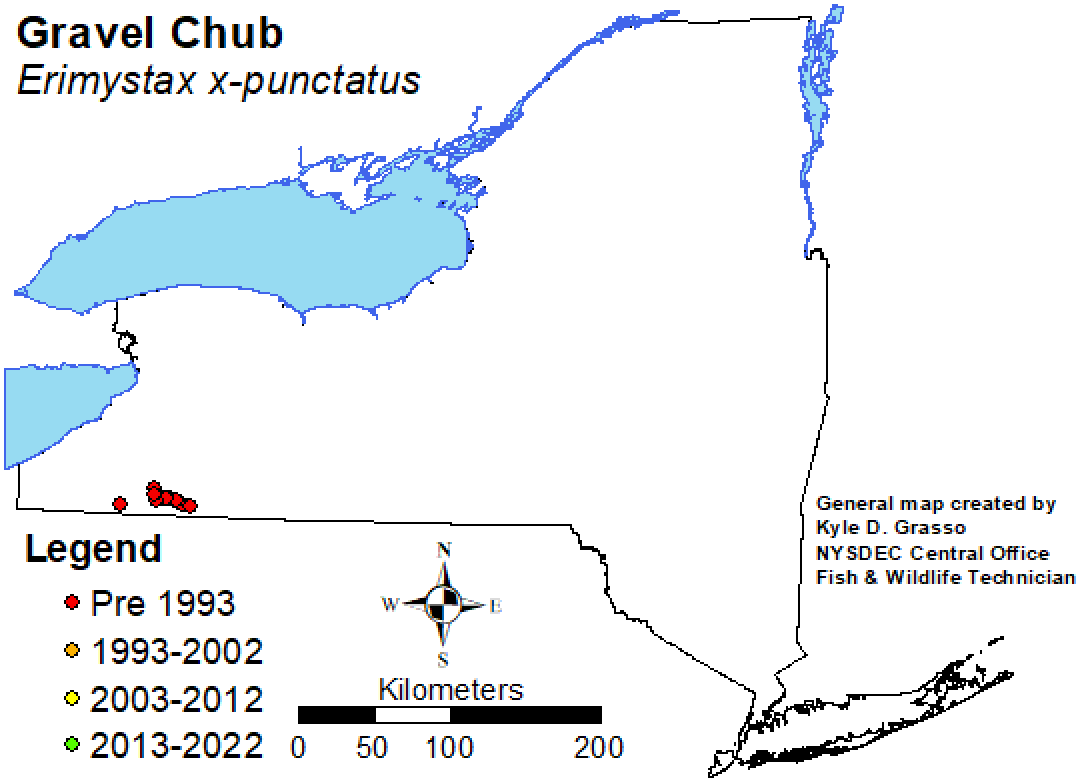
**Habitat:** Gravel Chubs inhabit the clear waters of medium to large-sized streams. As their name suggests, they prefer areas of slow to moderate flow (usually deeper riffles and runs) with silt free gravel or firm sand-gravel and occasionally rocky substrate. They will occasionally move into faster water where they will take refuge near shelter (e.g., boulders) in slower currents. Gravel Chubs can occasionally tolerate moderately turbid waters but if siltation persists they will move to swifter waters with coarser substrates or disappear entirely from the affected stream section.

**Life History:** The life history of Gravel Chub has not been well studied. Harris (1986) reported that Gravel Chubs reach sexual maturity at age 2 and that maximum age was 3+ years, which was heavily skewed towards females. In Minnesota, signs point to spawning occurring in May and possibly into June. In Arkansas, spawning occurred in April and May in water temperatures of 60 to 66°F. Spawning habitat is currently unknown, but spawning may occur in meter-deep swift water adjacent to clean, gravel bars. Nonadhesive eggs are scattered over the gravel substrate where they remain until hatching. No parental care is given. Harris (1986) stated that fecundity ranged from 150-525.

**Threats:** The two biggest threats to the Gravel Chub are siltation and high turbidity. Trautman (1981) noted that competition between the Gravel Chub and Streamline Chub seemed to be rather keen, especially while feeding.

**Population trend:** In New York, Gravel Chubs were only known to occur in the Allegheny watershed, but they have not been recorded in the state since 1980 and are presumed extirpated. There are a total of 19 Gravel Chub records in New York.

**Recommendation:** It is recommended that the Gravel Chub be delisted because they have not been recorded in New York since 1980 and are presumed extirpated.



# Species Status Assessment

**Common Name:** Gravel Chub **Date Updated:** January 2023

**Scientific Name:** *Erimystax x-punctatus* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Gravel Chub is in the class Actinopterygii and the family Cyprinidae (minnows and carps). Historically, Gravel Chubs have had a spotty distribution from Arkansas, Oklahoma, and Kansas to southern Ontario eastward along the Ohio River drainage to southwestern New York. In New York, they were only known to occur in the Allegheny watershed, but they have not been recorded in the state since 1980 and are presumed extirpated (Carlson et al. 2016). Gravel Chubs inhabit the clear waters of medium to large-sized streams. They prefer areas of slow to moderate flow (usually deeper riffles and runs) with silt free gravel or firm sand-gravel and occasionally rocky substrate (Genoways and Brenner 1985; Edwards et al. 2007; Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; Tiemann 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Threatened – Non-SGCN (due to presumed extirpation)

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** SH **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Extirpated (5/1/2019)

**Status Discussion:**

In New York, the Gravel Chub is currently listed as Threatened. However, they are currently listed as a Non-SGCN because they have not been recorded in New York since 1980 and are presumed extirpated. The Gravel Chub is globally ranked as Apparently Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

ii. **Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 40 years (extirpated from 4-5 states within range)

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 40 years (extirpated from NY and PA)

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:** _____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:** _____

**NEW JERSEY** **Not Present:** ✓ **No Data:** _____

**VERMONT** **Not Present:** ✓ **No Data:** _____

**QUEBEC** **Not Present:** ✓ **No Data:** _____

**PENNSYLVANIA** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last recorded in 1985

**Listing Status:** Extirpated - SX **SGCN?:** Yes

**ONTARIO** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Listed as extirpated in 2019

**Listing Status:** Not Listed – SX **SGCN?:** N/A

### d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** No records since 1980 (presumed extirpated)

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

"Distribution and abundance appear to be relatively stable in the central and western portions of the range. Warren et al. (2000) rated it as currently stable in the southern U.S. Jelks et al. (2008) did not list this species as endangered, threatened, or vulnerable. Page and Burr (2011) described it as locally common but declining over much of range" (NatureServe 2022). According to NatureServe, the short-term trend is a decline of <30% to relatively stable and the long-term trend is a decline of 50-70%.

In New York, they were only known to occur in the Allegheny watershed, but they have not been recorded in the state since 1980 and are presumed extirpated (Carlson et al. 2016). They are also presumed extirpated from Ontario, Kentucky, and Pennsylvania. The Thames River drainage in Ontario contained Gravel Chub in 1958 but they have since been extirpated (COSEWIC 2008). The last record in Pennsylvania was dated 1985 (Stauffer et al. 2016).

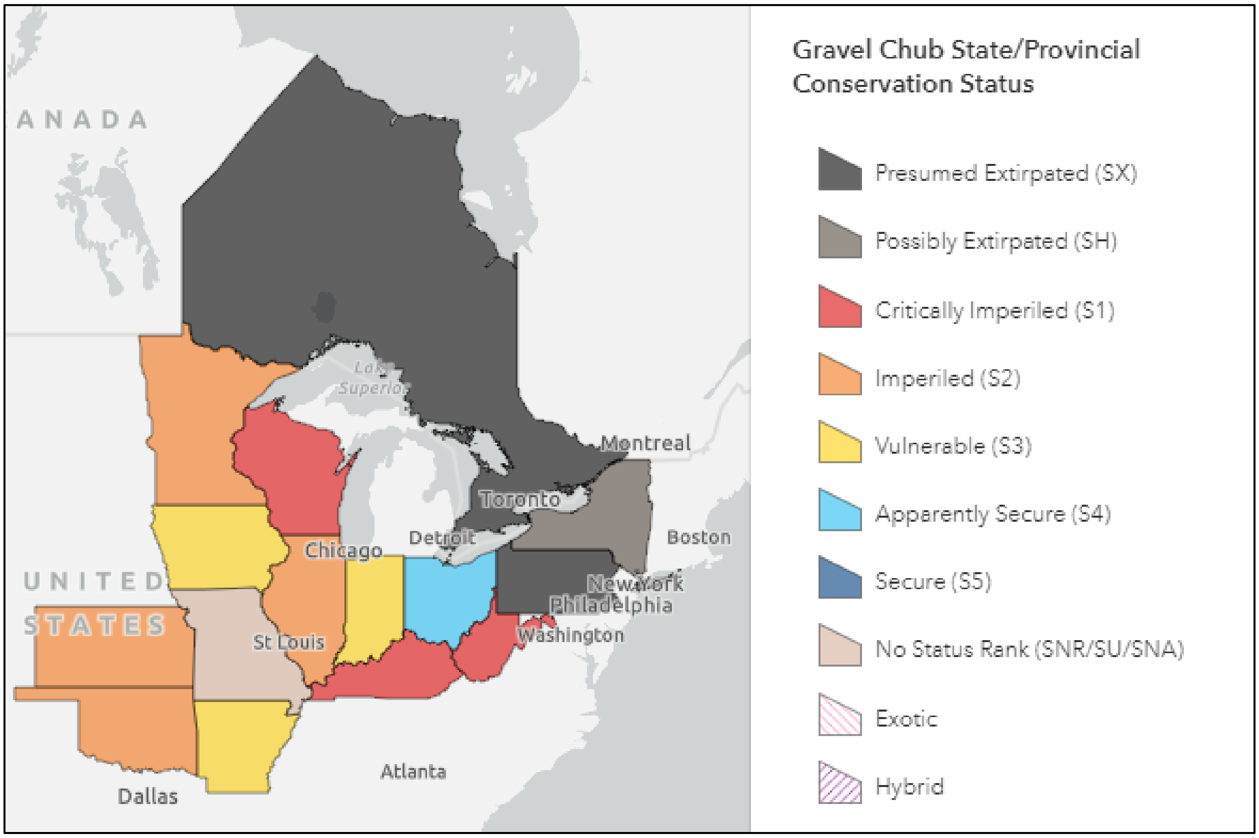


**Figure 1:** Gravel Chub distribution and status (Source: NatureServe 2022).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

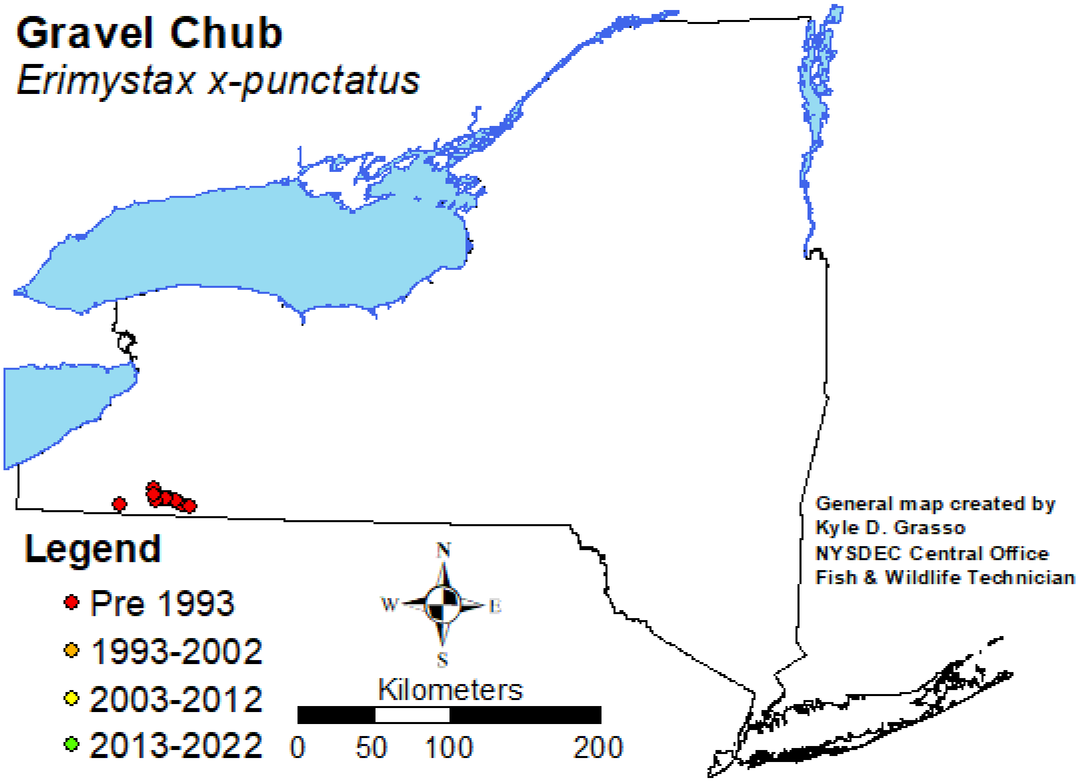


**Figure 2:** Records of Gravel Chub in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 19 | 2 | 0-5% |
| **1993-2002** | 0 | 0 | 0% |
| **2003 - 2012** | 0 | 0 | 0% |
| **2013 - 2022** | 0 | 0 | 0% |

**Table 1:** Records of Gravel Chub in New York.

### Details of historic and current occurrence:

In New York, the Gravel Chub historically only occurred in the Allegheny watershed. Four collections were made in 1937 and 15 reports are dated between 1954 and 1980. They were collected in the Allegheny River near Pierce Run, Vandalia, and S. Carrollton in 1937 (Carlson et al. 2016). Between 1977 and 1980 Gravel Chub were collected in the Allegheny River between Weston Mills and Vandalia, but not in 1985-89 (Becker 1982; Daniels 1989). They were also caught in Tunungwant Creek in 1978 (Eaton et al. 1982; Cervone et al.1985). Gravel Chub have not been recorded in New York since 1980 and are presumed extirpated (Carlson et al. 2016).

They have not occurred upstream of New York in the Pennsylvania portion of the Allegheny River (Genoways and Brenner 1985) and the most recent record in the downstream portion of the Allegheny river in PA was in 1971 despite thorough sampling (Koryak et al. 2009; Lorson 2009). The most recent record in PA was in 1985 and they are presumed extirpated (Stauffer et al. 2016).

### New York's Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:**__✓__

**Classification of New York Range**

**Core:**_____

**Peripheral:**__✓__

**Disjunct:**__✓__

**Distance to core population:**

Core pop. to the south and west

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Medium tributary and mainstem rivers

**b. Geology:** Assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to low-moderate gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:**__✓__

**Time frame of decline/increase:**_______________

**Habitat Specialist?** **Yes:**__✓__ **No:**_____

**Indicator Species?** **Yes:**__✓__ **No:**_____

### Habitat Discussion:

Gravel Chubs inhabit the clear waters of medium to large-sized streams. As their name suggests, they prefer areas of slow to moderate flow (usually deeper riffles and runs) with silt free gravel or firm sand-gravel and occasionally rocky substrate (Genoways and Brenner 1985; Edwards et al. 2007; Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; Tiemann 2022). They will occasionally move into faster water where they will take refuge near shelter (e.g., boulders) in slower currents (Smith 1985). Gravel Chubs can occasionally tolerate moderately turbid waters but if siltation persists they will move to swifter waters with coarser substrates or disappear entirely from the affected stream section (Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). "The species tends to avoid areas with macrophytes, larger algae species and aquatic moss species" (COSEWIC 2008).

"*E. x-punctatus* is difficult to capture with traditional sampling methods, such as electrofishing, and is often missed during normal community assessments (Neebling and Quist 2011)" (Tiemann 2022). During a 2022 study sampling Gravel Chub in Illinois, the fish was exclusively found in areas with flow over clean gravel and cobble substrates. The fish was never found in stagnant waters or over silty/pure sand substrates (Tiemann 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The life history of Gravel Chub has not been well studied (Werner 2004). Harris (1986) reported that Gravel Chubs reach sexual maturity at age 2 and that the maximum age was 3+ years, which was heavily skewed towards females (Stauffer et al. 2016). In Minnesota, signs point to spawning occurring in May and possibly into June (MDNR 2016). In Arkansas, spawning occurred in April and May in water temperatures of 60 to 66°F (Harris 1986; Stauffer et al. 2016). Spawning habitat is currently unknown, but spawning may occur in meter-deep swift water adjacent to clean, gravel bars (Smith 1979; NatureServe 2022). “Nonadhesive eggs are scattered over the gravel substrate where they remain until hatching. No parental care is given (Coker et al. 2001)” (COSEWIC 2008). Harris (1986) stated that fecundity ranged from 150-525 depending on the size of the female (Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

The two biggest threats to the Gravel Chub are siltation and high turbidity. Their presence is considered an indication of good water quality (Trautman 1981; COSEWIC 2008; Stauffer et al. 2016).

“Trautman (1981) noted that competition between the Gravel Chub and Streamline Chub seemed to be rather keen, especially while feeding. The latter has enjoyed a significant recent expansion in range and numbers in Pennsylvania, possibly at the expense of the former” (Stauffer et al. 2016).

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

**Yes:** __✓__ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Gravel Chub is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Since there have not been any Gravel Chub records in New York since 1980 and they are presumed extirpated, stocking will likely be the only possible mode of reintroduction. However, there may no longer be any suitable habitat in their historic New York range.

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat research:

-Inventory the habitat requirements of this species and its coinhabitants in the Allegheny and outside New York State, part of the same State Wildlife Grants project.

Habitat restoration:

-Habitat losses and restoration are part of a State Wildlife Grants project from 2003 that are directed at the Allegheny watershed.

Population monitoring:

-Additional survey in the Allegheny River and Tunungwant Creek is warranted as part of a State Wildlife Grants project in 2004.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Habitat/Natural Process Restoration |
| **5.** Species management | Species Re-introduction |
| **6.** Species management | Ex-situ Conservation |
| **7.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Gravel Chub.

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# Species Status Assessment

**Common Name:** Iowa darter **Date Updated:**

**Scientific Name:** *Etheostoma exile* **Updated by:**

**Class:** Actinopterygii

**Family:** Percidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The range of the Iowa darter extends from the Great Lakes drainage in both the United States and Canada, through the northern Midwest, as far south as Colorado, and throughout the prairie provinces of Canada, occurring father west and north than any other darter. It is currently found in about 17 waters scattered throughout the St. Lawrence, Lake Ontario, and Lake Erie watersheds in New York, occurring in lakes, low gradient streams, and larger rivers with submerged aquatic vegetation and gravel. Populations have declined to levels below detection in the Allegheny; in other watersheds there are no clear trends. Most records are from Lake Ontario bays and inland waters.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** Not listed; SGCN

### b. Natural Heritage Program

i. **Global:** G5

ii. **New York:** S2 **Tracked by NYNHP?:** Yes

**Other Ranks:**

- Species of Northeast Regional Conservation Concern (Therres 1999)

**Status Discussion:**

Iowa darter is globally ranked as Secure and ranked as Imperiled in New York due to scattered records throughout the state (NatureServe 2012).

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Stable | Stable | Over past 10 years | | Choose an item. |
| **Northeastern US** | Yes | Unknown | Unknown | | | Choose an item. |
| **New York** | Yes | Unknown | Unknown | Last 25 years | | Yes |
| **Connecticut** | No | Choose an item. | Choose an item. | | | Choose an item. |

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **Massachusetts** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **New Jersey** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Pennsylvania** | Yes | Unknown | Unknown | | Endangered | Yes |
| **Vermont** | No data | Choose an item. | Choose an item. | | | No |
| **Ontario** | Yes | Stable | Stable | | Not listed | Choose an item. |
| **Quebec** | Yes | Unknown | Unknown | | Not listed | Choose an item. |

*Column options*
**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item
**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

### Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit, 1998-2012.

### Trends Discussion *(insert map of North American/regional):*

Populations have been extirpated in many localities in the southern part of the range, although over the short term (past three generations) the trend thought to be relatively stable to slowly declining (NatureServe 2012).

In New York, trends for this species are unknown because thorough lake sampling has rarely been completed. Historically, Iowa darter were found in more than 36 waters (now about 17) and declining (or gone or dangerously sparse) in 3 of the 9 watersheds: Allegheny, Genesee, and Oswego. Historical populations in Oneida Lake and nearby streams and creeks in Oswego County, and Black Lake in St. Lawrence County have not been recorded since the 1930s.

The distribution of this species among sub-basins within each watershed (HUC-10) showed no clear pattern of change, with records from 36 of the units prior to 1977 and from only 17 units since 1976. There were 188 different site records from all sources examined, 70 of these records were since 1977 and 68 since 1993.

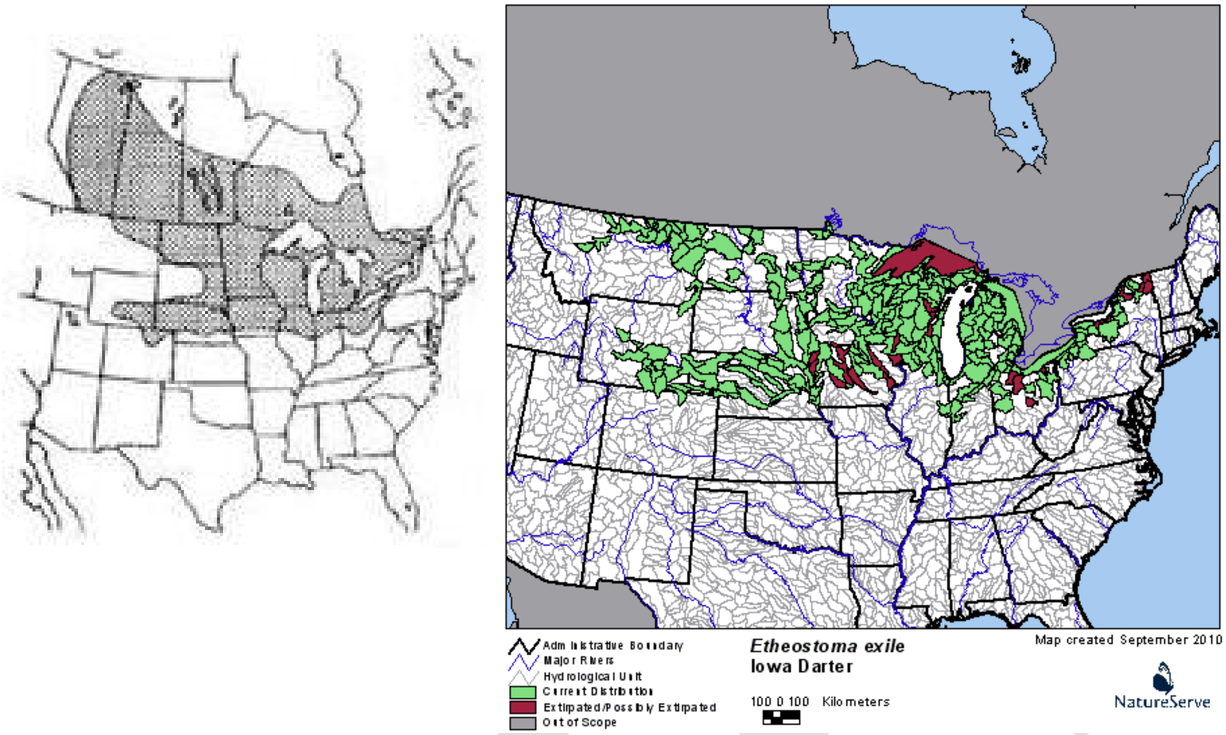

**Figure 1.** (National range map of Iowa darter and U.S. distribution by watershed (Page and Burr 1991, NatureServe 2012).

| Watershed | Total # HUC10 | Early only | Recent only | both | Watershed status |
|---|---|---|---|---|---|
| Allegheny | 2 | 2 | 0 | 0 | loss |
| Genesse | 3 | 2 | 0 | 1 | |
| Champlain | 1 | 0 | 0 | 1 | |
| Erie-Niagara | 4 | 2 | 1 | 1 | |
| Ontario | 14 | 8 | 5 | 1 | |
| Oswegatchie | 3 | 2 | 0 | 1 | |
| Oswego | 3 | 1 | 0 | 2 | |
| Raquette | 1 | 0 | 1 | 0 | gain |
| St. Law&SLC | 5 | 2 | 3 | 0 | |
| sum | 36 | 19 | 10 | 7 | |

**Table 1.** Records of rare fish species in hydrological units (HUC-10) are shown according to their watersheds in early and recent time periods (before and after 1977) to consider loss and gains. Further explanations of details are found in Carlson (2012).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

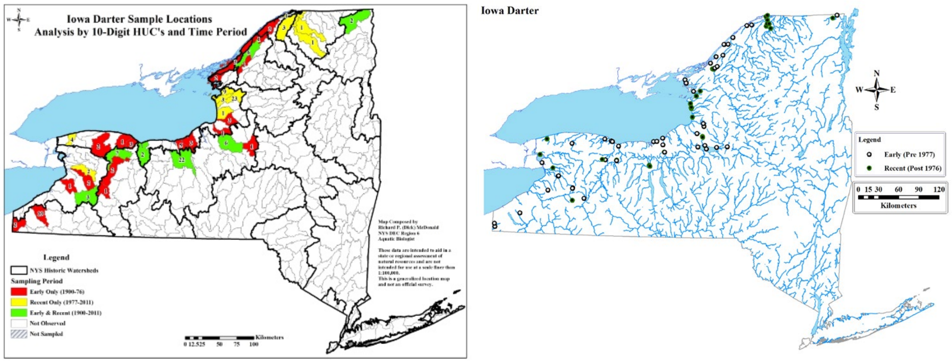

**Figure 2**. Iowa darter distribution in New York, depicting fish sampled before 1977 and from 1977 to current time, showing the corresponding HUC-10 units where they were found, along with the number of records. Left map shows the range of Iowa Darter in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | | 118 | 9/18 watersheds |
| **1993-2002** | | | |
| **2003 - 2012** | | 70 | 7/18 watersheds |
| **2013 - 2022** | | | |

**Table 2.** Records of Iowa darter in New York.

### Details of historic and current occurrence:

Iowa darter occurred in New York's Allegheny watershed and the 8 watersheds of the St. Lawrence River drainages, all except the Black. It is usually in bays, lakes and lowland streams like bays of Lake Ontario, Lake Champlain, Oneida Lake, Clear Lake (Jefferson Co.), Chautauqua Lake, Niagara River and St. Lawrence River.

The current distribution appears to be similar to the historic range in the bays of eastern Lake Ontario, the Niagara River, and the few lakes of the Oswego watershed. The watersheds of Champlain, Allegheny, and the western bays of Lake Ontario are in the part of their range where they are no longer found. Only one recent record comes from tributaries of western Lake Ontario, in East Branch of Twelve mile Creek. Most recent and historic records were from eastern Ontario and Niagara watersheds.

Rarity of this species is not discussed in the literature.

### New York's Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 1-25% | Peripheral | 400 miles |

*Column options*

**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item

**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

Small River, Low Gradient, Moderately Buffered, Neutral, Transitional Cool
Summer-stratified Monomictic Lake
Great Lakes Aquatic Bed

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| No | No | Unknown | |

*Column options*
**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item
**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

The Iowa darter occurs in quiet, shallow and weedy parts of lakes and rivers, but it also uses gravel and perhaps deeper areas. It usually occurs in clear-water, vegetated areas with sandy gravel or flocculent, and organic debris bottom types. Spawning occurs in shallow water of lake margins and quiet areas of streams; eggs are laid on submerged roots or debris, occasionally on gravel and sand.

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Yes | Yes | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

### Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Iowa darter spawns between April and July. It typically does not school except during breeding season. Sexual maturity is reached at one year and males establish territories (NatureServe 2012). Females mate with several males and deposit eggs on roots, sand or gravel. Iowa darter feed on tiny crustaceans when they are young and on amphipods, midge larvae, and other insect larvae and aquatic organisms when they mature (NYNHP 2013).

## VI. Threats *(from NY 2015 SWAP or newly described)*

The Iowa darter is sensitive to environmental perturbations, but little is known about the ecological requirements of this species. In other states, such as Illinois, distribution and abundance have declined due probably to habitat degradation caused by pollution, drainage of wetlands, and introductions of non-native species (NatureServe 2012).

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

**Yes:** _✓___ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law.

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

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for the Iowa darter.

**Fact Sheet:**

---- Develop fact sheet for DEC website

**Habitat Research:**

---- Determine ecological requirements of this species.

**Population Monitoring:**

---- Monitor for presence and ecological requirements of this species.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| Land/Water Protection | Resource/Habitat Protection |
| External Capacity Building | Alliance & Partnership Development |

**Table 3.** Recommended conservation actions for Iowa darter.

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| | |
|---|---|
| **Originally prepared by** | Doug Carlson and Amy Mahar |
| **Date first prepared** | April 10, 2012 |
| **First revision** | July 15, 2013 (Samantha Hoff) |
| **Latest revision** | Transcribed March 2024 |

# Species Status Assessment Cover Sheet

**Species Name:** Ironcolor Shiner
**Current Status:** Special Concern – SGCN
**Current NHP Rank:** S1

**Date Updated:** January 2023
**Updated By:** Kyle Grasso

**Distribution:** Ironcolor Shiners can be found along the Atlantic Coast from southern New York down to Florida, west along the Gulf Coast to Texas, and north along the Mississippi River to the Great Lakes. In New York, they are native to the Delaware and Newark Bay watersheds, however they are extirpated from the Newark Bay watershed.

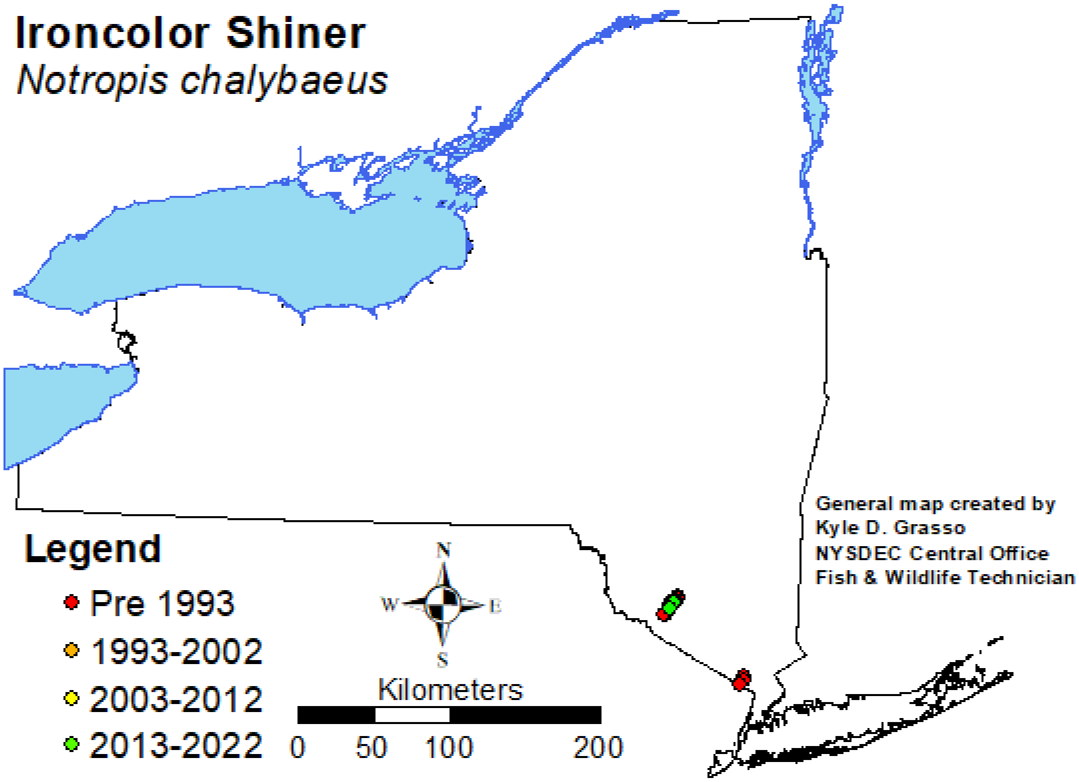
**Habitat:** Ironcolor Shiners inhabit warm, low gradient, clear streams, and swamps with mud and/or sand substrate. They prefer deep pools and slow runs with abundant vegetation and woody debris. They have also been observed in waterbodies with moderate current. Aquatic plants found in areas that this species inhabits include bladderwort, pondweed, and Elodea. They may occur in tannin-stained waters, at a pH as low as 4.2.

**Life History:** Ironcolor Shiners live to about 3 years old and become sexually mature at 1 year old. Marshall (1947) reported spawning occurring in Florida from mid-April through September at water temperatures of 57-77°F. In Pennsylvania, Leckvarcik (2001) reported a general spawning period of early June to late August in Marshalls Creek. They are fractional broadcast spawners, dispersing their eggs over aquatic vegetation in sand, mud, or fine detritus. There is no nest preparation or parental care. Most spawning occurred in areas with little to no current. Eggs hatch in roughly 2-3 days. Fecundity in Marshalls Creek in Pennsylvania ranged from 300-1250 depending on size.

**Threats:** Threats to the Ironcolor Shiner include habitat loss, increases in siltation and turbidity, pollution from industrial and sewage plant discharges, and lower base flows from water diversion. Introduction of non-native fishes and fish population alterations may also affect Ironcolor Shiner populations. More recently, the invasive Northern Snakehead (*Channa argus*) has been reported from the Bashakill Marsh and could detrimentally affect and extirpate the Ironcolor Shiner from the marsh complex.

**Population trend:** In New York, Ironcolor Shiners are native to the Delaware and Newark Bay watersheds. They were historically found in 3 waters in the 1930s (Basher Kill, Hackensack River, and Lake Tappan); however, they have not been recorded in the Hackensack River or Lake Tappan since 1936 and are considered extirpated from the Newark Bay watershed. The only remaining waterbody known to contain Ironcolor Shiners is the Bashakill Marsh. In the last 20 years, there have been 10 records in the Bashakill Marsh, with the last record being in 2021. Abundance appears to be stable, but the critical parts of their habitat and trend over time in the Bashakill Marsh have not been studied.

**Recommendation:** It is recommended that the Ironcolor Shiner be listed as Threatened due to their restricted range, vulnerability to environmental catastrophes, and the Northern Snakehead invasion in the Bashakill Marsh.



# Species Status Assessment

**Common Name:** Ironcolor Shiner **Date Updated:** January 2023

**Scientific Name:** *Notropis chalybaeus* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Ironcolor Shiner is in the class Actinopterygii and the family Cyprinidae (minnows and carps). Ironcolor Shiners can be found along the Atlantic Coast from southern New York to Florida, west along the Gulf Coast to Texas, and north along the Mississippi River to the Great Lakes (Stauffer et al. 2016; NatureServe 2022). In New York, they are native to the Delaware and Newark Bay watersheds. They were historically found in 3 waters in the 1930s (Basher Kill, Hackensack River, and Lake Tappan); however, they have not been recorded in the Hackensack River or Lake Tappan since 1936 and are considered extirpated from the Newark Bay watershed (Carlson et al. 2016). The only remaining waterbody known to contain Ironcolor Shiners is the Bashakill Marsh. In the last 20 years, there have been 10 records in the Bashakill Marsh, with the last record being in 2021 (Carlson et al. 2016). Abundance appears to be stable, but the critical parts of their habitat and trend over time in the Bashakill Marsh have not been studied. Due to their restricted range, one catastrophic event could be very detrimental to their survival in New York (Carlson et al. 2016). More recently, the invasive Northern Snakehead (*Channa argus*) has been reported from the Bashakill Marsh and could detrimentally affect and extirpate the Ironcolor Shiner from the marsh complex. Ironcolor Shiners inhabit warm, low gradient, clear streams, and swamps with mud and/or sand substrate (Leckvarcik 2001; Stauffer et al. 2016; NatureServe 2022). They prefer deep pools and slow runs with abundant vegetation and woody debris (Smith 1985; Stauffer et al. 2016; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Special Concern – SGCN

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)
- American Fisheries Society: Vulnerable (8/1/2008)

### Status Discussion:

In New York, the Ironcolor Shiner is currently listed as Special Concern and SGCN. They are globally ranked as Apparently Secure by NatureServe.

# II. Abundance and Distribution Trends

## a. North America

### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Declines since 1950s

## b. Northeastern U.S. (USWFS Region 5)

### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

## c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**_____

**ONTARIO** **Not Present:** ✓ **No Data:**_____

**QUEBEC** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Declines since the 1950s

**Listing Status:** Special Concern – S1 **SGCN?:** Yes

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Only one population remaining in the state (2016)

**Listing Status:** Endangered – S1 **SGCN?:** Yes

## d. New York

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_✓___ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_✓___ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

According to NatureServe, the short-term trends show a range wide decline of 10-30%. Declines in the northern part of the range have been observed due to siltation, increased turbidity, and pollution (Herkert 1992; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). Many disjunct populations, especially in the Midwest, have seen declines and extirpations due to stream siltation, increased turbidity, and water pollution (NatureServe 2022). The Ironcolor Shiner was thought to be extirpated from Pennsylvania in the early 1900s; however, they were caught in Martins Creek in 1962 and Marshalls Creek in 1995 (Mihursky 1962; Genoways and Brenner 1985; Stauffer et al. 2016). Marshalls Creek is the only known remaining population in Pennsylvania and they appear to be stable, however this region of the state is considered to be under developmental pressure (Stauffer et al. 2016). “Efforts to establish this species elsewhere in its occupied range in 2002-2005 were unsuccessful (Leckvarcik 2006)” (Stauffer et al. 2016). Habitat degradation may be driving small populations to extinction in Mississippi (Albanese and Slack 1998; NatureServe 2022). In Mississippi, surveys of 11 historical sites and 13 additional sites near historical sites yielded no Ironcolor Shiners; three specimens were, however, found in one new locality (Albanese and Slack 1998; NatureServe 2022). Many populations in Missouri have disappeared in the last 30 years, and the continued survival of this species in Missouri is doubtful (Pflieger 1997; NatureServe 2022). New Jersey populations of Ironcolor Shiner appear to be declining and could become extirpated without protection (Shawn Crouse, NJDEP, personal communication).

In New York, Ironcolor Shiners are native to the Delaware and Newark Bay watersheds. They were historically found in 3 waters in the 1930s (Basher Kill, Hackensack River, and Lake Tappan); however, they have not been recorded in the Hackensack River or Lake Tappan since 1936 and are considered extirpated from the Newark Bay watershed (Carlson et al. 2016). The only remaining waterbody known to contain Ironcolor Shiners is the Bashakill Marsh. In the last 20 years, there have been 10 records in the Bashakill Marsh, with the last record being in 2021 (Carlson et al. 2016). Abundance appears to be stable, but the critical parts of their habitat and trend over time in the Bashakill Marsh have not been studied. Due to their restricted range, one catastrophic event could be very detrimental to their survival in New York (Carlson et al. 2016). More recently, the invasive Northern Snakehead has been reported from the Bashakill Marsh and could detrimentally affect and extirpate the Ironcolor Shiner from the marsh complex.

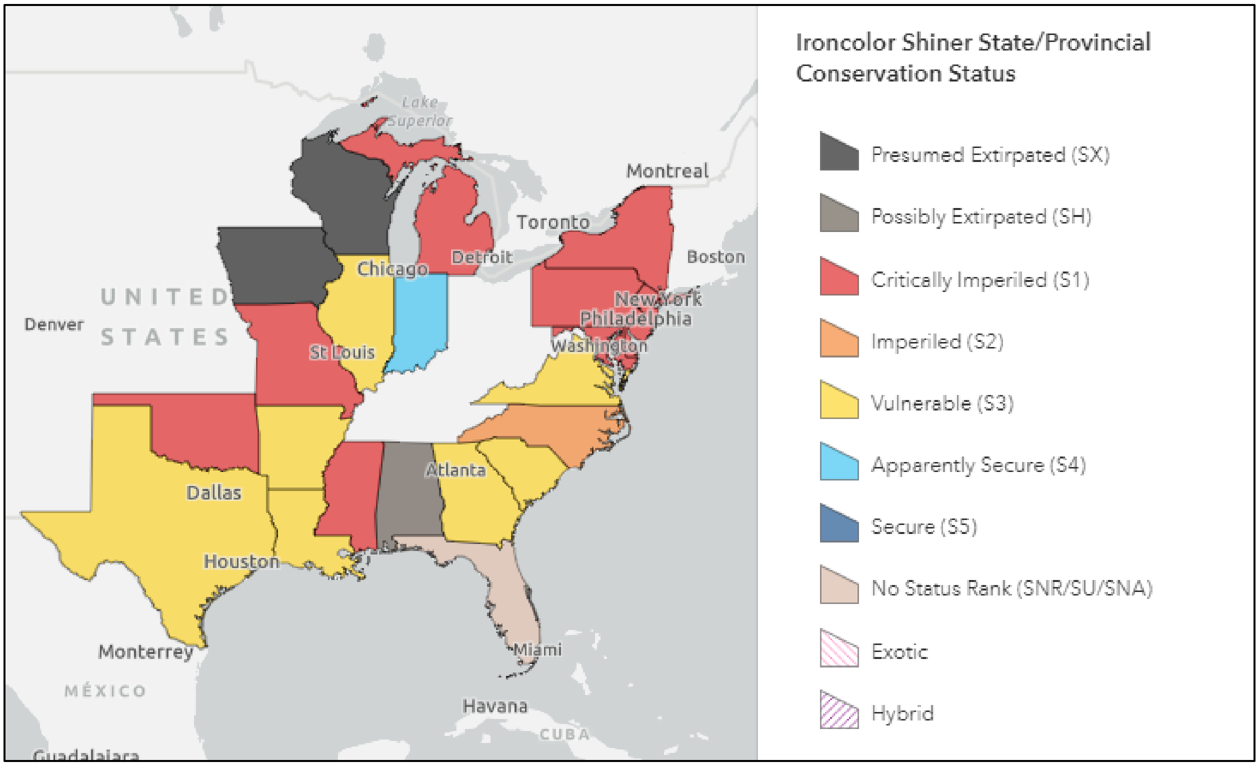


**Figure 1:** Ironcolor Shiner distribution and status (Source: NatureServe 2022).

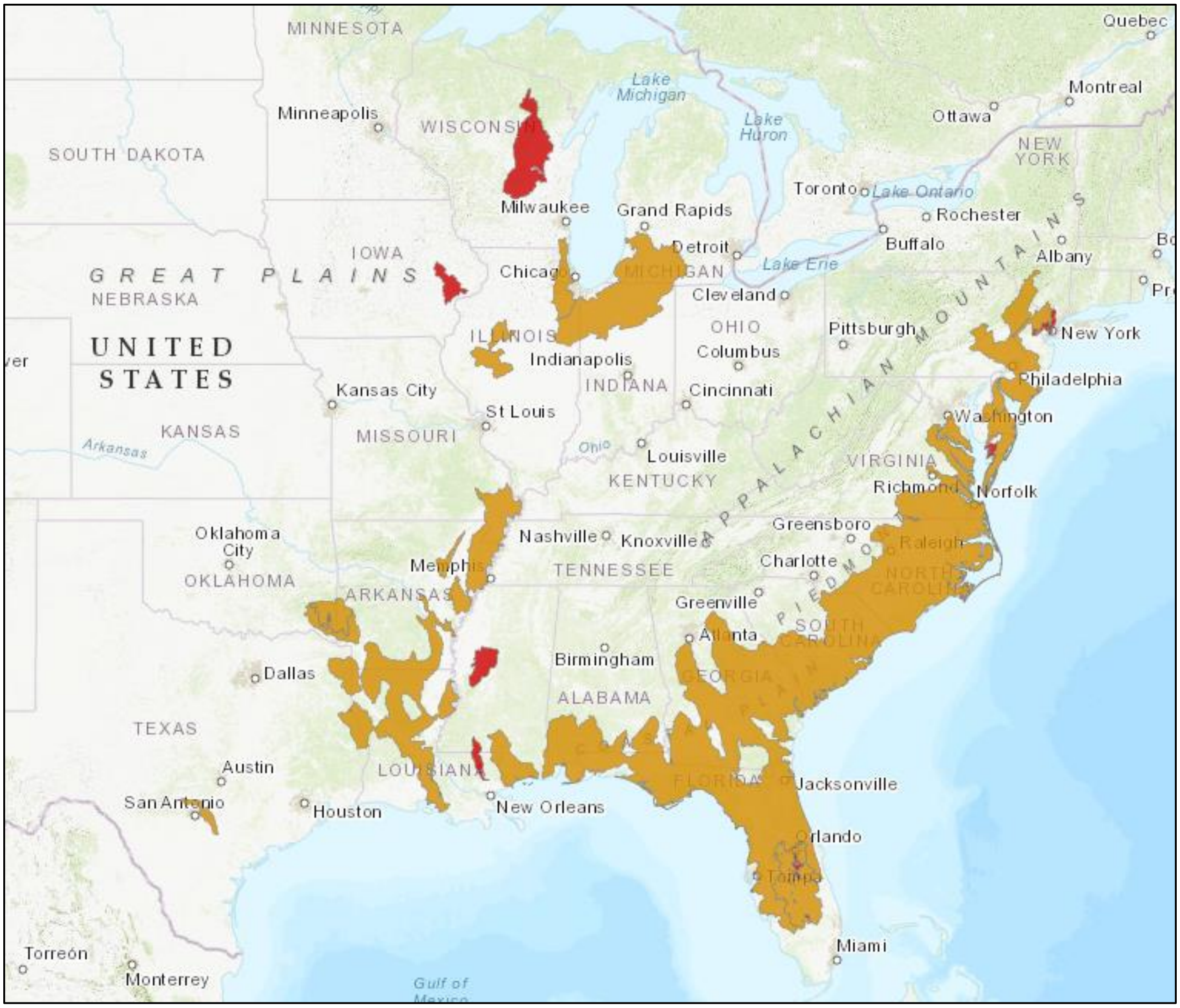


**Figure 2:** Ironcolor Shiner distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

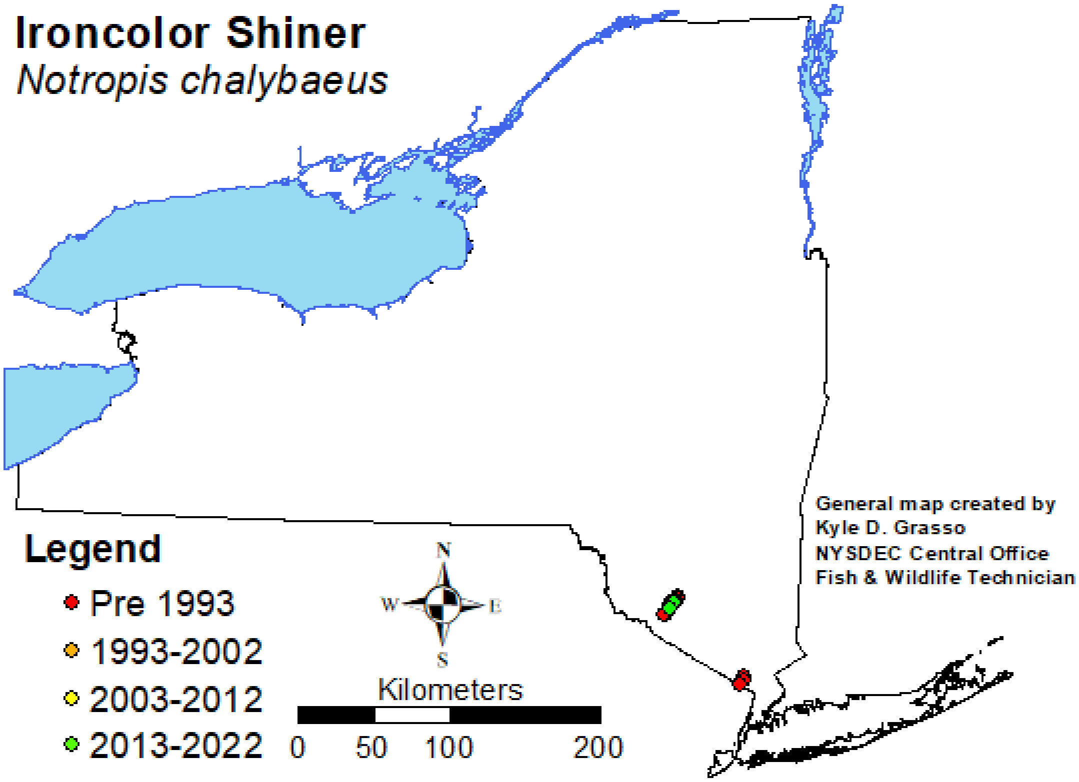


**Figure 3:** Records of Ironcolor Shiner in New York

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 19 | 3 | 0-5% |
| **1993-2002** | 1 | 1 | 0-5% |
| **2003 - 2012** | 2 | 1 | 0-5% |
| **2013 - 2022** | 8 | 1 | 0-5% |

**Table 1:** Records of Ironcolor Shiner in New York.

### Details of historic and current occurrence:

In New York, Ironcolor Shiners are native to the Delaware and Newark Bay watersheds. They were historically found in 3 waters in the 1930s (Basher Kill, Hackensack River, and Lake Tappan); however, they have not been recorded in the Hackensack River or Lake Tappan since 1936 and are considered extirpated from the Newark Bay watershed (Carlson et al. 2016). The only remaining waterbody known to contain Ironcolor Shiners is the Bashakill Marsh. In the last 20 years, there have been 10 records in the Bashakill Marsh, with the last record being in 2021 (Carlson et al. 2016). Abundance appears to be stable, but the critical parts of their habitat and trend over time in the Bashakill Marsh have not been studied. Due to their restricted range, one catastrophic event could be very detrimental to their survival in New York (Carlson et al. 2016). More recently, the invasive Northern Snakehead has been reported from the Bashakill Marsh and could detrimentally affect and extirpate the Ironcolor Shiner from the marsh complex.

**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%:**_____ | **Peripheral:**_✓__ |
| **51-75%:**_____ | **Disjunct:**_✓__ |
| **26-50%:**_____ | **Distance to core population:** |
| **1-25%:**_✓__ | Core pop. to the south and west |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Small to medium tributary rivers and swamps

**b. Geology:** Low to moderately buffered

**c. Temperature:** Transitional cool

**d. Gradient:** Low gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_✓__ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_____ **No:**_✓__

**Indicator Species?** **Yes:**_✓__ **No:**_____

### Habitat Discussion:

Ironcolor Shiners inhabit warm, low gradient, clear streams, and swamps with mud and/or sand substrate (Leckvarcik 2001; Stauffer et al. 2016; NatureServe 2022). They prefer deep pools and slow runs with abundant vegetation and woody debris (Smith 1985; Stauffer et al. 2016; NatureServe 2022). They have also been observed in waterbodies with moderate current. Aquatic plants found in areas that this species inhabits include bladderwort, pondweed, and Elodea (Leckvarcik 2001). "It may occur in tannin-stained waters, at a pH as low as 4.2 (Graham 1989)" (Stauffer et al. 2016).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Ironcolor Shiners live to about 3 years old and become sexually mature at 1 year old (Jenkins and Burkhead 1994; Perkin et al. 2012; NatureServe 2022). Marshall (1947) reported spawning occurring in Florida from mid-April through September at water temperatures of 57-77°F (Smith 1985; Stauffer et al. 2016). In Pennsylvania, “Leckvarcik (2001) reported a general spawning period of early June to late August in Marshalls Creek” (Stauffer et al. 2016). They are fractional broadcast spawners, dispersing their eggs over aquatic vegetation in sand, mud, or fine detritus. There is no nest preparation or parental care (Marshall 1947; Smith 1985; Leckvarcik 2001; Stauffer et al. 2016). Most spawning occurred in areas with little to no current (Marshall 1947; Smith 1985). Eggs hatch in roughly 2-3 days (Marshall 1947; Stauffer et al. 2016; NatureServe 2022). Fecundity in Marshalls Creek in Pennsylvania ranged from 300-1250 depending on size (Leckvarcik 2001; Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Ironcolor Shiner include habitat loss, increases in siltation and turbidity, pollution from industrial and sewage plant discharges, and lower base flows from water diversion (Herkert 1992; Albanese and Slack 1998; Stauffer et al. 2016; NatureServe 2022). Introduction of non-native fishes and fish population alterations may also affect Ironcolor Shiner populations (Leckvarcik 2006). More recently, the invasive Northern Snakehead has been reported from the Basher Kill and could detrimentally affect and extirpate the Ironcolor Shiner from the marsh complex.

At the Freshwater Fish SGCN meeting of experts held in November 2013, no immediate threats were identified for this species in New York. However, the limited populations of Ironcolor Shiner in New York are vulnerable to extirpation should a catastrophic event occur. Fish kills have occurred in the Bashakill Marsh in midwinter and in late summer from oxygen depletion as early as 1961 (Hermes undated).

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

**Yes:** _✓_ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations. The Bashakill Wetlands is managed by NYSDEC as a wildlife management area, providing quality habitat and recreational opportunities.

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

Research needs to be done into previous Northern Snakehead invasions and their effects on native fish populations to further inform management decisions in the Basher Kill.

Regular sampling for presence and abundance should continue to occur in the Bashakill Marsh. In Pennsylvania, “efforts to establish this species elsewhere in its occupied range in 2002-2005 were unsuccessful (Leckvarcik 2006)” (Stauffer et al. 2016). Stocking may be a solution if a catastrophic event were to happen in the Basher Kill. Stocking historic locations in the Newark Bay watershed might also allow for re-introduction into historic waterbodies.

The large marsh complex is owned and managed by NYSDEC as a wildlife management area. Water levels in the marsh are controlled by a large sand/gravel accumulation (and to a lesser degree a short concrete structure) at the lower end of the wetland, and major changes in this could be detrimental to the Ironcolor Shiner. The management plan recognizes this threat to the entire wetland system and discusses preventive measures.

The 2005 State Wildlife Action Plan included the following recommendations:

Population monitoring:

-Surveys of the Delaware River and lower section of the Basher Kill should be completed.

The 2015 State Wildlife Action Plan included the following recommendations:

-Survey for the presence of Ironcolor Shiner in the Delaware watershed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Invasive/Problematic Species Control |
| **5.** Species Management | Species Re-introduction |
| **6.** Species Management | Ex-situ Conservation |
| **7.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Ironcolor Shiner.

## VII. References

Albanese, B., and W. T. Slack. 1998. Status of the Ironcolor Shiner, *Notropis chalybaeus*, in Mississippi. Southeastern Fishes Council Proceedings (37):1-6.

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Genoways, H. H., and F. J. Brenner. 1985. Species of special concern in Pennsylvania. Carnegie Museum of Natural History Special Publication No. 11. Pittsburgh, Pennsylvania. 430 pp.

Graham, J. H. 1989. Foraging of sunfishes in a bog lake. US Department of Energy Symposium Series, 61: 517-527.

Herkert, J. R. 1992. Endangered and threatened species of Illinois: Status and distribution. Vol. 2: Animals. Illinois Endangered Species Protection Board. 142 pp.

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Jenkins, R. E., and N. M. Burkhead. 1994. Freshwater fishes of Virginia. American Fisheries Society. Bethesda, Maryland. 1079 pp.

Leckvarcik, L. G. 2001. Life history of the Ironcolor Shiner, *Notropis chalybaeus* (Cope), in Marshalls Creek, Monroe County, Pennsylvania. Master's thesis. The Pennsylvania State University, University Park, Pennsylvania. 75 pp.

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Marshall, N. 1947. Studies on the life history and ecology of *Notropis chalybaeus* (Cope). Q. J. Florida Acad. Sci. 9(3-4): 163-188.

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Pflieger, W. L. 1997. The fishes of Missouri. Second Edition. Missouri Department of Conservation. Jefferson City, Missouri. 372 pp.

Smith, C. L. 1985. The inland fishes of New York State. New York State Department of Environmental Conservation. Albany, New York. 522 pp.

Stauffer, J. R., Jr., R. W. Criswell, and D. P. Fischer. 2016. The fishes of Pennsylvania. Cichlid Press. El Paso, Texas. 556 pp.

# Species Status Assessment

**Common Name:** Lake trout (wild) **Date Updated:**

**Scientific Name:** *Salvelinus namaycush* **Updated by:**

**Class:** Actinopterygii

**Family:** Salmonidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Lake trout (*Salvelinus namaycush*) is the largest of the chars and is distinguished from the other by having more than 100 pyloric caeca. Its range is restricted to North America and it occurs in cold, oligotrophic lakes of Alaska, Canada, and the northern United States (Redick 1967), where it is often stocked for sport fishing. Lake trout is found as native in 11 watersheds in New York and has been regularly stocked in four others, outside its native range. Many of the native lake trout populations once supported commercial fisheries. Lake trout were once the dominant, offshore-benthic predator in Lakes Ontario and Erie, but severely declined due to overfishing and invasive fishes (NYSDEC 2015).

The natural range of lake trout includes much of Canada and portions of Alaska, and extends southward into the northern border states of eastern and mid-western United States (Lindsey 1964). Present knowledge suggests that the post glacial, southerly distribution of lake trout may have terminated in Lake Erie and certain inland lakes of central New York. Native lake trout populations inhabited Lake Erie, Lake Ontario, Lake Champlain, an indeterminate number of Adirondack lakes, Lake George, Otsego Lake and some Finger Lakes (Greeley 1930, 1934, 1936; Greeley and Greene 1931, Greeley and Bishop 1933, Trautman 1957, Webster et al. 1959). Many southern, central, and northern New York waters received experimental lake trout stockings during the late 1800s and early 1900s, but there is no evidence that its range within the state was measurably enlarged by these efforts. Historical data concerning the former abundance of lake trout in New York lacks sufficient detail to draw meaningful conclusions. However, since settlement of its natural range in New York, there has been general reduction in abundance within individual lakes and extirpation of the species in some lakes. Concern over diminishing lake trout populations and poor lake trout fishing was expressed as early as the 1870's (New York Comm. of Fisheries 1875, Halnon 1963).

New York holds importance in the continental US, as the only unexploited lake trout lakes in the Northeast are found in the Adirondacks. Also noteworthy, the Adirondacks may hold the greatest number of wild, self-sustaining lake trout populations that have never been stocked, although this has not been confirmed through genetic testing.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** Not listed

### b. Natural Heritage Program

i. **Global:** G5

ii. **New York:** S5 **Tracked by NYNHP?:** No

**Other Ranks:**

None

### Status Discussion:

Statewide, lake trout declined from a known high distribution of 203 waters to 143 with records after 1977. This includes extirpation from the Great Lakes. In the Adirondacks alone, lake trout were extirpated from 75 inland lakes, constituting 42 percent of waters that once had records in that region (Thill 2014). However, some of the losses in the Adirondacks may be due to failed introductions in unsuitable lakes (Jon Fieroh, DEC, personal communication 3/31/2015).

Lake trout are a prized sportfish and actively managed under several programs at the state, provincial and bi-national level. Both Lake Erie and Lake Ontario have lake trout recovery plans in place. In Lake Ontario, 20 years of natural reproduction of lake trout has been detected since the restoration program began. While the abundance levels in the Great Lakes are well below historic levels, the species is generally thought to be stable or increasing in abundance across its range. Five of ten states where lake trout occurs list it as SGCN due to its status as an apex predator, slow growth and maturation, and vulnerability to climate change as well as other stressors.

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Stable | Stable | | Not listed | Choose an item. |
| **Northeastern US** | Yes | Declining | Stable | | Not listed | Choose an item. |
| **New York** | Yes | Increasing | Declining | 1977-2013 | | Yes |
| **Connecticut** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Massachusetts** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **New Jersey** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Pennsylvania** | Yes | Stable | Stable | | Not listed | No |
| **Vermont** | Yes | Stable | Stable | | Not listed | Yes |
| **Ontario** | Yes | Declining | Stable | | Not listed | Choose an item. |
| **Quebec** | Yes | Increasing | Stable | 1988-2013 | Not listed | Choose an item. |

*Column options*
**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item
**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

### Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

Each year for more than 30 years, NYSDEC Lake Ontario Unit and the USGS Lake Ontario Biological Station, have conducted a juvenile lake trout bottom trawling assessment and an adult lake trout gill netting assessment to measure the progress towards reestablishing a self-sustaining lake trout population in Lake Ontario (J. Lantry, personal communication April 2015).

### **Trends Discussion** *(insert map of North American/regional):*

In New York State, lake trout are found mostly in the Adirondacks, the Finger Lakes and the Great Lakes. In many lakes, natural reproduction has been lost and the fishery depends on annual stocking. Some populations are declining, while the status of others remains unknown. Within its native range in the contiguous U.S., approximately 400 inland lake trout lakes have recent records of the species, and 25 percent of those are in the Adirondacks (Thill 2014). The province of Ontario alone has nearly 2,300 lake trout lakes and contains 25% of the global distribution of the species.

Today there is increasing abundance in Lake Erie and Lake Ontario due to stocking by New York and others. In Lake Ontario lake trout are naturally reproducing at a very low but detectable level. Populations are stable in the Finger Lakes, declining in Otsego Lake, and as stated above, there is some decline in Adirondack lakes, but they are generally stable.

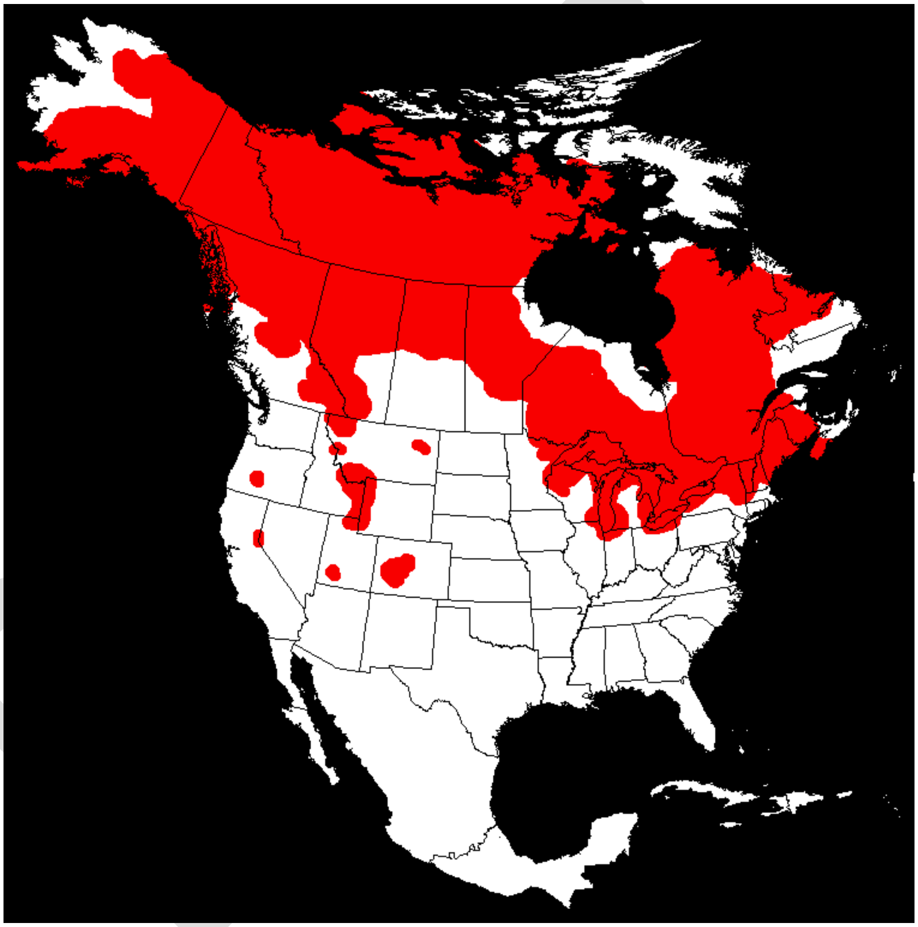

**Figure 1.** Lake trout distribution

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

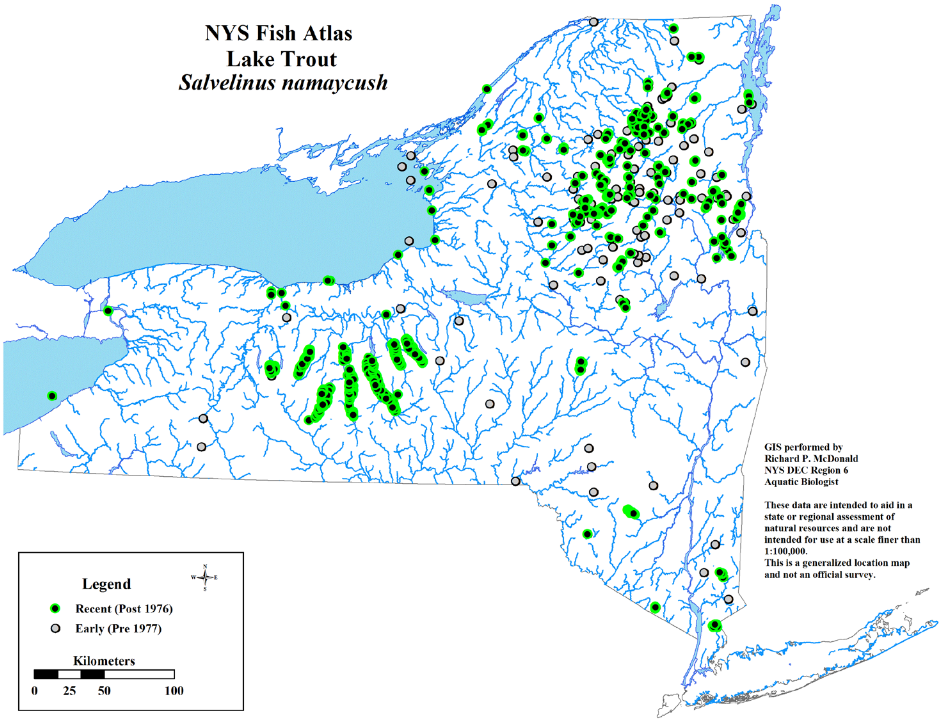

**Figure 2.** New York State Fish Atlas lake trout locations

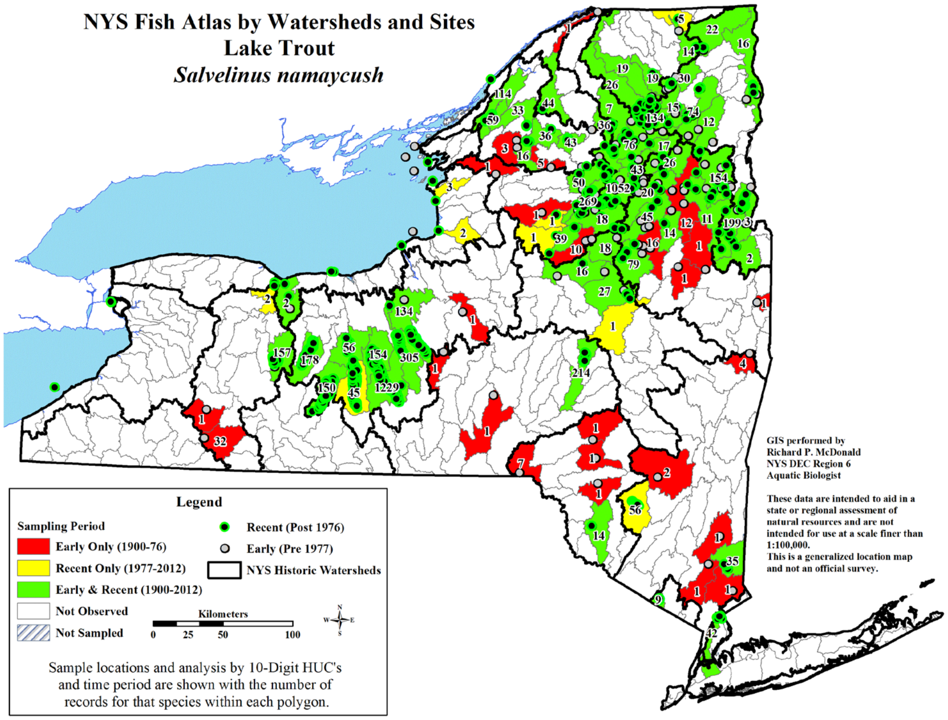

**Figure 3.** New York State Fish Atlas lake trout locations by watersheds*

*Note that lake trout are known to be distributed throughout lakes Erie and Ontario

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| Pre 1993 | | 203 | |
| 1993-2002 | | | |
| 2003 - 2012 | | 142 | |
| 2013 - 2022 | | | |

**Table 1.** Records of lake trout in New York.

### Details of historic and current occurrence:

Native to 11 watersheds and stocked in 4 others. Prior to 1977 it inhabited as many as 203 unique waters statewide. The current number of unique waters in the NY Fish Atlas is 124, but an inventory in 1976 showed it inhabited 121 lakes, mostly in the Adirondacks (Plosila 1977).

After 1977, lake trout were found to inhabit many Adirondack ponds and populations were maintained by natural reproduction in over 80% of these ponds (Gallagher and Baker 1990). The Nature Conservancy (Thill 2014) reports lake trout now inhabit an estimated 102 cold, deep, rocky Adirondack lakes, and native populations are self-sustaining in only half of those. The remaining ones are supported by stocking. Beyond the Adirondacks, lake trout are still found in Lake Champlain, Lake George, Otsego Lake, Lake Ontario, Lake Erie, and the Finger Lakes, with self-sustaining populations in Keuka Lake. Introduced populations in Kensico and Rondout reservoirs have self-sustaining introduced populations.

### New York's Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 1-25% | Peripheral | |

*Column options*
**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

Summer-stratified Oligotrophic Lake
Winter-stratified Oligotrophic Lake

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| Yes | Yes | Declining | |

*Column options*
**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item

**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

Lake trout inhabit deep, cold, well-oxygenated lakes. A very specific temperature/oxygen combination is required for suitable habitat. The water must be very cold (<55°F) and highly oxygenated (5+ milligrams per liter, or at least 50 percent saturated). Generally, the southern limit of the species range is 43° latitude, which is the southern boundary of the Adirondacks. Therefore, during the summer, Adirondack lake trout can only survive in the coldest water at the bottom of the deepest (30+ feet) lakes. The species name, namaycush, is believed to be an Algonquin term for "dweller of the deep" (Thill 2014).

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Yes | Yes | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

### Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The lake trout is a slow-growing and slow-maturing fish, but significant variation exists in growth rate and age of maturation, which is closely related to temperature; the more northern populations generally grow and mature slower than those in New York, although there is also extreme variation in individual growth rates (Redick 1967). Lake trout prefer a temperature of about 50° F and generally live at or near the bottom of lakes. They may move into cool surface waters off-shore to forage and enter inshore waters during the fall, winter and spring. They seldom remain in water warmer than 65° F for extended periods. Accordingly, deep, cold, well oxygenated lakes govern the distribution and management of this species. Particular attention must be directed to water temperature as a limiting factor in New York, since New York lakes lie along the southernmost perimeter of distribution of this species in eastern North America.

Lake trout spawn in the fall, with the spawning time varying widely in different lakes. Spawning time seems to be correlated with a cooling of water temperature to 12 degrees C or lower over the spawning beds. As such, populations in far northern lakes tend to spawn earlier than do southern populations. There is also some evidence which indicates that in some populations, photoperiodism is a significant determining factor of spawning time (Redick 1967).

Royce (1943) believed that in New York lakes, the effect of fall overturn was more important than specific water temperatures over the beds. He observed lake trout spawning at water temperatures ranging from 6 degrees C to 14.5 degrees C, but it never commenced prior to the fall overturn. Royce speculated that a narrow range of temperature was more important than the specific temperature over the bed and that spawning lake trout would not rise through a thermocline.

Spawning occurs over rocky shoals or rubble bottom, with broken rock from one to six inches in diameter preferred. Beyond careful selection of spawning sites, no parental care is given to the eggs, which are randomly scattered over the bottom and settle into cracks and crevices between rocks. Areas which tend to accumulate heavy bottom sediments are therefore not appropriate for lake trout spawning sites. Royce (1943) discovered a correlation between spawning areas and subsurface currents which tended to keep spawning areas clear of mud and debris.

Spawning depths are highly variable. Eggs were recovered from Otsego Lake in three inches of water by Royce (1943), and there was no mention of any unusual lowering of water levels. In contrast, spawning depths of approximately 200 feet were discovered in Seneca Lake (Royce 1943).

Males seem to precede the females onto the spawning beds, with a maximum number of individuals present during the evening hours. The males brush against the bottom with their fins and snouts to clean sediment from the spawning areas. Royce (1943) and Martin (1956) described the courtship and spawning behavior as follows: A male pursued a female and gently butted her sides with his snout. Occasionally, the male zig-zagged under the female, brushing his dorsal fin against her vent area, at which time the characteristic spawning colors of the male were quite visible. The males courted any female within range. Actual spawning occurred when one or two males pressed themselves against the sides of a female. Characteristically, the mouth was held open, the dorsal fin held erect, and associated with body quivering. Royce (1943) speculated that quivering aids the passage of sperm toward the vent and also noted that as many as seven males and three females may be pressed together during the spawning act.

The duration of spawning activity varies widely between lakes. In small, shallow water bodies, the spawning period can be completed in as few as 7 days (Royce 1943, Rawson 1961). In larger bodies of water, however, such as the Great Lakes, spawning activities can continue for a month or longer. The variability of spawning time may be accounted for by the presence of semi-isolated races containing genetic differences, within a single lake, or variations of limnological conditions in different parts of the lake. It has also been speculated that spawning activities can be prolonged by bright, calm, warm weather, and conversely shortened by a sudden drop in water temperature (Martin 1956).

Fertilization of eggs is efficient and successful in most NY waterbodies where Lake Trout are found. In Otsego lake, a sample of 309 eggs collected approximately one month after spawning revealed only 5.8 percent non-fertile, 15.2 percent dead (after fertilization), and 79 percent living. Royce (1943) believed this reflected the maximum mortality under normal conditions, as the eggs had been collected in shallow water and exposed to heavy wave action. Many factors can influence early lifestage survival in Lake Ontario (Fitzsimons et al. 2003). Natural reproduction is limited by reduced thiamine levels caused by a maternal diet dominated by Alewife, resulting in Early Mortality Syndrome (EMS) and lower fitness in emerging fry which can make them more susceptible by predation from Alewife and Round Goby.

The incubation period for lake trout is highly variable and correlated with water temperature. Royce (1951) reported average incubation time in New York lakes to be 140 days, with water temperature near 37 degrees F.

Little is known about the ecology of younger age classes of lake trout. Juveniles may be restricted to rocky areas that can afford protection from predators for several years after hatching (Royce 1951). Apparently, when large enough to avoid predation, the young fish then begin the solitary wandering which, except for spawning periods, continues through the rest of their life (Redick 1967).

Adirondack lake trout have been described specifically in a recent report on climate change and lake trout in that region (Thill 2014). They depend on lake turnover to replenish the oxygen supply in deeper waters. All lake trout lakes here are dimictic: water mixes from top to bottom twice yearly, in spring and fall. During winter and spring, and again in autumn, when surface water temperatures cool, lake trout are often found near shore. They are most abundant in lakes with large volumes of deep water with deep basins where temperatures remain 55°F or lower in summer, and where levels of dissolved oxygen exceed 6 milligrams per liter (Thill 2014).

Lake trout is the dominant member of the native Adirondack aquatic food web and remains a top predator, though today it often shares the role with introduced bass, pike and salmon. Lake trout are opportunistic carnivores, feeding on what's available. Native forage include round whitefish, cisco, white sucker, longnose sucker (Smith 1985), slimy and deepwater sculpin, and young lake trout. Introduced forage include alewife, rainbow smelt, round goby, perch and rock bass. Young feed on zooplankton, then larger invertebrates and insects, and small fish (Thill 2014).

Although introduced basses live mostly near shore, they can reduce the number of forage fish available for species in deeper water. When minnows and small fish are few, lake trout shift to zooplankton, invertebrates and other small prey, and grow more slowly (Lepak et al., 2006). Vander Zanden et al. (2004) found that lake trout growth was reduced 25 to 30 percent in an Ontario lake following bass establishment. In Little Moose Lake in the southwest Adirondacks, the catch rate of round whitefish increased after 90 percent of smallmouth bass were removed over six years (Weidel et al. 2007). In First Bisby Lake electrofishing removal of smallmouth bass since 2003 appears to be playing a role in lake trout recovery (Josephson et al., 2014). Rock bass and yellow perch are the main predators of lake trout fry in Lake Champlain (Riley and Marsden 2009).

Adirondack lake trout spawn over pebbly or rocky shoals in three to eight feet of water where currents sweep the cobbles free of silt. Spawning appears to be triggered by temperature and takes place around the time of autumn turnover, when surface water falls below 55°F (52° and 53° often correspond with peak spawn on Raquette Lake, according to 50 years of DEC records). Lake trout have been recorded spawning in water as warm as 57°F in Raquette Lake, but timing of peak spawn there has remained consistent since 1964; October 17 is the most common date (Thill 2014).
Eggs hatch in late winter or early spring. Consistent water levels are important to the egg survival. If dam-controlled reservoirs are lowered after spawn, eggs can freeze, be scraped by ice, or dry out in the five to six months of incubation (Thill 2014).

Lake trout are the longest lived member of the salmon family (salmon, trout, char, freshwater whitefish), sometimes living 25 years and longer. They are slow- growing and late to mature. In Raquette Lake maturity is reached at five years for males and eight years for females, according to Preall (1991). In Lake Ontario, about half of males were mature at age four, and half of females were mature at age five (Elrod et al. 1996). Naturally reproducing, unexploited and slower growing populations can reach maturity later in life. Growth varies from place to place depending on diet and water temperature. Smith (1985) estimates length at maturity usually at 14 to 17 inches. Long-term juvenile surveys in Raquette Lake find that six-year-old trout are considered slow-growing at 18 inches, healthy at 19 inches, and fast-growing at 20 inches. Lake trout in Raquette Lake under 16 inches are generally considered juvenile. In Lake Ontario, age-four fish averaged about 22 inches and by age six, averaged 26 to 27 inches (Elrod et al. 1996). Stocked yearling trout are around 6 inches long (Preall 1991).

In lakes where there are no prey fish, plankton-feeding lake trout can weigh 1 to 2 pounds as adults, while lake trout that feed upon fish can grow in excess of 3 feet and 30 pounds (Kraft et al. 2006). In the Adirondacks, there are examples of populations that consume primarily zooplankton and macro-invertebrates where forage fish are scarce (Josephson, personal communication). Lake Placid, Brandreth Lake, and Little Simon Pond present a split scenario. According to Preall (1991), minnows in those lakes are scarce, so young adults depend on invertebrates and are slow growing for many years. Then, when a trout reaches a length of 15 inches or so, it begins to feed on smaller lake trout, rock bass, perch and suckers, and it grows at a faster rate. As a result, Lake Placid contains adult lake trout less than 15 inches long but also yields trophy fish (Thill 2014).

Fishing regulations are generally standardized across New York. In 1977, 21 inches became the statewide minimum harvest size on most lakes (Thill 2014). Waterbody-specific regulations exist for some lakes. For example, in 1973, DEC increased minimum harvest size from 18 to 21 inches in Raquette Lake. This helped stabilize the population by protecting adults in the first two years of spawning (Rich Preall, DEC, personal communication). Since 1988 in Lake Ontario, lake trout harvest has been limited by a slot size limit designed to increase the number and ages of spawning adults. In 1993, the slot limit was set at 25-30 inches total length. Until fall 2006, Lake Ontario anglers could harvest three lake trout outside of the 25-30 inch slot limit. Effective October 1, 2006, the lake trout creel limit was reduced to two fish per day per angler, one of which could be within the 25-30 inch slot.

The largest lake trout on record in New York is 41 pounds, taken from Lake Erie in 2003. Follensby Pond in the Adirondacks long held the record, for a 31 pound fish taken in 1922. That record stood until 1985, when a 32 pounder was caught in Lake Placid (Thill 2014).

## VI. Threats *(from NY 2015 SWAP or newly described)*

Historic and continuing threats to lake trout in the Adirondacks include degraded water quality and introduced species. These population stressors are predicted to be intensified by climate change.

Current climate trends and models indicate that extended periods of late-summer stratification from warming are expected to reduce hypolimnetic oxygen concentrations in inland stratified lakes over the present century (De Stasio et al. 1996, Stefan et al. 1995, NYSERDA 2011).

Estimates have not yet been made on the amount of lake trout habitat that may be lost in the Adirondacks as a result of climate change, but scientists in Ontario and Minnesota, also on the retracting edge of lake trout range, project losses of up to 30 to 40 percent by 2100 (Minns et al. 2009, Stefan et al. 1996).

In an assessment of vulnerability to climate change conducted by the New York Natural Heritage Program (Schlesinger et al. 2011), lake trout was classified as “highly vulnerable” by the following criteria:
- adapted to cold or high elevation conditions
- near the southern boundary of their range
- narrow range of temperature tolerance
- specialized habitat requirements
- susceptible to new competitors

Restricted habitat, slow growth, late maturity and slow replacement rate have historically made lake trout vulnerable to overfishing, competition from introduced species, and pollution—stressors that are magnified by increased temperature. It’s unclear how much Adirondack range has been lost since settlement; records are unreliable, but by one estimate it has decreased 19 percent (George 1981).

Many threats to Lake Trout in Lake Ontario and Lake Erie exist. Invasive species impact adult survival (sea lamprey predation) and reproductive capacity (rainbow smelt and alewife predation on fry, alewife contributing to reproductive failure/ Early Mortality Syndrom, round goby acting as predator and prey, potential Dreissenid mussel impacts to spawning habitat). Other current threats include relatively low juvenile survival, low spawner density, and potentially impaired spawning habitat quality.

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

**Yes:** ✓____ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law.

The Adirondack Park was created by the New York State Legislature in 1892. State-owned Forest Preserve comprises 2.6 million acres (42%) and is protected by the state constitution as "forever wild." One million acres of the Forest Preserve is further classified as wilderness.

Fishing regulations set the manner, size and number of harvest to sustain stocks that are accessible to fishing.

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

** Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use green headings 1-7 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection). http://www.conservationmeasures.org/initiatives/threats-actions-taxonomies/actions-taxonomy

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| 3 Species Management | 3.4 Captive Breeding (stocking into newly recovered acid lakes) |
| 3  Species Management | 3.4 Captive Breeding (enhance existing populations) |
| 3 Species Management | 3.2 Recovery Plan Implementation (lakes Erie and Ontario) |
| 2 Land/Water Management | 2.2 Invasive Species/Pathogen Control (alewife, round goby, smelt, black bass, yellow perch, northern pike, sea lamprey, dreissenid mussels) |
| 2 Land/Water Management | 2.3 Habitat and Natural Process Restoration (restore spawning habitat) |
| 2 Land/Water Management | 2.3 Habitat and Natural Process Restoration (restore water quality; acid, eutrophication, sedimentation) |
| 3 Species Management | 3.3 Reintroduction (native forage species) |

**Table 2.** Recommended conservation actions for lake trout

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| | |
|---|---|
| **Originally prepared by** | |
| **Date first prepared** | |
| **First revision** | |
| **Latest revision** | Transcribed March 2024 |

# Species Status Assessment Cover Sheet

**Species Name:** Lake Chub **Date Updated:** January 2023
**Current Status:** Not Listed – SGCN **Updated By:** Kyle Grasso
**Current NHP Rank:** S2S3

**Distribution:** The Lake Chub is widely distributed from western Alaska, Canada, and the northern portions of the St. Lawrence (Great Lakes), Mississippi, and Missouri River drainages in the United States. They are native to 12 of the 18 watersheds in New York (Black, Champlain, Delaware, Erie-Niagara, Lower Hudson, Mohawk, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, Upper Hudson).

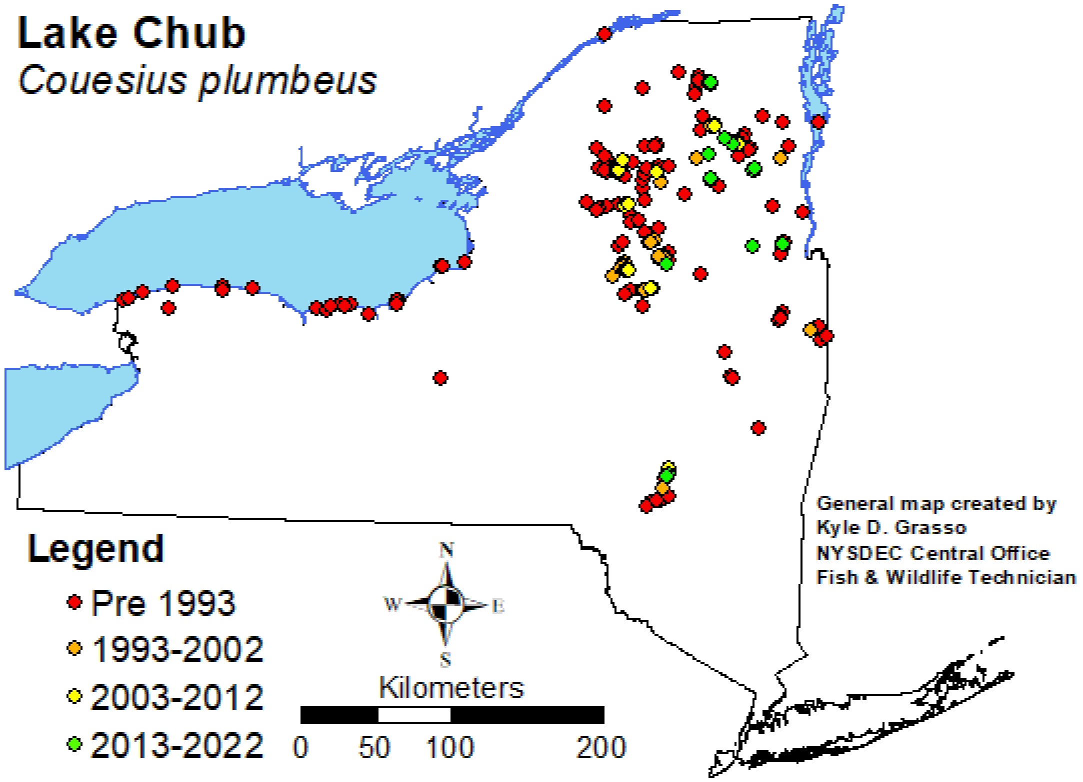
**Habitat:** The Lake Chub occurs in a variety of habitats range wide, but in New York they typically inhabit clear, cold-water lakes and streams with clean gravel or rocky substrate. It is more common in lakes in the southern part of the range, mostly in rivers in the north (but in lakes if available). They are often associated with the rocky shallows of lakes and gravel-bottomed pools, runs, and mouths of streams, but may move into deeper water in the summer.

**Life History:** Lake Chubs can live up to 5 years and maybe up to age 7. They reach sexual maturity by age 3 or 4. Mature Lake Chubs make temperature driven spawning migrations of up to one mile from lakes and streams into the shallows of tributaries with gravel or rocky substrates. They are also known to spawn on rocky shores of lakes. Lake Chubs in their southern range are early spawners, moving into streams as early as April. However, other southern populations have been recorded making migrations as late as early July. No nest is built. Instead, several males chase females in schools attempting to embrace females for a few seconds until she releases eggs. They are then fertilized and will fall onto the gravel or rocky substrate where they are not guarded and will hatch in about 10 days.

**Threats:** Threats to the Lake Chub include habitat (erosion and sedimentation) and stream flow alteration (groundwater pumping and stream diversion), turbidity, pollution (municipal sewage, industrial effluents, and agricultural runoff), ecological imbalances due to non-native fish introductions, and increased water temperatures.

**Population trend:** Lake Chubs are native to 12 of the 18 watersheds in New York (Black, Champlain, Delaware, Erie-Niagara, Lower Hudson, Mohawk, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, Upper Hudson). Their distribution in the Adirondacks has undergone small declines, they have substantially declined in 6 watersheds, and are likely extirpated from 4 others. They appear to be most stable in the Champlain watershed and have declined in the Black, Mohawk, Oswegatchie, Raquette, St. Lawrence, and Upper Hudson watersheds. They are likely extirpated from the Erie-Niagara, Lower Hudson, Ontario, and Oswego watersheds.

**Recommendation:** It is recommended that the Lake Chub be listed as Special Concern due to their decreased distribution and abundance, as well as their vulnerability to warming waters.



# Species Status Assessment

**Common Name:** Lake Chub **Date Updated:** January 2023

**Scientific Name:** *Couesius plumbeus* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Lake Chub is in the class Actinopterygii and the family Cyprinidae (minnows and carps). The Lake Chub is widely distributed from western Alaska, Canada, and the northern portions of the St. Lawrence (Great Lakes), Mississippi, and Missouri River drainages in the United States (McPhail and Lindsey 1970; Scott and Crossman 1973; Lee et al. 1980; Page and Burr 2011; Stasiak 2006). They are native to 12 of the 18 watersheds in New York (Black, Champlain, Delaware, Erie-Niagara, Lower Hudson, Mohawk, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, Upper Hudson) (Carlson et al. 2016). Their distribution in the Adirondacks has undergone small declines, they have substantially declined in 6 watersheds, and are likely extirpated from 4 others. The Lake Chub occurs in a variety of habitats range wide, but in New York they typically inhabit clear, cold-water lakes and streams with clean gravel or rocky substrate (NHF&GD; NatureServe 2022). They are often associated with the rocky shallows of lakes and gravel-bottomed pools, runs, and mouths of streams, but may move into deeper water in the summer (NHF&GD; Smith 1985; Stasiak 2006; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S2S3 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): See Status Discussion

### Status Discussion:

The Lake Chub is not currently federally listed or listed in the state of New York. However, they are currently listed as an SGCN in New York. The Lake Chub is globally ranked as Secure by NatureServe.

Comments from COSEWIC: The species was considered a single population unit (Northern British Columbia Hotsprings populations) in November 2004 and was designated as Data Deficient. The species was split into two separate units in November 2018, and the Atlin Warm Springs and Liard Hot Springs populations were both designated as Threatened.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:**_____

**Listing Status:** Endangered – S1 **SGCN?:** Yes

**VERMONT** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** No

**ONTARIO** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Two hot spring pop. designated Threatened in 2018

**Listing Status:** Not Listed – S5 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S5 **SGCN?:** N/A

### d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

According to NatureServe the short-term trend in the last 10 years is uncertain but likely relatively stable. (≤10% change). The Atlin Warm Springs and Liard Hot Springs populations in Canada were designated as Threatened in November 2018. Other populations in Canada seem to be stable.

Lake Chubs are native to 12 of the 18 watersheds in New York (Black, Champlain, Delaware, Erie-Niagara, Lower Hudson, Mohawk, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, Upper Hudson) (Carlson et al. 2016). Their distribution in the Adirondacks has undergone small declines, they have substantially declined in 6 watersheds, and are likely extirpated from 4 others. They appear to be most stable in the Champlain watershed and have declined in the Black, Mohawk, Oswegatchie, Raquette, St. Lawrence, and Upper Hudson watersheds. Lake Chubs have not been recorded in the Erie-Niagara watershed since 1920, Oswego watershed since 1927, Lower Hudson watershed since 1934, and the Ontario watershed since 1986. They are likely extirpated from all four of these watersheds. Declines and extirpations seemed to have occurred in areas where water temperatures may be a factor (peripheral or lower-elevation areas).

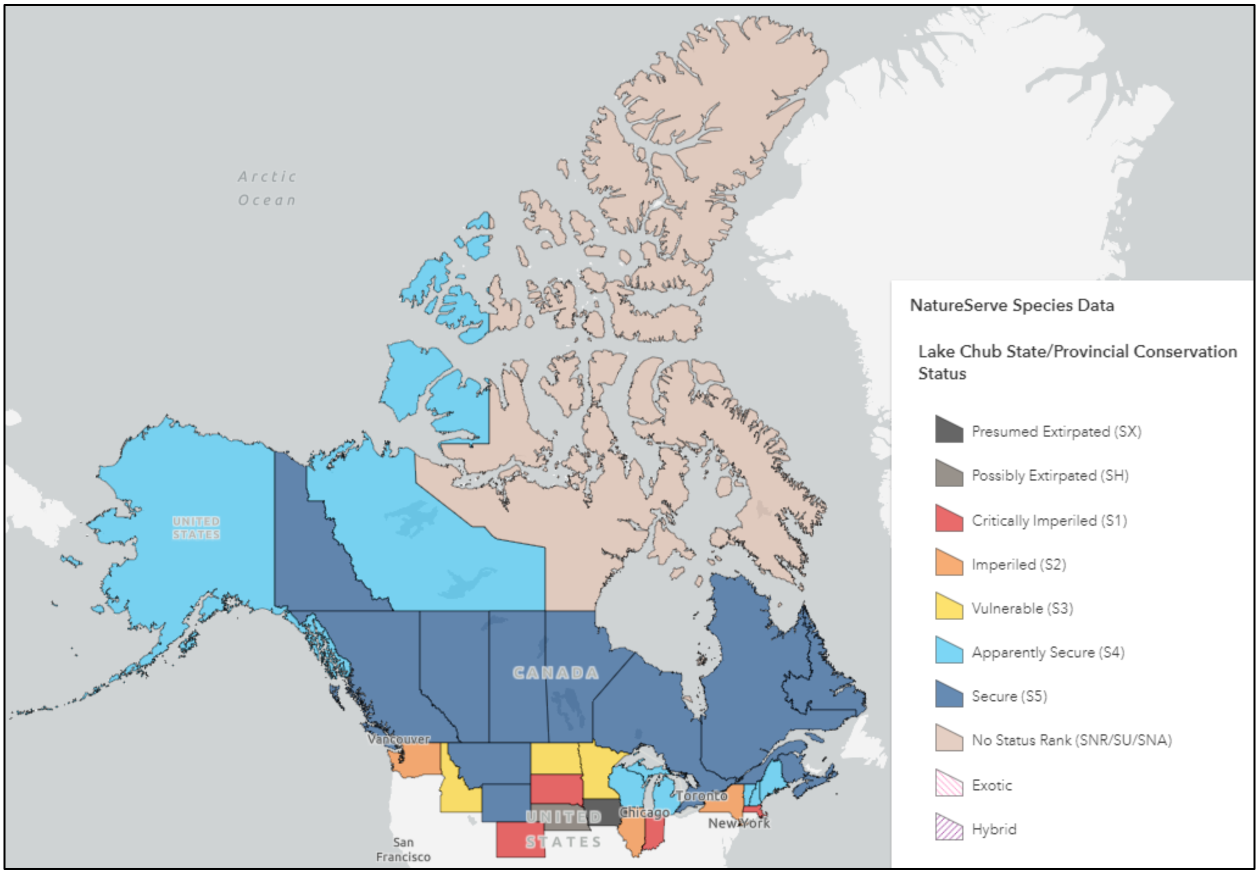


**Figure 1:** Lake Chub distribution and status (Source: NatureServe 2022).

**Figure 2:** Lake Chub distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

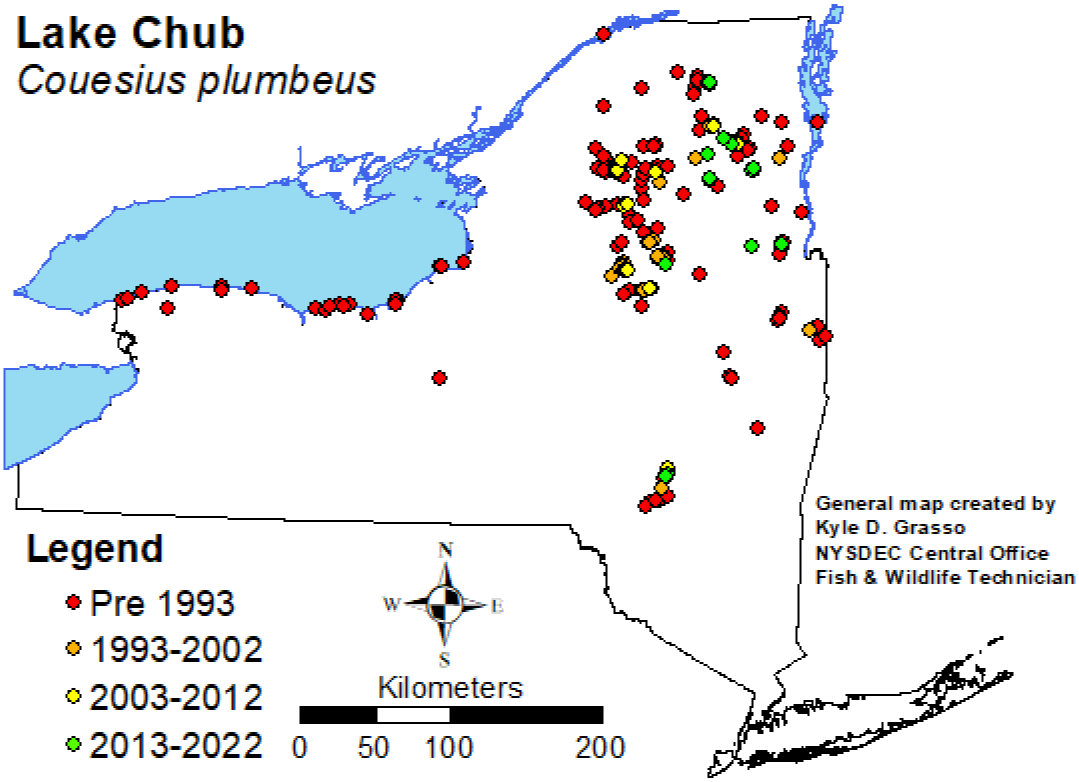


**Figure 3:** Records of Lake Chub in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 220 | 110 | 26-50% |
| **1993-2002** | 57 | 19 | 26-50% |
| **2003 - 2012** | 27 | 11 | 26-50% |
| **2013 - 2022** | 20 | 9 | 26-50% |

**Table 1:** Records of Lake Chub in New York.

### Details of historic and current occurrence:

Lake Chubs are native to 12 of the 18 watersheds in New York (Black, Champlain, Delaware, Erie-Niagara, Lower Hudson, Mohawk, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, Upper Hudson) (Carlson et al. 2016). Their distribution in the Adirondacks has undergone small declines, they have substantially declined in 6 watersheds, and are likely extirpated from 4 others. They appear to be most stable in the Champlain watershed and have declined in the Black, Mohawk, Oswegatchie, Raquette, St. Lawrence, and Upper Hudson watersheds. Lake Chubs have not been recorded in the Erie-Niagara watershed since 1920, Oswego watershed since 1927, Lower Hudson watershed since 1934, and the Ontario watershed since 1986. They are likely extirpated from all four of these watersheds. Declines and extirpations seemed to have occurred in areas where water temperatures may be a factor (peripheral or lower-elevation areas).

| Last Record by Watershed | |
|---|---|
| **Watershed** | **Year of last record** |
| Erie-Niagara | 1920 |
| Oswego | 1927 |
| Lower Hudson | 1934 |
| Ontario | 1986 |
| Mohawk | 2008 |
| Oswegatchie | 2011 |
| Black | 2012 |
| Upper Hudson | 2013 |
| Delaware | 2018 |
| Champlain | 2020 |
| St. Lawrence | 2020 |
| Raquette | 2021 |

**Table 2:** Last record of Lake Chub by watershed. Red = Pre 1993, Orange = 1993 - 2002, Yellow = 2003 - 2012, Green = 2013 - 2022.

### New York's Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Classification of New York Range**

**Core:**_____

**Peripheral:** ✓

**Disjunct:**_____

**Distance to core population:**

Core pop. to the north and west

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Headwaters to small rivers and cold-water lakes

**b. Geology:** Low-moderately buffered

**c. Temperature:** Cold to occasionally transitional cool

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:** ✓ **Stable:**_____ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

The Lake Chub occurs in a variety of habitats range wide, but in New York they typically inhabit clear, cold-water lakes and streams with clean gravel or rocky substrate (NHF&GD; NatureServe 2022). "It is more common in lakes in the southern part of the range, mostly in rivers in the north (but in lakes if available)" (NatureServe 2022). They are often associated with the rocky shallows of lakes and gravel-bottomed pools, runs, and mouths of streams, but may move into deeper water in the summer (NHF&GD; Smith 1985; Stasiak 2006; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

There are few studies on Lake Chub life history and those that exist are typically regarding lake populations (MNH&ESP 2015). Lake Chubs can live up to 5 years. Becker (1983) suggested that they may live up to 7 years, but aging scales was difficult. Females tend to live longer and reach larger sizes, but both male and females will reach sexually maturity by age 3 or 4 (Becker 1983; Stasiak 2006; NatureServe 2022). Mature Lake Chubs make temperature driven spawning migrations of up to one mile from lakes and streams into the shallows of tributaries with gravel or rocky substrates. They are also known to spawn on rocky shores of lakes (Brown et al. 1970; Scott and Crossman 1973; Stasiak 2006; Reebs et al. 2008; Woodford 2008; NatureServe 2022). Lake Chubs in their southern range are early spawners, moving into streams as early as April (Smith 1985). However, other southern populations have been recorded making migrations as late as early July (NHF&GD). Females can produce from 800 to 2400 eggs. No nest is built. Instead, several males chase females in schools attempting to embrace females for a few seconds until she releases eggs. They are then fertilized and will fall onto the gravel and rocky substrate where they are not guarded and will hatch in about 10 days (NHF&GD; Brown et al. 1970; Smith 1985; Stasiak 2006; NatureServe 2022).

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Lake Chub include habitat loss (erosion and sedimentation) and stream flow alteration (groundwater pumping and stream diversion), turbidity, pollution (municipal sewage, industrial effluents, and agricultural runoff), increased water temperatures, and non-native species (Stasiak 2006; MNH&ESP 2015; COSEWIC 2018). The combination of habitat alteration and increased water temperatures from climate change may pose a serious long-term threat to Lake Chub survival in New York. Increased turbidity, erosion, sedimentation, and flow alteration can decrease feeding efficiency and the availability of spawning habitat (MNH&ESP 2015). The presence of non-native species (particularly centrarchids in lakes and centrarchids and trout in streams) can also negatively affect Lake Chubs through the combined pressures of predation, competition, potential for addition of new parasites, and disease (Stasiak 2006). “In lentic systems (lakes), trout and chubs are basically found in different habitats; in streams, however, they share the same microhabitat (Jackson 2002)” (Stasiak 2006).

"Lake Chubs are tolerant of lower pH conditions than many other minnows (Driscoll et al. 1991), which benefited this species during the acidification of many Adirondack waters in recent decades" (Carlson et al. 2016).

"Parasitic infection of adult males with the black spot parasite in the Liard Hot Springs appears to be increasing their mortality and skewing the sex ratio in favor of females but it is non-lethal in cold-water populations" (COSEWIC 2018).

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations. These regulatory mechanisms do not mediate interspecific competition or climate change.

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

Populations should be monitored, and land use should be controlled to maintain habitat, good water quality, and prevent habitat changes, stream flow alteration, and warming (MDNR 2013; Stasiak 2006). Non-native species should be controlled and reduced where introduced and when possible (Stasiak 2006).

As waters continue to warm due to climate change, Lake Chub distribution should be monitored for declines in their southern populations (MDNR 2013).

Stocking could be a solution but may not be viable in New York without eliminating many of the threats that Lake Chubs face. And as waters continue to warm, stocking to prevent extirpations may be ineffective.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Site/Area Management |
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Species Management | Ex-situ Conservation |
| **5.** Law & Policy | Policies and Regulations |

**Table 3:** Recommended conservation actions for Lake Chub.

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# Species Status Assessment Cover Sheet

**Species Name:** Lake Chubsucker **Date Updated:** January 2023

**Current Status:** Threatened – Non-SGCN (due to presumed extirpation) **Updated By:** Kyle Grasso

**Current NHP Rank:** SH

**Distribution:** Historically, the Lake Chubsucker was found from the Great Lakes basins in southwestern New York and southern Ontario west to Wisconsin, south to the Gulf of Mexico, and north along the Atlantic Coast to Virginia. The only Lake Chubsucker records in New York are from the vegetated bays of Lake Ontario west of Rochester and in the mouths of Lake Erie tributaries. The last record in New York was from 1939, despite the fact that it is abundant in Lyons Creek south of Niagara Falls in Canada.

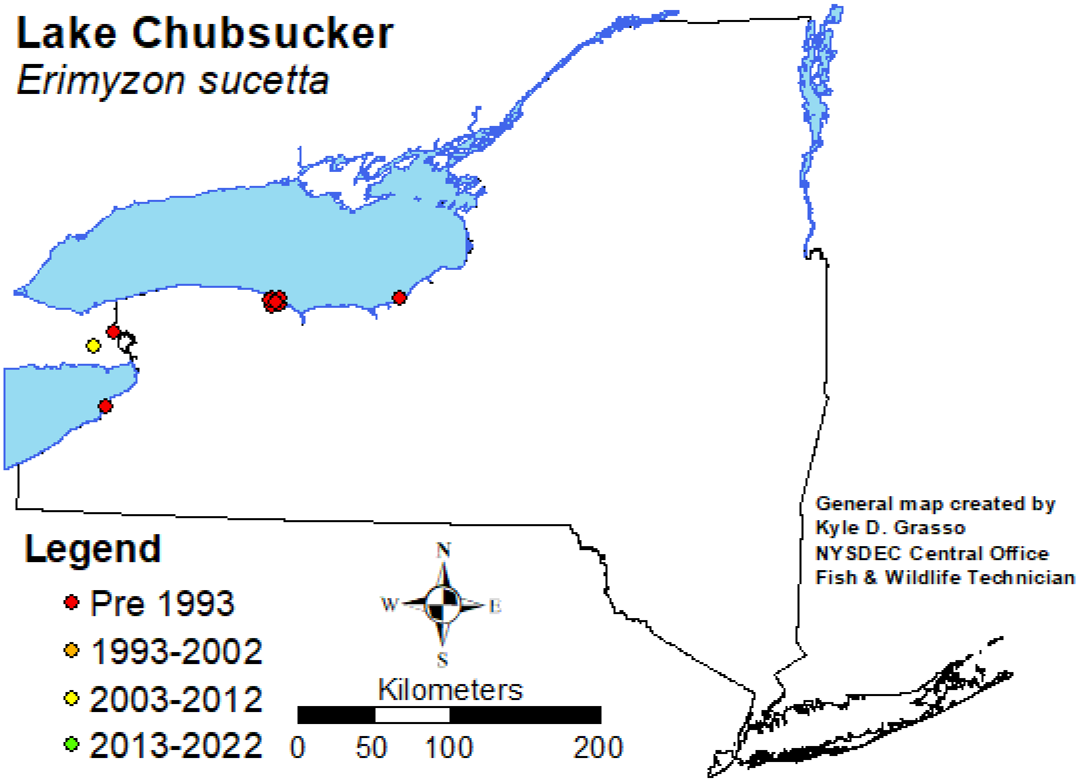
**Habitat:** Lake Chubsuckers inhabit the clear waters of lakes, oxbows, swamps, and quiet pools of creeks and small rivers that have abundant vegetation and sand, silt mixed with organic debris, and a variety of other substrates. Lake Chubsuckers are intolerant of fast water and are typically associated with lakes, ponds, and bays rather than streams.

**Life History:** Lake Chubsuckers live up to 5-6 years and sexually mature at age 3. Spawning typically occurs from late March to July depending on geographic location. Fecundities ranged from 3,000 to 20,000 eggs, depending on their size, with an average of 18,000. Non-adhesive eggs are broadcast over beds of vegetation with no apparent nest preparation. Eggs typically hatch in about a week.

**Threats:** Lake Chubsuckers are susceptible to habitat change, pollution, siltation, and increased turbidity from poor urban, industrial, and agricultural land use practices including shoreline development, dredging, wetland drainage, and other water-level manipulations. Some areas with mining are experiencing water acidification, which may contribute to population declines. The invasive European common reed in Canada can rapidly expand and substantially reduce Lake Chubsucker habitat in a short period of time. Other aquatic invasive fish such as the Round Goby and Grass Carp likely contribute to Lake Chubsucker declines through habitat related change.

**Population trend:** Lake Chubsucker have declined in many parts of their entire range. The only Lake Chubsucker records in New York are from the vegetated bays of Lake Ontario west of Rochester and in the mouths of Lake Erie tributaries in the 1920s and 1930s. The last record in New York was from 1939 and they are considered extirpated from the state, despite the fact that it is abundant in Lyons Creek south of Niagara Falls in Canada.

**Recommendation:** It is recommended that the Lake Chubsucker be delisted because they have not been recorded in New York since 1939 and are presumed extirpated.



# Species Status Assessment

**Common Name:** Lake Chubsucker **Date Updated:** January 2023

**Scientific Name:** Erimyzon sucetta **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Catostomidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Lake Chubsucker is in the class Actinopterygii and the family Catostomidae (suckers). They are easily mistaken for the Creek Chubsucker, but Lake Chubsuckers are more elongate, less stout, and reach a larger adult size than Creek Chubsuckers (ADCNR). Dorsal ray and lateral line scale counts can also be used to differentiate the two species (COSEWIC 2021). Historically, the Lake Chubsucker was found from the Great Lakes basins in southwestern New York and southern Ontario west to Wisconsin, south to the Gulf of Mexico, and north along the Atlantic Coast to Virginia. The only Lake Chubsucker records in New York are from the vegetated bays of Lake Ontario west of Rochester and the mouths of Lake Erie tributaries in the 1920s and 1930s (Carlson et al. 2016). The last record in New York was from 1939 and they are considered extirpated from the state, despite the fact that they are abundant in Lyons Creek south of Niagara Falls in Canada (COSEWIC 2021). Lake Chubsuckers inhabit the clear waters of lakes, oxbows, swamps, and quiet pools of creeks and small rivers that have abundant vegetation and sand, silt mixed with organic debris, and a variety of other substrates (Becker 1983; Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). Lake Chubsuckers are intolerant of fast water and are typically associated with lakes, ponds, and bays rather than streams (Smith 1985; Ross 2001).

## I. Status

### a. Current legal protected Status

**i. Federal:** Not Listed **Candidate:** No

**ii. New York:** Threatened – Non-SGCN (due to presumed extirpation)

### b. Natural Heritage Program

**i. Global:** Secure – G5

**ii. New York:** SH **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Endangered (5/1/2021)

**Status Discussion:**

In New York, the Lake Chubsucker is currently listed as Threatened. However, they are currently listed as a Non-SGCN because they have not been recorded in New York since 1939 and are presumed extirpated. The Lake Chubsucker is globally ranked as Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**b. Northeastern U.S. (USWFS Region 5)**

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**c. Adjacent States and Provinces**

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:** ✓ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**_____

**QUEBEC** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last seen 50+ years ago

**Listing Status:** Presumed extirpated – SX **SGCN?:** No

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Confirmed as Endangered in 2021

**Listing Status:** Endangered – S2 **SGCN?:** N/A

**d. New York**

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last record in 1939

## Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

## Trends Discussion *(insert map of North American/regional):*

According to NatureServe, in the last 10 years abundance and distribution are probably slowly declining (10-30%) while the long-term trend is a decline of 50-70%. “This species has declined in many parts of the range (Mandrak and Crossman 1996), but Warren et al. (2000) ranked it as currently stable in the southern United States (Warren et al. 2000) and Jelks et al. (2008) did not regard it as endangered, threatened, or vulnerable. The species is becoming increasingly rare and localized in Missouri and could disappear there if trends continue (Pflieger 1997). Abundance likely has declined in Arkansas in recent decades (Robison and Buchanan 1988), and populations likely have declined throughout the Tennessee range (Etnier and Starnes 1993). In Ohio, several populations greatly decreased in abundance or disappeared during 1925-1950, and several populations were extirpated during 1955-1980 (Trautman 1981). Smith (1979) indicated that this fish is apparently extirpated from various localities in southern Illinois. The species is extirpated in Iowa (Roosa 1977)” (NatureServe 2022). “No records for Pennsylvania waters have come to light since VanMeter and Trautman’s (1970) report” (Stauffer et al. 2016).

Lyons Creek at the headwaters of the Welland River in Ontario is thought to be some of the most abundant populations in Ontario (COSEWIC 2021). This may indicate that Lake Chubsucker still occur in Lake Ontario and could show up in one of the bays along New York’s shorelines. In Ontario, “three historical subpopulations have been lost and, of the remaining 10, the relative population status is poor for nine and fair for one. If the threats to these extant sub populations are not managed effectively, loss of individuals and subpopulations will continue” (COSEWIC 2021).

The only Lake Chubsucker records in New York are from the vegetated bays of Lake Ontario west of Rochester and the mouths of Lake Erie tributaries in the 1920s and 1930s (Carlson et al. 2016). The last record in New York was from 1939 and they are considered extirpated from the state, despite the fact that they are abundant in Lyons Creek south of Niagara Falls in Canada (COSEWIC 2021).

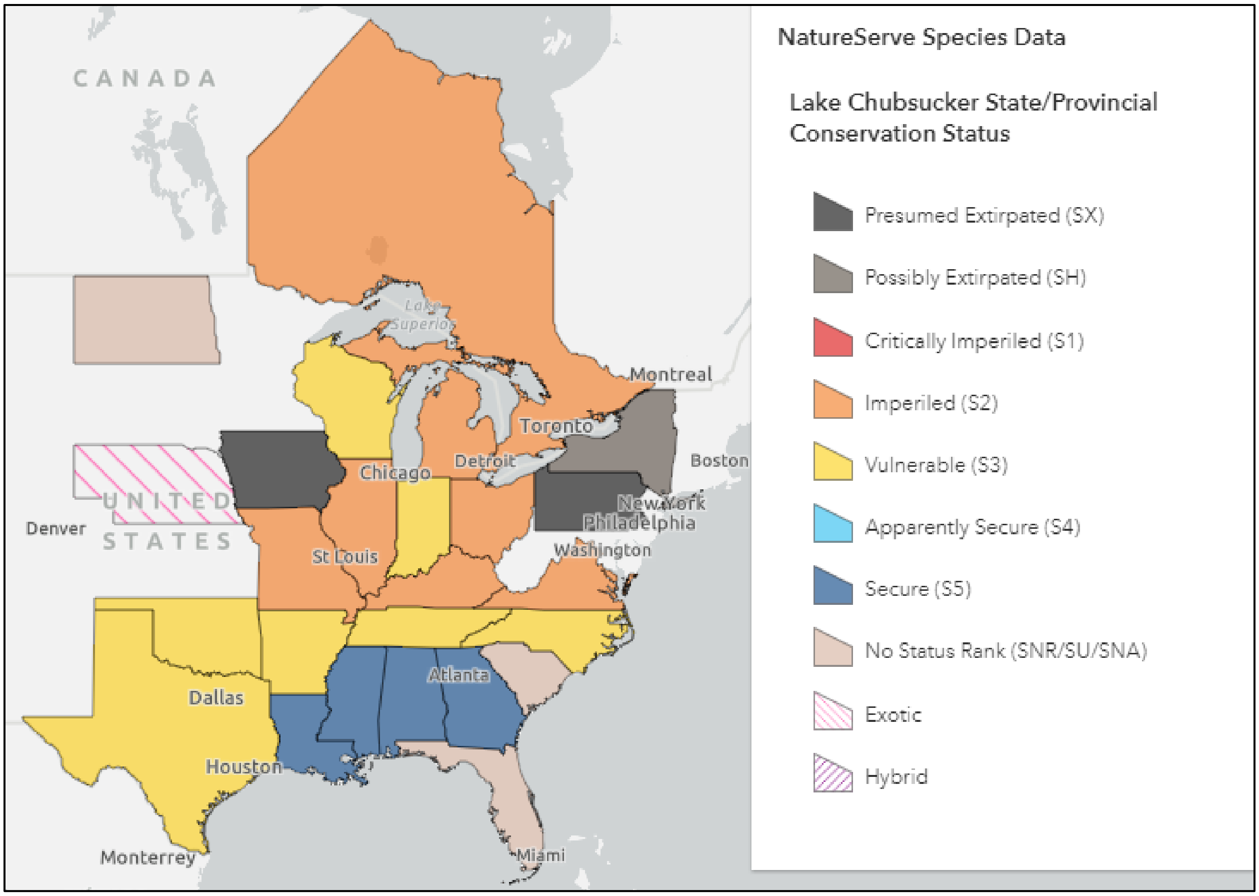


**Figure 1:** Lake Chubsucker distribution and status (Source: NatureServe 2022).

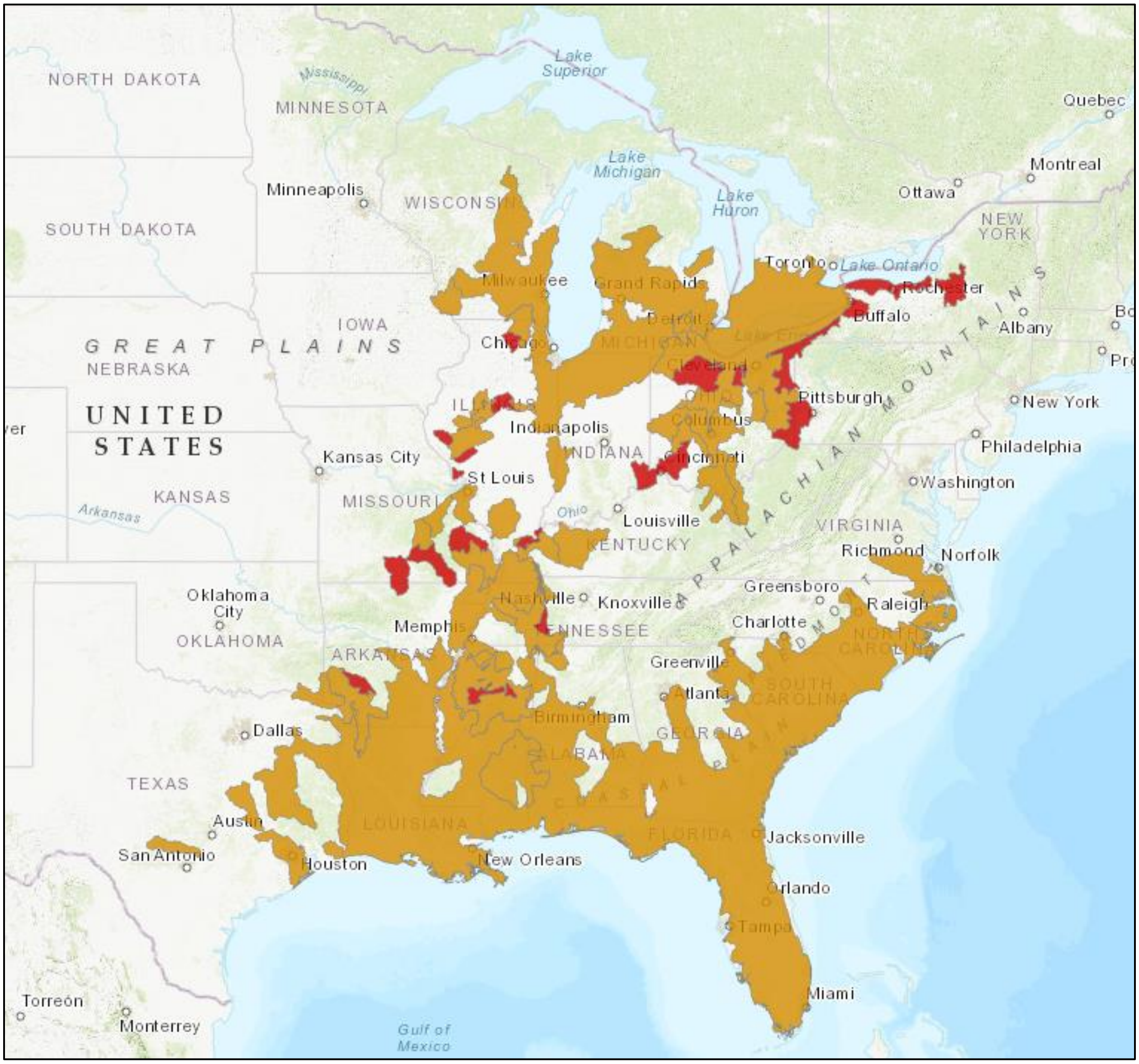


**Figure 2:** Lake Chubsucker distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

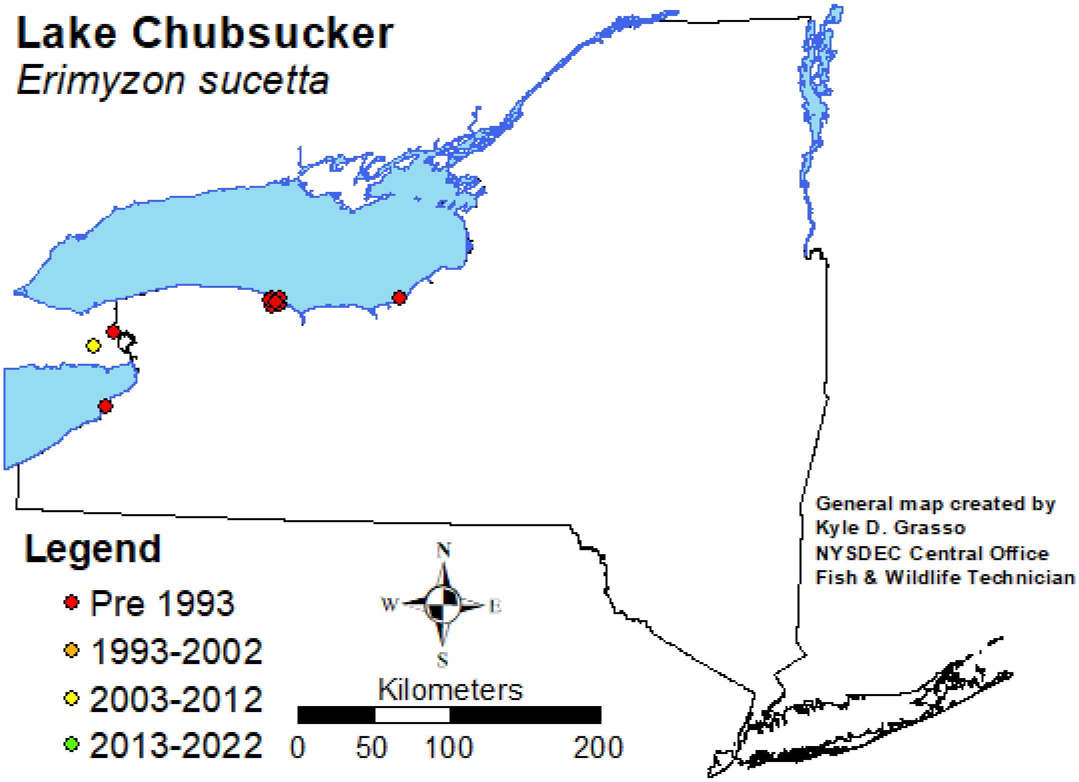


**Figure 3:** Records of Lake Chubsucker in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 11 | 8 | 0-5% |
| **1993-2002** | 0 | 0 | 0% |
| **2003 - 2012** | 0 | 0 | 0% |
| **2013 - 2022** | 0 | 0 | 0% |

**Table 1:** Records of Lake Chubsucker in New York.

### Details of historic and current occurrence:

The only Lake Chubsucker records in New York are from the vegetated bays of Lake Ontario west of Rochester and the mouths of Lake Erie tributaries in the 1920s and 1930s (Carlson et al. 2016). “In a 1928 survey, one specimen was caught in Muddy Creek near Angola (NYSM 13736). No further records exist from the New York portion of this watershed” (Carlson et al. 2016). During the 1920s and 30s, Lake Chubsuckers were collected from several bays and tributaries such as Braddock Bay, Blind Sodus Bay, Long Pond, West Creek, Buttonwood Creek, Northrup Creek, and North Creek (Greeley 1940; Carlson et al. 2016). The last record in New York was from 1939, despite the fact that it is abundant in Lyons Creek south of Niagara Falls in Canada (Carlson et al. 2016; COSEWIC 2021).

### 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%:**_____ | **Peripheral:**_✓__ |

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Disjunct:**_____

**Distance to core population:**

Core pop. in the southern U.S.

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks and small rivers to lakes and bays

**b. Geology:** Low to moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to low-moderate gradient

### Habitat or Community Type Trend in New York

**Declining:** ✓ **Stable:**_____ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:**_____ **No:** ✓

### Habitat Discussion:

Lake Chubsuckers inhabit the clear waters of lakes, oxbows, swamps, and quiet pools of creeks and small rivers that have abundant vegetation and sand, silt mixed with organic debris, and a variety of other substrates (Becker 1983; Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). Lake Chubsuckers are intolerant of fast water and are typically associated with lakes, ponds, and bays rather than streams (Smith 1985; Ross 2001).

## V. 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 *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Lake Chubsuckers live up to 5-6 years and sexually mature at age 3 (Cooper 1936; Becker 1983; Smith 1985; Etnier and Starnes 1993). Spawning typically occurs from late March to July depending on geographic location (Bennett and Childers 1972; Becker 1983; Cooper 1983; Smith 1985; Stauffer et al. 2016; COSEWIC 2021). Fecundities ranged from 3,000 to 20,000 eggs, depending on their size, with an average of 18,000 (Cooper 1936; Shireman et al. 1978; Smith 1985; Stauffer et al. 2016). Non-adhesive eggs are broadcast over beds of vegetation with no apparent nest preparation (Scott and Crossman 1973; Smith 1985; Etnier and Starnes 1993; Stauffer et al. 2016). Eggs typically hatch in about a week (Cooper 1936; Smith 1985; Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

Lake Chubsuckers are susceptible to habitat change, pollution, siltation, and increased turbidity from poor urban, industrial, and agricultural land use practices including shoreline development, dredging, wetland drainage, and other water-level manipulations (COSEWIC 2021; NatureServe 2022). Some areas with mining are experiencing water acidification, which may contribute to population declines (Burr and Warren 1986; NatureServe 2022). The invasive European common reed in Canada can rapidly expand and substantially reduce Lake Chubsucker habitat in a short period of time. Other aquatic invasive fish such as the Round Goby and Grass Carp likely contribute to Lake Chubsucker declines through habitat related change (COSEWIC 2021).

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

**Yes:** ✓ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Lake Chubsucker is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Best land use practices which reduce siltation and excess runoff are needed to help maintain the integrity of the remaining Lake Chubsucker habitat. Widespread regulatory mechanisms to reduce acid deposition and mercury accumulation will benefit this species. Management of invasive species such as the European common reed and Grass Carp will be necessary to continue to support Lake Chubsucker habitats (COSEWIC 2021). Stocking may be a possible mode of reintroduction. However, there may no longer be any suitable habitat in their historic New York range.

The 2005 State Wildlife Action Plan included the following recommendations for extirpated fishes:

<u>Habitat Monitoring:</u>

-Inventories will be completed in all areas where restoration might be practical.

<u>Relocation/reintroduction:</u>

-Re-establish, if feasible, populations of those endangered fish species now believed to be extirpated from New York.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Invasive/Problematic Species Control |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |
| **4.** Species Management | Species Re-introduction |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Lake Chubsucker.

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# Species Status Assessment Cover Sheet

**Species Name:** Lake Sturgeon
**Date Updated:** January 2023
**Current Status:** Threatened – SGCN
**Updated By:** Lisa Holst
**Current NHP Rank:** S2S3

**Distribution:** Lake Sturgeon are native to the Great Lakes Basin from Hudson Bay south into the Mississippi drainage to Alabama and Northern Mississippi, and from lakes Winnipeg and Manitoba to Lake Champlain and the St. Lawrence River, including connecting waters and major tributaries to these waters. It has been extirpated from North Dakota and West Virginia and remains Critically Imperiled throughout most of its range. Lake Sturgeon are currently present in 9 of 18 watersheds in New York.

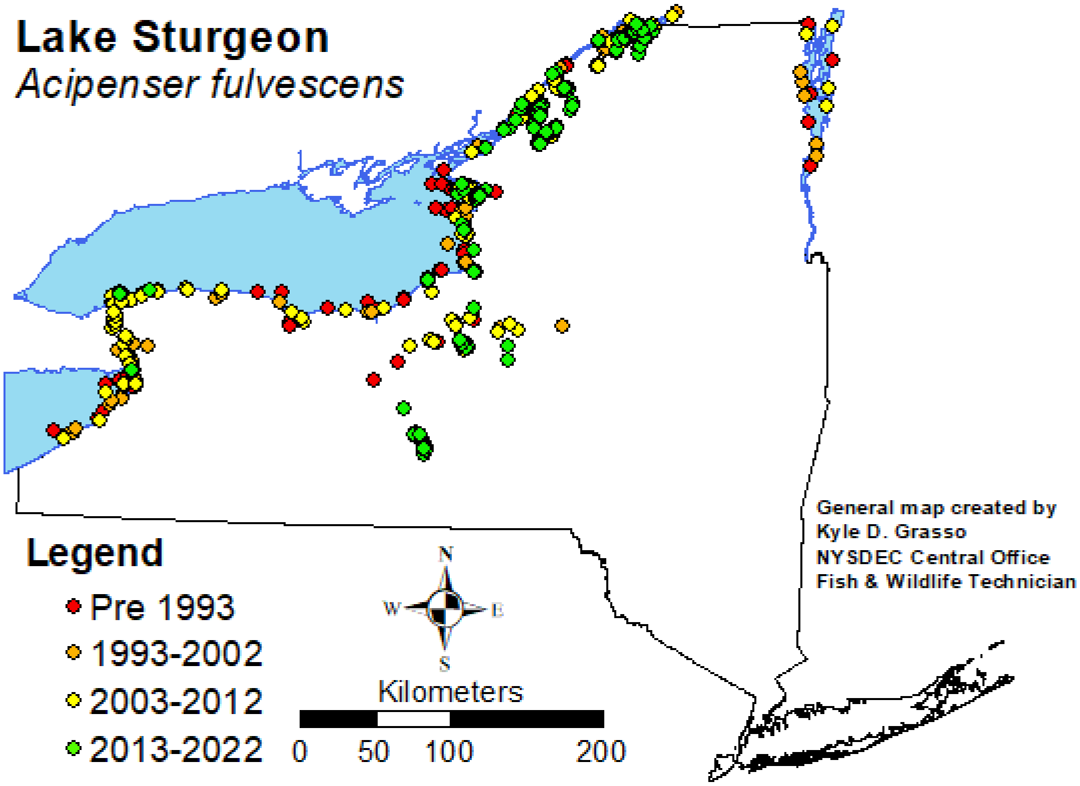
**Habitat:** Occurs in lowland rivers and large lakes. Requires swift moving water over hard substrate for spawning, juvenile life stages use deep soft bottomed pool habitat rich in benthic infauna like chironomids and oligochaetes. Older sturgeon use a variety of benthic habitats up to 40 feet deep.

**Life History:** Typically reach sexual maturity between the ages of 14 and 33 years for females and 12 and 20 years for males. Males in NY have been found sexually mature as young as 8, females around 16. They are potadromous and broadcast spawners over clean gravel or cobble substrate in swift moving tributaries in late May to early June in NY. Females are surrounded by multiple males during spawning. No parental care is given to eggs during the 3-8 day hatching period.

**Threats:** Historically, overfishing. Current **-** Dams, impaired water quality, egg predation, siltation of spawning habitat, lamprey predation on juveniles.

**Population trend:** Lake Sturgeon populations have stabilized due to stocking support and some natural recovery. Four of seven Management Units have reached the recovery target. A fifth is thought to be close to full recovery.

**Recommendation:** Retain as Threatened pending data demonstrating that the species has met the recovery targets established in the Lake Sturgeon Recovery Plan 2018-2024.



# Species Status Assessment

**Common Name:** Lake Sturgeon **Date Updated:** January 2023

**Scientific Name:** *Acipenser fulvescens* **Updated by:** Lisa Holst

**Class:** Osteichthyes (bony fishes)

**Family:** Acipenseridae (sturgeon)

## Species Synopsis *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Lake Sturgeon occurs in lowland rivers and large lakes and is currently present in 9 of 18 watersheds in New York. Its range seems secure in the St. Lawrence drainage watersheds where it is found in the main channel. The population in the lower St. Lawrence River seems stable to increasing based on recaptures during egg take operations (NYSDEC, 2022). Lake Champlain and downstream of the lowest barrier in tributaries, but its abundance has not recovered from 19th century declines. Lower reaches of the Oswegatchie, Grass, Raquette, and Oswego rivers provide spawning habitat. Stocking since 1995 has rebuilt a population in the Oswego watershed and juveniles have entered the upper Mohawk watershed, where this species is not native. The Lake Erie/Upper Niagara River populations are showing possible natural recovery, though it may be augmented by stocking programs in the Detroit River and Lake St. Claire upstream. The Lower Niagara River/Lake Ontario population remains stable, and the Genesee River/Lake Ontario population is recovering with the assistance of stocking.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** Yes

ii. **New York:** Threatened – SGCN

### b. Natural Heritage Program

i. **Global:** Vulnerable – G3

ii. **New York:** S2S3 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Endangered
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)
- Convention on International Trade in Endangered Species (CITES): Appendix II
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): See Status Discussion

### Status Discussion:

Active restoration and/or stocking has been underway for over a decade throughout the species range in the US. Breeding populations in NY have increased and natural reproduction by stocked fish has been documented in several locations over the course of multiple years (NYSDEC, 2022). Overall numbers and distribution have increased since the species was listed as Threatened in 1983.

Comments from COSEWIC: The species was considered a single unit and designated Not at Risk in April 1986. In May 2005, the species was split into four units: Great Lakes-Upper St. Lawrence, Lake of the Woods-Rainy River, Southern Hudson Bay-James Bay, and Western Populations. The Great Lakes-Upper St. Lawrence, Lake of the Woods-Rainy River, and Southern Hudson Bay-James Bay units were listed as Special Concern, and the Western Populations unit was designated as Endangered. All units were re-examined in November 2006 when the Western

Populations unit was split into five more units (Western Hudson Bay, Saskatchewan River, Nelson River, Red-Assiniboine Rivers-Lake Winnipeg, and Winnipeg River-English River) for a total of eight units. All five of the new units were listed as Endangered, the Lake of the Woods-Rainy River and Southern Hudson Bay-James Bay units were confirmed as Special Concern, and the Great Lakes-Upper St. Lawrence unit was changed to Threatened. All units were again re-examined in April 2017 when the eight total units were reduced down to four total: Southern Hudson Bay-James Bay, Great Lakes-Upper St. Lawrence, Western Hudson Bay, and Saskatchewan-Nelson River. The Western Hudson Bay and Saskatchewan-Nelson River units were designated as Endangered, the Southern Hudson Bay-James Bay unit was confirmed as Special Concern, and the Great Lakes-Upper St. Lawrence unit was confirmed as Threatened. See COSEWIC (2006) and COSEWIC (2017) for details.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** 20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** 20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Endangered – S1 **SGCN?:** Yes

**VERMONT** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**__✓__ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** 20 years

**Listing Status:** Endangered – S1 **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Statuses confirmed in 2017

**Listing Status:** E, T, and SC – S3 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Statuses confirmed in 2017

**Listing Status:** E and T – S3 **SGCN?:** N/A

## d. New York

**i. Abundance**

**Declining:**_____ **Increasing:**__✓__ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**__✓__ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. USGS, USFWS, SUNY ESF, Cornell and NYSDEC involved with population evaluations, monitoring of spawning, egg takes and habitat suitability surveys of Lake Sturgeon (Carlson et al. 2002). Status assessments were released in 2018 and 2022.

**Trends Discussion** *(insert map of North American/regional):*

Across its range, the short-term trend for this species is relatively stable. Recently, with improved management, including several restoration and reintroduction programs, the decline has slowed in some areas. In other areas populations may have stabilized, but at a depressed level. Great Lakes-Upper St. Lawrence populations are considered by NatureServe to be improving, but still threatened due to declining extent of occurrence and area of occupancy. Most populations have not increased since the early 1900s and are severely fragmented. More than a quarter of the historical populations have been lost, but more than half of the remaining populations are either stable or recovering with self-sustaining population units present in all of the Great Lakes and many tributaries.

The long-term trend has shown a decline of more than 90% (NatureServe 2022). Abundance declined drastically during the late 1800s and this species now exists at an estimated 1 percent of its former abundance (Hay-Chmielewski and Whelan 1997). Recently, with improved management, including several restoration and reintroduction programs, the decline has slowed in some areas and in other areas populations may have stabilized, but at a depressed population level (Environment Canada and U.S. EPA 2007). Abundance is increasing in the Great Lakes, where the overall trend is "improving" (Environment Canada and U.S. EPA 2007). In the United States, Michigan and Wisconsin have the largest remaining populations; Michigan populations were regarded as stable in the early 2000s (Michigan Department of Natural Resources). Trend in Canada varies among hydrographic units (see following); declines are continuing in most units (COSEWIC 2006). Trend may be relatively stable (at a low level) or possibly increasing in the Mississippi River basin

In New York, Lake Sturgeon has historically been found in 8 watersheds; it is present in all 8 and reproducing in 7 of them, although only on the Vermont side of Lake Champlain. The range has declined in 5 of the 8 watersheds where it occurs. Abundance appears to be increasing in the St. Lawrence River and thought to be stable in the Grasse River; there may be increases in abundance in the lower Niagara but population numbers are still low compared to historic levels. The Lake Erie populations in Buffalo Harbor and the Upper Niagara River appear to be increasing. Survival of stocked juveniles has been shown to approach 30% in the Genesee River and Oneida Lake. Gravid females have been documented in most of the stocked waters. Habitat appears to be stable but losses may accelerate due to the presence of invasive species.

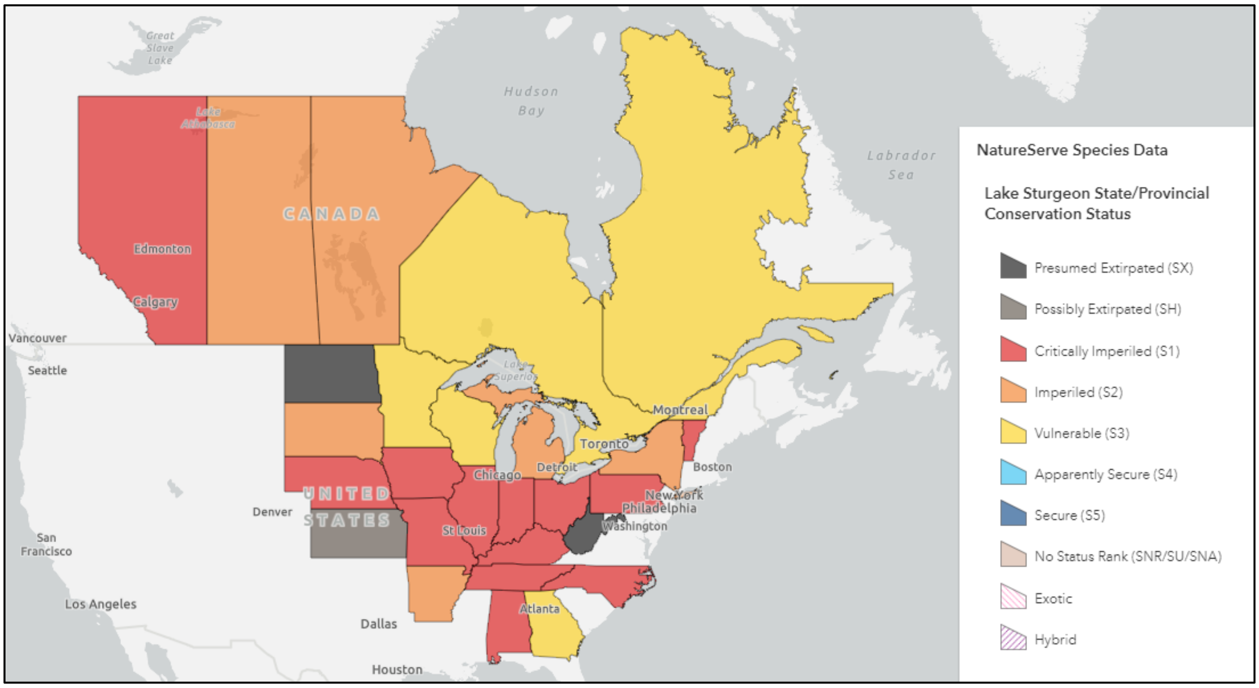


**Figure 1:** Lake Sturgeon distribution and status (Source: NatureServe 2022).

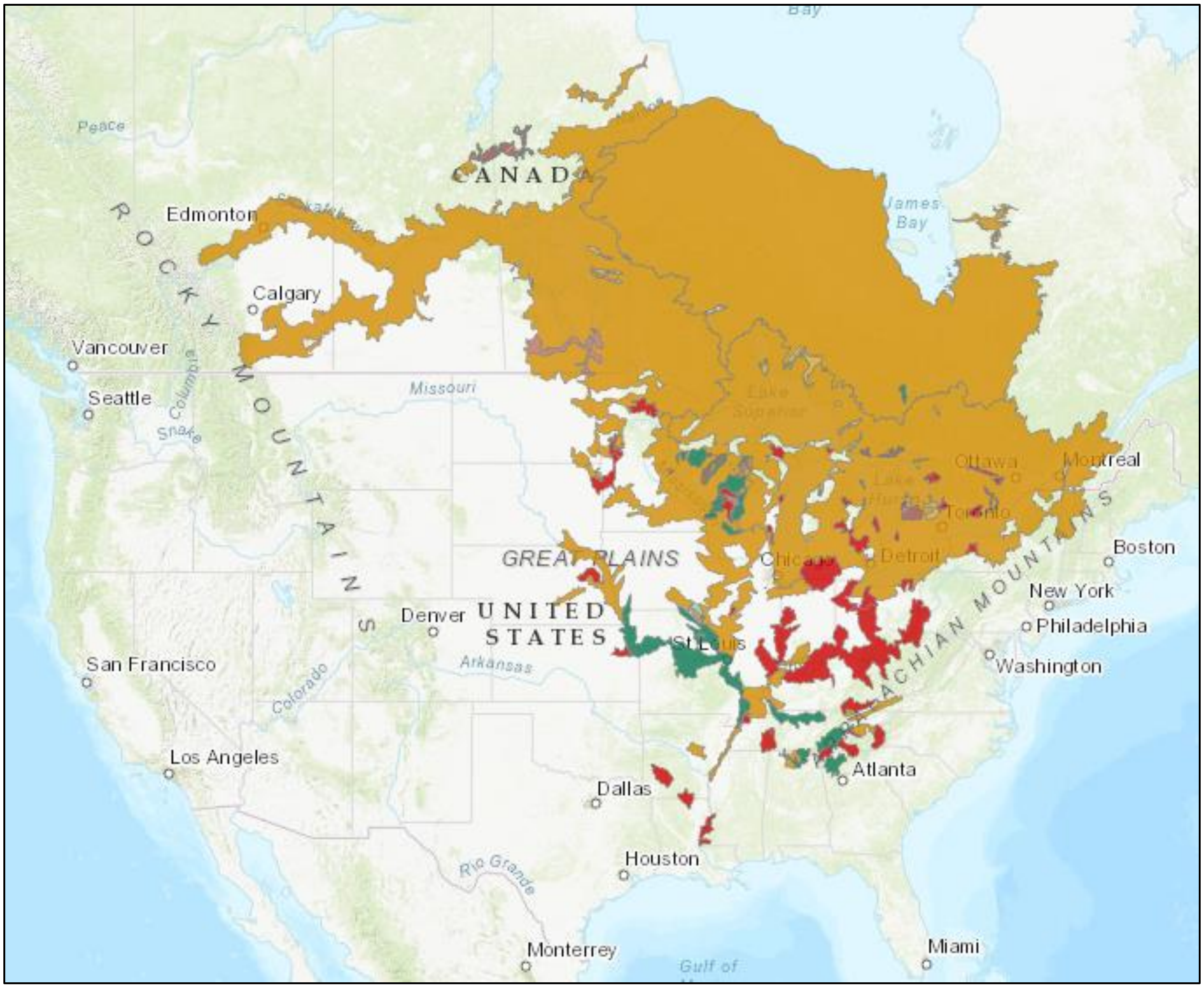


**Figure 2:** Lake Sturgeon distribution.
Brown=Extant, Green=Extant from reintroduction, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

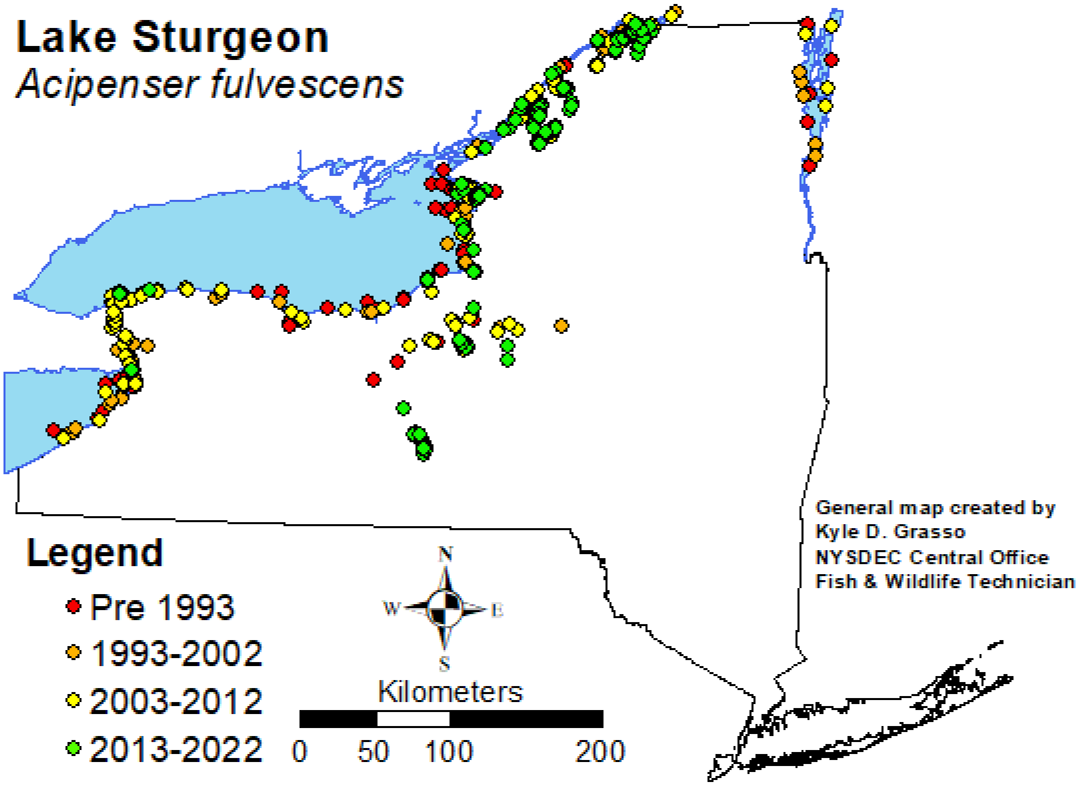


**Figure 3:** Records of Lake Sturgeon in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 137 | 18 | 26-50% |
| **1993-2002** | 183 | 16 | 26-50% |
| **2003 - 2012** | 400 | 23 | 26-50% |
| **2013 - 2022** | 620 | 16 | 26-50% |

**Table 1:** Records of Lake Sturgeon in New York.
Note: # of records may be skewed due to repeated targeting efforts

### Details of historic and current occurrence:

Lake Sturgeon have been collected and commercially harvested in Lake Ontario, Lake Erie, Niagara River, Lake Champlain, St. Lawrence River, Grasse River, Oswegatchie River and Black Lake. Other waters with fewer fish were Cayuga Lake, Oneida Lake, the Seneca River and Cayuga Canal. The Allegheny River in New York likely contained Lake Sturgeon historically, but the closest record was 30 mi south at Warren, PA. Spawning populations in the lower Genesee and lower Oswego, below the first impassable barriers, have been lost. Stocking programs to the lower Genesee, Oneida Lake, Cayuga Lake, Oswegatchie River, St. Lawrence River, St. Regis River and Black Lake are accountable for increased catches. In other waters, increased record keeping since the 1990s has accounted for much of the recent increase of individuals.

### 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%:**_____ **Peripheral:**_✓__

**51-75%:**_____ **Disjunct:**_____

**26-50%:**_____ **Distance to core population:**

**1-25%:**_✓__ ________________________________

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Large/Great River, Stratified Lake, Monomictic Lake

**b. Geology:** Assume moderately buffered

**c. Temperature:** Warm

**d. Gradient:** Low-Moderate

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_✓__ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** >100 years

**Habitat Specialist?** **Yes:**_✓__ **No:**_____

**Indicator Species?** **Yes:**_✓__ **No:**_____

### Habitat Discussion:

Lake Sturgeon are found in lakes and large rivers with mud, sand, and gravel substrate. A preference for lakes has been demonstrated within some genetic stocks, while others show a preference for rivers. In the Great Lakes, this sturgeon lives primarily in shoal water. Individuals are most often found at depths of 5-10 meters, but larger fish have occasionally been taken at depths up to 43 meters (Scott and Crossman 1973, COSEWIC 2006). In rivers, the preferred habitat is deep mid-river areas and pools, where water depths vary between 4 and 9 meters and food is abundant (Harkness and Dymond 1961, Priegel and Wirth 1977).

Several reports describe spawning habitat and habitat-use by young sturgeon in rivers (Carlson 1995). In rivers, spawning occurs in water generally 0.3-4.7 meters deep, typically in areas of swift currents, rapids, or waterfalls that prevent upstream migration (Scott and Crossman 1973). Spawning substrate varies from hard-pan clay to gravel to boulders, including riprap that has been placed along river edges (LaHaye et al. 1992, COSEWIC 2006). In lakes, spawning occurs over rocky ledges or shoals where wave action produces sufficient oxygen levels for the eggs.

Young sturgeon travel in large schools over gravel areas and sand bars during the fall months of their first year. After the first year, the young inhabit the same areas as older fish, as described above (NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Mortality among sexes varies considerably during the first 10-15 years of life. Males and females generally grow at the same rate, but females tend to live longer (Becker 1983, Dumont et al. 1987). Individuals can live as long as 80 years or more (Scott and Crossman 1973, NatureServe 2022).

Of all freshwater fishes, the Lake Sturgeon takes the longest to reach sexual maturity (Houston 1987). The age of first spawning varies between the two sexes, with latitude and within a population. It has been estimated that maturity is reached between 8 and 13 years, but first spawning occurs at 8 to 19 years for males and 14 to 23 years for females. Becker (1983), however, stated that female Lake Sturgeons in Wisconsin, reach sexual maturity when they are 24-26 years old and roughly 140 cm (55 in) in length.

Upon reaching sexual maturity, the females will spawn once every 4-6 years. Males mature when they reach a size of 114 cm (45 in) in length, and then spawn every year or every other year (Becker 1983). Spawning occurs in spring or early summer (LaHaye et al. 1992). Spawning dates are dependent on water temperatures and can vary widely between given years. Populations exhibit long recovery times because of delayed maturation and the number of years between spawning events.

## VI. Threats *(from NY CWCS Database or newly described)*

Although it is difficult to determine the specific causes of Lake Sturgeon population declines, several factors have been blamed including historical over-exploitation of stocks due to high demand for their eggs (caviar) and smoked fish (Peterson *et al*. 2007); construction of dams that block migrations and alter flows and water levels; loss of large mussel beds (food resources), and possibly by-products of urban and rural development such as pollution, siltation of spawning habitat, and channelization that caused degradation of habitat (NatureServe 2022). Its limited spawning opportunities and late maturity are also factors affecting recovery times (Peterson *et al*. 2007).

In the Great Lakes additional threats include chemical control of sea lamprey, potentially genetic contamination through stocking from non-native populations, zebra mussel colonization of spawning habitats, and predation of eggs by round gobies (Hay-Chmielewski and Whelan 1997, COSEWIC 2006). With the collapse of the Caspian Sea sturgeon populations, black market demand for sturgeon caviar could put tremendous pressure on Great Lakes Lake Sturgeon populations (Environment Canada and U.S. EPA 2007). An additional concern for Lake Sturgeon in Lake Erie and Lake Ontario is the spread of Botulism Type E, which produced a die-off of Lake Sturgeon in Lake Erie in 2001 and 2002. Botulism may also have been the cause of similar mortalities observed in Lake Ontario in 2003 and in Green Bay of Lake Michigan (Environment Canada and U.S. EPA 2007). In the Great Lakes (and many other areas), current low numbers or lack of fish (where extirpated) is a significant impediment to recovery in many spawning areas (Environmental Canada and U.S. EPA 2007, NatureServe 2022).

Lake Sturgeon was classified as “extremely vulnerable” to predicted climate change in an assessment of vulnerability conducted by the New York Natural Heritage Program (Schlesinger et al. 2011). While the overexploitation through legal fisheries has been checked, the value of caviar and collapse of other sturgeon fisheries globally has made poaching a greater threat (COSEWIC 2006). Invasive species like round goby and sea lamprey remain as threats due to egg predation by the former and increased juvenile mortality by the latter.

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

**Yes:** ✓ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Lake Sturgeon is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Releases from hydro-electric dams should be managed to ensure reproductive success and to maintain habitat productivity. Protection of upland areas is needed to ensure habitat maintenance and reduce the risk of degradation through point and non-point pollution sources. Procedures designed to reduce siltation, pesticide pollution, and point-source pollutants should be implemented in selected rivers where the likelihood of sturgeon restoration is most probable. Protection through land acquisition is not feasible or necessary unless primary spawning or resting areas are targeted. Management of the aquatic habitat is also a mandatory requirement for successful, long-term population maintenance.

Management needs include a strict control of harvest, the rehabilitation of spawning stock, and pollution control. In many areas habitat restoration is needed because spawning and rearing habitat has been destroyed or altered, or access to it has been blocked.

Population monitoring programs should be installed at representative sites throughout the range. A concern for monitoring is to determine if natural reproduction is occurring. Radiotelemetry work may provide valuable information pertaining to the life history and preferred habitats of the species. Such studies would provide useful information in determining movement patterns within the lake and possible spawning areas (NatureServe 2022).

The 2005 State Wildlife Action Plan included the following recommendations:

Captive Breeding:

-Pyatskowit (1998) recommended that restoration programs with hatchery stocking include a genetic evaluation. Some preliminary comparisons of Lake Sturgeon genetics in the St. Lawrence River are reported by McQuown et al. (1999 oral). Additional studies are needed to determine if there are differences between these and stocks in Lake Erie and Champlain.

Habitat Restoration:

-The relicensing of the Niagara Mohawk project at Niagara Falls provides an opportunity to improve the habitats and flow conditions for sturgeon that have been impaired in this area, so habitat should be restored.

-Stocking: evaluations of hatchery rearing and experimental plantings should be conducted in the Oswegatchie, St. Regis and Genesee Rivers and Black, Oneida, and Cayuga Lakes.

-Spawning habitat should be restored in the St. Lawrence River.

Statewide Management Plan:

-Develop and implement a plan that continues efforts to return this species back to its full range and abundance. Target waters would be tributaries of Lake Champlain, and tributaries of Lake Ontario and Erie and the St. Lawrence River.

The 2015 State Wildlife Action Plan included the following recommendations:

-Continue Lake Sturgeon restoration efforts in Lake Ontario and the St. Lawrence River.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource/Habitat Protection |
| **2.** Land/Water Management | Habitat/Natural Process Restoration |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Invasive/Problematic Species Control |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Lake Sturgeon.

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# Species Status Assessment Cover Sheet

**Species Name:** Lake Whitefish **Date Updated:** January 2023

**Current Status:** Not Listed **Updated by:** Kyle Grasso

**Current NHP Rank:** S4

**Distribution:** Lake Whitefish occur from Alaska and most of Canada south to the Great Lakes region and east throughout northern New England. They have also been introduced in the western U.S. including Washington, Idaho, and Montana. In New York, they occur in the Great Lakes, Lake Champlain, the Finger Lakes, Otsego Lake, and through introductions in the Adirondacks and elsewhere throughout the state.

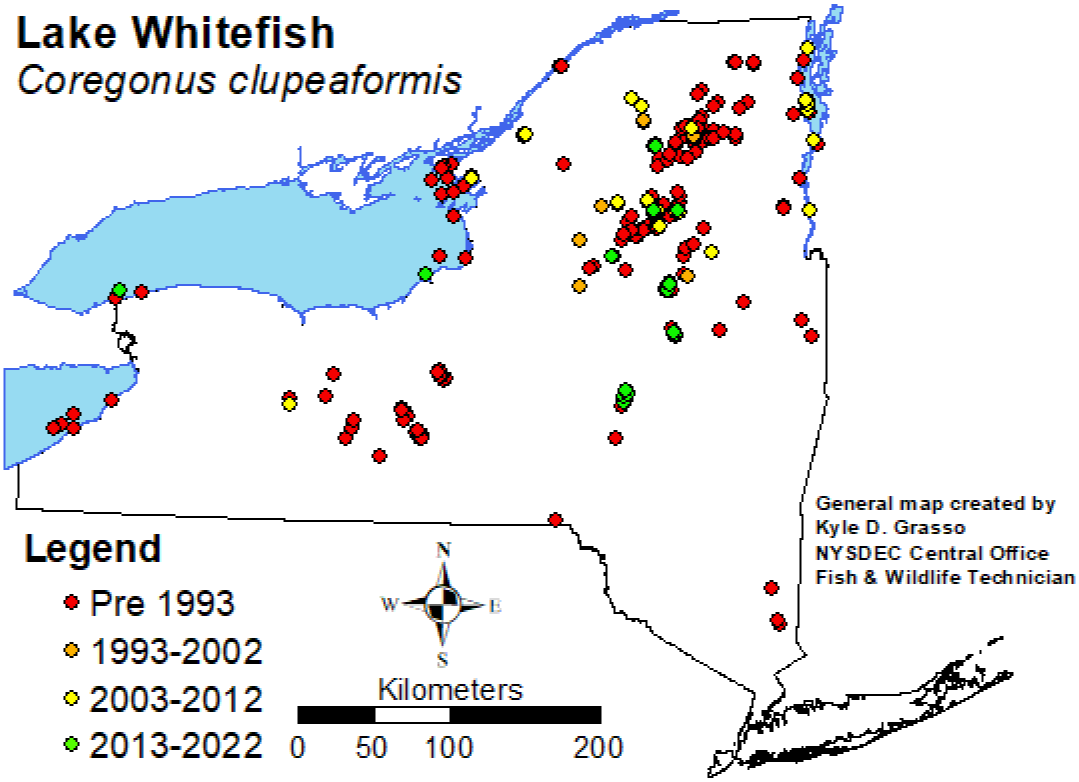
**Habitat:** The Lake Whitefish primarily inhabits large, deep cold-water lakes and occasionally occupies large, cool rivers. They thrive best in deep, oligotrophic lakes with large volumes of cold, well-oxygenated water, rarely entering streams except to spawn and feed. Lake Whitefish remain in the deep, cooler water (12m – 40m) in the warmer months and make seasonal migrations into shallows in the spring to feed and again in the fall during breeding season.

**Life History:** Lake Whitefish are a long-lived fish, typically reaching ages of 10+ with the capability to live up to 30 years or more. Sexual maturity is reached between ages 2-7. Spawning typically occurs in the fall between mid-October and early December when water temperatures drop to about 43-46°F. In October, Lake Whitefish will move to shoals of rock, gravel, or sand substrate in water 1-9m deep. The fish gather in spawning pairs, with the female broadcasting eggs mid-water where they are fertilized by the male and settle into cracks and crevices in the substrate below. Hatching usually occurs in spring, and fry school near shore before entering deeper waters in early summer.

**Threats:** Primary threats to Lake Whitefish include overfishing, competition and predation by nonnative species (Rainbow Smelt, Alewife, White Perch, Sea Lamprey and dreissenid mussels), pollution (industrial discharge, siltation, and nutrient loading), habitat degradation from poor land and water management (e.g., urban and agricultural development, lake drawdowns), and warming waters from climate change.

**Population trend:** Lake Whitefish populations in the U.S. waters of Lake Ontario spiked in the 1990s and have remained low since. In Lake Erie, populations are highly variable but more consistent reproduction in recent years is responsible for a recent uptick in abundance. In 2010, biological parameters in Lake Champlain were typical of an unexploited population. Carlson et al. (2016) reported that recent catches are much reduced in Otsego Lake. The last records in the Finger Lakes were in 2007 in Hemlock Lake and 1989 in Skaneateles Lake. Several isolated populations still exist in stocked ponds. The status of these isolated populations is unknown.

**Recommendation:** It is recommended that the Lake Whitefish be listed as Special Concern due to the highly variable trends in the Great Lakes and the unknown status of the Otsego Lake, Finger Lakes, and other populations.



# Species Status Assessment

**Common Name:** Lake Whitefish **Date Updated:** January 2023

**Scientific Name:** *Coregonus clupeaformis* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Salmonidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Lake Whitefish is in the class Actinopterygii and family Salmonidae (salmonids). There are "stunted" Lake Whitefish known as dwarf Lake Whitefish that have been documented in Maine and Canada. They reach a much smaller size, mature earlier, and have short life spans; however, they are not currently recognized as a separate species (Wood 2016; NatureServe 2022). Lake Whitefish occur from Alaska and most of Canada south to the Great Lakes region and east throughout northern New England. They have also been introduced in the western U.S. including Washington, Idaho, and Montana (Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). In New York, they occur in the Great Lakes, Lake Champlain, the Finger Lakes, Otsego Lake, and through introductions in the Adirondacks and elsewhere throughout the state (Smith 1985). Carlson et al. (2016) stated that they are native to 8 watersheds and have been introduced in 6 others. Lake Whitefish populations in the U.S. waters of Lake Ontario spiked in the 1990s and have remained low since (Hoyle 2005). In Lake Erie, populations have highly variable trends but appear to ride on "the larger year classes that are intermittently produced. We have had some more consistent reproduction in recent years which is responsible for the recent uptick in abundance" (Jim Markham, NYSDEC, Personal Communication). Herbst (2010) reported that although Lake Champlain has experienced substantial change since the early 1900s, "biological parameters (size and age structure, sex composition, growth, condition, energy density, and fecundity) of whitefish in Lake Champlain were typical of an unexploited population, with multiple length and age classes represented." In Otsego Lake, there have been 28 records in the last 20 years, however, Carlson et al. (2016) reported that "recent catches are much reduced in Otsego Lake and the introduction of the Alewife may have contributed to this decrease." The last record in the Finger Lakes was in 2007 in Hemlock Lake, and prior to that was 1989 in Skaneateles Lake (Carlson et al. 2016). It is unknown whether the limited number of records in the last 30 years is due to the absence of targeted effort or declines/extirpations across the Finger Lakes. Several isolated populations still exist in the Adirondacks and other areas of the state, and the status of these isolated populations is unknown (Carlson et al. 2016). The Lake Whitefish is a schooling fish that primarily inhabits large, deep cold-water lakes and occasionally occupies large, cool rivers (Lee et al. 1980; Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). "They thrive best in deep, oligotrophic lakes with large volumes of cold, well-oxygenated water, rarely entering streams except to spawn" and feed (Wood 2016).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S4 **Tracked by NYNHP?:** No

### Other Ranks:

- IUCN Red List: Not Evaluated
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): See Status Discussion

### Status Discussion:

The Lake Whitefish is not currently federally listed or listed in the state of New York. They are not currently listed as an SGCN in New York either. The Lake Whitefish is globally ranked as Secure by NatureServe.

Comments from COSEWIC: The Como Lake small-bodied population and Como Lake large-bodied population are designated Extinct, the Squanga Lake large-bodied population, Opeongo Lake small-bodied population, Opeongo Lake large-bodied population, and Little Teslin Lake large-bodied population are designated Threatened, and the Lake Simcoe population and Mira River population are designated Data Deficient.

The Lake Whitefish is listed as Special Concern in Maine and New Hampshire.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

#### ii. Distribution

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

#### ii. Distribution

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Declining in some states; stable in others since 1990s

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:** _____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:** _____

**NEW JERSEY** **Not Present:** ✓ **No Data:** _____

**PENNSYLVANIA** **Not Present:** _____ **No Data:** _____

#### i. Abundance

**Declining:** _____ **Increasing:** ✓ **Stable:** _____ **Unknown:** _____

#### ii. Distribution

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Uptick in Lake Erie adundance in past 10 years

**Listing Status:** Not Listed – S4 **SGCN?:** No

**VERMONT** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Characteristics typical of unexploited pops. (2011)

**Listing Status:** Not Listed – S4? **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:**_____

**Listing Status:** See Status Discussion section **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:**_____

**Listing Status:** See Status Discussion section **SGCN?:** N/A

**d. New York**

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 30-40 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. Canadian and U.S. agencies manage and monitor populations through gillnet and trawling surveys in the Great Lakes.

**Trends Discussion** *(insert map of North American/regional):*

In New York, the Lake Whitefish occurs in the Great Lakes, Lake Champlain, the Finger Lakes, Otsego Lake, and through introductions in the Adirondacks and elsewhere throughout the state (Smith 1985). Carlson et al. (2016) stated that they are native to 8 watersheds and have been introduced in 6 others. Wood (2016) reported on two important concepts regarding trends in Lake Whitefish: 1. B “

recruitment may be adequate for population persistence." And 2. The old age of the Lake Whitefish can be deceiving because "the species can experience many years of recruitment failure with adults (albeit older) still appearing prominently in the fishery."

Great Lakes

In Lake Ontario, "except for a period of about two decades from the mid-1960s to the mid-1980s, Lake Whitefish have been the mainstay of the lake's commercial fishery. Lake Whitefish stocks collapsed and remained depressed after the mid-1960s due to overexploitation, proliferation of exotic predaceous species (i.e., Sea Lamprey (Petromyzon marinus), Rainbow Smelt (*Osmerus mordax*), Alewife (*Alosa pseudoharengus*), and White Perch (*Morone americana*), and cultural eutrophication. Reduction of these pressures and favorable weather conditions led to a recovery of stocks during the 1980s. The commercial harvest was expanded conservatively through the mid-1990s. Dreissenid mussels invaded eastern Lake Ontario in the early 1990s, and *Diporeia* spp. disappeared from the benthic food web soon thereafter. Lake Whitefish stocks responded by showing signs of stress, including a die-off; diet changes; declines in body condition and growth; delayed mean age at maturity; very poor reproductive success; changes in seasonal, geographic, and bathymetric distribution; and changes in feeding patterns" (Hoyle 2005). Hoyle (2005) concluded that "whitefish reproductive success was very poor for several years after these changes. Even given an assumption of improved reproductive success, whitefish potential yield will be lower in the future compared to that of the past." Populations levels in U.S. waters of Lake Ontario have remained low since.

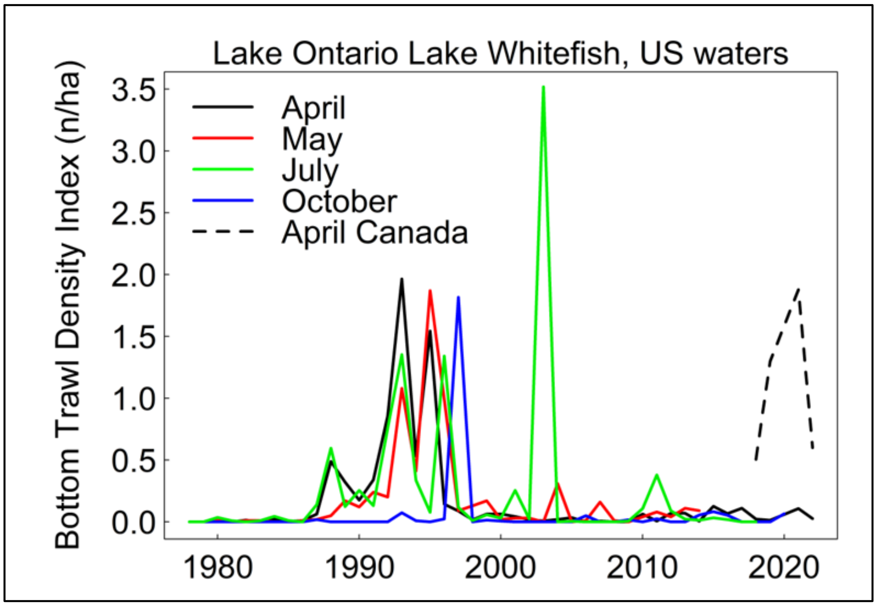


**Figure 1:** Depth stratified average densities in #/ha. Note: Any individual year can have a bias, for instance July 2003 seems odd given that other surveys did not detect the increase and large year classes would likely show up in multiple years. The April survey is the most consistent with the widest lake coverage. The lack of catches in the October survey in the early 1990s is likely because this survey did not include the eastern portion of Lake Ontario until 2015. (Source: Brian Weidel, Brian O'Malley, Brian Lantry, Jessica Goretzke, Michael Connerton, Jeremy Holden, and Lee Gutowsky).

In Lake Erie, "the Province of Ontario's whitefish harvest achieved comparability with the United States harvest in the 1900s (Baldwin et al. 2002). Several exceptional year-classes supported the fishery, including those in 1926, 1936, and 1944 (Lawler 1965)." "Lake Erie Lake Whitefish (*Coregonus clupeaformis*) populations declined precipitously in 1959 due to the cumulative effects of exploitation, watershed degradation, eutrophication, and exotic species. A recovery began in the mid-1980s and was abetted by reduced nutrient loading. Also in the mid-1980s, the abundance of

Rainbow Smelt (*Osmerus mordax*), a major predator of larval Lake Whitefish, was reduced as Walleye (*Stizostedion vitreum*), a predator of smelt, became abundant and the trawl fishery for smelt intensified. The 1984 year-class, the first recent one to appear strongly in the fishery, gave rise to other strong year-classes. By the end of the 1990s, the harvest averaged 563 metric tonnes, most of which was taken by Ontario's gillnet fishery. The invasion of dreissenid mussels during the late 1980s was not associated with long-term reductions in growth or condition of Lake Whitefish" (Cook et al. 2005). In the last 35 years, the Lake Erie population has had highly variable trends. Nalepa et al. (2005) reported that Lake Whitefish "growth and condition have remained stable, and current values are within the range of historical means". "The population, in general, rides on the larger year classes that are intermittently produced. We have had some more consistent reproduction in recent years which is responsible for the recent uptick in abundance" (Jim Markham, NYSDEC, Personal Communication - 2022).

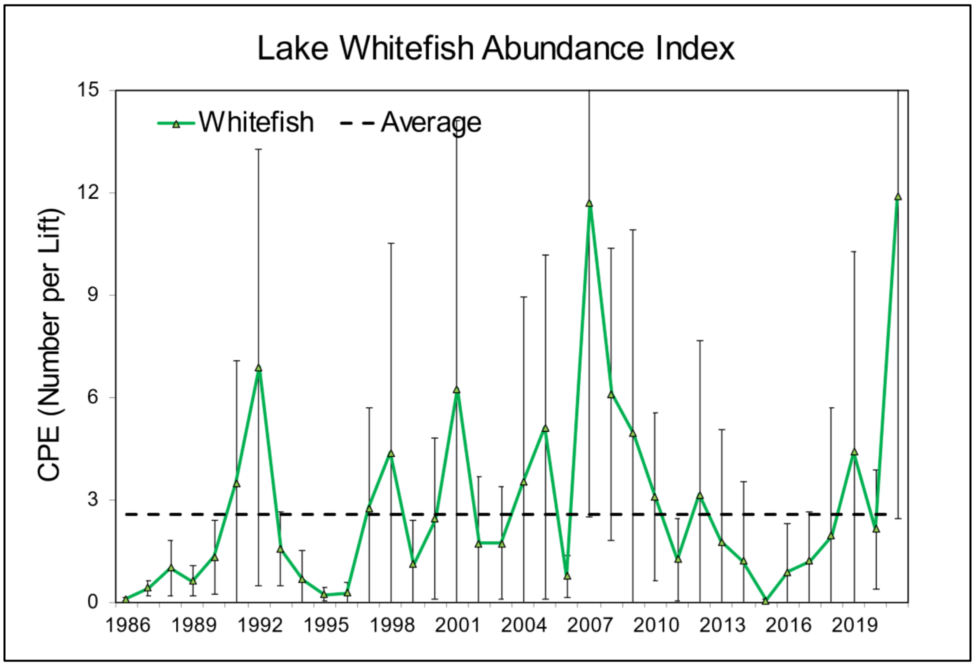


**Figure 2:** Lake Whitefish index from annual coldwater assessment survey on Lake Erie. (Source: Jim Markham, NYSDEC, Personal Communication – 2022).

See Mohr and Nalepa (2005) for the status of Lake Whitefish in other Great Lakes.

Lake Champlain

"Since the closure of the commercial whitefish fishery in U.S. waters of Lake Champlain in 1913, only one study has focused on whitefish. In the early 1930s, Van Oosten and Deason (1939) described age and size structure, growth, and condition of whitefish collected in the fall of the year at the two commercially harvested locations within the lake. In more recent years, whitefish have only been recorded as present or absent during biological surveys conducted periodically from the 1930s to the late 1990s. During the 1970s a fish population inventory documented whitefish in all areas of the lake except for the two historic commercially fished locations (Anderson 1978). The highest whitefish catch rates were in the main lake" (Herbst 2010). In 2010, Herbst (2010) reported that although Lake Champlain has experienced substantial change since the early 1900s, "biological parameters (size and age structure, sex composition, growth, condition, energy density, and fecundity) of whitefish in Lake Champlain were typical of an unexploited population, with multiple length and age classes represented."

Inland populations (Otsego Lake, Finger Lakes, and stocked waterbodies)

Lake Whitefish were recorded in Otsego Lake as far back as the mid-1800s (DeKay 1842; Carlson et al. 2016). “Greeley (1936) listed the species as very common in the lake” (Carlson et al. 2016). There have been 28 records in the last 20 years, however, Carlson et al. (2016) reported that “recent catches are much reduced in Otsego Lake and the introduction of the Alewife may have contributed to this decrease.”

Lake Whitefish were first recorded in the Finger Lakes in the late 1800s and early 1900s. The last record in the Finger Lakes was in 2007 in Hemlock Lake, and prior to that was 1989 in Skaneateles Lake (Carlson et al. 2016). It is unknown whether the limited number of records in the last 30 years is due to the absence of targeted effort or declines/extirpations across the Finger Lakes.

Lake Whitefish were stocked in many isolated ponds in the Adirondacks and other areas of the state with mixed success. Several isolated populations still exist throughout the state (Carlson et al. 2016). The status of these isolated populations is unknown.

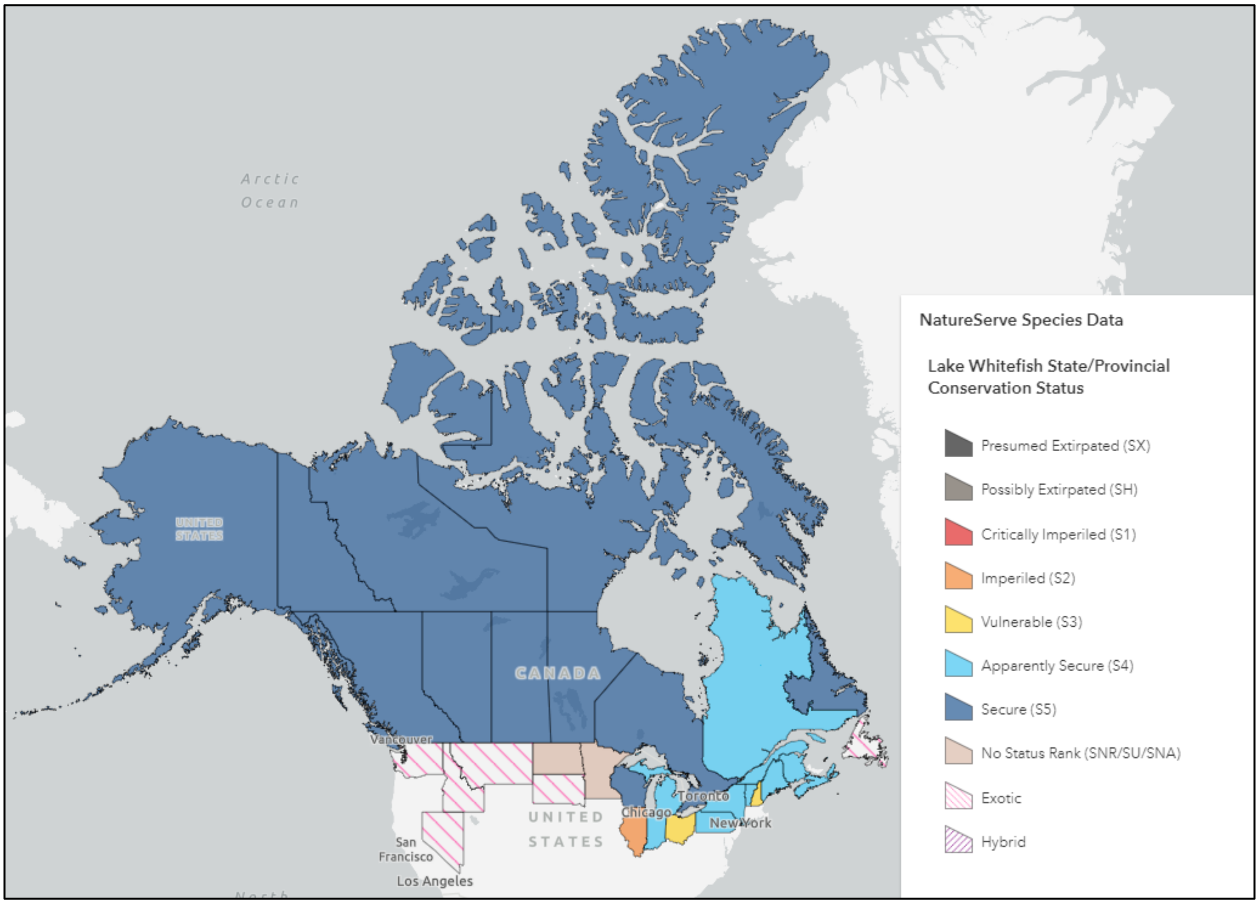


**Figure 3:** Lake Whitefish distribution and status (Source: NatureServe 2022).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

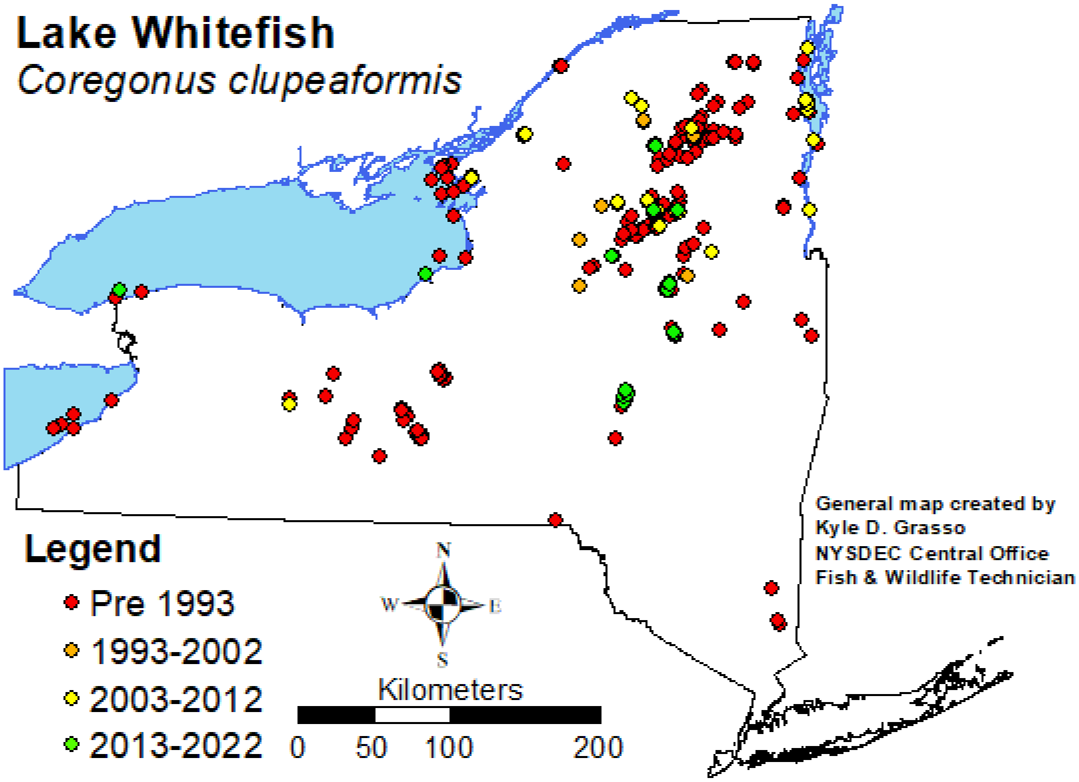


**Figure 4:** Records of Lake Whitefish in New York.
Note: Lake Erie and Lake Ontario records are largely missing from this map.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 925 | 105 | >50% |
| **1993-2002** | 65 | 13 | >50% |
| **2003 - 2012** | 55 | 17 | >50% |
| **2013 - 2022** | 32 | 8 | >50% |

**Table 1:** Records of Lake Whitefish in New York.
Note: Lake Erie and Lake Ontario records are largely missing from this table.

### Details of historic and current occurrence:

In New York, the Lake Whitefish occurs in the Great Lakes, Lake Champlain, the Finger Lakes, Otsego Lake, and through introductions in the Adirondacks and elsewhere throughout the state (Smith 1985). Carlson et al. (2016) stated that they are native to 8 watersheds and have been introduced in 6 others.

Great Lakes

In Lake Ontario, "except for a period of about two decades from the mid-1960s to the mid-1980s, Lake Whitefish have been the mainstay of the lake's commercial fishery. Lake Whitefish stocks collapsed and remained depressed after the mid-1960s due to overexploitation, proliferation of exotic predaceous species (i.e., Sea Lamprey (Petromyzon marinus), Rainbow Smelt (*Osmerus mordax*), Alewife (*Alosa pseudoharengus*), and White Perch (*Morone americana*), and cultural eutrophication. Reduction of these pressures and favorable weather conditions led to a recovery of stocks during the 1980s. The commercial harvest was expanded conservatively through the mid-

1990s. Dreissenid mussels invaded eastern Lake Ontario in the early 1990s, and *Diporeia* spp. disappeared from the benthic food web soon thereafter. Lake Whitefish stocks responded by showing signs of stress, including a die-off; diet changes; declines in body condition and growth; delayed mean age at maturity; very poor reproductive success; changes in seasonal, geographic, and bathymetric distribution; and changes in feeding patterns" (Hoyle 2005). Hoyle (2005) concluded that "whitefish reproductive success was very poor for several years after these changes. Even given an assumption of improved reproductive success, whitefish potential yield will be lower in the future compared to that of the past." Populations levels in U.S. waters of Lake Ontario have remained low since.

In Lake Erie, "the Province of Ontario's whitefish harvest achieved comparability with the United States harvest in the 1900s (Baldwin et al. 2002). Several exceptional year-classes supported the fishery, including those in 1926, 1936, and 1944 (Lawler 1965)." "Lake Erie Lake Whitefish (*Coregonus clupeaformis*) populations declined precipitously in 1959 due to the cumulative effects of exploitation, watershed degradation, eutrophication, and exotic species. A recovery began in the mid-1980s and was abetted by reduced nutrient loading. Also in the mid-1980s, the abundance of Rainbow Smelt (*Osmerus mordax*), a major predator of larval Lake Whitefish, was reduced as Walleye (*Stizostedion vitreum*), a predator of smelt, became abundant and the trawl fishery for smelt intensified. The 1984 year-class, the first recent one to appear strongly in the fishery, gave rise to other strong year-classes. By the end of the 1990s, the harvest averaged 563 metric tonnes, most of which was taken by Ontario's gillnet fishery. The invasion of dreissenid mussels during the late 1980s was not associated with long-term reductions in growth or condition of Lake Whitefish" (Cook et al. 2005). In the last 35 years, the Lake Erie population has had highly variable trends. Nalepa et al. (2005) reported that Lake Whitefish "growth and condition have remained stable, and current values are within the range of historical means". "The population, in general, rides on the larger year classes that are intermittently produced. We have had some more consistent reproduction in recent years which is responsible for the recent uptick in abundance" (Jim Markham, NYSDEC, Personal Communication - 2022).

### Lake Champlain

"Since the closure of the commercial whitefish fishery in U.S. waters of Lake Champlain in 1913, only one study has focused on whitefish. In the early 1930s, Van Oosten and Deason (1939) described age and size structure, growth, and condition of whitefish collected in the fall of the year at the two commercially harvested locations within the lake. In more recent years, whitefish have only been recorded as present or absent during biological surveys conducted periodically from the 1930s to the late 1990s. During the 1970s a fish population inventory documented whitefish in all areas of the lake except for the two historic commercially fished locations (Anderson 1978). The highest whitefish catch rates were in the main lake" (Herbst 2010). In 2010, Herbst (2010) reported that although Lake Champlain has experienced substantial change since the early 1900s, "biological parameters (size and age structure, sex composition, growth, condition, energy density, and fecundity) of whitefish in Lake Champlain were typical of an unexploited population, with multiple length and age classes represented."

### Inland populations (Otsego Lake, Finger Lakes, and stocked waterbodies)

Lake Whitefish were recorded in Otsego Lake as far back as the mid-1800s (DeKay 1842; Carlson et al. 2016). "Greeley (1936) listed the species as very common in the lake" (Carlson et al. 2016). There have been 28 records in the last 20 years, however, Carlson et al. (2016) reported that "recent catches are much reduced in Otsego Lake and the introduction of the Alewife may have contributed to this decrease."

Lake Whitefish were first recorded in the Finger Lakes in the late 1800s and early 1900s. The last record in the Finger Lakes was in 2007 in Hemlock Lake, and prior to that was 1989 in Skaneateles Lake (Carlson et al. 2016). It is unknown whether the limited number of records in the last 30 years is due to the absence of targeted effort or declines/extirpations across the Finger Lakes.

Lake Whitefish were stocked in many isolated ponds in the Adirondacks and other areas of the state with mixed success. Several isolated populations still exist throughout the state (Carlson et al. 2016). The status of these isolated populations is unknown.

### New York's Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Classification of New York Range**

**Core:**_____

**Peripheral:** ✓

**Disjunct:**_____

**Distance to core population:**

Core pop. in Great Lakes

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Large, deep lakes

**b. Geology:** Low-moderately buffered

**c. Temperature:** Cold to transitional cool

**d. Gradient:** Low gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:** ✓

**Time frame of decline/increase:**_____

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:**_____ **No:** ✓

### Habitat Discussion:

The Lake Whitefish is a schooling fish that primarily inhabits large, deep cold-water lakes and occasionally occupies large, cool rivers (Lee et al. 1980; Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). "They thrive best in deep, oligotrophic lakes with large volumes of cold, well-oxygenated water, rarely entering streams except to spawn" and feed (Wood 2016). Lake Whitefish remain in the deep, cooler water (12m – 40m) in the warmer months and make seasonal migrations into shallows in the spring to feed and again in the fall during breeding season (Scott and Crossman 1973; Trautman 1981; Smith 1985; COSEWIC 2005; Stauffer et al. 2016). They sometimes occur in brackish water in the Northwest Territories and the Hudson Bay region (Smith 1985; Wood 2016). The dwarf Lake Whitefish may occupy different habitats than its larger counterpart, such as shallow water.

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Lake Whitefish are a long-lived fish, typically reaching ages of 10+ with the capability to live up to 30 years or more (Scott and Crossman 1973; Stauffer et al. 2016; Wood 2016). According to FishBase, the maximum recorded age is 50. Sexual maturity is reached between ages 2-7 (Stauffer et al. 2016; Wood 2016; NatureServe 2022). There are “stunted” Lake Whitefish known as dwarf Lake Whitefish that have been documented in Maine and Canada. They reach a much smaller size, mature earlier, and have short life spans; however, they are not currently recognized as a separate species (Wood 2016; NatureServe 2022). Kennedy (1953) suggested that spawning was an annual occurrence in their southern range and may occur every other or every three years in northern populations. Spawning typically occurs in the fall between mid-October and early December when water temperatures drop to about 43-46°F (Lawler 1965; Smith 1985; Stauffer et al. 2016; Wood 2016). Northern populations may spawn earlier (Herbst 2010). In October, Lake Whitefish will move to shoals of rock, gravel, or sand substrate in water 1-9m deep (Scott and Crossman 1973; Smith 1985; Bégout Anras et al.1999; COSEWIC 2005; Herbst 2010; Stauffer et al. 2016; NatureServe 2022). “The fish gather in spawning pairs, with the female broadcasting eggs mid-water where they are fertilized by the male and settle into cracks and crevices in the substrate below” (Wood 2016). “Hatching usually occurs in spring, and fry school near shore before entering deeper waters in early summer (Faber 1970). For eastern Lake Erie, fecundity has been reported as 7,310 eggs per kg of fish (Lawler 1961)” (Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

Primary threats to Lake Whitefish include overfishing, competition and predation by nonnative species (Rainbow Smelt, Alewife, White Perch, Sea Lamprey and dreissenid mussels), pollution (industrial discharge, siltation, and nutrient loading), habitat degradation from poor land use and water management (e.g., urban and agricultural development, lake drawdowns), and warming waters from climate change (Evans and Loftus 1987; Ebener 1997; Cook et al. 2005; COSEWIC 2005; Hoyle 2005; Nalepa et al. 2005; Herbst 2010; Wood 2016; NHF&GD). These threats can act in combination to drastically reduce recruitment and harm the long-term survival of Lake Whitefish populations.

“Introduced Rainbow Smelt and Alewife have negatively impacted whitefish populations, primarily through larval predation. In a Canadian inland lake, predation on larval whitefish by Rainbow Smelt was intense due to the coincidence of peak hatching activity of whitefish with peak Rainbow Smelt spawning activity (Loftus and Hulsman 1986)” (Herbst 2010). Spangler et al. (1980) found that Sea Lamprey attacks on Lake Whitefish in Lake Huron occurred most frequently in August to November and 75% of attacks were fatal in mid-June to mid-November. “Dreissenid mussels invaded eastern Lake Ontario in the early 1990s, and *Diporeia* spp. disappeared from the benthic food web soon thereafter. Lake Whitefish stocks responded by showing signs of stress, including a die-off; diet changes; declines in body condition and growth; delayed mean age at maturity; very poor reproductive success; changes in seasonal, geographic, and bathymetric distribution; and changes in feeding patterns” (Hoyle 2005). COSEWIC (2005) suggested that introductions of the spiny waterflea in some Ontario lakes could alter the food web structure and affect Lake Whitefish.

“Sediments cover hard, stony substrate and can cover and suffocate eggs, causing high egg mortality and decreased recruitment (Evans et al. 1996). In Lake Erie, reduced catches of whitefish were reported following years of low recruitment that were associated with years of increased siltation on spawning areas (Trautman 1981; Cook et al. 2005)" (Herbst 2010). Lake Whitefish may be vulnerable to climate change as waters continue to warm and cold-water habitat in lakes and ponds begins to disappear (NHF&GD).

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

**Yes:** ✓ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

"There is quite a bit of work on Lake Whitefish occurring in recent years on Lake Erie, including genetics to determine if there are different stocks in the lake and acoustic tagging to determine movements during the year. A project to determine spawning sites and habitat began last year" (Jim Markham, NYSDEC, Personal Communication). Continued efforts to manage and monitor populations in the Great Lakes are necessary. The status of Lake Whitefish in Lake Champlain was last reported in 2010 by Herbst (2010). Continued efforts to manage and monitor populations in Lake Champlain are necessary. Protecting the water quality and preventing poor water management practices is also important (NHF&GD).

Wisconsin Department of Natural Resources and the New Hampshire Fish & Game Department noted the need to explore the potential for new methods to monitor populations. Investigating these methods will likely benefit the sampling of populations where trends are not well known. Wisconsin Department of Natural Resources holds frequent stakeholder meetings to discuss rule changes and ways to manage the fishery on Lake Michigan.

Maine and Ontario have stocked Lake Whitefish in a variety of waters including the Canadian waters of Lake Ontario with mixed success (Wood 2016). Stocking the seemingly rare or extirpated Lake Whitefish populations of the Finger Lakes may be a potential action. Maine increased recreational fishing restrictions on Lake Whitefish in the last 40 years with little response on Lake Whitefish populations (Wood 2016). Wood (2016) concluded the presence of Rainbow Smelt was a more important factor than recreational angling.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Management | Site/Area Management |
| **2.** Land/Water Management | Invasive/Problematic Species Control |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |

| | |
|---|---|
| **4.** Species Management | Harvest Management |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Species Management | Species Recovery |
| **7.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Lake Whitefish.

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# Species Status Assessment Cover Sheet

**Species Name:** Longhead Darter **Date Updated:** January 2023

**Current Status:** Threatened – Non-SGCN (Removed from SGCN list) **Updated By:** Kyle Grasso

**Current NHP Rank:** S2

**Distribution:** The Longhead Darter occurs in the Ohio River system from New York southwest to the Duck River system in Tennessee. In New York, they are only native to the Allegheny watershed where they currently inhabit up to 13 streams.

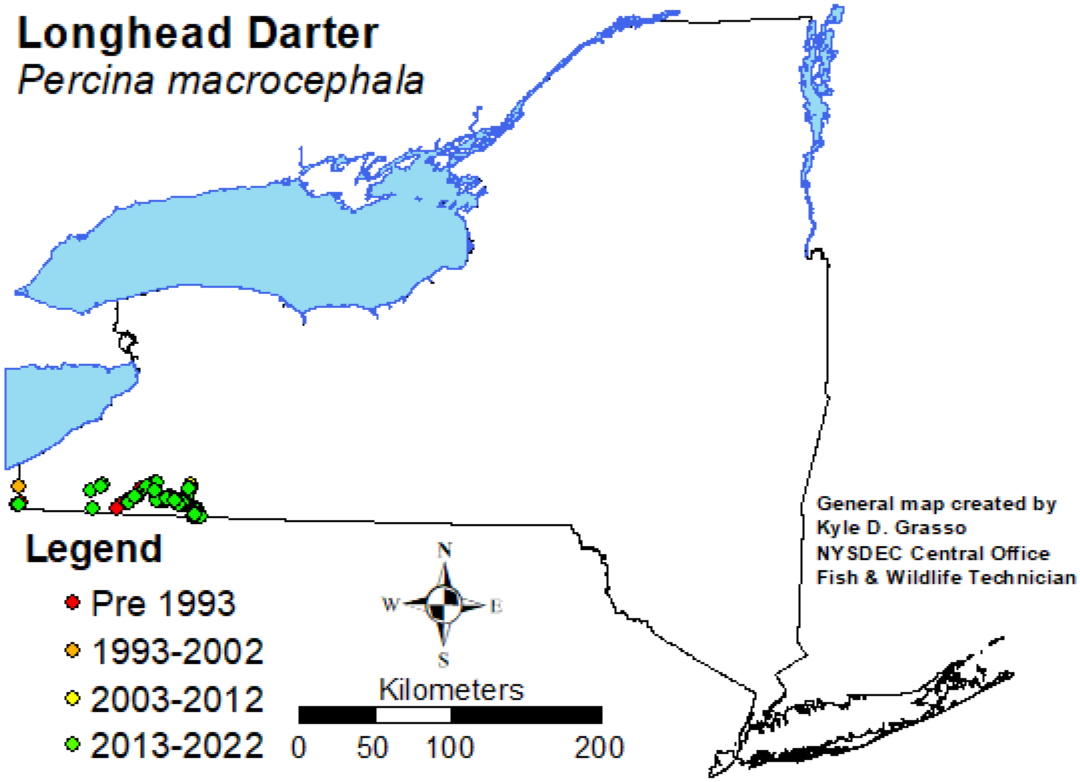
**Habitat:** The Longhead Darter inhabits warm, clear, and clean medium to large streams typically in areas of swift current over gravel, cobble, or boulder substrate. Longhead Darters have been recorded in a wide variety of habitats, while an association with riffles seems to be common. Stauffer et al (2016) captured Longhead Darter in riffles and runs over substrates of clean gravel, cobble, rubble, and boulders, especially at the interface areas between strong current and backwash. They also occur in pools with both clean bottoms of gravel and rubble, and those covered with silt and/or detritus. They may be found, as well, in vegetated backwaters and in beds of *Justicia* in flowing waters. Smith (1985) and Etnier and Starnes (1993) reported them as a midwater species. The Longhead Darter has been known to migrate seasonally and move to deeper water in the winter. Welsh and Perry (1998) reported some habitat partitioning between Longhead Darter and logperch in the Birch and Elk River, West Virginia.

**Life History:** Very little is known about the life history of the Longhead Darter. The Longhead Darter is believed to live 3-4 years and they do not sexually mature until age 2. Page (1978) hypothesized that spawning in the Green River in Kentucky occurred in March-May based on young-of-the-year sizes. Smith (1985) suggested that in New York it is likely later than that. NatureServe stated that spawning may occur over gravel shoals and no parental care is given.

**Threats:** Threats to the Longhead Darter include sedimentation and siltation, poor water quality, habitat fragmentation, and potentially invasive species.

**Population trend:** Abundance has increased throughout most of the Allegheny River in the last 20 years. Since the late 1990s, they have also moved into 6 major tributaries of the Allegheny River (Olean Creek, Ischua Creek, Dodge Creek, Fivemile Creek, Great Valley Creek, Tunungwant Creek). Upstream passage on Conewango Creek was restored in 2014 and as a result, Longhead Darters have been recorded in the Chadakoin River in 2017 and Conewango Creek in 2017 and 2020. French Creek populations in Pennsylvania appear to be stable and they were mostly recently caught in the New York portion of French Creek in 2016 and West Branch French Creek in 1998.

**Recommendation:** It is recommended that the Longhead Darter be downlisted from Threatened to Special Concern due to increases in their abundance and distribution over the last 20 years.



# Species Status Assessment

**Common Name:** Longhead Darter **Date Updated:** January 2023

**Scientific Name:** *Percina macrocephala* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Percidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Longhead Darter is in the class Actinopterygii and family Percidae (perches, walleyes, and darters). The Longhead Darter occurs in the Ohio River system from New York southwest to the Duck River system in Tennessee (Page and Burr 2011; Stauffer et al. 2016). In New York, they are only native to the Allegheny watershed where they currently inhabit up to 13 streams. Abundance has increased throughout most of the Allegheny River in the last 20 years. Since the late 1990s, they have also moved into 6 major tributaries of the Allegheny River (Olean Creek, Ischua Creek, Dodge Creek, Fivemile Creek, Great Valley Creek, Tunungwant Creek) (Carlson et al. 2016). Upstream passage on Conewango Creek was restored in 2014 and as a result, Longhead Darters have been recorded in the Chadakoin River in 2017 and Conewango Creek in 2017 and 2020. French Creek populations in Pennsylvania appear to be stable and they were mostly recently caught in the New York portion of French Creek in 2016 and West Branch French Creek in 1998 (Stauffer et al. 2016). The Longhead Darter inhabits warm, clear, and clean medium to large streams typically in areas of swift current over gravel, cobble, or boulder substrate (Smith 1985; Burr and Warren 1986; Stauffer et al. 2016; NatureServe 2022; NYNHP 2022). Longhead Darters have been recorded in a wide variety of habitats, while an association with riffles seems to be common (Page 1978; Lee et al. 1980; Morse et al. 2009; Stauffer et al. 2016; NYNHP 2022). Stauffer et al (2016) captured Longhead Darters in “riffles and runs over substrates of clean gravel, cobble, rubble, and boulders, especially at the interface areas between strong current and backwash. It also occurs in pools with both clean bottoms of gravel and rubble, and those covered with silt and/or detritus. It may be found, as well, in vegetated backwaters and in beds of *Justicia* in flowing waters.”

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Threatened – Non-SGCN (removed from SGCN list)

### b. Natural Heritage Program

i. **Global:** Vunerable – G3

ii. **New York:** S2 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Data Deficient
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)
- American Fisheries Society: Vulnerable (8/1/2008)

### Status Discussion:

In New York, the Longhead Darter is currently listed as Threatened. However, they are currently listed as a Non-SGCN because they were removed from the SGCN list in 2015. The Longhead Darter is globally ranked as Vulnerable by NatureServe.

The Longhead Darter was petitioned to be listed under the Endangered Species Act on April 20, 2010. In 2018, a species assessment was undertaken, resulting in the 2019 finding that listing the Longhead Darter as Endangered or Threatened was not warranted (USFWS 2018; USFWS 2019). Along with the decision, the USFWS stated that despite active threats and “some level of decline in abundance, including the loss of at least three of its historical populations, the species continues to maintain resilient populations over time. Although we predict some continued impacts from these stressors in the foreseeable future, we anticipate this species will continue to have resilient populations that are distributed widely throughout its range” (USFWS 2019).

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**✓ **Unknown:**_____

**Time Frame Considered:** Last 30 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:**_____ **Increasing:**✓ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**✓ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 30 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:**✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:**✓ **No Data:**_____

**NEW JERSEY** **Not Present:**✓ **No Data:**_____

**VERMONT** **Not Present:**✓ **No Data:**_____

**ONTARIO** **Not Present:**✓ **No Data:**_____

**QUEBEC** **Not Present:**✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

## d. New York

### i. Abundance

**Declining:**_____ **Increasing:**_✓___ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_✓___ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** (*insert map of North American/regional*):

In the mid to late 1900s, Longhead Darter range and abundance had declined, and the species was potentially extirpated from Kentucky and Ohio (Page 1978, Trautman 1981, Burr and Warren 1986; NatureServe 2022). Warren et al. (2000) reviewed their status and categorized them as Threatened and likely to become endangered throughout a significant portion of the range. This study, however, did not include the statuses of the species in New York and Pennsylvania where the species was more stable and starting to recover (Carlson et al. 2016; NatureServe 2022). “A range-wide categorization by Jelks et al. (2008) assigned this species to the Vulnerable category” (NatureServe 2022). In the early 2000s, Longhead Darter distribution and abundance began to increase in New York, Pennsylvania, and West Virginia (Criswell 2006; Carlson et al. 2016; USFWS 2018). These increases were thought to be associated with improved water quality and survey techniques (Herzog et al. 2005; Koryak et al. 2008; Freedman et al. 2009; Honick et al. 2017; USFWS 2018). Since 2018, the Ohio State University has collaborated with the Ohio Division of Wildlife and Pennsylvania Fish and Boat Commission to trap and transfer fish from Pennsylvania into 4 historic waters in Ohio (USFWS 2018). The current status of the project is unknown.

In New York, they are only native to the Allegheny watershed where they currently inhabit up to 13 waterbodies. Abundance has increased throughout most of the Allegheny River in the last 20 years. There has been a total of 160 records in the Allegheny River in the last 20 years compared to just 39 records in the years prior. Since the late 1990s, they have also moved into 6 major tributaries of the Allegheny River (Olean Creek, Ischua Creek, Dodge Creek, Fivemile Creek, Great Valley Creek, Tunungwant Creek) (Carlson et al. 2016). Upstream passage on Conewango Creek was restored in 2014 and as a result, Longhead Darters have been recorded in the Chadakoin River in 2017 and Conewango Creek in 2017 and 2020. French Creek populations in Pennsylvania appear to be stable and they were mostly recently caught in the New York portion of French Creek in 2016 and West Branch French Creek in 1998 (Stauffer et al. 2016). Overall, populations in New York and Pennsylvania are stable, and Pennsylvania is considered a stronghold for the species (Stauffer et al. 2016).

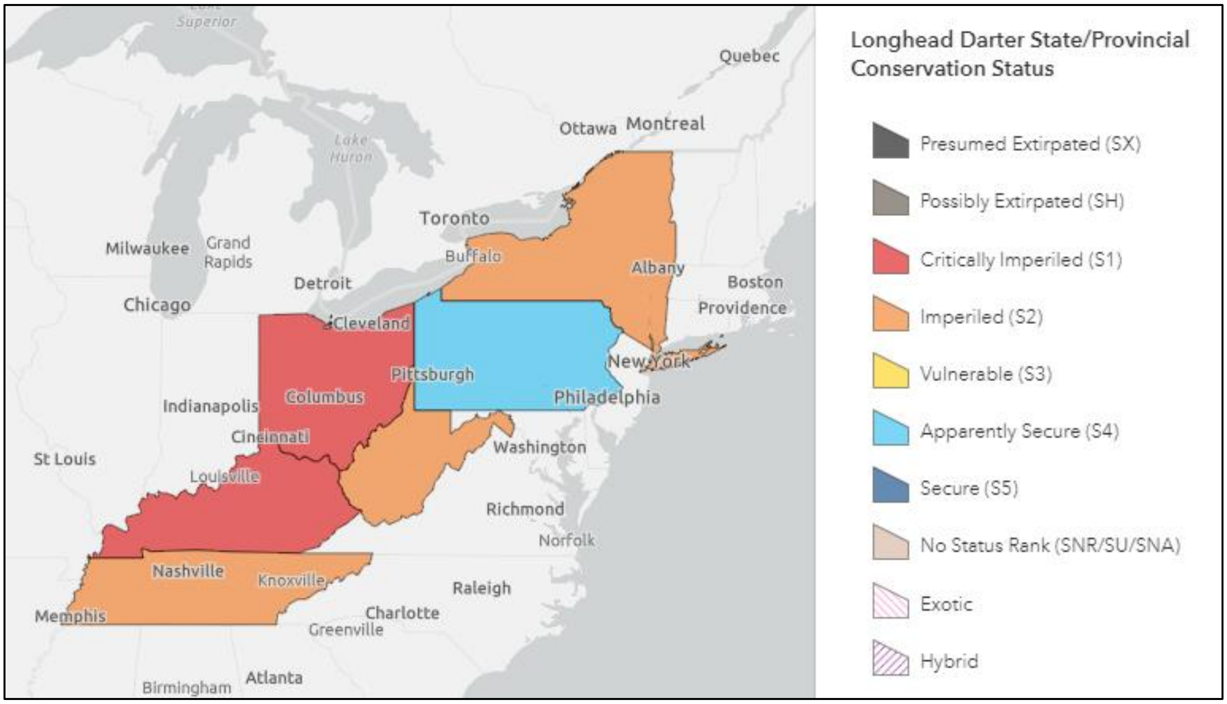


**Figure 1:** Longhead Darter distribution and status (Source: NatureServe 2022).

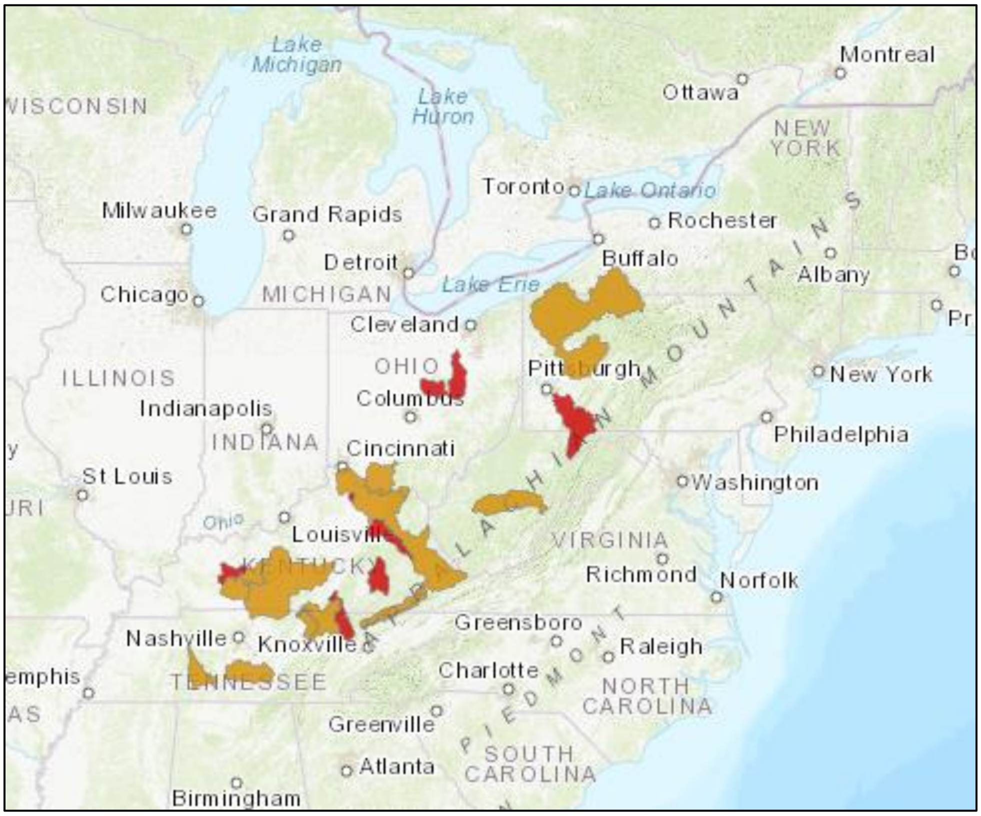


**Figure 2:** Longhead Darter distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

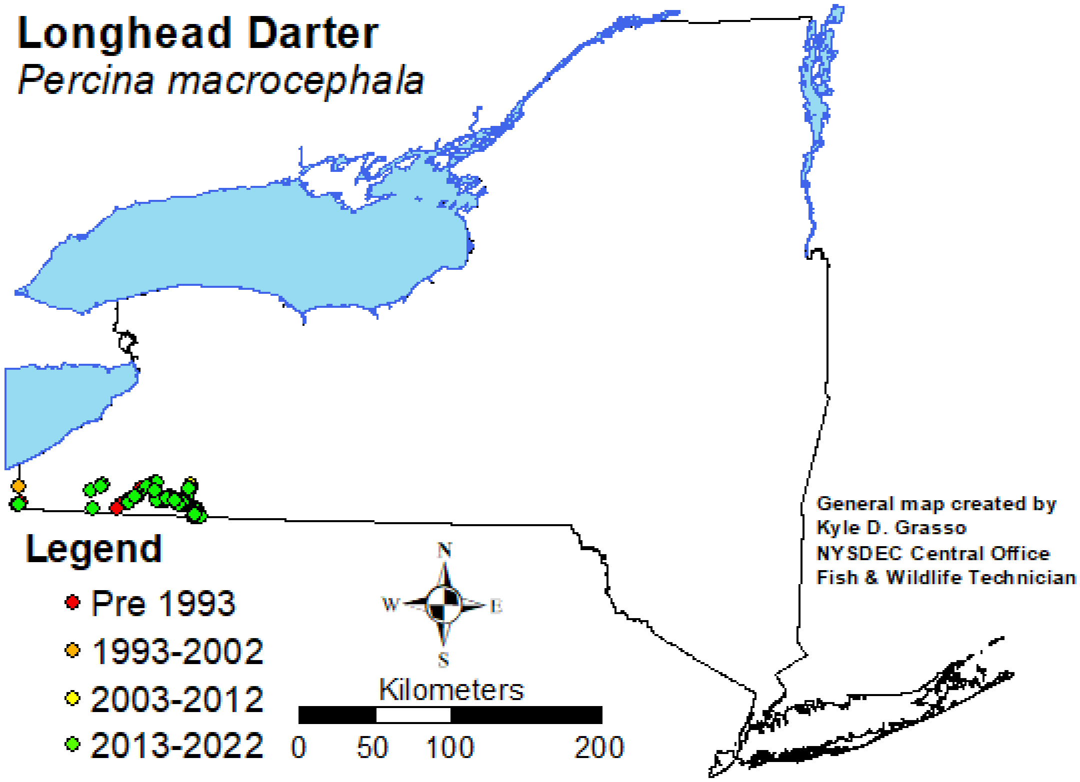


**Figure 3:** Records of Longhead Darter in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 18 | 3 | 0-5% |
| **1993-2002** | 37 | 5 | 0-5% |
| **2003 - 2012** | 80 | 8 | 0-5% |
| **2013 - 2022** | 116 | 8 | 0-5% |

**Table 1:** Records of Longhead Darter in New York.

### Details of historic and current occurrence:

In New York, the Longhead Darter is only native to the Allegheny watershed where they currently inhabit up to 13 waterbodies. They were recorded in the Allegheny River and French Creek as early as 1937 (Carlson et al. 2016). In the early 2000s, Longhead Darter distribution and abundance began to increase in New York, Pennsylvania, and West Virginia (Criswell 2006; Carlson et al. 2016; USFWS 2018). These increases were thought to be associated with improved water quality and survey techniques (Herzog et al. 2005; Koryak et al. 2008; Freedman et al. 2009; Honick et al. 2017; USFWS 2018). In New York, abundance has increased throughout most of the Allegheny River in the last 20 years. There has been a total of 160 records in the Allegheny River in the last 20 years compared to just 39 records in the years prior. Since the late 1990s, they have also moved into 6 major tributaries of the Allegheny River (Olean Creek, Ischua Creek, Dodge Creek, Fivemile Creek, Great Valley Creek, Tunungwant Creek) (Carlson et al. 2016). Upstream passage on Conewango Creek was restored in 2014 and as a result, Longhead Darters have been recorded in the Chadakoin River in 2017 and Conewango Creek in 2017 and 2020. French Creek populations in Pennsylvania appear to be stable and they were mostly recently caught in the New York portion of French Creek in 2016 and West Branch French Creek in 1998 (Stauffer et al.

2016). Overall, populations in New York and Pennsylvania are stable, and Pennsylvania is considered a stronghold for the species (Stauffer et al. 2016).

### 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%:**_____ | **Peripheral:**__✓__ |
| **51-75%:**_____ | **Disjunct:**_____ |
| **26-50%:**_____ | **Distance to core population:** |
| **1-25%:**__✓__ | Core pop. to the southwest |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Small to medium mainstem rivers

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**__✓__ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**__✓__ **No:**_____

**Indicator Species?** **Yes:**__✓__ **No:**_____

### Habitat Discussion:

The Longhead Darter inhabits warm, clear, and clean medium to large streams typically in areas of swift current over gravel, cobble, or boulder substrate (Smith 1985; Burr and Warren 1986; Stauffer et al. 2016; NatureServe 2022; NYNHP 2022). Longhead Darters have been recorded in a wide variety of habitats, while an association with riffles seems to be common (Page 1978; Lee et al. 1980; Morse et al. 2009; Stauffer et al. 2016; NYNHP 2022). Stauffer et al (2016) captured Longhead Darter in "riffles and runs over substrates of clean gravel, cobble, rubble, and boulders, especially at the interface areas between strong current and backwash. It also occurs in pools with both clean bottoms of gravel and rubble, and those covered with silt and/or detritus. It may be found, as well, in vegetated backwaters and in beds of *Justicia* in flowing waters." Smith (1985) and Etnier and Starnes (1993) reported them as a midwater species that is difficult to catch using normal seining methods. The Longhead Darter has been known to migrate seasonally and move to deeper water in the winter (Schiering 2013; USFWS 2018; NatureServe 2022). "Welsh and Perry (1998) reported some habitat partitioning between Longhead Darter and logperch in the Birch and Elk River, West Virginia. In riffle/ pool transition areas in the Elk River, logperch used areas of faster water than Longhead Darters" (Stauffer et al. 2016).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Very little is known about the life history of the Longhead Darter. The Longhead Darter is believed to live 3-4 years and they do not sexually mature until age 2 (Page 1978; Smith 1985; USFWS 2018; NatureServe 2022). Page (1978) hypothesized that spawning in the Green River in Kentucky occurred in March-May based on young-of-the-year sizes (Smith 1985; Stauffer et al. 2016; USFWS 2018; NatureServe 2022). Smith (1985) suggested that in New York it is likely later than that. Longhead Darter reproduction studies are sparse, however, “in the Little River, Tennessee, the closely related sickle darter has been observed to move into deep pools during winter months and migrate to shallow gravel shoal areas to spawn in the spring. Sickle darter eggs in this system hatched in 27 days” (USFWS 2018). NatureServe stated that spawning may occur over gravel shoals and no parental care is given.

## VI. Threats *(from NY CWCS Database or newly described)*

The primary threats to Longhead Darter include sedimentation and siltation, poor water quality, habitat fragmentation, and potentially invasive species (Schiering 2013; USFWS 2018; USFWS 2019). “Increased siltation resulting from industrial, agricultural, and municipal development has been identified as a principal threat to Longhead Darter (Page and Near 2007)” (USFWS 2018). Increased sedimentation and siltation can increase embeddedness and as a result, decrease the habitat availability of Longhead Darter (Schiering 2013). Pollution and siltation associated with urbanization, agricultural activities, coal mining (specifically in West Virginia), and other poor land use practices has been implicated in some Longhead Darter population declines (USFWS 2018; NatureServe 2022; NYNHP 2022). “Historically, Longhead Darters likely had a more continuous distribution, but now populations, although widespread, are geographically isolated from each other as a result of dams and other barriers, resulting in limited connectivity between populations. Dams likely eliminated populations that were never discovered and have influenced Longhead Darter’s ability to recolonize streams and rivers where water quality has improved” (USFWS 2018). In New York, the Kinzua dam (completed in 1967) effectively isolated the New York populations of Longhead Darter. Upstream passage on Conewango Creek was restored in 2014 which helps increase connectivity between previously separated populations in New York and Pennsylvania. The Round Goby has been introduced in many of the waterbodies inhabited by Longhead Darter across their entire range. No information suggests that the Round Goby or any other nonnative species are negatively affecting Longhead Darter viability, however Round Goby have been implicated in the declines of many species (USFWS 2018).

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

**Yes:**__✓__ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Longhead Darter is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Conservation strategies and management practices from New York Natural Heritage Program website (NYNHP 2022):

Measures are needed to reduce runoff into areas used by the fish. When construction is needed near water systems, steps should be taken to reduce siltation as much as possible. This could include disturbing only the work area to maintain as much vegetation as possible to reduce runoff, working in phases to allow for more centralized control of sedimentation, using sediment traps or ditches to direct runoff away from the river, stabilizing soil by seeding, mulching, use of blankets, or wool binders. Protect slopes by using silt fences or fiber rolls. Logging and farming practices near waters can increase siltation or pollution. Encourage practices that maintain a riparian buffer to control pollution. Gravel and boulders should not be disturbed or removed from the river as they are necessary for spawning and provide refuge from predators. Any alteration to the flow of water may affect upstream movement to spawning areas. Consider removing any barriers to allow free movement. Studies are needed to determine spawning dates, larval habitat needs, and movement patterns in New York.

The 2005 State Wildlife Action Plan included the following recommendations:

Population monitoring:

-This species has not been caught in recent years in French Creek, and occasional sampling should continue for updating records in both this and the central part of the Allegheny basin.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Management | Site/Area Management |
| **2.** Land/Water Management | Invasive/Problematic Species Control |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |
| **4.** Species Management | Species Recovery |

| | |
|---|---|
| **5.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Longhead Darter.

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# Species Status Assessment Cover Sheet

**Species Name:** Longnose Sucker

**Date Updated:** January 2023

**Current Status:** Not Listed – SGCN

**Updated By:** Kyle Grasso

**Current NHP Rank:** S3

**Distribution:** Longnose Suckers can be found from western Labrador and Quebec, south to West Virginia, west to Colorado, Idaho, and Washington, and north through Alaska and most of Canada. They are also located in the Arctic drainages of eastern Siberia. They are native to 13 of 18 watersheds in New York.

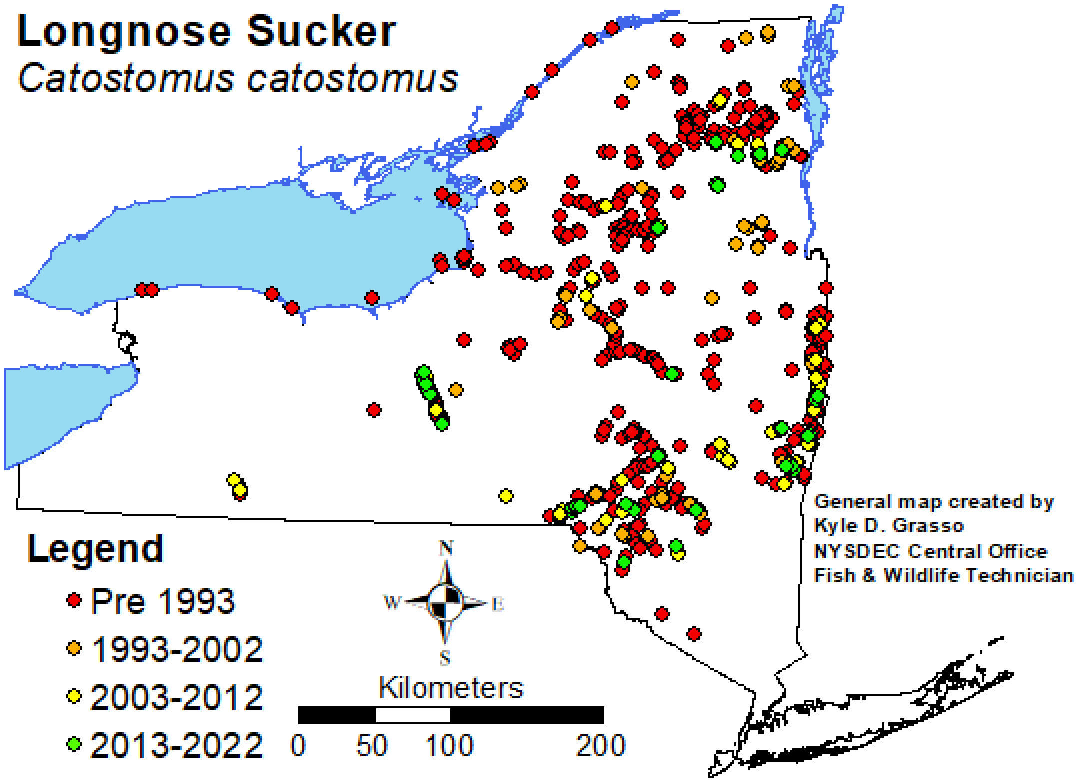
**Habitat:** Longnose Suckers inhabit cold, clear streams with clean gravel or cobble substrate as well as the deep water of lakes. In Pennsylvania, Longnose Suckers most frequently occur in deeper pools and slower runs with boulder-rubble substrate or significant amounts of submerged woody debris typically below riffles. They've been found at depths of 600 feet in the Great Lakes and are known to occur in brackish water near the mouths of Arctic streams.

**Life History:** Longnose Suckers can exceed 20 years in age. They reach sexual maturity at 4-7 years, sometimes even maturing as late as age 9. Spawning typically occurs from April to July depending on the location. Spawning primarily occurs in water temperatures of 50-60°F. Some populations move upstream to spawn in the riffles of small, shallow streams with gravel bottoms, while others spawn on lake shoals and thrive in lakes and ponds. Spawning typically occurs during daylight hours. Longnose Suckers do not build nests. Instead, males will grasp females and they will simultaneously release adhesive eggs and sperm that will sink and stick to the gravel substrate. By the end of summer, juvenile suckers will leave spawning areas and move downstream or to lakes to over-winter.

**Threats:** Threats to the Longnose Sucker include habitat (erosion and sedimentation) and stream flow alteration (groundwater pumping and stream diversion), turbidity, pollution (acidification, municipal sewage, industrial effluents, and agricultural runoff), ecological imbalances due to non-native fish introductions, and increased water temperatures. Dams may present a barrier to upstream spawning migrations.

**Population trend:** Longnose Suckers are native to 13 of 18 watersheds in New York. They have declined in the Ontario, Oswegatchie, Raquette, and Susquehanna watersheds. There have not been any Longnose Sucker records in the Ontario or Oswegatchie watersheds since 1982 and may be extirpated. They appear to be most stable in southeastern watersheds and continue to be found in about half of historic areas in New York.

**Recommendation:** It is recommended that the Longnose Sucker be listed as Threatened due to their decreased distribution and abundance, as well as their vulnerability to warming waters.



# Species Status Assessment

**Common Name:** Longnose Sucker **Date Updated:** January 2023

**Scientific Name:** *Catostomus catostomus* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Catostomidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Longnose Sucker is in the class Actinopterygii and the family Catostomidae (suckers). There are “stunted” Longnose Suckers common in the northeastern U.S. called dwarf Longnose Suckers that rarely exceed 10 inches. There are several studies on this dwarf form, but they are not currently recognized as a separate taxon in the state of New York (NHF&GD; Criswell and Fischer 2002; Carlson et al. 2016). Longnose Suckers can be found from western Labrador and Quebec, south to West Virginia, west to Colorado, Idaho, and Washington, and north through Alaska and most of Canada. They are also located in the Arctic drainages of eastern Siberia (Criswell and Fischer 2002). Longnose Suckers are native to 13 of 18 watersheds in New York (Black, Champlain, Delaware, Genesee, Lower Hudson, Mohawk, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, Susquehanna, Upper Hudson). They have declined in the Ontario, Oswegatchie, Raquette, and Susquehanna watersheds. They appear to be most stable in southeastern watersheds and continue to be found in about half of historic areas in New York (Carlson et al. 2016). Longnose Suckers inhabit cold, clear streams with clean gravel or cobble substrate as well as the deep water of lakes. They’ve been found at depths of 600 feet in the Great Lakes and are known to occur in brackish water near the mouths of Arctic streams (NHF&GD; Page and Burr 2011; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S3 **Tracked by NYNHP?:** Watchlist

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)

### Status Discussion:

The Longnose Sucker is not currently federally listed or listed in the state of New York. However, they are currently listed as an SGCN in New York. The Longnose Sucker is globally ranked as Secure by NatureServe.

“The U.S. Fish and Wildlife Service announced a 90-day finding on a petition to list the Monongahela River Basin population of *Catostomus catostomus* in Pennsylvania as endangered. They found the petition did not present substantial scientific or commercial information indicating that listing was warranted (3/8/2007)” (NatureServe 2022).

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**NEW JERSEY** **Not Present:** ✓ **No Data:** _____

**CONNECTICUT** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Attempts in the last 10 years to find them have failed

**Listing Status:** Special Concern – SNR **SGCN?:** Yes

**MASSACHUSETTS** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** _____ **Unknown:** ✓

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** _____ **Unknown:** ✓

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Special Concern – S3 **SGCN?:** Yes

**PENNSYLVANIA** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** _____ **Unknown:** ✓

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** _____ **Unknown:** ✓

**Time Frame Considered:** Occurs in only five streams (2016)

**Listing Status:** Endangered – S1 **SGCN?:** Yes

**VERMONT** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** No

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S5 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S5 **SGCN?:** N/A

### d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 45 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

According to NatureServe the short-term trend in the last 10 years is uncertain but likely relatively stable. (≤10% change). They are only found in 5 streams in Pennsylvania and are classified as endangered (Stauffer et al. 2016). They are thought to be extirpated from Maryland and Virginia (Stauffer et al. 1995; Stauffer et al. 2016).

Longnose Suckers are native to 13 of 18 watersheds in New York (Black, Champlain, Delaware, Genesee, Lower Hudson, Mohawk, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, Susquehanna, Upper Hudson). They have declined in the Ontario, Oswegatchie, Raquette, and Susquehanna watersheds. There have not been any Longnose Sucker records in the Ontario or Oswegatchie watersheds since 1982 and they may be extirpated. They appear to be most stable in southeastern watersheds and continue to be found in about half of historic areas in New York (Carlson et al. 2016).

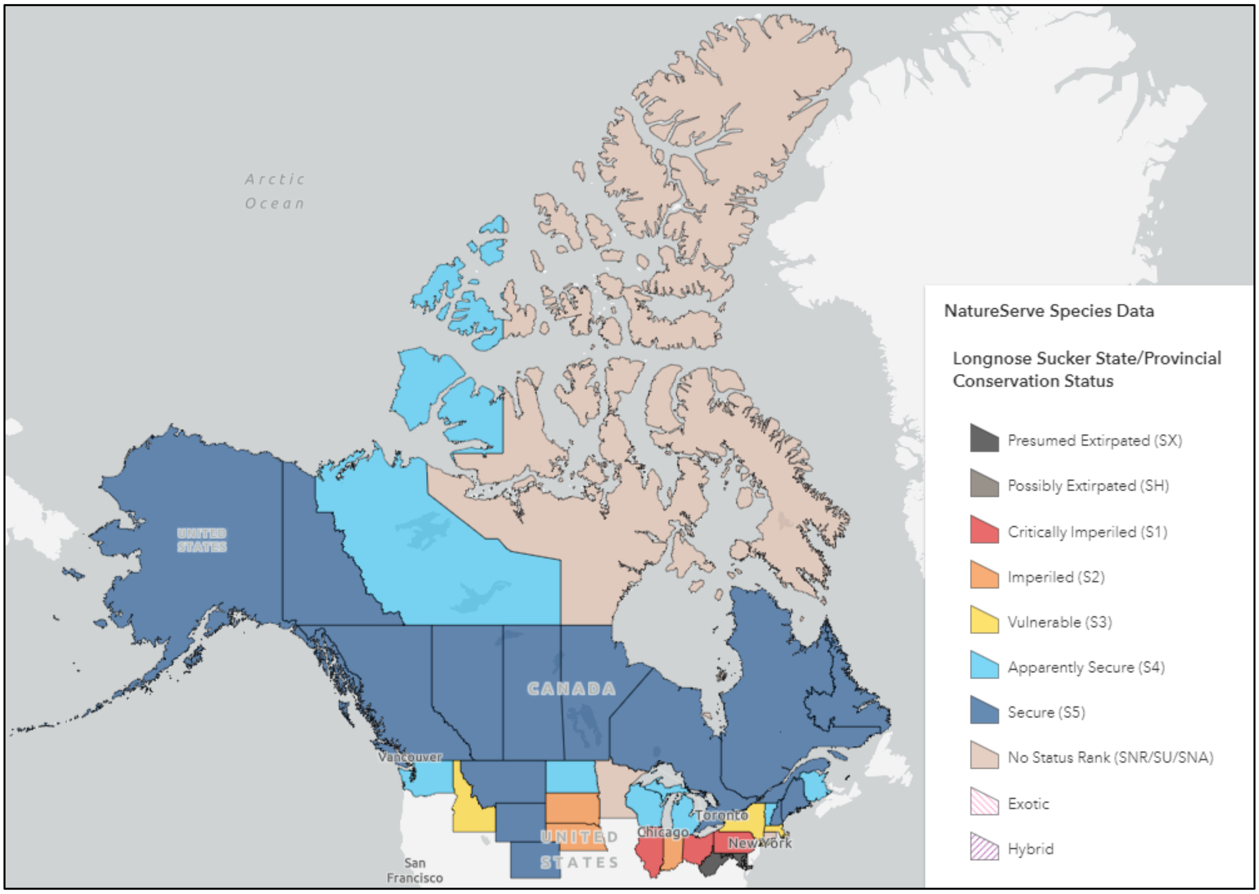


**Figure 1:** Longnose Sucker distribution and status in North America (Source: NatureServe 2022).

**Figure 2:** Longnose Sucker distribution in North America.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

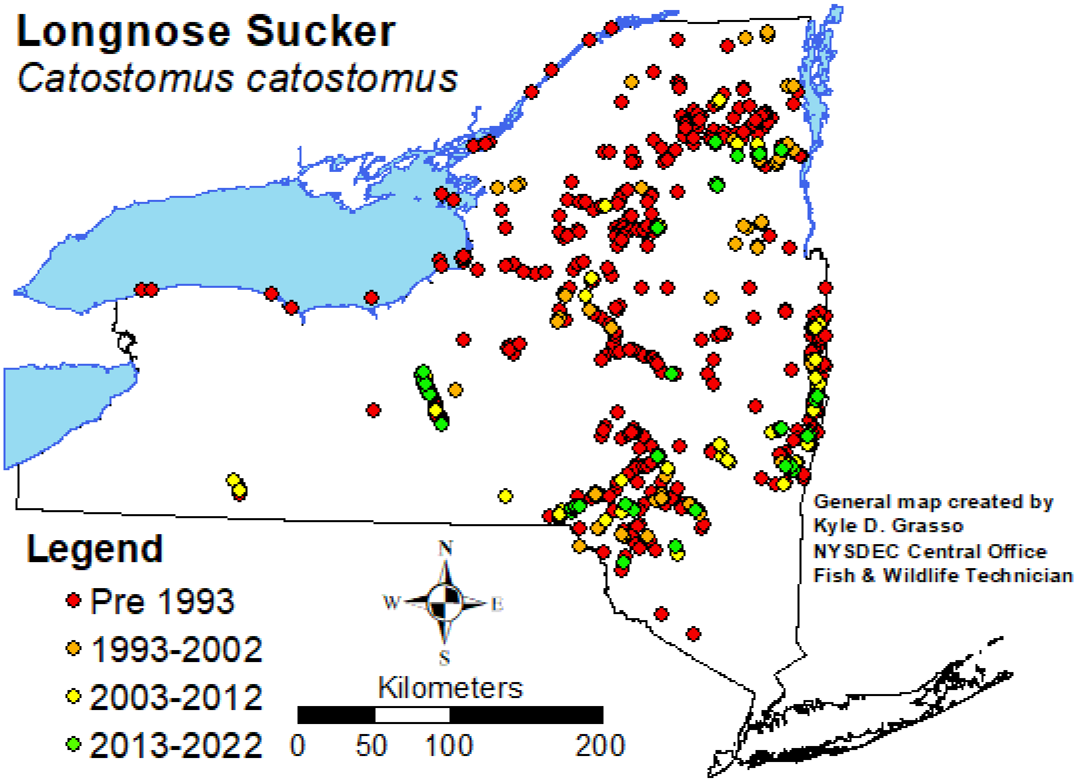


**Figure 3:** Records of Longnose Sucker in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 822 | 238 | >50% |
| **1993-2002** | 110 | 45 | >50% |
| **2003 - 2012** | 85 | 32 | >50% |
| **2013 - 2022** | 44 | 20 | >50% |

**Table 1:** Records of Longnose Sucker in New York.

### Details of historic and current occurrence:

Longnose Suckers are native to 13 of 18 watersheds in New York (Black, Champlain, Delaware, Genesee, Lower Hudson, Mohawk, Ontario, Oswegatchie, Oswego, Raquette, St. Lawrence, Susquehanna, Upper Hudson). They have declined in the Ontario, Oswegatchie, Raquette, and Susquehanna watersheds. There have not been any Longnose Sucker records in the Ontario or Oswegatchie watersheds since 1982 and may be extirpated. They appear to be most stable in southeastern watersheds and continue to be found in about half of historic areas in New York (Carlson et al. 2016).

| **Last Record by Watershed** | |
|---|---|
| **Watershed** | **Year of last record** |
| Ontario | 1982 |
| Oswegatchie | 1982 |
| St. Lawrence | 1997 |

| | |
|---|---|
| Genesee | 2006 |
| Susquehanna | 2008 |
| Black | 2010 |
| Oswego | 2012 |
| Mohawk | 2014 |
| Raquette | 2014 |
| Delaware | 2018 |
| Lower Hudson | 2018 |
| Upper Hudson | 2018 |
| Champlain | 2019 |

**Table 2:** Last record of Longnose Sucker by watershed. Red = Pre 1993, Orange = 1993 - 2002, Yellow = 2003 - 2012, Green = 2013 - 2022.

### New York's Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:**_✓__

**Classification of New York Range**

**Core:**_____

**Peripheral:**_____

**Disjunct:**_✓__

**Distance to core population:**

_Core pop. to the north and west______

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Headwaters to medium tributary rivers and cool, deep lakes

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Cold to occasionally transitional cool

**d. Gradient:** Low to high gradient

### Habitat or Community Type Trend in New York

**Declining:**_✓__ **Stable:**_____ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_✓__ **No:**_____

**Indicator Species?** **Yes:**_✓__ **No:**_____

### Habitat Discussion:

Longnose Suckers inhabit cold, clear streams with clean gravel or cobble substrate as well as the deep water of lakes. In Pennsylvania, Longnose Suckers most frequently occur in deeper pools and slower runs with boulder-rubble substrate or significant amounts of submerged woody debris typically below riffles (Criswell and Fischer 2002; Stauffer et al. 2016). They've been found at depths of 600 feet in the Great Lakes and are known to occur in brackish water near the mouths of Arctic streams (NHF&GD; Page and Burr 2011; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Longnose Suckers can exceed 20 years in age. They reach sexual maturity at 4-7 years, sometimes even maturing as late as age 9 (NHF&GD; Scott and Crossman 1973; Becker 1983; NatureServe 2022). They will spawn multiple times throughout their lives. Spawning typically occurs from April to July depending on the location. Spawning primarily occurs in water temperatures of 50-60°F (Stauffer et al. 2016). Mature suckers will typically display a red lateral line before spawning. Some populations move upstream to spawn in the riffles of small, shallow streams with gravel bottoms, while others spawn on lake shoals and thrive in lakes and ponds (Criswell and Fischer 2002; Woodford 2008). Spawning typically occurs during daylight hours. Longnose Suckers do not build nests. Instead, males will grasp females and they will simultaneously release adhesive eggs and milt that will sink and stick to the gravel substrate. Females can produce up to 60,000 eggs which take about 2 weeks to hatch. By the end of summer, juvenile suckers will leave spawning areas and move downstream or to lakes to over-winter (NHF&GD; Woodford 2008). Suckers may be vulnerable to predation during spawning as they congregate (NHF&GD). There are “stunted” Longnose Suckers called dwarf Longnose Suckers that rarely exceed 10 inches. They are not currently recognized as a separate taxon but are common in northeastern U.S. (NHF&GD; Criswell and Fischer 2002; Carlson et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described):*

Threats to the Longnose Sucker include habitat (erosion and sedimentation from deforestation) and stream flow alteration (groundwater pumping and stream diversion), turbidity, pollution (acidification, municipal sewage, industrial effluents, and agricultural runoff) and increased water temperatures. Dams may present a barrier to upstream spawning migrations to preferred spawning habitats (PNHP 2007; Stauffer et al. 2016).

Longnose Suckers rely on cold, clear water so the combination of habitat alteration and increased water temperatures from climate change pose a serious long-term threat to Longnose Sucker survival in New York (Criswell and Fischer 2002; PNHP 2007).

Longnose Suckers are “threatened in Lake Michigan due to deteriorating water quality and ecological imbalance caused by introductions of non-native fishes (Herkert 1992)” (NatureServe 2022).

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

**Yes:** _✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

“The first step in preserving this population is to prevent any land-use practices that result in the warming or silting of its crucial habitat” (Hendricks 1980). “There are signs that their range is contracting and shifting northward” due to increased water temperatures (NHF&GD). Populations should be monitored for any signs of range shifts.

Stocking could be a solution but may not be viable in New York without eliminating many of the threats that Longnose Suckers face. And as waters continue to warm, stocking to prevent extirpations may be ineffective.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Site/Area Management |
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Species Management | Ex-situ Conservation |
| **5.** Law & Policy | Policies and Regulations |

**Table 3:** Recommended conservation actions for Longnose Sucker.

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# Species Status Assessment Cover Sheet

**Species Name:** Mooneye
**Current Status:** Threatened – HPSGCN
**Current NHP Rank:** S2

**Date Updated:** January 2023
**Updated By:** Lisa Holst

**Distribution:** Range includes the St. Lawrence-Great Lakes (except Superior), Mississippi river, and Hudson Bay basins from Quebec to Alberta, south to Louisiana; Gulf Slope drainages from Mobile Bay, Alabama, to Lake Pontchartrain, Louisiana. The mooneye is found in the Lake Erie, Lake Ontario, the St. Lawrence River, and the Lake Champlain drainage basins. It is native to 7 of 18 watersheds in New York.

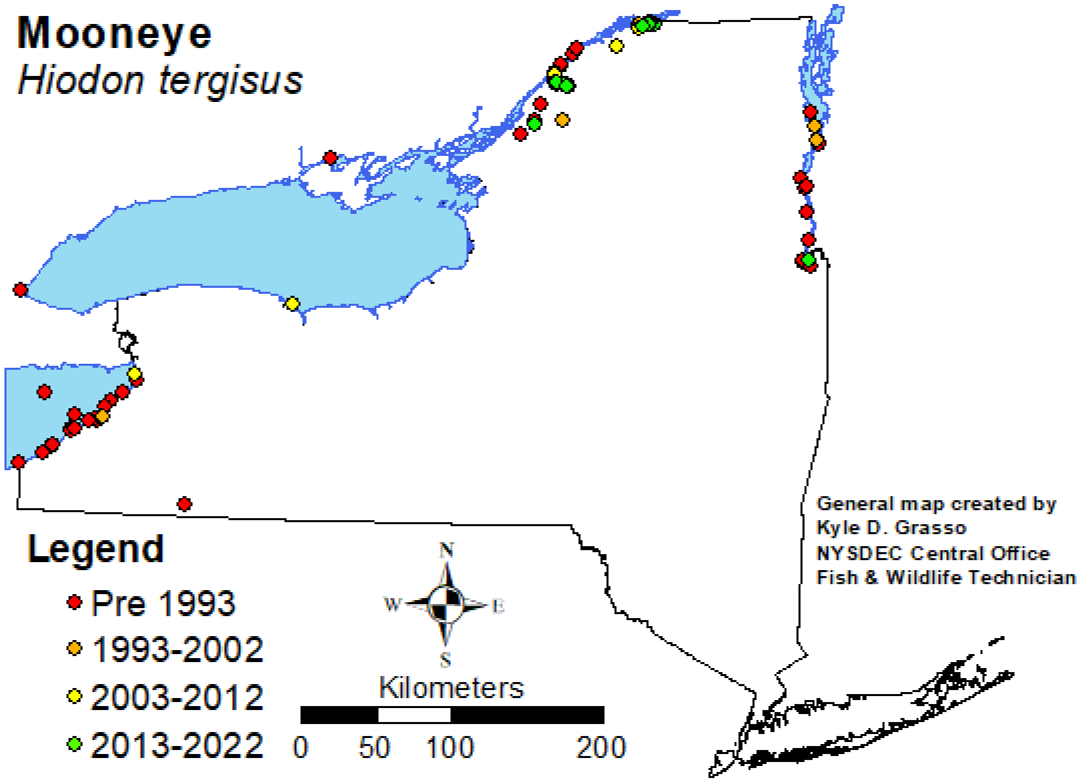
**Habitat:** Habitat includes deep pools and backwaters of medium to large rivers and interconnecting lakes and reservoirs with clear water; often in nonflowing waters but feeds mostly in swift water. Mooneye may migrate upstream in large clear streams to spawn in spring. Eggs are semibuoyant and drift downstream or into quiet water. In the Tennessee-Cumberland system, most larvae were collected from near-surface waters at night.

**Life History:** Individuals up to age 8 have been collected from Lake Erie, and age 11 mooneye have been reported from Canada. Males usually reach sexual maturity in 3 years, while females are often not mature until 5 years of age. The mooneye migrates into medium to large-sized rivers from March through May to deposit its eggs over rocks in swift water areas. Spawning occurs at water temperatures of 8-15° C; spawning peaks in late April-early May in the Tennessee River and May in Cumberland River. Larvae were collected in deep water pelagic areas of Lake Champlain in 2000 and 2001. Females release approximately 10,000-20,000 eggs.

**Threats:** While the causes of population declines are not known, one likely factor is increased siltation occurring in clear water areas where mooneye normally occur. Loss of insects as food sources could also be a factor in their decline. Mooneye can be caught by anglers, but angling is not thought to be a threat to population recovery.

**Population trend:** Populations have declined to levels below detection in the Allegheny watershed and it is thought to be extirpated from New York portions of Lake Ontario. Steep declines have been noted in the Champlain and Erie watersheds. It has recovered in the Oswegatchie and St. Lawrence watersheds, particularly in tributaries downstream of Massena.

**Recommendation:** It is recommended that the Mooneye remain listed as Threatened due to the declines seen across their restricted range in New York.



# Species Status Assessment

**Common Name:** Mooneye **Date Updated:** January 2023

**Scientific Name:** *Hiodon tergisus* **Updated by:** Lisa Holst

**Class:** Osteichthyes

**Family:** Hiodontidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Range includes the St. Lawrence-Great Lakes (except Superior), Mississippi river, and Hudson Bay basins from Quebec to Alberta, south to Louisiana; Gulf Slope drainages from Mobile Bay, Alabama, to Lake Pontchartrain, Louisiana (Page and Burr 2011). The Mooneye is found in the Lake Erie, Lake Ontario, the St. Lawrence River, and the Lake Champlain drainage basins. It lives in low gradient, clear-water streams and lakes and is native to 7 of 18 watersheds in New York. Populations have declined to levels below detection in the Allegheny watershed and it is thought to be extirpated from New York portions of Lake Ontario. Steep declines have been noted in the Champlain and Erie watersheds. It has recovered in the Oswegatchie and St. Lawrence watersheds, particularly in tributaries downstream of Massena. Other watersheds with records include Ontario and Raquette. Habitat includes deep pools and backwaters of medium to large rivers and interconnecting lakes and reservoirs with clear water; often in nonflowing waters but feeds mostly in swift water. Mooneye may migrate upstream in large clear streams to spawn in spring. Eggs are semibuoyant and drift downstream or into quiet water.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Threatened – HPSGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S2 **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern

**Status Discussion:**

The species is represented by a large number of occurrences and is locally common in parts of its range (NatureServe 2022). It is a common game fish throughout its Canadian range.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

ii. **Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10 years or 3 generations

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:**__✓__ **No Data:**_____

**MASSACHUSETTS** **Not Present:**__✓__ **No Data:**_____

**NEW JERSEY** **Not Present:**__✓__ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** No

**VERMONT** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

**Time Frame Considered:**_____

**Listing Status:** SU **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:**_____

**Listing Status:** S4 - Not Listed **SGCN?:**_____

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**__✓__ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**__✓__ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** S4/S5 – Not Listed **SGCN?:**_____

## d. New York

### i. Abundance

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. Larval fish surveys are conducted on Lake Champlain by University of Vermont. They are incidentally captured in Lake Erie gill netting surveys carried out by other states and the Province of Ontario.

**Trends Discussion** *(insert map of North American/regional):*

Breeding populations remain on the Canadian side of Lake Ontario and Lake Erie, and populations in the lower St. Lawrence River in Quebec are expanding. Mooneye have not been reported from Lake Champlain since 2001, when yolk-sac larvae were caught during plankton sampling. The last report of an adult Mooneye from Lake Champlain was from an angler in the Mettawee River in 1989. Mooneye has been absent from the Allegheny watershed in NY since the 1840s but is expanding up the Allegheny River in Pennsylvania.

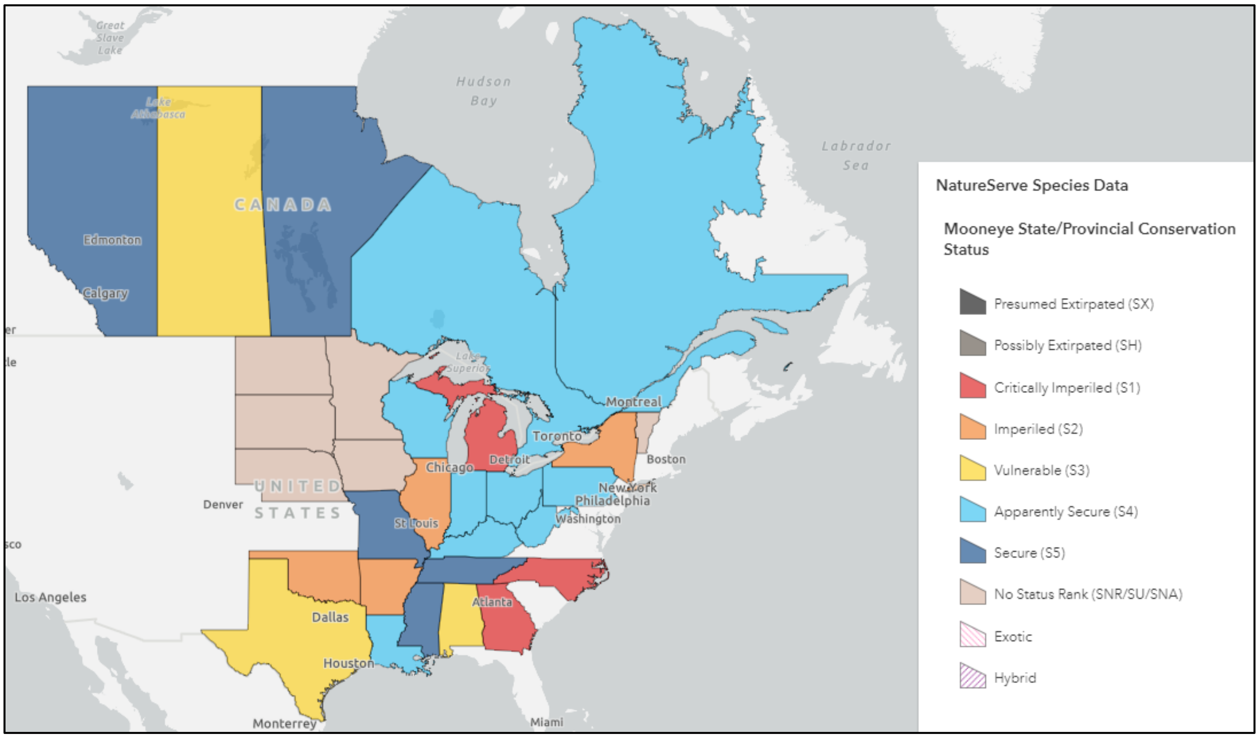


**Figure 1:** Mooneye distribution and status (Source: NatureServe 2022).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

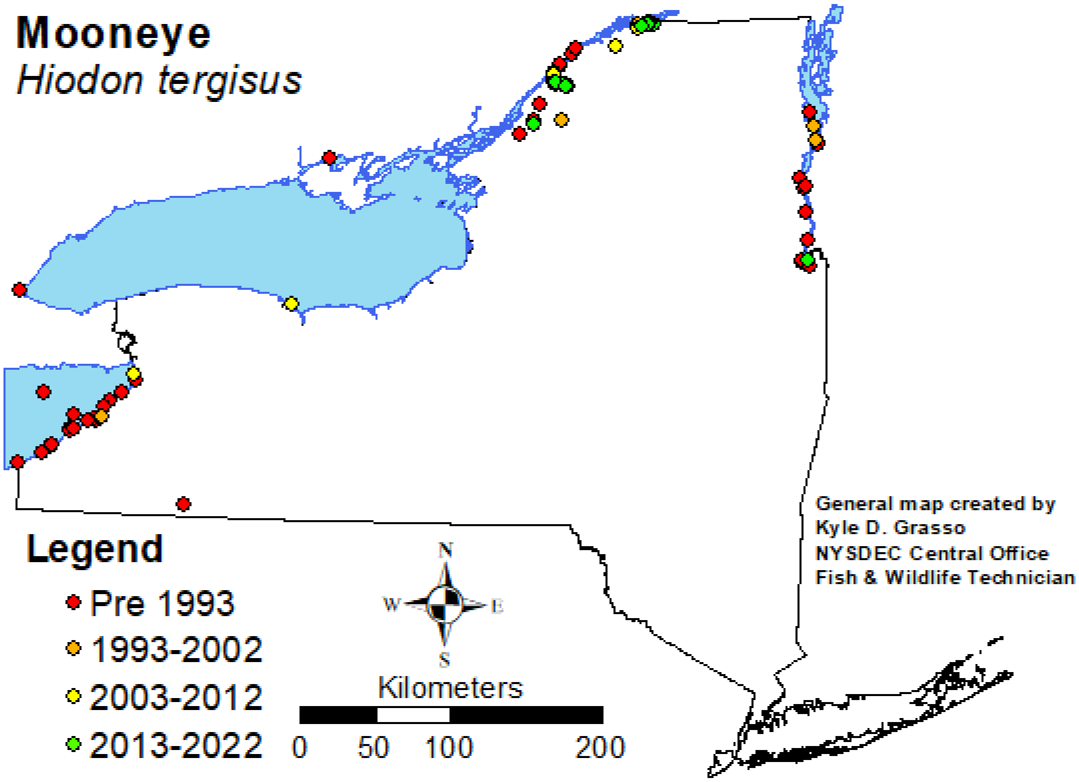


**Figure 2:** Records of Mooneye in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 50 | 17 | 6-10% |
| **1993-2002** | 10 | 5 | 6-10% |
| **2003 - 2012** | 17 | 5 | 6-10% |
| **2013 - 2022** | 37 | 5 | 6-10% |

**Table 1:** Records of Mooneye in New York.

### Details of historic and current occurrence:

Mooneye is native to seven of the 18 New York watersheds. It remains healthy in the Oswegatchie and Raquette watersheds and is sporadically reported by anglers in Lake Erie and Lake Ontario. Breeding populations remain on the Canadian side of Lake Ontario and Lake Erie, and populations in the lower St. Lawrence River in Quebec are expanding. Mooneye have not been reported from Lake Champlain since 2001, when yolk-sac larvae were caught during plankton sampling. The last report of an adult Mooneye from Lake Champlain was from an angler in the Mettawee River in 1989. Mooneye has been absent from the Allegheny watershed in NY since the 1840s but is expanding up the Allegheny River in Pennsylvania.

### 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%:**_____ | **Peripheral:**_✓__ |
| **51-75%:**_____ | **Disjunct:**_____ |

**26-50%:**_____ **Distance to core population:**

**1-25%:** ✓ ______________________________

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Medium River/Big River/Large Lakes/Reservoirs

**b. Geology:** Assume Moderately Buffered

**c. Temperature:** Warm/stratified monomictic

**d. Gradient:** Low gradient/moderate gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:** ✓ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** last 40 years

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

Habitat includes deep pools and backwaters of medium to large rivers and interconnecting lakes and reservoirs with clear water; often in nonflowing waters but feeds mostly in swift water. Mooneye may migrate upstream in large clear streams to spawn in spring. Eggs are semibuoyant and drift downstream or into quiet water. In the Tennessee-Cumberland system, most larvae were collected from near-surface waters at night (Wallus and Buchanan 1989).

The only two known spawning areas in New York are in the St. Lawrence River at Ogdensburg (Tibbits Creek and Oswegatchie River mouth) and upstream of Black Lake at Rossie (Greeley and Greene 1931, Greeley and Bishop 1932). Spawning in the Indian River at Rossie has been assumed to be in mid-late April when temperatures are about 50F. In New York, habitat in the smaller historic waters is probably still suitable.

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Mooneye has an intermediate length life span. Individuals up to age 8 have been collected from Lake Erie, and age 11 Mooneye have been reported from Canada (Werner 2004). Males usually reach sexual maturity in 3 years, while females are often not mature until 5 years of age. The Mooneye migrates into medium to large-sized rivers from March through May to deposit its eggs over rocks in swift water areas. Spawning occurs at water temperatures of 8-15° C; spawning peaks in late April-early May in the Tennessee River and May in Cumberland River (Wallus and Buchanan 1989). Larvae were collected in deep water pelagic areas of Lake Champlain in 2000 and 2001. Females release approximately 10,000-20,000 eggs.

Little is known about the larval stage of Mooneye, but they eat mainly aquatic and terrestrial insects; also crustaceans, molluscs, and small fishes. They are primarily surface feeding insectivores as adults. They are a known host for the federally endangered spectaclecase mussel, *Cumberlandia monodonta*.

## VI. Threats *(from NY CWCS Database or newly described)*

While the causes of population declines are not known, one likely factor is increased siltation occurring in clear water areas where Mooneye normally occur. Loss of insects as food sources could also be a factor in their decline. Mooneye can be caught by anglers, but angling is not thought to be a threat to population recovery.

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

**Yes:** _✓_ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Mooneye is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

The 2005 State Wildlife Action Plan included the following recommendations:

<u>Habitat Restoration:</u>

-Restoration of spawning areas may be accomplished with cobble and rubble placed in streams like that done for walleye spawning. Examples near Black Lake include the Oswegatchie River at Ogdensburg and Fish Creek at Pope Mills.

Population Monitoring:

-The status of the Black Lake and the Lake Erie populations need to be evaluated, and critical habitats needs to be identified.

The 2015 State Wildlife Action Plan included the following recommendations:

-Survey Mooneye population and habitat usage in Lake Erie and St. Lawrence River watersheds.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Habitat & Natural Process Restoration |
| **3.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Mooneye

## VII. References

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Werner, R. G. 2004. Freshwater fishes of the northeastern United States: A field guide. Syracuse University Press. Syracuse, New York. 335 pp.

# Species Status Assessment Cover Sheet

**Species Name:** Mountain Brook Lamprey **Date Updated:** January 2023

**Current Status:** Special Concern – SGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** S1

**Distribution:** The Mountain Brook Lamprey has a fragmented range in the Ohio River basin from southwestern New York down to northern Alabama and Georgia. In New York, they are only located in the Allegheny watershed.

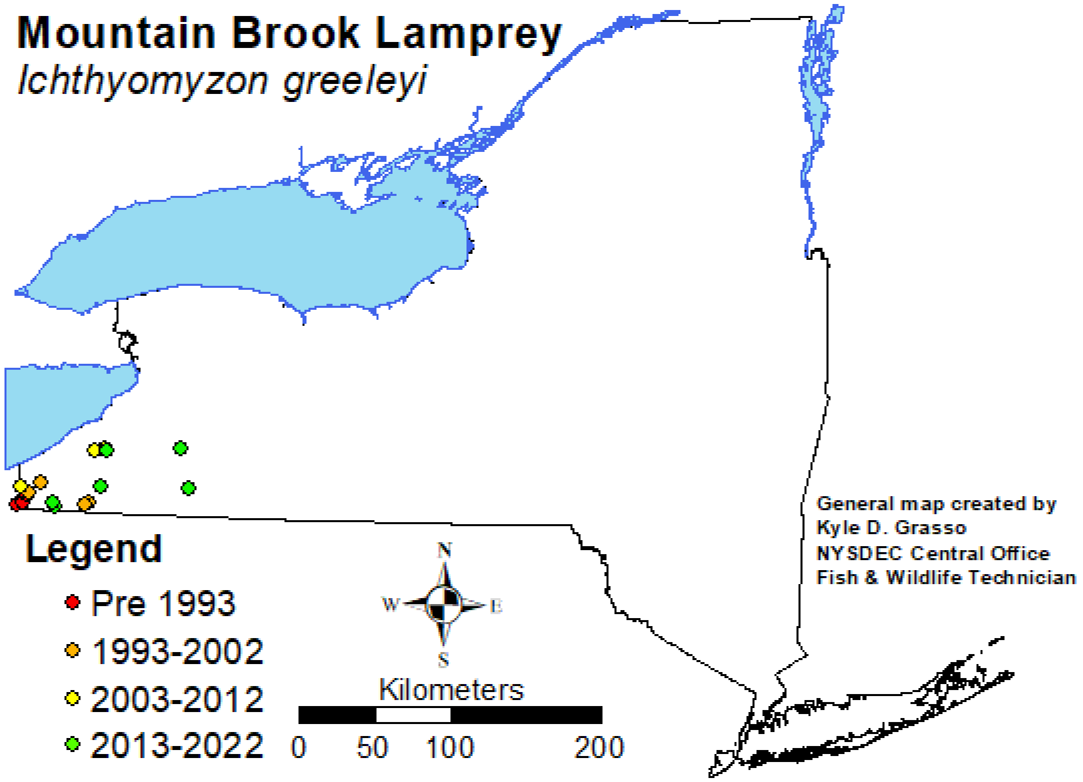
**Habitat:** Mountain Brook Lamprey prefer clear, small to medium sized creeks with substrates generally consisting of sand, pebbles, and small stones. Adults occur in riffles or runs, under overhanging banks, or occasionally they attach to stones in the current; larvae burrow into beds of mixed sand, mud, and organic debris in pools and backwaters.

**Life History:** The spawning behavior of the Mountain Brook Lamprey is similar to that of other lampreys. The Mountain Brook Lamprey lives up to 5 or 6 years, and adults usually die after spawning. In North Carolina, the larval stage is reported to last 4-5 years. Larvae metamorphose in mid-August to mid-December in western North Carolina. In some populations, older ammocoetes may attain a greater total length than adults. Spawning takes place between late April and early June depending upon geographic location. Raney (1939) observed spawning in Pennsylvania in mid-May when water temperature was 18.9 °C. Before spawning, males will excavate gravel or sand nests in riffles and shallow runs. Mountain Brook Lampreys sometimes spawn in the same nests with Ohio Lampreys in Pennsylvania. Spawning occurred when a female moved over the nest and attached to a stone. The male then attached to her, and they vibrated together. Usually there were five to nine lampreys per nest and spawning by one pair seemed to stimulate other pairs to spawn.

**Threats:** Threats to the Mountain Brook Lamprey include habitat degradation due to pollution (e.g., runoff with cow manure, sewage, fertilizer, and pesticides), siltation (e.g., from overgrazing, row cropping, and land clearing), and stream alteration, including dams that block movements of adults and ammocoetes.

**Population trend:** In the last 20 years, the documented range of Mountain Brook Lamprey in New York has increased. Abundance remains poorly understood because of their secretive habits. There are 10 documented streams containing Mountain Brook Lamprey within the state. Although populations are restricted, they appear secure.

**Recommendation:** It is recommended that the Mountain Brook Lamprey be delisted due to their range expansion in New York.



# Species Status Assessment

**Common Name:** Mountain Brook Lamprey **Date Updated:** January 2023

**Scientific Name:** *Ichthyomyzon greeleyi* **Updated by:** Kyle Grasso

**Class:** Petromyzontida

**Family:** Petromyzontidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Mountain Brook Lamprey is a non-parasitic lamprey in the class Petromyzontida and the family Petromyzontidae (northern lampreys). The Mountain Brook Lamprey has a fragmented range in the Ohio River basin from southwestern New York down to northern Alabama and Georgia (NatureServe 2022). In New York, they are only located in the Allegheny watershed (Carlson et al. 2016). In the last 20 years, the documented range of Mountain Brook Lamprey in New York has increased. Abundance remains poorly understood because of their secretive habits. There are 10 documented streams containing Mountain Brook Lamprey within the state. Although populations are restricted, they appear secure. Mountain Brook Lamprey prefer clear, small to medium sized creeks with substrates generally consisting of sand, pebbles, and small stones (Schwartz 1959; Burr and Warren 1986; Boschung and Mayden 2004; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). "Adults occur in riffles or runs, under overhanging banks, or occasionally they attach to stones in the current; larvae burrow into beds of mixed sand, mud, and organic debris in pools and backwaters (Burr and Warren 1986; Page and Burr 2011)" (NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Special Concern – SGCN

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)

### Status Discussion:

In New York, the Mountain Brook Lamprey is currently listed as Special Concern and SGCN. They are globally ranked as Apparently Secure by NatureServe. The Mountain Brook Lamprey was recently removed from the Threatened Species List in Pennsylvania.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

ii. **Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:**_____

### c. Adjacent States and Provinces

| | | |
|---|---|---|
| **CONNECTICUT** | **Not Present:** ✓ | **No Data:**_____ |
| **MASSACHUSETTS** | **Not Present:** ✓ | **No Data:**_____ |
| **NEW JERSEY** | **Not Present:** ✓ | **No Data:**_____ |
| **VERMONT** | **Not Present:** ✓ | **No Data:**_____ |
| **ONTARIO** | **Not Present:** ✓ | **No Data:**_____ |
| **QUEBEC** | **Not Present:** ✓ | **No Data:**_____ |
| **PENNSYLVANIA** | **Not Present:**_____ | **No Data:**_____ |

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Taken off Threatened Species List recently

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

### d. New York

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:** ✓ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

Mountain Brook Lamprey are relatively widespread in their fragmented range (Genoways and Brenner 1985). According to NatureServe, the short-term trend is unknown; however area of occupancy, number of subpopulations, population size, and habitat quality are thought to be relatively stable (≤10% change). The degree of long-term decline is not precisely known but is estimated to be 30-70% (NatureServe 2022). Some populations have been extirpated; however, most of the decline likely happened many years ago (Trautman 1981; Jenkins and Burkhead 1994; NatureServe 2022). “Warren et al. (2000) categorized the species as "currently stable" in the southern United States. Jelks et al. (2008) similarly concluded that on a range-wide basis this species is not endangered, threatened, or vulnerable” (NatureServe 2022).

In Pennsylvania, Raney (1939) found Mountain Brook Lamprey to be common in earlier studies. According to Stauffer et al. (2016), they have a fragmented distribution in Pennsylvania and are seldom taken in large numbers; however, they haven’t seen any significant range reduction in the last 25 years. “The nature of this species’ known distribution is in part an artifact of insufficient effort and the relative difference in collecting adults, the only stage at which this species can be identified with confidence” (Stauffer et al. 2016). Surveys from 2000-2016, led Stauffer et al. (2016) to be believe that Mountain Brook Lamprey populations are stable and in no danger of extirpation. They were recently removed from the Threatened Species List in Pennsylvania.

The largest collection from Virginia (aside from spawning groups) contained only five adults (Jenkins and Burkhead 1994). “The species was characterized as "sporadic and rare" in the upper Green and Cumberland rivers in Kentucky (Burr and Warren 1986). Boschung and Mayden (2004) stated that the rarity of this species in Alabama warrants Special Concern status” (NatureServe 2022).

In New York, they are only located in the Allegheny watershed (Carlson et al. 2016). In the last 20 years, the documented range of Mountain Brook Lamprey in New York has increased. Abundance remains poorly understood because of their secretive habits. There are 10 documented streams containing Mountain Brook Lamprey within the state. Although populations are restricted, they appear secure.

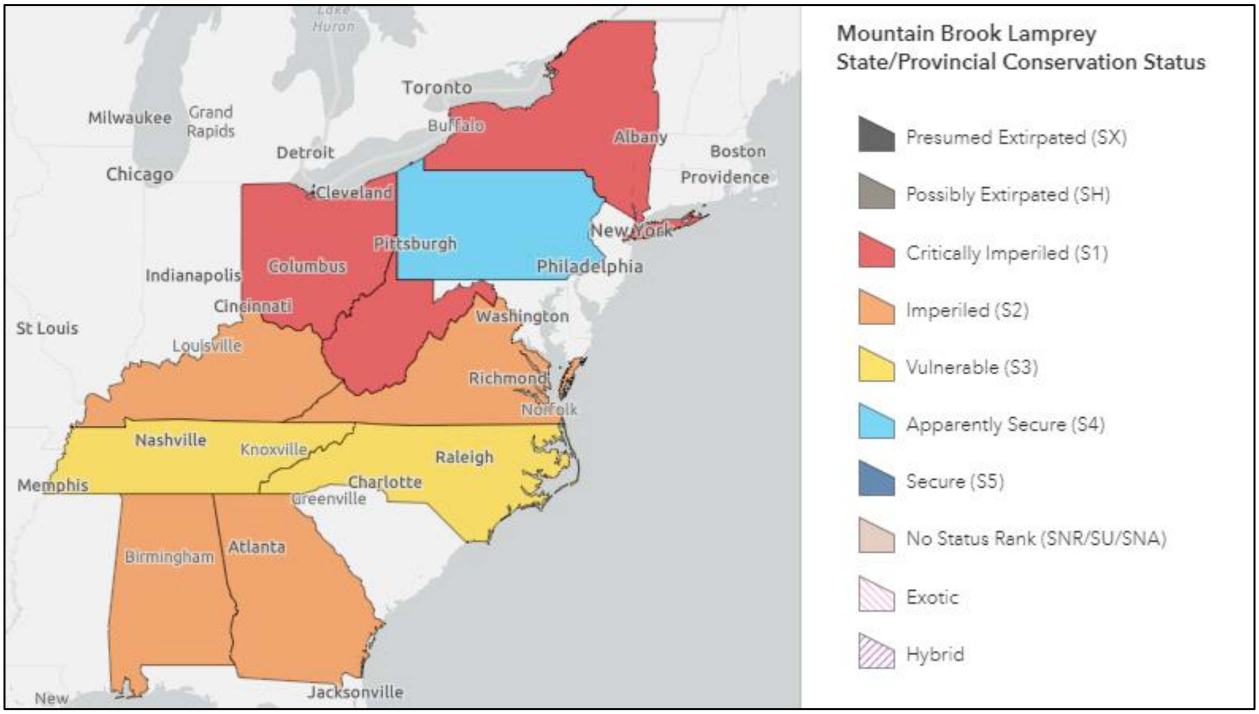


**Figure 1:** Mountain Brook Lamprey distribution and status (Source: NatureServe 2022).

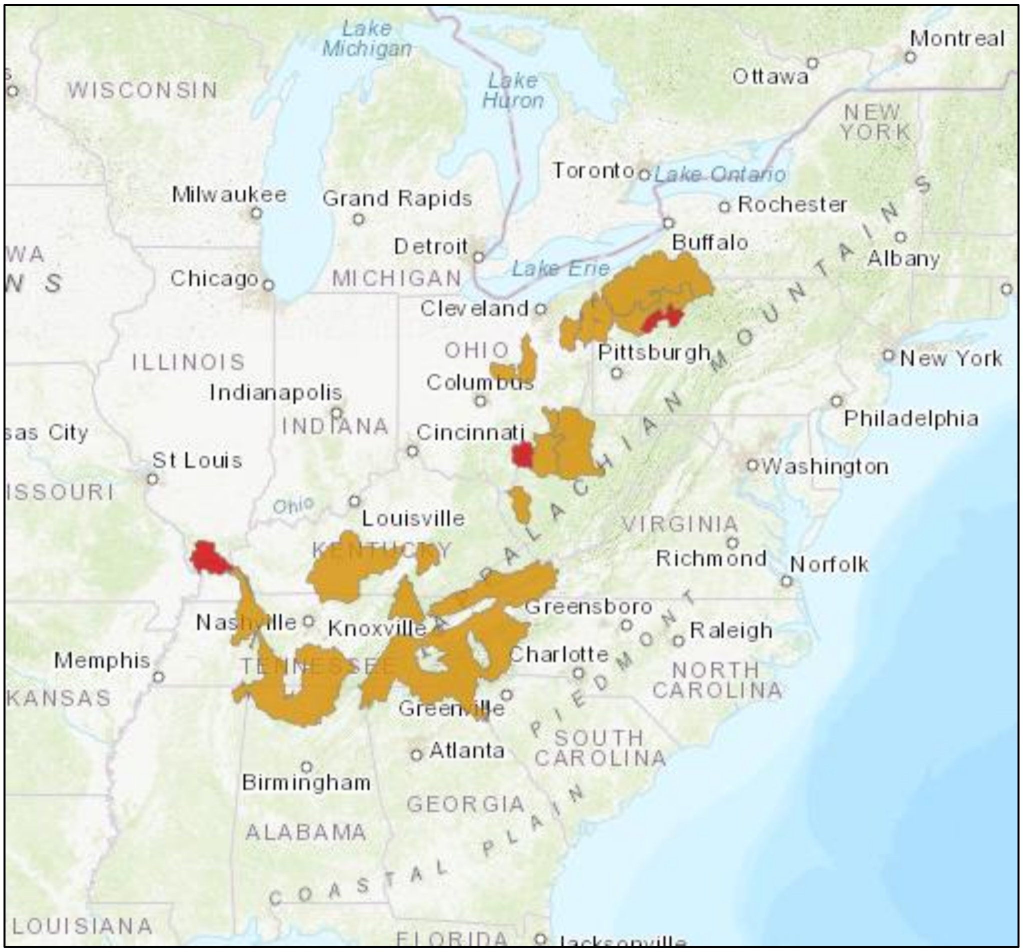


**Figure 2:** Mountain Brook Lamprey distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

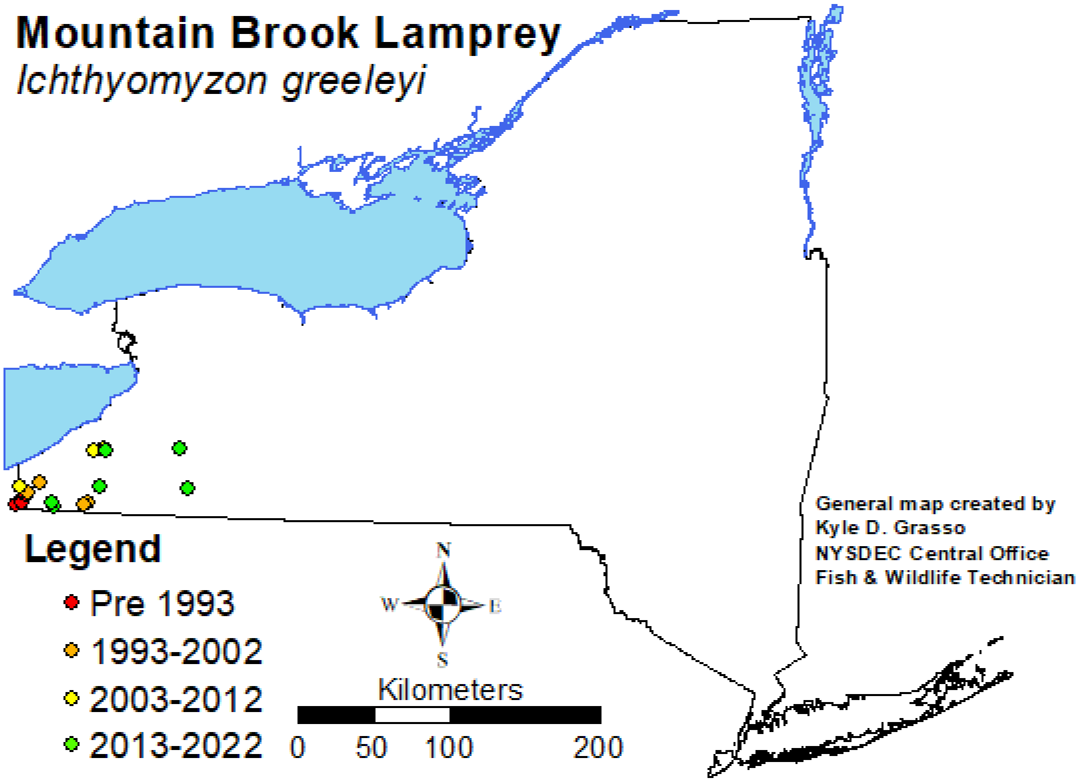


**Figure 3:** Records of Mountain Brook Lamprey in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 4 | 1 | 0-5% |
| **1993-2002** | 7 | 4 | 0-5% |
| **2003 - 2012** | 8 | 4 | 0-5% |
| **2013 - 2022** | 10 | 6 | 0-5% |

**Table 1:** Records of Mountain Brook Lamprey in New York.

### Details of historic and current occurrence:

In New York, Mountain Brook Lamprey are only located in the Allegheny watershed (Carlson et al. 2016). They were first collected in New York in French Creek in 1937 (Carlson et al. 2016; NatureServe 2022). Smith (1985) reported that they were caught in Allegheny River tributaries upstream and downstream of the New York section.

In the last 20 years, the documented range of Mountain Brook Lamprey has increased. Abundance remains poorly understood because of their secretive habits. Recent sampling has resulted in confirmation of the species in French Creek, West Branch French Creek, Ischua Creek, Conewango Creek, West Branch Conewango Creek, Stillwater Creek, Little Brokenstraw Creek, Olean Creek, and two unnamed tributaries of these streams. Bringing the total number of waterbodies to 10. Although populations are restricted, they appear secure.

### 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%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Peripheral:** ✓

**Disjunct:** ✓

**Distance to core population:**

Core populations to the southwest

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** From headwater creeks to medium tributary rivers

**b. Geology:** Low-moderately buffered with one record in assume moderately buffered

**c. Temperature:** Cold to transitional cool with one record in warm

**d. Gradient:** Low-moderate to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:** ✓

**Time frame of decline/increase:**_______________________________________

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

Mountain Brook Lamprey prefer clear, small to medium sized creeks with substrates generally consisting of sand, pebbles, and small stones (Schwartz 1959; Burr and Warren 1986; Boschung and Mayden 2004; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). “Adults occur in riffles or runs, under overhanging banks, or occasionally they attach to stones in the current; larvae burrow into beds of mixed sand, mud, and organic debris in pools and backwaters (Burr and Warren 1986; Page and Burr 2011)” (NatureServe 2022). Smith (1985) reported that they spend their lives “in creeks without moving to larger rivers.” “In Pennsylvania, the Mountain Brook Lamprey frequently occurs in stocked trout streams, but is seldom found in colder streams containing wild Brook Trout” (Stauffer et al. 2016). They are generally taken further upstream in headwaters than the Ohio Lamprey, however the two species are sympatric in the Allegheny River and French Creek (Stauffer et al. 2016).

## V. 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 *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The spawning behavior of the Mountain Brook Lamprey is similar to that of other lampreys (Smith 1985). The Mountain Brook Lamprey lives up to 5 or 6 years, and adults usually die after spawning (Raney 1939; Schwartz 1959; Stauffer et al. 2016; NatureServe 2022). In North Carolina, the larval stage is reported to last 4-5 years (Beamish and Austin 1985; Stauffer et al. 2016; NatureServe 2022). Larvae metamorphose in mid-August to mid-December in western North Carolina (Beamish and Austin 1985; Stauffer et al. 2016; NatureServe 2022). “In some populations, older ammocoetes may attain a greater total length than adults (Beamish and Medland 1988)” (Stauffer et al. 2016). Spawning takes place between late April and early June depending upon geographic location (Raney 1939; Schwartz 1959; Trautman 1981; Jenkins and Burkhead 1994; NatureServe 2022). Raney (1939) observed spawning in Pennsylvania in mid-May when water temperature was 18.9 °C. Before spawning, males will excavate gravel or sand nests in riffles and shallow runs (Raney 1939; Schwartz 1959; Smith 1985; Jenkins and Burkhead 1994; Stauffer et al. 2016; NatureServe 2022). “Mountain Brook Lampreys sometimes spawn in the same nests with Ohio Lampreys in Pennsylvania (Cooper 1983)” (Stauffer et al. 2016). “Spawning occurred when a female moved over the nest and attached to a stone. The male then attached to her, and they vibrated together. Usually there were five to nine lampreys per nest and spawning by one pair seemed to stimulate other pairs to spawn” (Smith 1985).

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Mountain Brook Lamprey include “habitat degradation due to pollution (e.g., runoff with cow manure, sewage, fertilizer, and pesticides), siltation (e.g., from overgrazing, row cropping, and land clearing), and stream alteration, including dams that block movements of adults and ammocoetes (Trautman 1981, Jenkins and Burkhead 1994, Felbaum 1995)” (NatureServe 2022).

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

**Yes:** ✓ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

Better information is needed on Mountain Brook Lamprey distribution, abundance, and trends. The best-known management strategy is habitat protection.

The 2005 State Wildlife Action Plan included the following recommendations:

<u>Habitat research:</u>

-Inventory the habitat requirements of this species and protect critical areas, as is part of the State Wildlife Grants project in 2003 focusing on the Allegheny watershed. These efforts will be coordinated with similar programs in place by The Nature Conservancy.

Life history research:

-Also, specific information of its life history in the French and Olean Creek systems is needed. Studies in Pennsylvania on the native lamprey species (J. Stauffer, Penn. State Univ.) were to be completed in 1998, and this will provide valuable insight. Sampling in the Allegheny tributaries in 2000 by the author has extended the known range of the genus Ichthyomyzon, but there is yet a limited basis to confirm which species (I. greeleyi or I. bdellium). More sampling is needed to obtain adults which can be identified to species.

Population monitoring:

-More information is needed for this lamprey regarding the significance of its occurrence in French Creek.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Mountain Brook Lamprey.

## VII. References

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# Species Status Assessment Cover Sheet

**Species Name:** Mud Sunfish **Date Updated:** January 2023

**Current Status:** Threatened – Non-SGCN (due to presumed extirpation) **Updated By:** Kyle Grasso

**Current NHP Rank:** SH

**Distribution:** Historically, the Mud Sunfish was widely distributed uncommon along the Atlantic coast from New York down to Florida. The only Mud Sunfish records in New York are from the Hackensack River. They were last recorded in the state in 1936, although they are present in neighboring watersheds in New Jersey

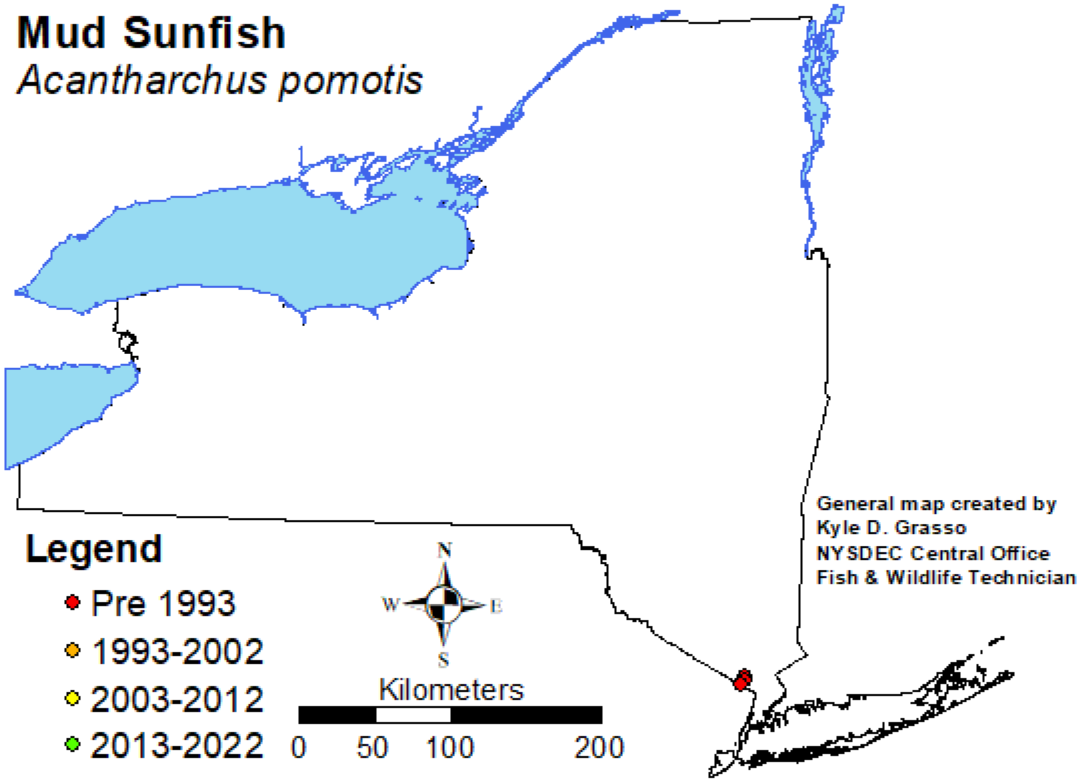
**Habitat:** The Mud Sunfish inhabits darkly stained, sluggish, weedy lowland creeks (prefers pools and runs), small to medium rivers (including backwaters), ponds, lakes, and swamps, usually with mud, silt, or detritus substrates. They favor the acidic waters associated with cedar swamps and pine barrens areas and are most often found where there is dense vegetation and/or woody debris. There may no longer be any suitable habitat in their historic New York range.

**Life History:** Studying the life history of Mud Sunfish is difficult due to its nocturnal nature, low natural densities, and lack of sampling effort in swamps. Mud Sunfish can live up to 8 years and will become sexually mature by age 2. The few studies that have been conducted have revealed that spawning seems to vary with latitude as gravid females were collected late spring to early summer in Delaware and spawning in North Carolina and Georgia occurs from early fall to late winter. Pardue (1993) observed spawning taking place from December to May when water temperatures were rising through a 44-68°F range. Eggs are laid in nests that have been excavated by males in soft, muddy, and sandy bottoms within weeds and roots. Fecundities in North Carolina ranged from 5,500 to 12,000. The species is said to make a grunting sound which may or may not have a function.

**Threats:** Impoundments and land use changes (draining, shrinking, and drying of wetlands) isolate populations and reduce available habitat. Competition and predation by non-native fish (like the largemouth bass), and pollution are also threats.

**Population trend:** The only Mud Sunfish records in New York are from the Hackensack River. They were last recorded in the state in 1936, although they are present in neighboring watersheds in New Jersey. There may no longer be any suitable habitat in their historic New York range. Mud Sunfish have experienced significant range reduction within New Jersey and populations have declined in the northern and central portions of the state.

**Recommendation:** It is recommended that the Mud Sunfish be delisted because they have not been recorded in New York since 1936 and are presumed extirpated. There may no longer be any suitable habitat in their historic New York range.



# Species Status Assessment

**Common Name:** Mud Sunfish **Date Updated:** January 2023

**Scientific Name:** *Acantharchus pomotis* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Centrarchidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Mud Sunfish is in the class Actinopterygii and the family Centrarchidae (sunfish). Historically, the Mud Sunfish was widely distributed but uncommon along the Atlantic coast from New York down to Florida (Page and Burr 2011; NatureServe 2022). The only Mud Sunfish records in New York are from the Hackensack River. They were last recorded in the state in 1936, although they are present in neighboring watersheds in New Jersey (Arndt 2004; Carlson et al. 2016). The Mud Sunfish inhabits darkly stained, sluggish, weedy lowland creeks (prefers pools and runs), small to medium rivers (including backwaters), ponds, lakes, and swamps, usually with mud, silt, or detritus substrates (Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). They favor the acidic waters associated with cedar swamps and pine barrens areas and are most often found where there is dense vegetation and/or woody debris (NYSDEC 2013; Stauffer et al. 2016). There may no longer be any suitable habitat in their historic New York range.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Threatened – Non-SGCN (due to presumed extirpation)

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** SH **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)

**Status Discussion:**

In New York, the Mud Sunfish is currently listed as Threatened. However, they are currently listed as a Non-SGCN because they have not been recorded in New York since 1936 and are presumed extirpated. The Mud Sunfish is globally ranked as Apparently Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:** ____ **Increasing:** ____ **Stable:** ✓ **Unknown:** ____

ii. **Distribution**

**Declining:** ____ **Increasing:** ____ **Stable:** ✓ **Unknown:** ____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**_____

**ONTARIO** **Not Present:** ✓ **No Data:**_____

**QUEBEC** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Recommended as Special Concern in 2016

**Listing Status:** Special Concern – S3 **SGCN?:** Yes

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Only two records (both predate 1900)

**Listing Status:** Presumed extirpated – SX **SGCN?:** No

### d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** No records since 1936 (presumed extirpated)

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

The short-term trend over the last 10 years is relatively stable or slowly declining (<30%). Range extent has probably not declined much over the long term besides the extirpations in New York and Pennsylvania (NatureServe 2022). The Mud Sunfish "has experienced significant range reduction within New Jersey and its population has declined in the northern and central portions of the state" (Davenport 2016). They are thought to have been extirpated from Pennsylvania in the 1600s (Stauffer et al. 2016). There is only one known location containing Mud Sunfish in Alabama, however, "few studies have concentrated on Mud Sunfish due to its nocturnal nature, low natural densities, and lack of sampling effort in swamps; consequently, it is the most poorly studied species of the family Centrarchidae (Mansueti and Elser 1953; Marcy et al. 2005)" (ADCNR).

The only Mud Sunfish records in New York are from the Hackensack River. They were last recorded in the state in 1936, although they are present in neighboring watersheds in New Jersey (Arndt 2004; Carlson et al. 2016). There may no longer be any suitable habitat in their historic New York range.

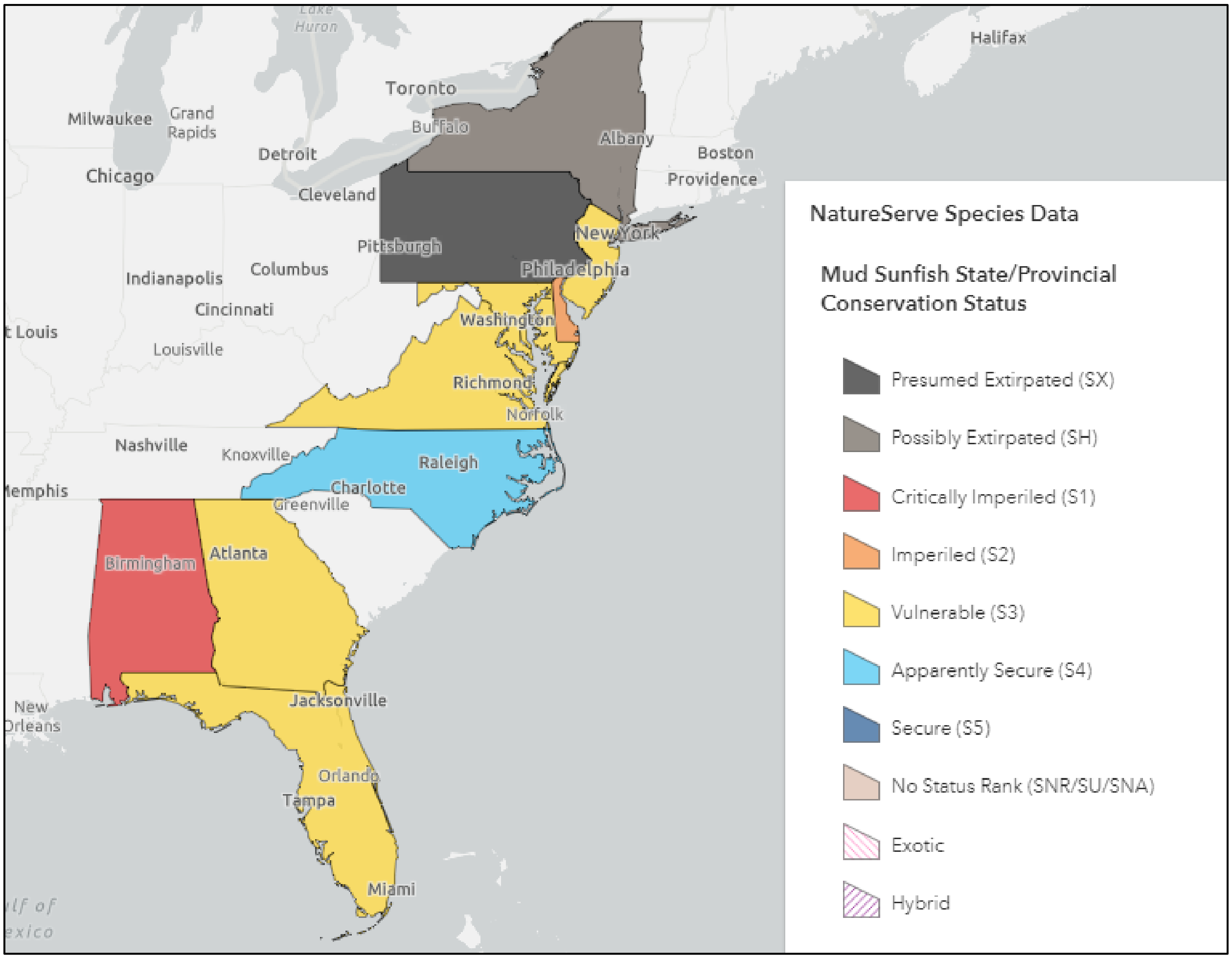


**Figure 1:** Mud Sunfish distribution and status (Source: NatureServe 2022).

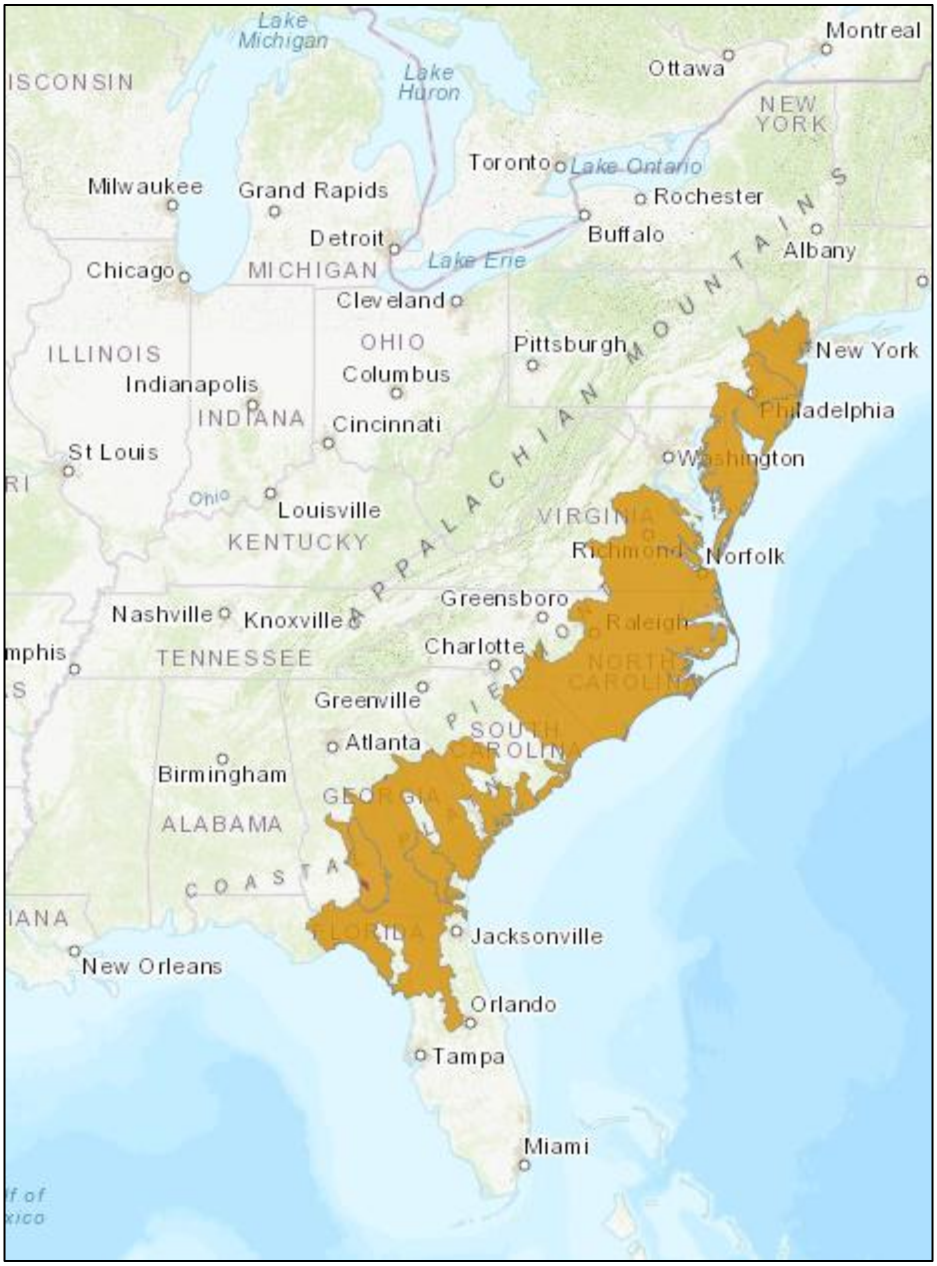


**Figure 2:** Mud Sunfish distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

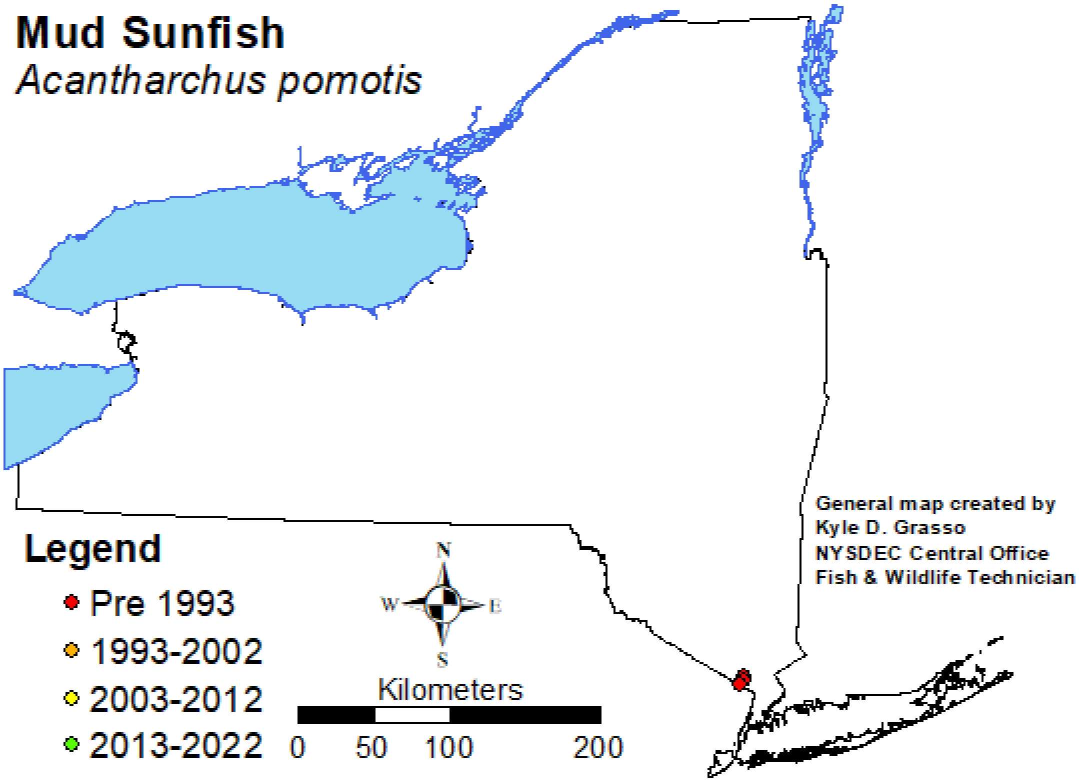


**Figure 3:** Records of Mud Sunfish in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 3 | 1 | <1% |
| **1993-2002** | 0 | 0 | 0% |
| **2003 - 2012** | 0 | 0 | 0% |
| **2013 - 2022** | 0 | 0 | 0% |

**Table 1:** Records of Mud Sunfish in New York.

### Details of historic and current occurrence:

The only Mud Sunfish records in New York are from the Hackensack River. They were last recorded in the state in 1936, although they are present in neighboring watersheds in New Jersey (Arndt 2004; Carlson et al. 2016). There may no longer be any suitable habitat in their historic New York range.

### 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%:**_____ | **Peripheral:**_✓__ |
| **51-75%:**_____ | **Disjunct:**_____ |
| **26-50%:**_____ | **Distance to core population:** |
| **1-25%:**_✓__ | Core populations to the south |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to pine barrens shrub and northern white cedar swamps

**b. Geology:** Low-moderately buffered

**c. Temperature:** Warm

**d. Gradient:** Low gradient

### Habitat or Community Type Trend in New York

**Declining:** ✓ **Stable:** _____ **Increasing:** _____ **Unknown:** _____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:** ✓ **No:** _____

**Indicator Species?** **Yes:** _____ **No:** ✓

### Habitat Discussion:

The Mud Sunfish inhabits darkly stained, sluggish, weedy lowland creeks (prefers pools and runs), small to medium rivers (including backwaters), ponds, lakes, and swamps, usually with mud, silt, or detritus substrates (Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). They favor the acidic waters associated with cedar swamps and pine barrens areas and are most often found where there is dense vegetation and/or woody debris (NYSDEC 2013; Stauffer et al. 2016). There may no longer be any suitable habitat in their historic New York range.

## V. 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 *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Studying the life history of Mud Sunfish is difficult due to its nocturnal nature, low natural densities, and lack of sampling effort in swamps (Mansueti and Elser 1953; Smith 1985; Marcy et al. 2005; ADCNR). Mud Sunfish can live up to 8 years and will become sexually mature by age 2 (Smith 1985; Pardue 1993; Stauffer et al. 2016). “The few studies that have been conducted have revealed that spawning seems to vary with latitude as gravid females were collected in late spring to early summer in Delaware and spawning in North Carolina and Georgia occurs from early fall to late winter (Laerm and Freeman 1986; Pardue 1993; Marcy et al. 2005)” (ADCNR). Pardue (1993) observed spawning taking place from December to May when water temperatures were rising through a 44-68°F range (Stauffer et al. 2016). Eggs are laid in nests that have been excavated by males in soft, muddy, and sandy bottoms within weeds and roots (Davenport 2016; Stauffer et al. 2016). Fecundities in North Carolina ranged from 5,500 to 12,000 (Pardue 1993; Stauffer et al. 2016). The species is said to make a grunting sound which may or may not have a function (Abbott 1894; Smith 1985; Cashner et al. 1989).

## VI. Threats *(from NY CWCS Database or newly described)*

Impoundments and land use changes (draining, shrinking, and drying of wetlands) isolate populations and reduce available habitat (Cooper 1983; Smith 1985; NatureServe 2022). Competition and predation by non-native fish (like the largemouth bass), and pollution are also threats (Davenport 2016; NatureServe 2022).

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Mud Sunfish is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Stocking will likely be the only possible mode of reintroduction because there have not been any Mud Sunfish records in New York since 1936 and they are presumed extirpated. However, there may no longer be any suitable habitat in their historic New York range. It may be beneficial to preserve small, heavily vegetated bodies of water for stocking.

The 2005 State Wildlife Action Plan included the following recommendations for extirpated fishes:

<u>Habitat Monitoring:</u>

-Inventories will be completed in all areas where restoration might be practical.

<u>Relocation/reintroduction:</u>

-Re-establish, if feasible, populations of those endangered fish species now believed to be extirpated from New York.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Habitat/Natural Process Restoration |
| **5.** Species management | Species Re-introduction |
| **6.** Species management | Ex-situ Conservation |
| **7.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Mud Sunfish.

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# Species Status Assessment Cover Sheet

**Species Name:** Muskellunge

**Date Updated:** January 2023

**Current Status:** Not Listed – SGCN

**Updated By:** Kyle Grasso

**Current NHP Rank:** S4

**Distribution:** The muskellunge is native to the Great Lakes and Mississippi River drainages from Quebec to Manitoba south to Tennessee and North Carolina. In New York, they are native to the Allegheny, Champlain, Erie-Niagara, and St. Lawrence watersheds. They have been stocked across the state and have records in 15 of 18 watersheds.

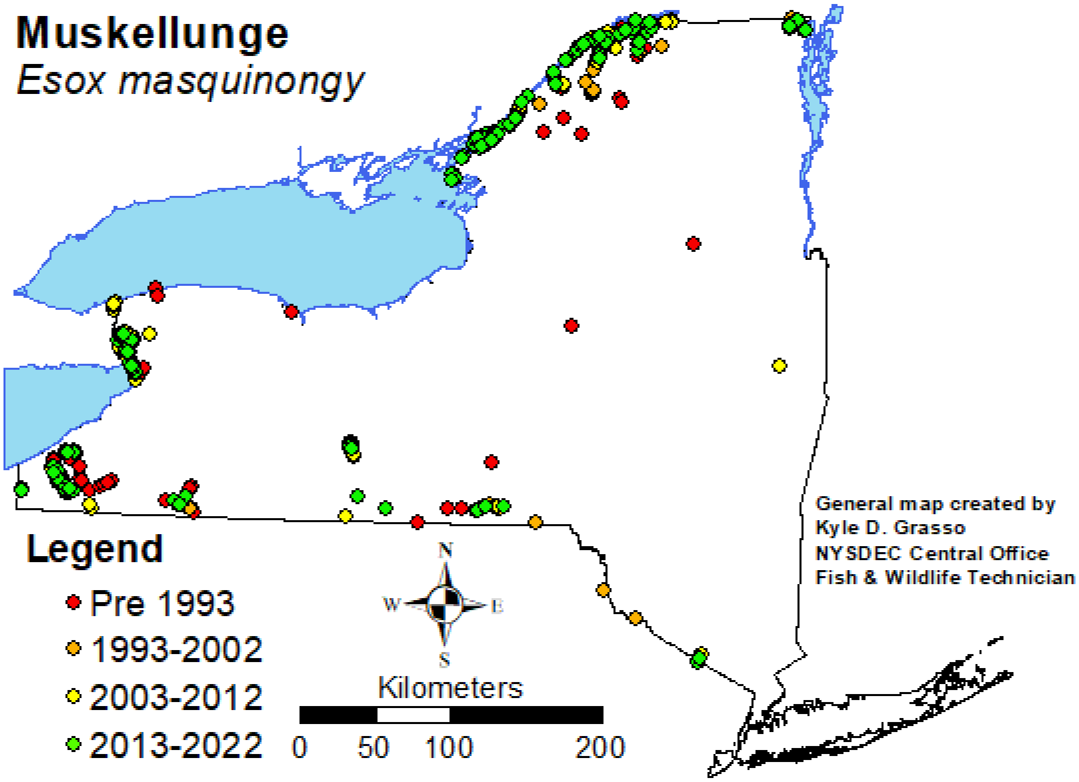
**Habitat:** Muskellunge inhabit the marshes and heavily vegetated pools of low gradient medium to large rivers with slow to moderate current and large, cool lakes with extensive deep and shallow basins. Areas with aquatic vegetation, clear water, sandy substrate, and long pools with submerged coarse, woody debris are ideal habitats for the muskie. Adult muskellunge are often sedentary and solitary and associated with submergent aquatic vegetation.

**Life History:** Muskellunge can live up to 30 years and they typically sexually mature in 3-7 years (males: 3-5 years; females: 5-7 years). Spawning occurs in April-June following the northern pike spawning season when water temperatures are between 45-65°F with 55 °F being optimal. Spawning occurs at depths of 3-5 m over muddy, vegetated bottoms. Before spawning, muskellunge seek out warm, shallow water with aquatic vegetation or structure along lake and river shorelines. Males arrive at spawning grounds before females. Males and females swim side by side occasionally rolling together while the slightly adhesive eggs are released, fertilized, and dropped to the bottom where they will take 1-2 weeks to hatch. No nest is built, and no parental care is provided to eggs or juveniles. Juvenile muskellunge grow rapidly during their first 3 years. Muskellunge can grow to large sizes (50+ lbs.).

**Threats:** The main factors connected to the decline of muskellunge include habitat loss/degradation (from dredging, stream channelization, shoreline development, and wetland encroachment), diseases/pathogens, overexploitation, non-native species, increased abundance of northern pike, and pollution.

**Population trend: I**n New York, muskellunge are native to the Allegheny, Champlain, Erie-Niagara, and St. Lawrence watersheds. They have also been stocked across the state and there are muskellunge records in 15 of 18 watersheds. Populations in the St. Lawrence, Erie-Niagara, and Susquehanna watersheds are self-sustaining while other populations are supplemented or maintained by stocking. The St. Lawrence River population has heavily declined and is most at-risk with the introduction of viral hemorrhagic septicemia (VHS) and the round goby.

**Recommendation:** The St. Lawrence River population should be closely monitored due to the threat of viral hemorrhagic septicemia (VHS) and round goby introductions.



# Species Status Assessment

**Common Name:** Muskellunge

**Date Updated:** January 2023

**Scientific Name:** *Esox masquinongy*

**Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Esocidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Muskellunge is in the class Actinopterygii and the family Esocidae (pike, pickerel, and mudminnows). The Muskellunge is native to the Great Lakes and Mississippi River drainages from Quebec to Manitoba south to Tennessee and North Carolina. They have also been widely introduced in the Atlantic Slope drainages and south-central U.S. (Page and Burr 2011; NatureServe 2022). In New York, they are native to the Allegheny watershed and the watersheds of the St. Lawrence River basin (Champlain, Erie-Niagara, and St. Lawrence watersheds). They have been stocked across the state and there are Muskellunge records in 15 of 18 watersheds (Carlson et al. 2016). Populations in the St. Lawrence, Erie-Niagara, and Susquehanna watersheds are managed as self-sustaining populations while other populations are supplemented or maintained by stocking (NYSDEC 2022). The St. Lawrence River population has heavily declined and is most at-risk due to the introduction of viral hemorrhagic septicemia (VHS) and round goby (Farrell et al. 2017). Muskellunge inhabit the marshes and heavily vegetated pools of low gradient medium to large rivers with slow to moderate current and large, cool lakes with extensive deep and shallow basins (Lee et al. 1980; Page and Burr 2011; Carlson et al. 2016; Stauffer et al. 2016; NatureServe 2022). “Areas with aquatic vegetation, clear water, sandy substrate, and long pools with submerged coarse, woody debris are ideal habitats for the muskie” (Stauffer et al. 2016).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S4 **Tracked by NYNHP?:** No

**Other Ranks:**

- IUCN Red List: Least Concern

**Status Discussion:**

The Muskellunge is not currently federally listed or listed in the state of New York. However, they are currently listed as an SGCN in New York. The Muskellunge is globally ranked as Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**b. Northeastern U.S. (USWFS Region 5)**

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**c. Adjacent States and Provinces**

**CONNECTICUT** **Not Present:**_✓__ **No Data:**_____

**MASSACHUSETTS** **Not Present:**_✓__ **No Data:**_____

**NEW JERSEY** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Introduced – SNA **SGCN?:** No

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** No

**VERMONT** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Signs of improvement from restoration last 15 years

**Listing Status:** Special Concern – S1 **SGCN?:**_____________

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** N/A

**d. New York**

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by NYSDEC staff and SUNY ESF. Targeted sampling such as electrofishing and adult trap netting surveys occur during spawning throughout its native and stocked ranged to assess population health.

**Trends Discussion** *(insert map of North American/regional):*

“Abundance declined in many jurisdictions by the late 1800s and early 1900 (Kerr 2011). Stocking has expanded the distribution of Muskellunge in a number of locations beyond its natural range. Forty-six percent (864 waters) of all North American Muskellunge waters have resulted from introductions (Kerr 2011)” (NatureServe 2022). According to NatureServe, the short-term trend over the past 10 years is uncertain but likely relatively stable (≤10% change) and the long-term trend is an increase of about 25%.

In New York, they are native to the Allegheny watershed and the watersheds of the St. Lawrence River basin (Champlain, Erie-Niagara, and St. Lawrence, and Champlain). They have been stocked across the state and there are Muskellunge records in 15 of 18 watersheds (Carlson et al. 2016). Populations in the St. Lawrence, Erie-Niagara, and Susquehanna watersheds (St. Lawrence River, Lake Ontario, Niagara River, Lake Erie (Buffalo Harbor), and the Susquehanna River) are managed as self-sustaining populations while other populations are supplemented or maintained by stocking (NYSDEC 2022).

### St. Lawrence Watershed Trends

The Muskellunge fishery in the St. Lawrence River is believed to have declined significantly from historic levels and reached critically low levels during the 1970s due to overexploitation and loss/alteration of spawning and nursery habitat (Farrell et al. 2007). Standardized monitoring of adult and age-0 Muskellunge, however, began in 1990 and immediately detected “an apparent positive response to the improved management strategies of the late 1990s and early 2000s, with increased numbers of age-0 Muskellunge on nursery grounds and higher adult catch rates on spawning grounds and in the fishery (Farrell et al. 2007)” (Farrell et al. 2017). “Long-term research indicates a significant and ongoing decline within the upper St. Lawrence River Muskellunge *Esox masquinongy* population. Index surveys show a sharp reduction in catch of both spawning adults and age-0 Muskellunge and catch rates by anglers have similarly declined while harvest remains low” (Farrell et al. 2017).

From 2005 through 2008, a widespread die-off of adult Muskellunge was observed in the St. Lawrence River and was attributed to invasion of a new sublineage of viral hemorrhagic septicemia virus (VHSV) that has spread throughout the Great Lakes (Bain et al. 2010; Casselman et al. 2017; Farrell et al. 2017). “These population changes were also temporally correlated with detection and proliferation of invasive Round Goby *Neogobius melanostomus*, a known VHS virus (VHSV) reservoir, egg predator, and competitor with native fishes” (Farrell et al. 2017). Understanding the impact of VHS and round goby introduction is paramount because round goby are highly abundant, and abundance of age-0 Muskellunge on nursery grounds has declined enough that managers have real concern over the future of the population if current trends continue (Farrell et al. 2017).

See Farrell et al. (2017) for more details on St. Lawrence River Muskellunge populations.

### Erie-Niagara Watershed Trends

“Stocking of Muskellunge in the Niagara River occurred sporadically from 1941 to 1974 when angler harvest was common. Since the late 1970s, managers have enacted increasingly restrictive minimum length limits and anglers adopted a catch-and-release ethic. Despite these efforts, angler catches declined sharply after 1991 in Buffalo Harbor and 1984 in the upper Niagara River; catch rates rebounded after 2006 in the Niagara River but remain near all-time lows in Buffalo Harbor” (Kapuscinski et al. 2014). See Kapuscinski et al. (2014) for more details on Buffalo Harbor and Niagara River Muskellunge populations.

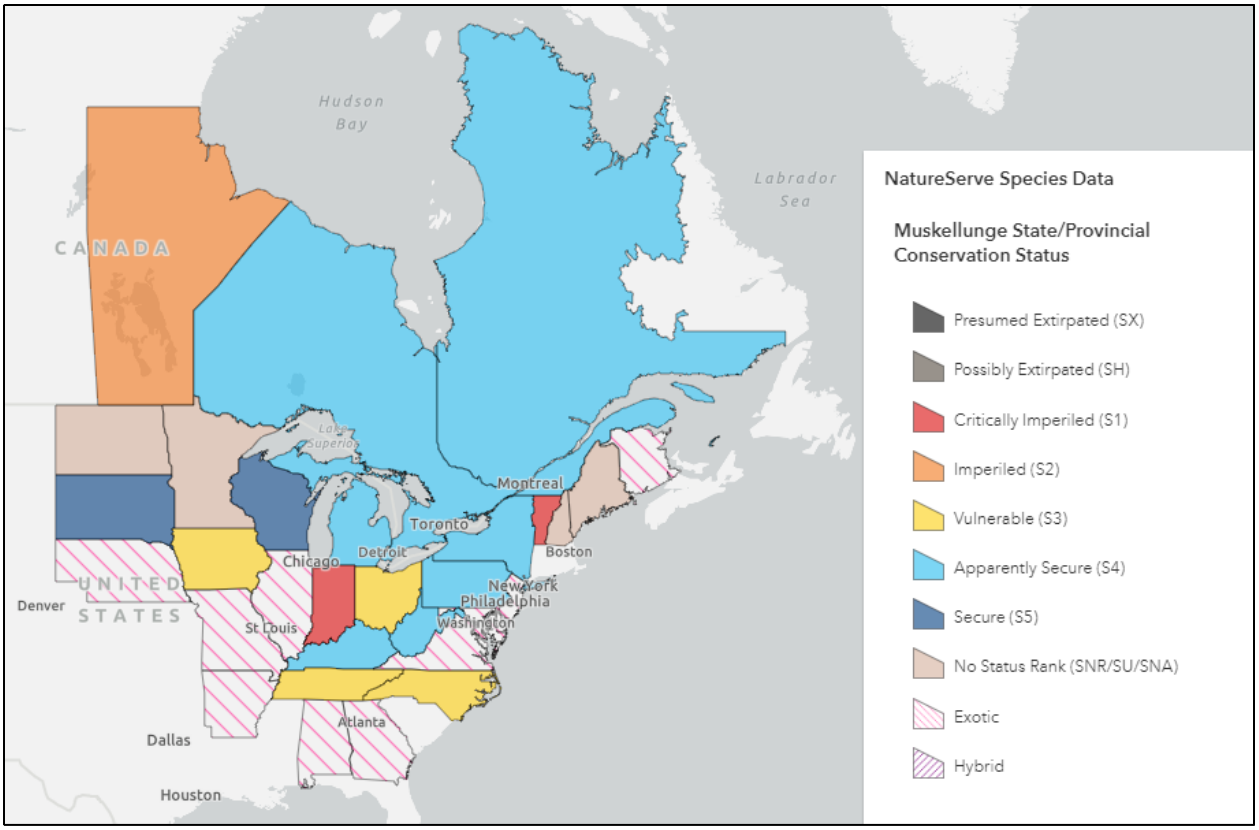


**Figure 1:** Muskellunge distribution and status (Source: NatureServe 2022).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

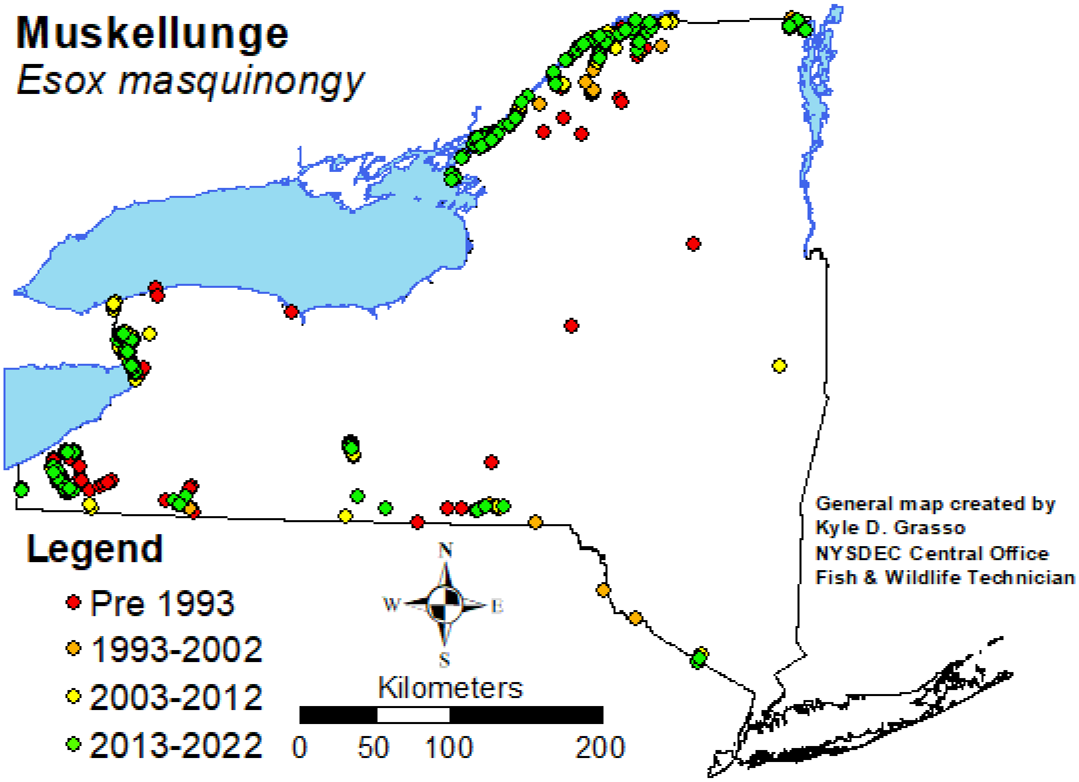


**Figure 2:** Records of Muskellunge in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 682 | 39 | 26-50% |
| **1993-2002** | 832 | 22 | 26-50% |
| **2003 - 2012** | 751 | 28 | 26-50% |
| **2013 - 2022** | 713 | 25 | 26-50% |

**Table 1:** Records of Muskellunge in New York.

### Details of historic and current occurrence:

In New York, they are native to the Allegheny watershed and the watersheds of the St. Lawrence River basin (Champlain, Erie-Niagara, and St. Lawrence watersheds). They have been stocked across the state and there are Muskellunge records in 15 of 18 watersheds (Carlson et al. 2016). Populations in the St. Lawrence, Erie-Niagara, and Susquehanna watersheds (St. Lawrence River, Lake Ontario, Niagara River, Lake Erie (Buffalo Harbor), and the Susquehanna River) are managed as self-sustaining populations while other populations are supplemented or maintained by stocking (NYSDEC 2022).

Records by watershed from Carlson et al. (2016) and NYSDEC Statewide Fisheries Database:

Allegheny

The earliest records in this watershed were in the early 1930s. Greeley (1938) reported Muskellunge populations were declining in this watershed, although specimens had been taken at 5% of the survey sample sites. Greeley (1938) attributed this decline to the loss of suitable spawning habitat (Carlson et al. 2016). Recent surveys have reported Muskellunge from the Allegheny River, Olean Creek, Conewango Creek, Cassadaga Lakes, Bear Lake, and Chautauqua

Lake. NYSDEC has stocked most of these waterbodies (Carlson et al. 2016). "Lack of suitable habitat for successful recruitment remains a problem but catches of young Muskellunge in Conewango Creek in 2012 (NYSM 67816) suggest that, at least in this basin, natural reproduction still occurs" (Carlson et al. 2016).

Champlain

"This species was widely distributed and reported to be locally common at some sites sampled during the 1929 watershed survey (in the Great Chazy River for example) but was uncommon elsewhere (Greeley 1930). There have been no reported catches from Lake Champlain after the 1970s (Marsden and Langdon 2012)" (Carlson et al. 2016). All recent records have come from the Great Chazy River (NYSDEC Statewide Fisheries Database). Vermont has also been stocking Lake Champlain and the Missisquoi River since 2008.

Chemung

Muskellunge in the Chemung watershed may be migrants from Pennsylvania stocked fish (Carlson et al. 2016). Recent records include the Chemung River in 2015, Tioga River in 2007, Lamoka Lake in 2006, and Waneta Lake in 2021 (NYSDEC Statewide Fisheries Database).

Delaware

"This species was reported from Lake Louise Marie in 1935. It is stocked in the New Jersey portion of the Delaware River, and individuals have been caught from 19-57 km upstream of the state line between 1993-1995 and also at Hancock in 2006 (R. Horwitz, ANSP, pers. Comm.)" (Carlson et al. 2016).

Erie-Niagara (self-sustaining)

"It was uncommon in the New York portion of the watershed during the 1928 survey, with catches from the upper Niagara River and Eagle Bay in Lake Erie (Greeley 1929) as well as Cattaraugus Creek (NYSM 38519)" (Carlson et al. 2016). "Stocking of Muskellunge in the Niagara River occurred sporadically from 1941 to 1974 when angler harvest was common. Since the late 1970s, managers have enacted increasingly restrictive minimum length limits and anglers adopted a catch-and-release ethic. Despite these efforts, angler catches declined sharply after 1991 in Buffalo Harbor and 1984 in the upper Niagara River; catch rates rebounded after 2006 in the Niagara River but remain near all-time lows in Buffalo Harbor" (Kapuscinski et al. 2014).

"Available data on catch rates of all fishes in a standardized seining survey and catches of Muskellunge by anglers, in spring and fall electrofishing surveys, and in a standardized seining survey all indicate that habitats in Buffalo Harbor supported fewer fish than habitats in the upper Niagara River." "The nearly complete destruction or alteration of riparian and nearshore habitat by humans in Buffalo Harbor is the most likely factor influencing differences in fish densities and assemblage structure between the two areas. Nearly all of the shoreline in Buffalo Harbor is armored and all wetlands have either been destroyed or rendered inaccessible to fish. Furthermore, shallow (1 m deep), vegetated nearshore habitat is extremely limited in Buffalo Harbor relative to the upper Niagara River. Riparian and nearshore habitats in the upper Niagara River have also been significantly altered, just not to the extent that has occurred in Buffalo Harbor" (Kapuscinski et al. 2014).

See Kapuscinski et al. (2014) for more details on Buffalo Harbor and Niagara River Muskellunge populations.

Genesee

"Seth Green reported that, prior to 1900, Muskellunge were only found in the mouth of the Genesee River (Black 1944). Greeley (1927) stated that this species was introduced into Honeoye and Conesus lakes but also noted that no specimens were caught or observed during the 1926 survey. No further records exist from this watershed" (Carlson et al. 2016).

Lower Hudson

Muskellunge were reported from the Hudson River in 2007 (NYSDEC Statewide Fisheries Database). This may be a migrant from previous stocking efforts.

Mohawk

This species was caught at the mouth of Nine Mile Creek in 1981 and 1982. “These individuals may have inadvertently been introduced when Tiger Muskellunge were stocked” (Carlson et al. 2016).

Newark Bay

Catches have been recorded in Greenwood Lake from 1997-2017 where New Jersey stocks Muskellunge (Carlson et al. 2016).

Ontario

“No Muskellunge were caught during the 1939 survey (Greeley 1940), but earlier catches had been reported (Dymond et al. 1929). Important spawning areas are just outside the boundaries of this watershed, in the Saint Lawrence and Niagara rivers. Fish are regularly caught in the lake, however, primarily in eastern bays near Henderson and Chaumont” (Carlson et al. 2016).

Oswegatchie

“Greeley and Bishop (1932) reported that only two specimens were obtained during the 1931 survey, one from Ogdensburg and the other from Eel Bay of the Saint Lawrence River, although the species was also reported from the Oswegatchie River as far upstream as Richville in field notes. It was also taken from Pleasant Lake in 1931, but Odell (1932), based on anecdotal reports, listed it in Black and Butterfield lakes as well. Later catches from the Oswegatchie River documented Muskellunge as far upstream as Elmdale in 1955 and Oxbow in 1990 (NYSM 41299)” (Carlson et al. 2016). More recently, there are seven records from the Oswegatchie River since 2001 and two records from Black Lake in 1996 and 2000 (NYSDEC Statewide Fisheries Database).

Raquette

“No Muskellunge were caught during the 1933 survey (Greeley 1934) although occasional catches were reported in the lower river and from several Raquette River reservoirs, where they were probably stocked. In recent decades, the species has been reported from the lower river, including records in 1988 (NYSM 30000; Sloan and Jock (1990)), 1989 (Niagara Mohawk Power Corporation 1991), and 2007 (NYSM 62291)” (Carlson et al. 2016). More recently, there are Raquette River records from 2014, 2015, and 2017 (NYSDEC Statewide Fisheries Database).

St. Lawrence (self-sustaining)

The Muskellunge fishery in the St. Lawrence River is believed to have declined significantly from historic levels and reached critically low levels during the 1970s due to overexploitation and loss/alteration of spawning and nursery habitat (Farrell et al. 2007). Standardized monitoring of adult and age-0 Muskellunge, however, began in 1990 and immediately detected “an apparent positive response to the improved management strategies of the late 1990s and early 2000s, with increased numbers of age-0 Muskellunge on nursery grounds and higher adult catch rates on spawning grounds and in the fishery (Farrell et al. 2007)” (Farrell et al. 2017). “Long-term research indicates a significant and ongoing decline within the upper St. Lawrence River Muskellunge *Esox masquinongy* population. Index surveys show a sharp reduction in catch of both spawning adults and age-0 Muskellunge and catch rates by anglers have similarly declined while harvest remains low” (Farrell et al. 2017).

From 2005 through 2008, a widespread die-off of adult Muskellunge was observed in the St. Lawrence River and was attributed to invasion of a new sublineage of viral hemorrhagic septicemia virus (VHSV) that has spread throughout the Great Lakes (Bain et al. 2010; Casselman et al. 2017;

Farrell et al. 2017). “These population changes were also temporally correlated with detection and proliferation of invasive Round Goby *Neogobius melanostomus*, a known VHS virus (VHSV) reservoir, egg predator, and competitor with native fishes” (Farrell et al. 2017). Understanding the impact of VHS and round goby introduction is paramount because round goby are highly abundant, and abundance of age-0 Muskellunge on nursery grounds has declined enough that managers have real concern over the future of the population if current trends continue (Farrell et al. 2017).

See Farrell et al. (2017) for more details on St. Lawrence River Muskellunge populations.

Susquehanna (self-sustaining)

“In 1966, this species was caught near Whitney Point. More recent collections are from the Susquehanna River near Windsor in 1995, near Binghamton in 2002, and near Barton in 2004.” Muskellunge are stocked in the Pennsylvania portion of the watershed and likely made their way into New York from there. There was evidence of self-sustaining populations in the watershed but that was not verified until 2008 when young-of-the-year Muskellunge were located in the Susquehanna and Chenango River (NYSDEC). Spawning is thought to occur in the Susquehanna River near the mouth of the Chenango River (D. Lemon, NYSDEC, pers. comm.; Carlson et al. 2016).

Upper Hudson

Muskellunge were reported from Indian Lake in 1932. This record could be a possible remnant of historic stocking efforts (Carlson et al. 2016).

### 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%:_____ | Peripheral:_____ |
| 51-75%:_____ | Disjunct:_____ |
| 26-50%:_____ | Distance to core population: |
| 1-25%: ✓ | ____________________ |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Medium tributary river to large rivers and large lakes

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Warm to transitional cool

**d. Gradient:** Low gradient

### Habitat or Community Type Trend in New York

**Declining:** ✓ **Stable:**_____ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_____ **No:** ✓

**Indicator Species?** **Yes:**_____ **No:** ✓

### Habitat Discussion:

Muskellunge inhabit the marshes and heavily vegetated pools of low gradient medium to large rivers with slow to moderate current and large, cool lakes with extensive deep and shallow basins (Lee et al. 1980; Page and Burr 2011; Carlson et al. 2016; Stauffer et al. 2016; NatureServe 2022).

“Areas with aquatic vegetation, clear water, sandy substrate, and long pools with submerged coarse, woody debris are ideal habitats for the muskie” (Stauffer et al. 2016). Mud, sand, and gravel substrate are common while rocky shoals may also be used. Large woody debris is an important habitat component. Adult Muskellunge are often sedentary and solitary and associated with submergent aquatic vegetation, whereas juveniles prefer emergents (Dombeck 1986; NatureServe 2022). “During the summer, the fish remained in water less than 2 meters deep where the temperatures were 24 to 27°C” (Smith 1985). They have a relatively small home range but are known to move more during spawning and when food is in short supply (Dehring and Krueger 2012).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Muskellunge can live up to 30 years and they typically sexually mature in 3-7 years (males: 3-5 years; females: 5-7 years) (Smith 1985; Dehring and Krueger 2012; Stauffer et al. 2016; NatureServe 2022). Spawning occurs in April-June following the northern pike spawning season when water temperatures are between 45-65°F with 55 °F being optimal. Spawning occurs at depths of 3-5 m over muddy, vegetated bottoms (Becker 1983; Smith 1985; Farrell et al. 1996; Stauffer et al. 2016). Farrell et al.(1996) reported shallower spawning at an average depth of 1.1 m in a St. Lawrence River marsh. Before spawning, Muskellunge seek out warm, shallow water with aquatic vegetation or structure along lake and river shorelines (Dehring and Krueger 2012; NYSDEC 2022). Males arrive at spawning grounds before females (Sternberg 1992; Dehring and Krueger 2012; Stauffer et al. 2016). Males and females swim side by side occasionally rolling together while the slightly adhesive eggs are released, fertilized, and dropped to the bottom where they will take 1-2 weeks to hatch (Smith 1985; Dehring and Krueger 2012; NatureServe 2022). Females can produce up to 300,000 eggs depending on size with an average of about 120,000 (Smith 1985; Stauffer et al. 2016). No nest is built, and no parental care is provided to eggs or juveniles (Dehring and Krueger 2012; Stauffer et al. 2016). Juvenile Muskellunge grow rapidly during their first 3 years. By the end of their first summer, they are 10-12 inches long (Smith 1985; Stauffer et al. 2016). Muskellunge can grow to large sizes, sometimes reaching 50 pounds or more (NYSDEC 2022).

## VI. Threats *(from NY CWCS Database or newly described)*

The main factors connected to the decline of Muskellunge include habitat loss/degradation, diseases/pathogens, overexploitation, non-native species, increased abundance of northern pike, and pollution (Kerr 2011; Stauffer et al. 2016; NatureServe 2022; NYSDEC 2022).

Habitat loss and degradation (e.g., loss of suitable spawning habitat) from dredging, stream channelization, shoreline development, wetland encroachment, and unnatural water level fluctuations has reduced viable habitat in some areas and threatens the stability of Muskellunge (Greeley 1938; Dehring and Krueger 2012; Carlson et al. 2016; Stauffer et al. 2016; NYSDEC 2022). Many fish species, Muskellunge included, rely on submerged aquatic vegetation for spawning, refuge, and foraging (Valley et al. 2004). Shoreline development activities such as aquatic weed control may threaten this key habitat.

Muskellunge are susceptible to viral hemorrhagic septicemia (VHS) and piscirickettsia (musky pox) (Kerr 2011; NatureServe 2022; NYSDEC 2022). In 2005, widespread mortality due to VHS was observed resulting in major declines of adult and young-of-the-year catches (NYSDEC 2022). “Viral hemorrhagic septicemia virus itself is known to be changing in the Great Lakes, and new strains have developed that could cause future Muskellunge mortality and may affect other fish populations (Stepien et al. 2015; Lewis et al. 2017).” “There is support from other species in the St. Lawrence River that spawning stress may play a significant role in VHSV-related mortality” (Farrell et al. 2017).

Kerr (2004) reported on a highly contagious malignant blood cancer in Muskellunge called Lymphosarcoma. Sonstegard and Hnath (1978) reported an infection rate as high as 16% in wild Muskellunge populations. Members of Muskies Canada Inc. monitored the incidence of lymphosarcoma on angled Muskellunge from 1979-2003. Generally, the incidence of the disease was relatively low (~2%) in Ontario (Kerr 2004).

Catch and release is common among Muskellunge fishermen. However, regulations, policies, and stocking programs are needed to monitor and maintain populations to avoid overexploitation that could cause declines across New York populations (NYSDEC 2022).

“Round Goby potentially act as a significant egg and benthic predator (Miano 2015), altering the nearshore fish community (Kapuscinski and Farrell 2014), and serve as a reservoir and vector for VHSV transmission (Groocock et al. 2007; Eckerlin et al. 2011; Cornwell et al. 2012)” (Farrell et al. 2017).

Muskellunge have been known to co-exist with northern pike. Negative interactions between the two that can affect Muskellunge populations include “interference by adults on the spawning grounds, predation by age-0 pike on Muskellunge, interspecific competition in nursery areas, and a differential ability to withstand environmental change (Inskip 1986)” (Farrell 1996). It’s been hypothesized that the two species may react differently to environmental changes depending on their habitat tolerances. For example, northern pike may prefer the lentic habitats that are often a result of human development (Inskip 1986). This may give northern pike a competitive advantage under certain environmental changes, potentially compounding the negative interactions that may exist between the two species.

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

**Yes:** ✓ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations. Article 24 protects mapped wetlands but may not be protective of the submerged aquatic vegetation needed by Muskellunge for spawning and nursery habitat.

New York has fishing regulations in place for recreational Muskellunge fishing. Statewide regulations are subject to change. For the most up to date Muskellunge regulations check the New York Codes, Rules, and Regulations (NYCRR). Absent explicit protection of their habitat under 6 NYCRR Part 182, muskie habitat could be protected under the new wetland regulations under Part 664, and the Critical Environmental Areas designation.

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

The Erie-Niagara, St. Lawrence, and Susquehanna watershed Muskellunge populations are managed as self-sustaining populations. According to the NYSDEC Muskellunge Management Site, Muskellunge fisheries in New York are managed through habitat protection and enhancement, research and monitoring, stocking, and fishing regulations:

Habitat protection and enhancement

Maintaining and enhancing water quality and habitat are critical to the maintenance of healthy muskie populations. Habitat protection and enhancement measures include identification and rehabilitation of spawning sites, enforcement of water quality and wetland regulations, identifying and preserving important spawning and nursery habitats, educating property owners about good shore-land management, and determining the impacts of invasive species on habitat quality (Dehring and Krueger 2012).

Research and Monitoring

As top predators, Muskellunge are naturally low in abundance. Because of this, monitoring their populations is challenging and requires a variety of sampling techniques dependent on the objective and waterbody. The status of some important lake Muskellunge fisheries in New York State, including Chautauqua Lake, Waneta Lake and the Cassadaga lakes, are regularly monitored by adult trap netting surveys during spawning in the spring. Boat electrofishing surveys are also sometimes used to check the status of populations in inland rivers, such as the Great Chazy and Susquehanna.

Monitoring of adult and young of-the-year Muskellunge in the St. Lawrence and Upper Niagara River has been ongoing since 1990, providing an annual assessment of population changes. Continued monitoring in nursery areas and studying the factors influencing reproductive success are highly important. The information derived from these efforts is guiding habitat and population enhancement strategies. Research in the Upper Niagara River has focused on evaluating habitat quality, young-of-the-year production, and fish community structure in both the river and Buffalo Harbor. In addition, annual angler catch-and-release records collected by the Niagara Musky Association have allowed for a long-term assessment of the fishery. The St. Lawrence and Upper Niagara River research programs are conducted by the SUNY College of Environmental Science and Forestry (ESF) under a contract with NYSDEC using Federal Aid in Sportfish Restoration grant funds. Niagara River Muskellunge research is also supported by funds from the New York Power Authority through the Niagara Greenway Ecological Fund.

In the Susquehanna watershed, DEC staff continue to collect angler reports of Muskellunge caught and have recently started a tagging program for some of the fish caught and released by anglers. This effort along with continued fishery surveys by DEC staff will aid us in tracking down spawning locations, documenting home ranges, and eventually estimating numbers of Muskellunge in reaches of both the Susquehanna and Chenango Rivers.

Propagation and Stocking

Stocking has been used to establish new fisheries and maintain fisheries where natural reproduction may be lacking. Muskellunge have been raised for stocking in New York since the late 1800s, and this continues today at the Chautauqua State Fish Hatchery. Each spring, hatchery staff collect and fertilize eggs from wild fish, usually from Chautauqua Lake. Fertilized eggs are then hatched and reared at the hatchery. In August, these "fingerlings" are transferred to outside ponds, where they are fed live minnows until they are ready for stocking at about 9 inches long in October.

About 25,000 fingerlings are annually stocked in roughly 14 waters, primarily in the Allegheny watershed (Chautauqua Lake in the Allegheny watershed, Waneta Lake in the Chemung watershed, and the Great Chazy River in the Champlain watershed). Most stocked fingerlings are fin clipped to aid in monitoring the success of the stocking programs.

Developing vaccines for VHS to protect stocked Muskellunge may be useful in controlling the virus (Millard 2013; Farrell et al. 2017).

Fishing Regulations

Catch and release is widely practiced by dedicated Muskellunge fishermen. Fishing regulations, including harvest limits, minimum sizes, and open seasons, are still important management tools designed to provide angling opportunity while protecting Muskellunge during the spawning season, and allowing them to survive to reproductive maturity and grow to desirable sizes. Regulations are intended to bring regulatory consistency to all inland muskie waters, provide more spring fishing opportunities after the spawning period, and require that more muskies are returned to their respective fisheries, which will allow them to grow to more desirable sizes and give them additional years to spawn.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Site/Area Management |
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Land/Water Management | Habitat & Natural Process Restoration |
| **5.** Species Management | Harvest Management |
| **6.** Species Management | Ex-situ Conservation |
| **7.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Muskellunge.

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# Species Status Assessment Cover Sheet

**Species Name:** Northern Sunfish

**Date Updated:** January 2023

**Current Status:** Threatened – HPSGCN

**Updated By:** Kyle Grasso

**Current NHP Rank:** S1

**Distribution:** The Northern Sunfish occurs in the Great Lakes, Hudson Bay, and upper Mississippi River drainages in southern Canada, and the northern part of the east-central U.S. In New York, the Northern Sunfish is native to several streams in the Champlain, Erie-Niagara, Ontario, and Oswego watersheds.

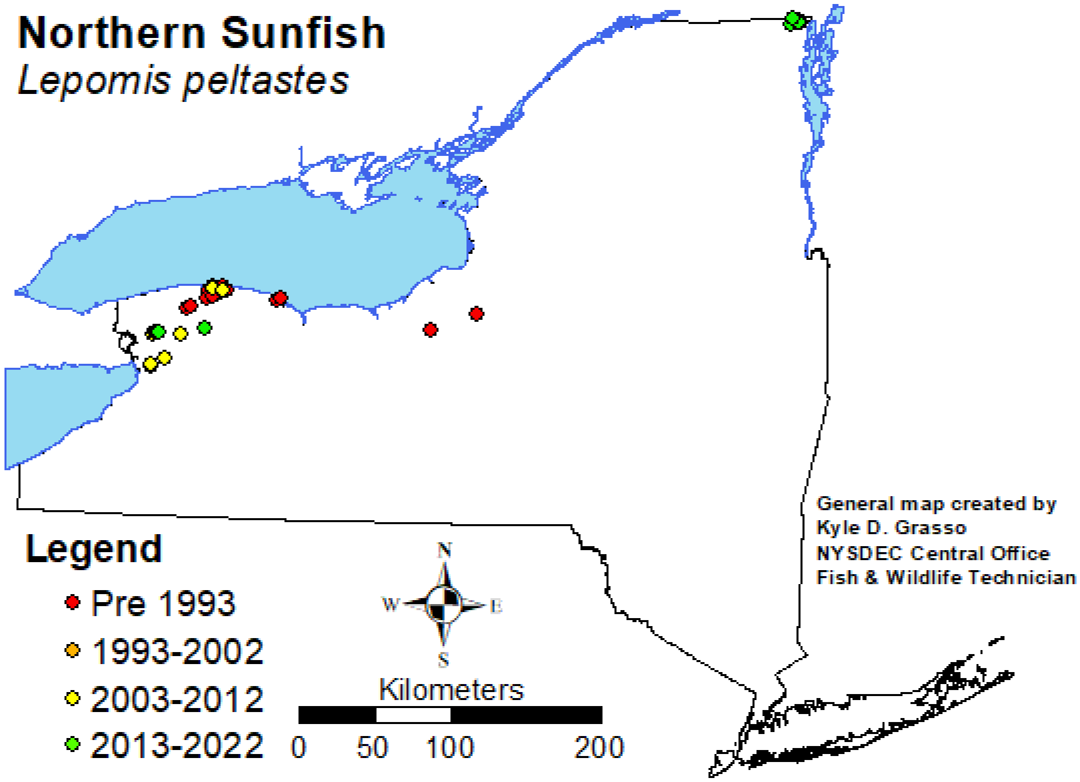
**Habitat:** The Northern Sunfish inhabits slow-moving, low gradient rivers and streams with clear, shallow, quiet, and warm waters. They also inhabit the shallow areas of clear, warm lakes and ponds. Northern Sunfish prefer densely weeded areas with a gravel or sand bottom but are found over silt substrate as well. They generally avoid strong currents and are intolerant of siltation. They tolerate current more than other sunfishes and have been reported in some turbid streams with a high silt load (e.g., lower Tonawanda Creek). They will often linger around submerged woody debris.

**Life History:** Survival rates of Northern Sunfish are not well known, but individuals as old as 7-10 years have been reported. Sexual maturity is reached between ages 2 and 4. Spawning occurs from June to July (sometimes into August) in Michigan, Minnesota, Wisconsin when water temperatures reach 68-77°. Males excavate circular nests in gravel or cobble substrate often near cover (e.g., aquatic vegetation or woody debris) in 6-36 inches of water (average of 12 inches). Females deposit adhesive eggs in the nest where they are guarded and cared for by the territorial male until they hatch in 3-5 days. Females can produce 500-4,213 eggs depending on their size. Populations in New York are known to hybridize with other sunfish species.

**Threats:** Threats to the Northern Sunfish include siltation/elevated levels of turbidity and invasive species (Round Goby and Green Sunfish).

**Population trend:** In New York, Northern Sunfish experienced a significant decline during the 20th century. The only known population that persisted into the 2000s was in a 6-km segment of Tonawanda Creek. In 2006, a 10-year stocking plan began that stocked Northern Sunfish in a variety of historic waters. Despite early positive signs, the Northern Sunfish has been unable to persist in western New York and the last record came in 2014 in Oak Orchard Creek. In the Fall of 2016, a healthy population of Northern Sunfish was located in the Great Chazy River in northeast New York. This population appears to be the only stable Northern Sunfish population remaining in New York.

**Recommendation:** It is recommended that the Northern Sunfish remain listed as Threatened due to their rarity, restricted range, and vulnerability to invasive species.



# Species Status Assessment

**Common Name:** Northern Sunfish **Date Updated:** January 2023

**Scientific Name:** Lepomis peltastes **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Centrarchidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Northern Sunfish is in the class Actinopterygii and the family Centrarchidae (sunfishes). This longear sunfish subspecies was designated as a full species by the American Fisheries Society in 2013. "The Northern Sunfish occurs in the Great Lakes, Hudson Bay, and upper Mississippi River drainages in southern Canada, and the northern part of the east-central U.S." (Stauffer et al. 2016). In New York, the Northern Sunfish is native to several streams in the Champlain, Erie-Niagara, Ontario, and Oswego watersheds (Carlson et al. 2016; Maxwell and Carlson 2018). Northern Sunfish "experienced a significant decline in New York during the 20th century. The only known population that persisted in New York into the 2000s was in a 6-km segment of Tonawanda Creek in the Erie-Niagara watershed (Carlson et al. 2016)" (Maxwell and Carlson 2018). In 2006, a 10-year stocking plan began that stocked Northern Sunfish in a variety of historic waters and adjacent tributaries. Over 19,000 fish were stocked over the course of the program. The population in Tonawanda Creek began to diminish in 2010 and the last record in the creek came in 2013. Despite stocking efforts and early positive signs, the Northern Sunfish has been unable to persist in western New York and the last record came in 2014 in Oak Orchard Creek (Carlson 2014; Maxwell and Carlson 2018). In the Fall of 2016, a healthy population of Northern Sunfish was located in the Great Chazy River in northeast New York. This population appears to be the only stable Northern Sunfish population remaining in New York (Maxwell and Carlson 2018). The Northern Sunfish inhabits slow-moving, low gradient rivers and streams with clear, shallow, quiet, and warm waters (Stauffer et al. 2016; NYNHP 2022). They also inhabit the shallow areas of clear, warm lakes and ponds (COSEWIC 2016; Porterfield and Ceas 2012). Northern Sunfish prefer densely weeded areas with a gravel or sand bottom but are found over silt substrate as well (Keenleyside 1978; Hall-Armstrong et al. 1996; Wells and Haynes 2007; Porterfield and Ceas 2012; NYNHP 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Threatened – HPSGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

### Other Ranks:

- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): See Status Discussion

### Status Discussion:

In New York, the Northern Sunfish is currently listed as Threatened and HPSGCN. They are globally ranked as Secure by NatureServe.

Comments from COSEWIC: The species was considered a single unit and designated Not at Risk in April 1987. The species was split into two separate units in April 2016, and the Great Lakes - Upper St. Lawrence populations was designated Special Concern and the other designated Not at Risk.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:** ✓ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Has not been reported since the 1930s

**Listing Status:** Extirpated – SX **SGCN?:** No

**ONTARIO** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Listed as Special Concern in 2016

**Listing Status:** Special Concern **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Listed as Special Concern in 2016

**Listing Status:** Special Concern **SGCN?:** N/A

## d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. Extensive monitoring was completed in 2004-05 by Wells and Haynes (2007). This was followed by sampling via SUNY Brockport and NYSDEC from 2006-2022. A new population in the Great Chazy River was discovered via backpack electrofishing (Maxwell and Carlson 2018).

**Trends Discussion** *(insert map of North American/regional):*

Populations in Canada appear to be at the greatest risk in Quebec where siltation and contaminants inputs have severely degraded habitat in the Châteauguay and Yamaska rivers (COSEWIC 2016). Populations in Ontario are subject to less pressure from agricultural and other forms of development and “in the relatively remote areas of northwestern Ontario, the species appears to be widespread, although sampling has not been exhaustive” (COSEWIC 2016).

In New York, the Northern Sunfish is native to several streams in the Champlain, Erie-Niagara, Ontario, and Oswego watersheds (Carlson et al. 2016; Maxwell and Carlson 2018). Northern Sunfish “experienced a significant decline in New York during the 20th century. The only known population that persisted in New York into the 2000s was in a 6-km segment of Tonawanda Creek in the Erie-Niagara watershed (Carlson et al. 2016)” (Maxwell and Carlson 2018). In 2006, a 10-year stocking plan began that stocked Northern Sunfish in a variety of historic waters and adjacent tributaries. Over 19,000 fish were stocked over the course of the program. The population in Tonawanda Creek began to diminish in 2010 and the last record in the creek came in 2013. Despite stocking efforts and early positive signs, the Northern Sunfish has been unable to persist in western New York and the last record came in 2014 in Oak Orchard Creek (Carlson 2014; Maxwell and Carlson 2018). They are likely still present in some historic and stocked waters at levels below detection.

In the Fall of 2016, a healthy population of Northern Sunfish was located in the Great Chazy River in northeast New York. This population has continued to be monitored and appears to be the only stable Northern Sunfish population remaining in New York (Maxwell and Carlson 2018). “The reason for this species’ apparently sudden appearance in the river after several decades of sampling is unclear” (Maxwell and Carlson 2018).

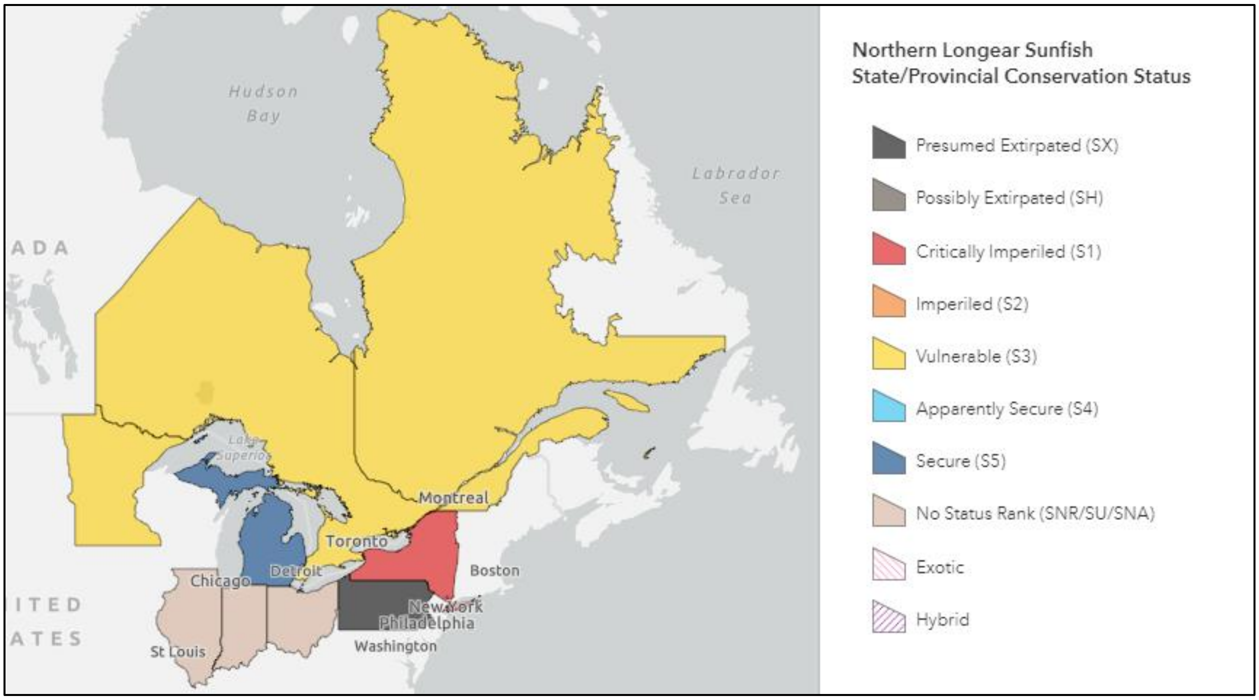


**Figure 1:** Northern Sunfish distribution and status (Source: NatureServe 2022).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

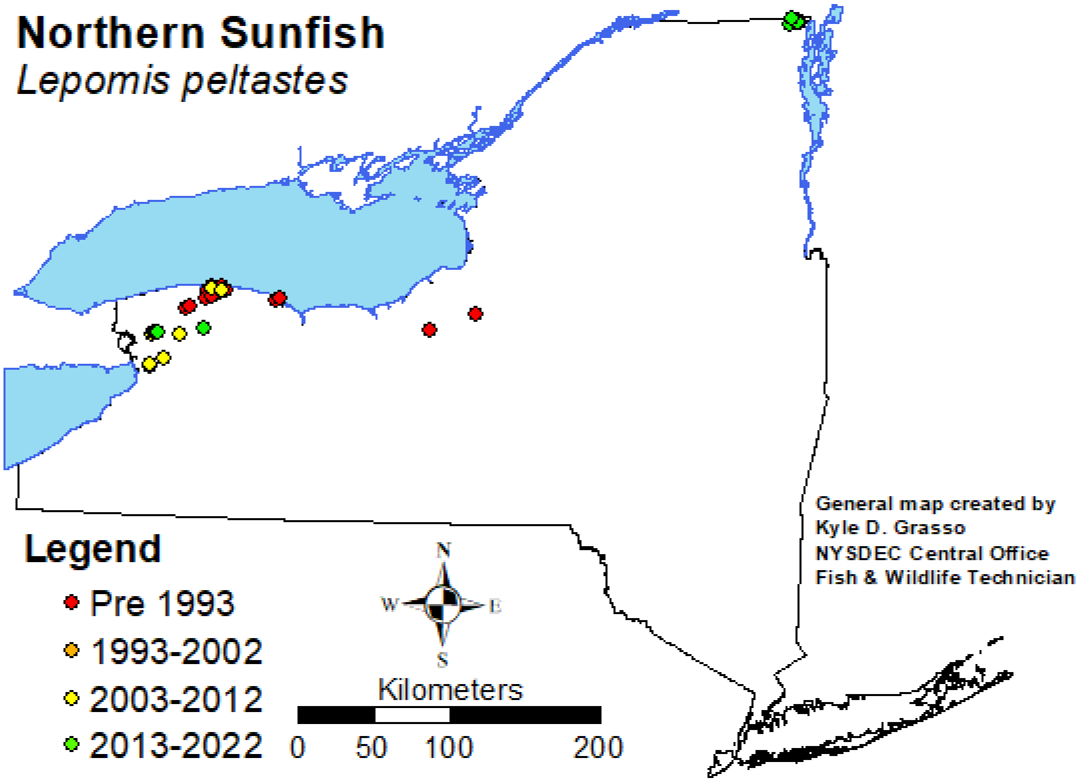


**Figure 2:** Records of Northern Sunfish in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 28 | 10 | 0-5% |
| **1993-2002** | 5 | 1 | 0-5% |
| **2003 - 2012** | 33 | 7 | 0-5% |
| **2013 - 2022** | 15 | 3 | 0-5% |

**Table 1:** Records of Northern Sunfish in New York.

### Details of historic and current occurrence:

The Northern Sunfish was recorded in 10 waterbodies from the early 1900s to 2005, the year before stocking a 10-year stocking program starter (Carlson 2014). They were recorded in Johnson Creek, Oak Orchard Creek, West Creek, Jeddo Creek, Marsh Creek, Oneida Lake, Braddock Bay, Cross Lake, and Waterport Reservoir from the early to mid-1900s. They were not recorded in Tonawanda Creek until 1975 (Carlson et al. 2016). Northern Sunfish “experienced a significant decline in New York during the 20th century. The only known population that persisted in New York into the 2000s was in a 6-km segment of Tonawanda Creek in the Erie-Niagara watershed (Carlson et al. 2016)” (Maxwell and Carlson 2018). In 2006, a 10-year stocking plan began that stocked Northern Sunfish in a variety of historic waters and adjacent tributaries. Over 19,000 fish were stocked over the course of the program. The population in Tonawanda Creek began to diminish in 2010 and the last record in the creek came in 2013. Despite stocking efforts and early positive signs, the Northern Sunfish has been unable to persist in western New York and the last record came in 2014 in Oak Orchard Creek (Carlson 2014; Maxwell and Carlson 2018). They are likely still present in some historic and stocked waters at levels below detection.

In the Fall of 2016, a healthy population of Northern Sunfish was located in the Great Chazy River in northeast New York. This population has continued to be monitored and appears to be the only stable Northern Sunfish population remaining in New York (Maxwell and Carlson 2018). "The reason for this species' apparently sudden appearance in the river after several decades of sampling is unclear" (Maxwell and Carlson 2018), though they are native to adjoining Quebec.

### 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%:_____ | Peripheral:_✓___ |
| 51-75%:_____ | Disjunct:_____ |
| 26-50%:_____ | Distance to core population: |
| 1-25%:_✓___ | Core pop. to the north and slightly west |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creek to medium tributary rivers and lakes/ponds

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:**_✓___

**Time frame of decline/increase:**__________________________________________

**Habitat Specialist?** **Yes:**_✓___ **No:**_____

**Indicator Species?** **Yes:**_✓___ **No:**_____

### Habitat Discussion:

The Northern Sunfish inhabits slow-moving, low gradient rivers and streams with clear, shallow, quiet, and warm waters (Stauffer et al. 2016; NYNHP 2022). They also inhabit the shallow areas of clear, warm lakes and ponds (COSEWIC 2016; Porterfield and Ceas 2012). Northern Sunfish prefer densely weeded areas with a gravel or sand bottom but are found over silt substrate as well (Keenleyside 1978; Hall-Armstrong et al. 1996; Wells and Haynes 2007; Porterfield and Ceas 2012; NYNHP 2022). They generally avoid strong currents and are intolerant of siltation. They tolerate current more than other sunfishes and have been reported in some turbid streams with a high silt load (ex: lower Tonawanda Creek) (Smith 1979; Trautman 1981; Hubbs et al. 2004). They will often linger around submerged woody debris (NYNHP 2022). The species is often found along Redfin Shiner in areas such as the confluence of Tonawanda and Mud Creeks (Millersport, NY) (Wells 2009).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Survival rates of Northern Sunfish are not well known, but individuals as old as 7-10 years have been reported. Sexual maturity is reached between ages 2 and 4 (Becker 1983; Werner 2004; COSEWIC 2006; Porterfield and Ceas 2012; Stauffer et al. 2016). Spawning occurs from June to July (sometimes into August) in Michigan, Minnesota, Wisconsin when water temperatures reach 68-77°F (Hubbs and Cooper 1935; Becker 1983; Porterfield and Ceas 2012; Stauffer et al. 2016). Males excavate circular nests in gravel or cobble substrate often near cover (e.g., aquatic vegetation or woody debris) in 6-36 inches of water (average of 12 inches) (Jennings and Philipp 1994; Porterfield and Ceas 2012; COSEWIC 2016). Bietz (1981) and Dupuis and Keenleyside (1988) observed males in Canada building nests in large aggregations of 20-100 nests, while Porterfield and Ceas (2012) reported clumps of 3-5 nests. Males are aggressive and compete against each other for mates. Females deposit adhesive eggs in the nest where they are guarded and cared for by the territorial male until they hatch in 3-5 days (Keenleyside 1978; COSEWIC 2016). Young are also attended to until the yolk sac is absorbed, and young-of-the-year sunfish can begin free swimming (Jennings 2013; COSEWIC 2016). Females can produce 500-4,213 eggs depending on their size (COSEWIC 2016; Porterfield and Ceas 2012; Stauffer et al. 2016). Porterfield and Ceas (2012) observed fish suspending spawning activities during periods of rainy/stormy weather. Populations in New York are known to hybridize with other sunfish species. This hybridization threatens the perpetuation of Northern Sunfish populations and is likely compounded by the difficulty of finding non-hybrid Northern Sunfish mates (Sanderson-Kilchenstein 2015; NYNHP 2022).

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Northern Sunfish include habitat degradation (from siltation, elevated levels of turbidity, and pollution) and invasive species (e.g. Round Goby and Green Sunfish) (COSEWIC 2016; NYNHP 2022).

Northern Sunfish are sensitive to siltation, elevated levels of turbidity, and contaminants caused by runoff from agriculture and other land use activities (Scott and Crossman 1973). “Trautman (1981) has described its widespread decline and replacement by Green Sunfish in Ohio as a result of these factors” (COSEWIC 2016). If a catastrophic event were to occur in the Great Chazy River, the newly found and stable population in the river could become extirpated.

Invasive species threaten Northern Sunfish populations as well. The Green Sunfish is presumed to intimidate and outcompete the smaller and less aggressive Northern Sunfish due to its aggressive behavior (Sanderson-Kilchenstein 2015; Maxwell and Carlson 2018). This scenario has played out in Tonawanda Creek where Green Sunfish are now the dominant sunfish (Maxwell and Carlson 2018). “Competition for spawning habitat with other more abundant *Lepomis* species may be problematic as well” (NYNHP 2022). Round Goby are a known egg predator that invaded Tonawanda Creek in 2005. They compete for food and space with Northern Sunfish where they are now abundant (COSEWIC 2016; NYNHP 2022). Despite their extraordinary dispersal capabilities, the Round Goby hasn’t arrived in the Lake Champlain basin yet. They are expected to reach the basin eventually via the Richelieu River and/or the Hudson-Champlain Canal. The Whiteside Dam is currently the only immediate barrier stopping these nonnative species from reaching this population (Maxwell and Carlson 2018). As a result, the Whiteside Dam "should definitely be maintained as a fish barrier for the foreseeable future" (Maxwell and Carlson 2018). Northern Sunfish are known to hybridize with other sunfish species. This hybridization threatens the perpetuation of Northern Sunfish populations and is likely compounded by the difficulty of finding non-hybrid Northern Sunfish mates (Sanderson-Kilchenstein 2015; NYNHP 2022).

"Another invasive species that may negatively affect Northern Sunfish in northwest Ontario is Rusty Crayfish (*Orconectes rusticus*). This large, aggressive species originates from the Ohio Valley and may degrade habitat used by Northern Sunfish by consuming large amounts of aquatic vegetation (Brian Jackson, pers. comm.)" (COSEWIC 2016).

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Northern Sunfish is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

The intentional spread of invasive species is prohibited, but several species that threaten Northern Sunfish are spreading rapidly through previous introductions.

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

"Despite the fact that the Northern Sunfish appears to be persisting without human intervention in the Great Chazy River, it is apparent that this population may prove critical to the long-term survival of this species in New York State. Thus, steps should be taken to ensure that the habitat in the area is not negatively impacted by agricultural runoff including cow manure, which is regularly applied to row crops in this area and can result in fish kills when accidental spills occur (Meade 2004). Whiteside Dam, perhaps the only barrier preventing non-native species from invading the upstream segment of the Northern Sunfish habitat, should definitely be maintained as a fish barrier for the foreseeable future. It not only keeps Sea Lamprey away from their potential spawning areas but also keeps out other non-native species." (Maxwell and Carlson 2018).

Conservation strategies and management practices from New York Natural Heritage Program website (NYNHP 2022):

Previously occurring locations such as Johnson Creek and Oak Orchard Creek should be resurveyed and the population in Tonawanda Creek and Great Chazy River should be monitored by periodic surveys to gain data on short-term trends. Genetic studies may be useful to determine how hybridization has affected the population.

Measures are needed to reduce runoff into areas used by the sunfish. When construction is needed near water systems, measures should be taken to reduce siltation as much as possible.

This could include disturbing only the work area to maintain as much vegetation as possible to reduce runoff, working in phases to allow for more centralized control of sedimentation, using sediment traps or ditches to direct runoff away from the river, stabilizing soil by seeding, mulching, use of blankets, or wool binders. Protect slopes by using silt fences or fiber rolls. Logging and farming practices near waters can increase siltation or pollution. Encourage practices that maintain a riparian buffer to control pollution.

Competition with non-native species such as Round Goby and Green Sunfish pose a threat in parts of the Northern Sunfish range. It is difficult to control the movement of both species. It is recommended to monitor Round Goby and Green Sunfish movements in New York. Prohibit the use of Round Gobies in the bait trade. Trapping may be useful in some systems, but eradication is not likely. The use of chemicals, such as rotenone, is not advisable in areas with Northern Sunfish because all fish will succumb to the chemical. In the Great Chazy River, the Whiteside Dam may be a barrier that keeps non-native species from invading the known stretch of the river with Northern Sunfish (Maxwell and Carlson 2018).

Northern Sunfish are not likely to be over fished because of their small size, but signage may still be helpful in fishing areas to reduce accidental takes (Maxwell and Carlson 2018)

The 2005 State Wildlife Action Plan included the following recommendations:

<u>Population monitoring:</u>

-Continue surveys to understand its current distribution of the species.

<u>Statewide management plan:</u>

-A State Wildlife Grants funded project from 2004, by SUNY Brockport is designed to provide habitat and population assessment as well as to develop a recovery plan.

The 2015 State Wildlife Action Plan included the following recommendations:

-Continue restoration and monitor restored populations of Northern Sunfish in the Ontario watershed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Invasive/Problematic Species Control |
| **5.** Land/Water Management | Habitat & Natural Process Restoration |
| **6.** Species Management | Ex-situ Conservation |
| **7.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Northern Sunfish.

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# Species Status Assessment

**Common Name:** Ohio lamprey **Date Updated:**

**Scientific Name:** *Icthyomyzon bdellium* **Updated by:**

**Class:** Agnatha

**Family:** Petromyzontidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Ohio lamprey is found and is widely distributed through the Ohio River basin from southwestern New York, to northern Indiana, to eastern Illinois and southward to Kentucky, Tennessee, northern Alabama and in West Virginia. It is native to the Allegheny watershed in New York and occurs in medium-sized and larger streams with clean sand. Increases in range and abundance in the last 30 years suggest that populations are secure.

Genetics studies by Docker in 2002 are controversial (Docker 2009, Docker et al. 2012), but contend that the two species of this genus (including mountain brook lamprey) might be morphs of the same species.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** SGCN

### b. Natural Heritage Program

i. **Global:** G3G4

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

**Other Ranks:**

-IUCN Red List:

Species of Northeast Regional Conservation Concern (Therres 1999)

**Status Discussion:**

Ohio lamprey is moderately widespread in the Ohio River basin, but uncommon. Additional sampling is likely to yield new occurrences. Populations tend to fluctuate. In New York it is ranked as Critically imperiled (NatureServe 2012).

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Declining | Declining | 2002-2012 | | Choose an item. |

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **Northeastern US** | Yes | Unknown | Unknown |  |  | Choose an item. |
| **New York** | Yes | Stable | Stable | Last 30 years |  | Choose an item. |
| **Connecticut** | No | Choose an item. | Choose an item. |  |  | Choose an item. |
| **Massachusetts** | No | Choose an item. | Choose an item. |  |  | Choose an item. |
| **New Jersey** | No | Choose an item. | Choose an item. |  |  | Choose an item. |
| **Pennsylvania** | Choose an item. | Choose an item. | Choose an item. |  | Special Concern | Yes |
| **Vermont** | No | Choose an item. | Choose an item. |  |  | Choose an item. |
| **Ontario** | No | Choose an item. | Choose an item. |  |  | Choose an item. |
| **Quebec** | No | Choose an item. | Choose an item. |  |  | Choose an item. |

*Column options*
**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item
**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

### Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit, 1998-2012.

### Trends Discussion *(insert map of North American/regional):*

Throughout its range, trend over the past 10 years is uncertain but probably relatively stable or in a slow decline of 30%. Long-term trends are relatively stable to decline of 50%. Distribution and abundance likely have declined, but the degree of decline is unknown (NatureServe 2012).

In New York State, Ohio lamprey has historically been found in 5 waters, and is now found in at least 7 waters within the Allegheny watershed. Its range is not declining (or gone or dangerously sparse) and abundance trends are unknown although there is no knowledge of decline. The frequency occurrences of this species in comprehensive stream surveys from this watershed are low and show no evidence of decline, up to 4% for periods of 1930s, 1970s and 2000s.

The distribution of this species among sub-basins (HUC 10) within the one watershed has changed at perhaps an insignificant level, with records from slightly fewer units in the recent period. Overall, there are records from 10 of the units for all time periods and from recent times (since 1976). Statewide, the number of individual site records for this species has been 41 for all time periods, 35 in the last 30 years, and 26 since 1993.

| Watershed name | Total # HUC10 | Early only | Recent only | both |
|---|---|---|---|---|
| Allegheny | 10 | 0 | 9 | 1 |

**Table 1**. Records of rare fish species in hydrological units (HUC-10) are shown according to their watersheds in early and recent time periods (before and after 1977) to consider loss and gains. Further explanations of details are found in Carlson (2012).

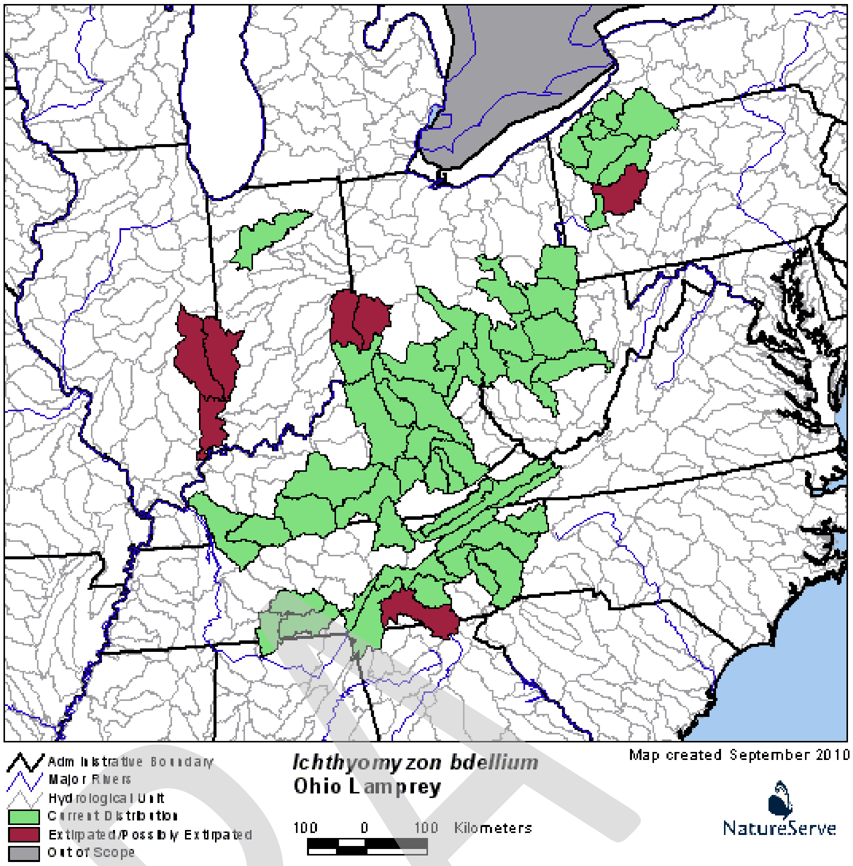

**Figure 1**. U.S. distribution of Ohio lamprey by watershed (NatureServe 2012).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

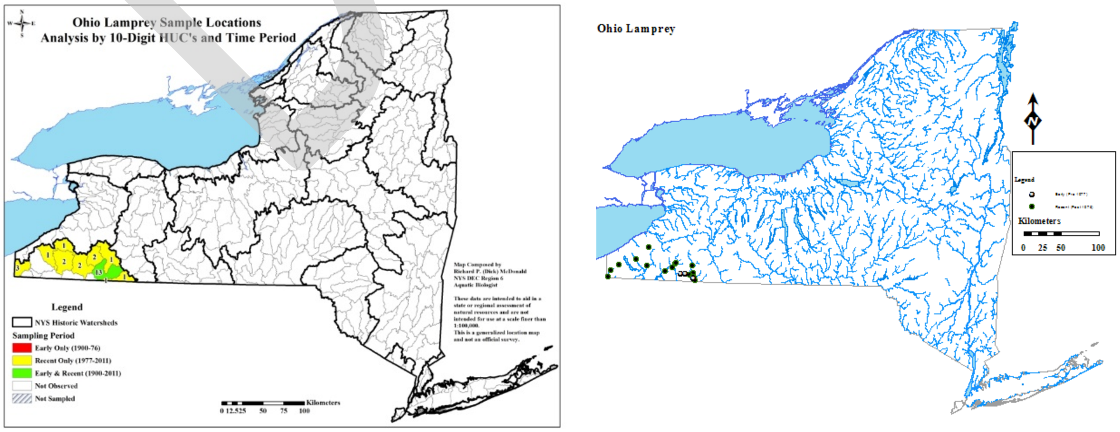

**Figure 2**. Ohio lamprey distribution in New York, depicting fish sampled before 1977 and from 1977 to current time, is shown with the corresponding HUC-10units where they were found, along with the number of records.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| Pre 1993 | | 6 | 1/18 watersheds |
| 1993-2002 | | | |
| 2003 - 2012 | | 35 | 1/18 watersheds |
| 2013 - 2022 | | | |

**Table 2.** Records of Ohio lamprey in New York.

### Details of historic and current occurrence:

Ohio lamprey has historically been found in 5 New York waters. Individuals were collected in the Allegheny River downstream in Pennsylvania prior to 1937, and it was first collected in New York in 1966 near Vandalia bridge (Cattaraugus County) (Eaton et al. 1982).

The Ohio lamprey is still found in at least seven waters of New York, including the Allegheny River (Smith 1985), Great Valley Creek (1992, DEC), Olean Creek (Eaton et al. 1979), Ischua Creek (DEC, 2004) Oswayo Creek (Daniels 1989), Mill Creek of Cassadaga (1992, DEC), Conewango and Mill creeks (2001, DEC), French Creek (Smith 1985, Hansen and Ramm 1994, Bowers et al. 1992, Carlson et al. 1999) and a tributary of French Ck, Crosscut Creek (DEC 1992). This species was more widespread in Pennsylvania (Argent et al. 1998), and it is not uncommon to catch it in these areas of New York. Unconfirmed collections of ammocoetes in 1998 also put this species in five tributaries of Conewango Creek, Cassadaga Creek and Allegheny River (M. Bain, Cornell U.). Continued sampling by DEC in some of these (Ischua Creek at Machias, W. Br. Conewango Creek at Skunk Corners) plus Stillwater Creek at Rte 62 in 2000-04 confirmed the genus as either Ohio lamprey or mountain brook lamprey, but was unable to confirm this species because of uncertain identity at early life stages.

This species is generally uncommon (Page and Burr 1991).

### New York’s Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 1-25% | Disjunct | 300 miles |

*Column options*
**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

Medium River, Low-Moderate Gradient, Assume Moderately Buffered, Transition
Small River, Low-Moderate Gradient, Assume Moderately Buffered, Transition

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| Yes | Yes | Unknown | |

*Column options*
**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item
**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

Adult Ohio lampreys are found in moderate to large-sized creeks and rivers, and the ammocoetes inhabit the detritus of pools and quiet backwaters (Morse et al. 2009). Transformed lampreys live in runs and riffles of clean gravel with rubble. Spawning may occur in that area or in smaller tributaries.

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Yes | Yes | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

### Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Ohio lamprey has an intermediate length life span. The larval stage lasts over 5 years and larvae feed on plankton (Smith 1979). Adults spawn once at the beginning of the second summer after transformation then die. Adults are parasitic on other fish such as carp (Mettee et al. 1996). There is but one spawning after the adult form (females) has a shorter parasitic stage. Life span is approximately 6 years.

## VI. Threats *(from NY 2015 SWAP or newly described)*

This species is threatened by pollution, siltation, and hydrological alteration.

Populations of Ohio lamprey in New York are consistently found in French Creek, Conewango Creek and the Allegheny River. The Kinzua Dam in Pennsylvania impounds the Allegheny River into New York, and it likely prohibits effective interaction between the isolated New York (and downstream in Pennsylvania) groups of the Ohio lamprey from its larger below-dam core population.This could limit the potential genetic diversity in the future.

An additional threat to both lamprey populations and to their essential habitat is pollution, primarily agricultural in French Creek and industrial and domestic pollution in the Allegheny River. General threats include habitat degradation, especially of spawning streams, due to siltation and hydrological alteration.

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

**Yes:** ✓ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law. However, agricultural activities, which can degrade the high water quality needed by these fish, are exempt from regulation under Article 15. Ohio lamprey is often found in Class C streams and these streams are exempt from Article 15 regulation.

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

Maintain adequate spawning habitat and host populations.

Conservation actions following IUCN taxonomy are categorized in the table below.

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for the Ohio lamprey.

**Life History Research:**

____ Also specific information of its life history in the French Creek system is needed. Studies in Pennsylvania on the native lamprey species (J. Stauffer, Penn State University) were to be completed in 1998, and this will provide valuable insight. Sampling in the Allegheny tributaries in 2000 by the author has extended the known range of the genus Ichthyomyzon, but there is yet no basis to confirm which species (*I. greeleyi* or *I. bdellium*).

**Population Monitoring**:

____ More sampling in other tributaries of the Allegheny system (with lamprey sampling gear) may show them more widely distributed than presently thought.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| Land/Water Protection | Resource/Habitat Protection |
| Land/Water Management | Habitat/Natural Process Restoration |
| External Capacity Building | Alliance & Partnership Development |

**Table 3.** Recommended conservation actions for Ohio lamprey.

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| | |
|---|---|
| **Originally prepared by** | Doug Carlson and Amy Mahar |
| **Date first prepared** | April 17, 2012 |
| **First revision** | July 30, 2013 |
| **Latest revision** | Transcribed March 2013 |

# Species Status Assessment Cover Sheet

**Species Name:** Paddlefish **Date Updated:** January 2023

**Current Status:** Not Listed – HPSGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** SX

**Distribution:** The historic range of the Paddlefish stretches from the Mississippi River and Gulf Slope drainages from southwestern New York to central Montana, south to Texas and east to Alabama. In New York, they are native to backwaters of low-gradient rivers and lakes in the Allegheny watershed, such as Chautauqua Lake.

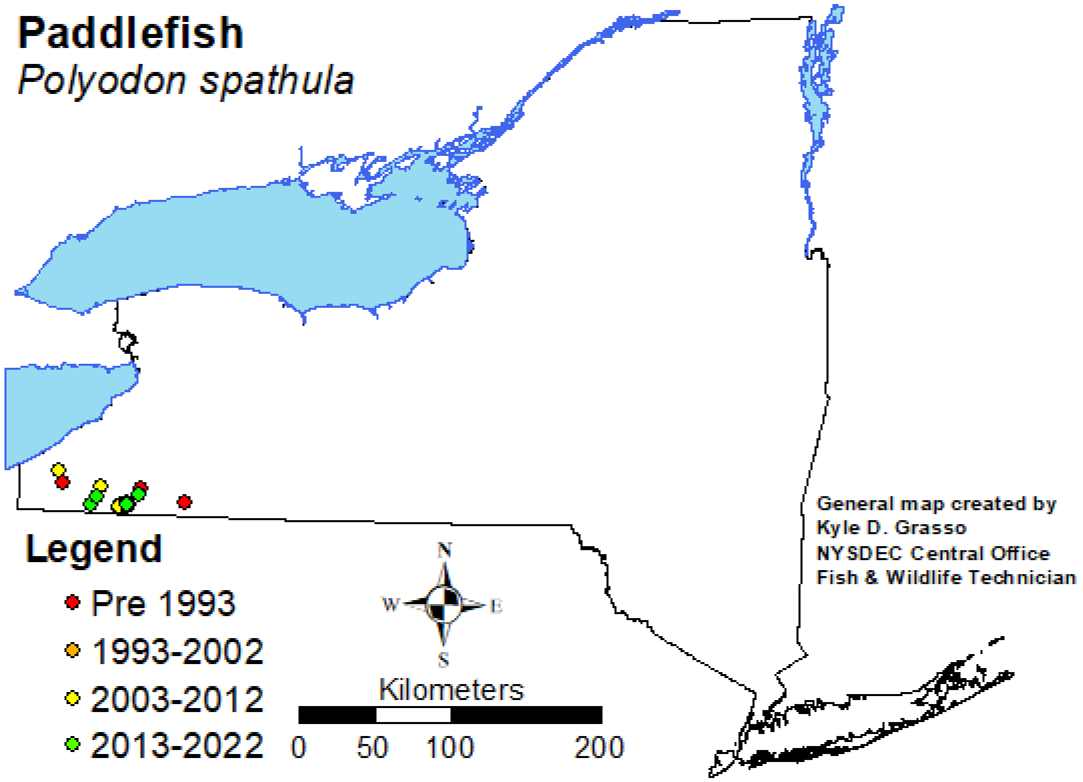
**Habitat:** Paddlefish inhabit the deep, slow-moving sections of large, low gradient rivers and backwater areas of river-margin lakes, oxbows, impoundments, and large lakes. Habitat requirements include waters rich in zooplankton with access to large, free-flowing rivers containing gravel bars that become inundated by spring floods for spawning.

**Life History:** Paddlefish typically live for about 15 years while ages between 30-50 are not uncommon. Males reach sexual maturity at about 7-9 years, females around 9-12 years. Males will often spawn every year while females may take 2-7 years in between spawning events. Spawning typically occurs in late spring to early summer (April - June) and is triggered by increasing water temperatures of 50-65°F, higher flows, substantial rises in water levels, and changing photoperiod. As spring water temperatures rise and flows increase, Paddlefish migrate large distances (50 to 200 miles) to flooded, fast-flowing tributaries with clean gravel beds. They are also known to spawn in large tailwater sections below impoundments. During spawning, eggs are broadcast and fertilized over clean gravel where they become adhesive and stick to the substrate, hatching in about 9 days. Young of the year Paddlefish grow rapidly in order to avoid predation from Walleye, Sauger, and other fish or even birds.

**Threats:** Threats to the Paddlefish include poor water use practices and dam construction, degradation and destruction of spawning habitat, over-harvest (legal and illegal) for their meat and caviar, industrial pollution, and invasive species.

**Population trend:** In New York, early records show the Paddlefish in Chautauqua Lake and the Allegheny River in the late 1800s and early 1900s. The species disappeared from the Allegheny watershed in the early 1900s with the last known record in 1907. In 1998, a New York restoration program began stocking Paddlefish fingerlings into the Allegheny River, Conewango Creek, and Chautauqua Lake with the hope of establishing self-sustaining populations. The stocking program stopped in 2015 despite fish survival, due to the lack of evidence of self-sustaining populations or natural reproduction.

**Recommendation:** It is recommended that the Paddlefish be listed as Special Concern due to the possible presence of stocked Paddlefish, and the possibility of the Paddlefish restoration being restarted.



# Species Status Assessment

**Common Name:** Paddlefish **Date Updated:** January 2023

**Scientific Name:** *Polyodon spathula* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Polyodontidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Paddlefish is a large, freshwater fish in the class Actinopterygii, and the only North American fish in the family Polyodontidae. The historic range of the Paddlefish stretches from the Mississippi River and Gulf Slope drainages from southwestern New York to central Montana, south to Texas and east to Alabama. Historically, they were also present in the Great Lakes Basins but are now thought to be extirpated (Roseman et al. 2009; Stauffer et al. 2016; COSEWIC 2019; NatureServe 2022). In New York, “they were native to backwaters of low-gradient rivers and lakes in the Allegheny watershed, such as Chautauqua Lake” (Carlson et al. 2016). They have also been introduced across the globe and are commonly farmed in aquaculture due to the increased demand for their meat and caviar (Mims and Shelton 2005). The installation of lock and dam structures, declining water quality, and loose harvest regulations in the 1800s caused declines, and by the late 1800s they were extirpated from large portions of their historic range (Argent et al. 2016). Those extirpations included New York where the last known record was in 1907 in the Allegheny River. In 1998, a restoration program began stocking Paddlefish fingerlings into the Allegheny River, Conewango Creek, and Chautauqua Lake with the hope of establishing self-sustaining populations. The stocking program stopped in 2015 despite fish survival, due to the lack of evidence of self-sustaining populations or natural reproduction (Budnik et al. 2014; Argent et al. 2016). Paddlefish inhabit the deep, slow-moving sections of low gradient, medium to large rivers and backwater areas of river-margin lakes, oxbows, impoundments/tailwaters, and large lakes (Cooper 1983; Smith 1985; COSEWIC 2008; Stauffer et al. 2016; NatureServe 2022). Habitat requirements include waters rich in zooplankton with access to large, free-flowing rivers containing gravel bars that become inundated by spring floods for spawning (Becker 1983; Pflieger 1997; Stauffer et al. 2016; NatureServe 2022). They prefer deep water (>1.5m) and move to deeper water (>3m) in late fall and winter to overwinter (Rosen et al. 1982; Crance 1987; Terwilliger 1991; COSEWIC 2008; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed - HPSGCN

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** SX **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Vulnerable
- Convention on International Trade in Endangered Species (CITES): Appendix II (March 1992)
- American Fisheries Society: Vulnerable (8/1/2008)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Extirpated (5/1/2019)

**Status Discussion:**

The Paddlefish is not currently federally listed or listed in the state of New York. However, they are currently listed as a HPSGCN in New York. The Paddlefish is globally ranked as Apparently Secure by NatureServe.

The Paddlefish was petitioned to be federally listed as Threatened under the Endangered Species Act on July 6, 1989, because of range-wide declines, extirpations on the periphery of their range, and ongoing threats to their survival (USFWS 1990). In 1992, the USFWS “concluded that, because of the apparent viability of some populations or population segments and apparent increases in the species’ numbers in parts of its range listing the species across its range is not warranted”. Listing of individual subpopulations was deemed not possible because “there is not sufficient scientific evidence to conclusively demonstrate that any population segments are in fact “distinct" from other members of their taxon.” Although the Paddlefish was not listed under the Endangered Species Act, the USFWS stated that “there is a severe lack of population data and scientific information on the species which hinders an accurate assessment of the status of the species. Therefore, the Service intends to reclassify the Paddlefish from a category 3C to a category 2. This classification change should encourage further investigation and biological research of the species’ status” (USFWS 1992).

Comments from COSEWIC: This fish, once found in the Great Lakes, was never common in the Canadian portion of its range. The Paddlefish has not been observed in Canadian waters since the early 1900s despite extensive sampling and being a large distinctive fish that is easily recognizable. The Paddlefish disappeared from Canada in approximately 1913 and was designated Extirpated in April 1987. Their status was re-examined and confirmed in May 2000, April 2008, and May 2019.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:**__✓__ **No Data:**_____

**MASSACHUSETTS** **Not Present:**__✓__ **No Data:**_____

**NEW JERSEY** **Not Present:**__✓__ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**

**QUEBEC** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Prior to stocking, last record was in early 1900s

**Listing Status:** Extirpated – SX **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Disappeared from Canada in approximately 1913.

**Listing Status:** Extirpated – SX **SGCN?:** N/A

### d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Prior to stocking, last record was in 1907

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. 16,539 fingerling Paddlefish were stocked in the Allegheny River, Conewango Creek, and Chautauqua Lake from 1998-2015. All New York stocked fish were implanted with a coded wire tag that could be detected with a handheld wand detector (Brewer 2013). Monitoring studies have been conducted to track the location of stocked Paddlefish and investigate potential reproduction in both the Allegheny Reservoir and its tributaries.

From 2008 to 2011, gill nets were used to capture adult and subadult fish to be implanted with transmitters. Gill netting occurred each year from April to June, except 2010 when conditions did not allow for sampling to start until the end of April. Gill nets were fished during the day and overnight in the Allegheny River and the upper third of the Allegheny Reservoir (Brewer 2013; Budnik et al. 2014). A subset of 44 Paddlefish collected were radio-tagged and released after date, location, length, and weight were recorded. When possible, fish were sexed and examined for signs of reproduction (Brewer 2013; Budnik et al. 2014). After release, tagged fish were tracked two to five times per week from May 2008 to August 2011 using radio telemetry by driving a boat in a zip-zag pattern from shoreline to shoreline throughout the reservoir (Budnik et al. 2014). Paddlefish passage through Kinzua Dam was tracked multiple times per month by using radio telemetry along the shoreline of the pool below the dam within the same time period (Budnik et al. 2014). When a fish was located during radio tracking, certain habitat characteristics such as depth, current flow, location within the reservoir (main res., upper res., river/res., river), secchi disk reading, shoreline habitat, site (main navigation channel, secondary channel, channel border), and boat traffic were recorded (Brewer 2012).

The stocking program in New York stopped in 2015, despite stocked fish survival, due to the lack of evidence of self-sustaining populations or natural reproduction (Budnik et al. 2014; Argent et al. 2016). See Budnik et al. (2014) and Argent et al. (2016) for more details on Paddlefish stocking in New York.

### **Trends Discussion** *(insert map of North American/regional):*

Historically, the Paddlefish inhabited many of Mississippi River Basin's large rivers. They were also present in the Great Lakes Basins but are now thought to be extirpated (Roseman et al. 2009; Stauffer et al. 2016; COSEWIC 2019; NatureServe 2022). The installation of lock and dam structures, declining water quality, and loose harvest regulations in the 1800s caused declines and by the late 1800s they were extirpated from large portions of their historic range (Argent et al. 2016). "From the 1970s through the 1990s, the status of Paddlefish stocks was on a downward trend throughout much of the species' range" (Bettoli et al. 2009). Bettoli et al. (2009) studied the status of Paddlefish in 2006 and reported that the status of Paddlefish had improved since the 1980s and 90s. "17 of 26 states in 2006 reported that their Paddlefish populations were stable or increasing, compared to only 14 states in 1983 and 1994. The number of states with closed fisheries (i.e., no commercial or sport harvest) increased to 12 in 2006 from 8 in 1983. The number of states reporting declining or stable/declining Paddlefish populations dropped from seven states in 1983 to only three states in 2006." "As long as the demand for caviar remains strong, pressure on Paddlefish stocks will undoubtedly remain high in the seven states where they are commercially exploited. However, earlier fears of a basin-wide collapse in Paddlefish stocks should continue to diminish if resource managers are successful in combating overfishing and continued habitat destruction, which will always threaten the long-term viability of Paddlefish stocks throughout the Mississippi River basin" (Bettoli et al. 2009).

The species disappeared from the Allegheny watershed in the early 1900s with the last known record in 1907 (Carlson et al. 2016). They were presumed extirpated for 90 years until 1998 when a New York restoration program began stocking Paddlefish fingerlings into the Allegheny River, Conewango Creek, and Chautauqua Lake with the hope of establishing self-sustaining populations (Budnik et al. 2014; Carlson et al. 2016). Many other states have recognized the importance of the Paddlefish fishery and have also initiated stocking programs (NatureServe 2022). Pennsylvania began their stocking program in 1991 (Stauffer et al. 2016). New York and Pennsylvania stocking programs combined have stocked approximately 130,000 Paddlefish in the Pennsylvania portion of the Ohio River, the Allegheny River across both states, and Chautauqua Lake and Conewango Creek in New York (Stauffer et al. 2016). Monitoring efforts in Pennsylvania have shown that fish have moved into the Monongahela River, which is significant because they were not stocked there prior to the survey (Lorson and Argent 2005). Some mature adults have been recorded and one larval Paddlefish was captured, but little to no evidence exists of self-sustaining populations or natural reproduction (Budnik et al. 2014; Argent et al. 2016; Stauffer et al. 2016).

Stocked Paddlefish in New York have been known to go through the Kinzua Dam on the Allegheny River which may directly lead to increased mortality because the dam is not equipped with fish passage (Budnik et al. 2014; Carlson et al. 2016). Although, fish stocked in New York have been found alive downstream of the Kinzua Dam in Pennsylvania. Upstream passage on Conewango Creek was restored in 2014 and as a result, it is possible that Paddlefish could periodically move back into New York from the Allegheny River in Pennsylvania. Paddlefish were also stocked into Chautauqua Lake which gives access to the Chadakoin River and Cassadaga Creek. The stocking program in New York stopped in 2015, despite stocked fish survival, due to the lack of evidence of self-sustaining populations or natural reproduction (Budnik et al. 2014; Argent et al. 2016). See Budnik et al. (2014) and Argent et al. (2016) for more details on Paddlefish stocking in New York.

Paddlefish spawning conditions may no longer be present in New York and other states. For example, current spring water temperatures in New York may be too cold for Paddlefish spawning. However, as waters continue to warm with climate change, spring water temperatures in New York may become more optimal for Paddlefish spawning over time.

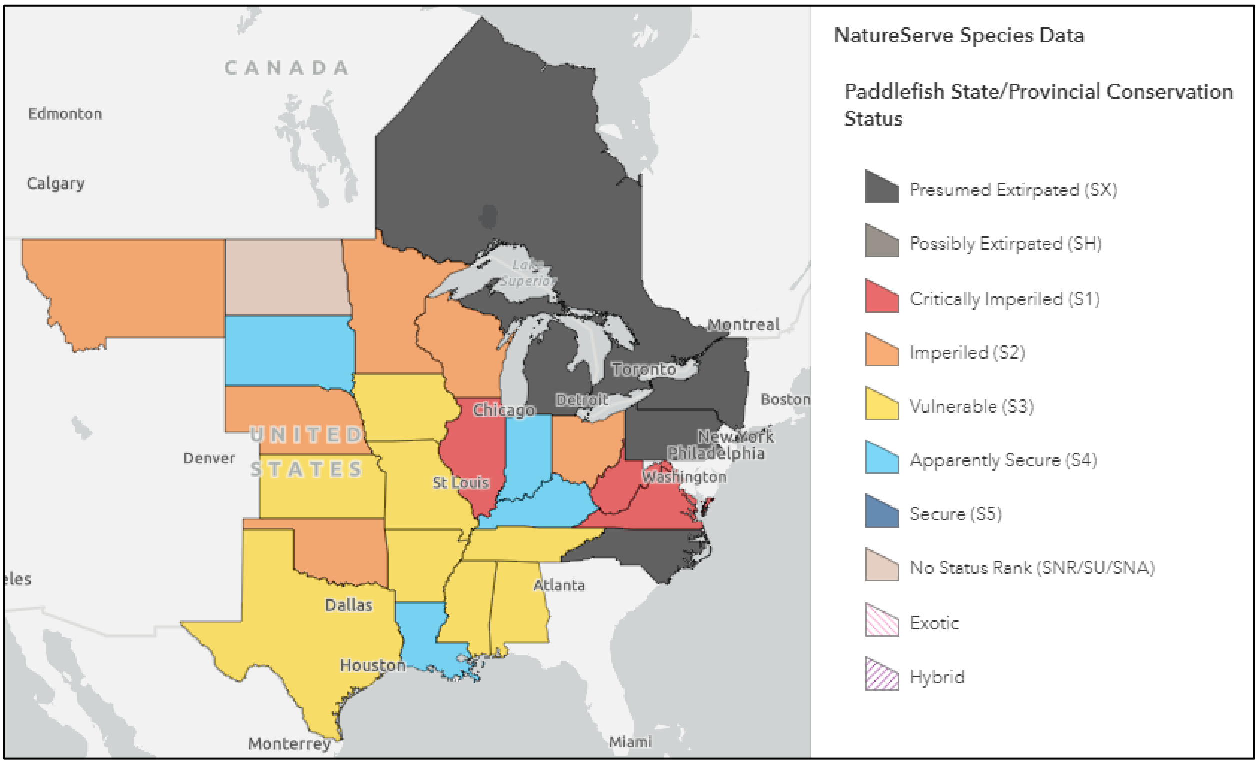


**Figure 1:** Paddlefish distribution and status (Source: NatureServe 2022).

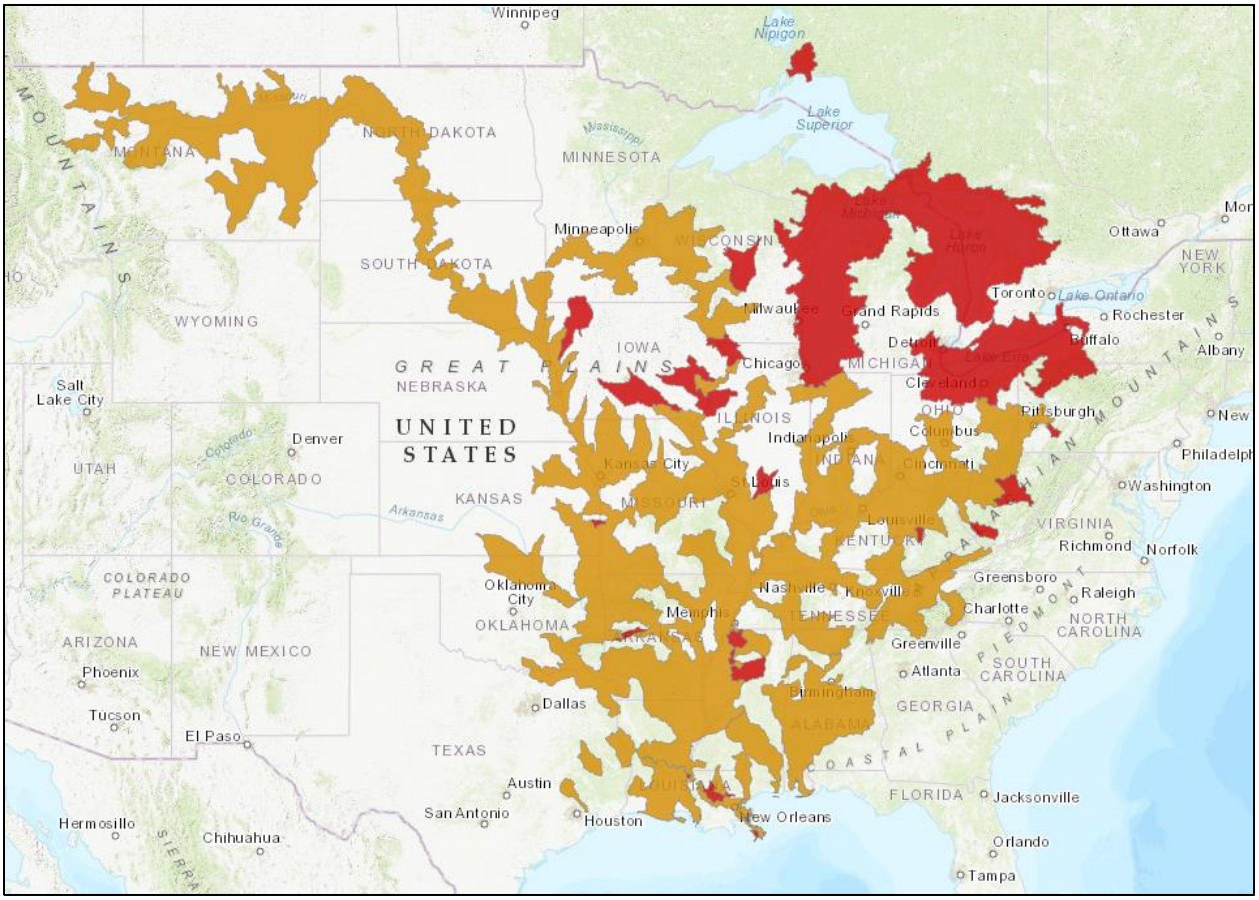


**Figure 2:** Paddlefish distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

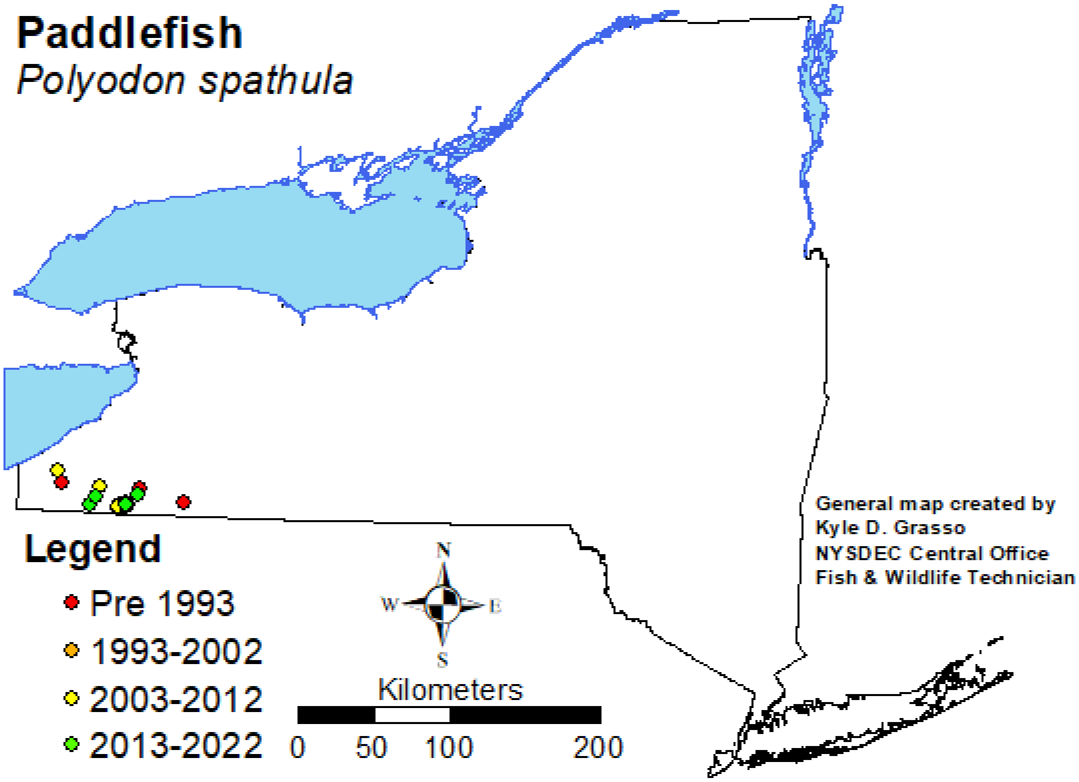


**Figure 3:** Records of Paddlefish in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 3 | 2 | 0-5% |
| **1993-2002** | 0 | 0 | 0% |
| **2003 - 2012** | 71 | 3 | 0-5% |
| **2013 - 2022** | 9 | 3 | 0-5% |

**Table 1:** Records of Paddlefish in New York.

### Details of historic and current occurrence:

The earliest record of Paddlefish in New York was from the Jamestown Post Journal, dated July 15, 1872, in Chautauqua Lake. Evermann and Goldsborough (1902) reported a Paddlefish from Chautauqua Lake in 1890. Fowler (1907, 1919) reported Paddlefish from the Allegheny River near Salamanca and Olean in 1907. The species disappeared from the Allegheny watershed in the early 1900s with the last known record in 1907 (Carlson et al. 2016). They were presumed extirpated for 90 years until 1998 when a New York restoration program began stocking Paddlefish fingerlings into the Allegheny River, Conewango Creek, and Chautauqua Lake with the hope of establishing self-sustaining populations (Budnik et al. 2014; Carlson et al. 2016). A total of 16,539 fingerlings were stocked across all three waterbodies. Monitoring efforts have led to some mature adult recaptures, however little to no evidence exists of self-sustaining populations or natural reproduction (Budnik et al. 2014; Argent et al. 2016; Stauffer et al. 2016). The stocking program in New York stopped in 2015, despite stocked fish survival, due to the lack of evidence of self-sustaining populations or natural reproduction (Budnik et al. 2014; Argent et al. 2016). In 2016, a Paddlefish was caught in the mouth of Cassadaga Creek. The last record in the state was in 2018 in the Allegheny Reservoir 1 mile above Red House Brook. See Budnik et al. (2014) and Argent et al. (2016) for more details on Paddlefish stocking in New York.

| Year | # of Paddlefish Stocked |
|---|---|
| 1998 | 48 |
| 1999 | 535 |
| 2000 | 132 |
| 2001 | 1,878 |
| 2002 | 762 |
| 2003 | 778 |
| 2004 | 803 |
| 2005 | 1,433 |
| 2006 | 367 |
| 2007 | 177 |
| 2008 | 1,660 |
| 2009 | 164 |
| 2010 | 1,592 |
| 2011 | 2,150 |
| 2012 | 2,061 |
| 2013 | 984 |
| 2014 | N/A |
| 2015 | 1,015 |
| **Total** | **16,539** |

**Table 2:** Number of Paddlefish stocked in New York per year (1998-2015) (Source: Jim Daley, Mike Clancy).

**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%:**_____ | **Peripheral:**__✓__ |
| **51-75%:**_____ | **Disjunct:**_____ |
| **26-50%:**_____ | **Distance to core population:** |
| **1-25%:**__✓__ | Core populations to the west |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Medium tributary to mainstem rivers, oxbows, impoundments, and lakes

**b. Geology:** Assumed moderately buffered

**c. Temperature:** Warm

**d. Gradient:** Low gradient

**Habitat or Community Type Trend in New York**

**Declining:**_____ **Stable:**__✓__ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_____ **No:**__✓__

**Indicator Species?** **Yes:**_____ **No:**__✓__

### Habitat Discussion:

Paddlefish inhabit the deep, slow-moving sections of low gradient, medium to large rivers and backwater areas of river-margin lakes, oxbows, impoundments/tailwaters, and large lakes (Cooper 1983; Smith 1985; COSEWIC 2008; Stauffer et al. 2016; NatureServe 2022). Habitat requirements include waters rich in zooplankton with access to large, free-flowing rivers containing gravel bars that become inundated by spring floods for spawning (Becker 1983; Pflieger 1997; Stauffer et al. 2016; NatureServe 2022). They prefer deep water (>1.5m) and move to deeper water (>3m) in late fall and winter to overwinter (Rosen et al. 1982; Crance 1987; Terwilliger 1991; COSEWIC 2008; NatureServe 2022). Individuals may congregate near human-made structures such as bridge supports and tailwaters below dams that create eddies and reduce current velocity (Southall and Hubert 1984; COSEWIC 2008; NatureServe 2022). In unimpounded, unchannelized rivers, Paddlefish are often found downstream from submerged sandbars or in nearshore habitats with low velocities (Rosen et al. 1982; NatureServe 2022). Preferred substrates are not known, but Paddlefish have been reported over mud bottoms (Becker 1983; Reid et al. 2007). They are apparently more tolerant of increased silt levels and turbid waters than sturgeon (Trautman 1981; Etnier and Starnes 1993; Stauffer et al. 2016).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Paddlefish typically live for about 15 years while ages between 30-50 are not uncommon (Terwilliger 1991; Scarnecchia and Schmitz 2003; NatureServe 2022). Males reach sexual maturity at about 7-9 years, females around 9-12 years (USFWS 1990; NatureServe 2022). However, sexual maturity varies with latitude, with southern populations maturing at younger ages than northern populations (Lein and DeVries 1998; NatureServe 2022). Scarnecchia and Schmitz (2003) reported males maturing at ages 9-10 and females as late as 16-17 (Parker 1988). Females apparently grow faster and reach larger sizes and ages than males (Dillard et al. 1986; Scarnecchia and Schmitz 2003; COSEWIC 2008). Males will often spawn every year while females may take 2-7 years in between spawning events (Parker 1988; USFWS 1990; Jennings and Zigler 2000; COSEWIC 2008).

Spawning typically occurs in late spring to early summer (April - June) and is triggered by increasing water temperatures of 50-65°F, higher flows, substantial rises in water levels, and changing photoperiod (Purkett 1961; Smith 1985; Lein and DeVries 1998; Scarnecchia and Schmitz 1986; Stauffer et al. 2016; NatureServe 2022). As spring water temperatures rise and flows increase, Paddlefish migrate large distances (50 to 200 miles) and congregate on spawning grounds depending on the presence of barriers. They seek out flooded, fast-flowing tributaries with clean gravel beds in 2-12 meters of water (3-6 m optimal depths) that will remain flooded and flowing to keep eggs silt free. They are also known to spawn in large tailwater sections below impoundments (Robinson 1966; Stancill et al 2002; COSEWIC 2008; NatureServe 2022).

Females can hold up to 600,000 eggs depending on their size (Purkett 1961; COSEWIC 2008; Stauffer et al 2016). During spawning, eggs are broadcast and fertilized over clean gravel where they become adhesive and stick to the substrate, hatching in about 9 days (Purkett 1961; Smith 1985; NatureServe 2022). After hatching, larvae begin to swim actively from top to bottom in the water column in order to drift downstream away from the receding waters of flooded spawning areas (Wallus 1986; Reid et al 2007; COSEWIC 2008). Young-of-the-year Paddlefish grow rapidly in order to avoid predation from Walleye, Sauger, and other fish or even birds (Scarnecchia and Schmitz 1986; Mero et al. 1994; COSEWIC 2008).

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Paddlefish include poor water use practices and dam construction, habitat degradation and destruction of spawning habitat, over-harvest (legal and illegal) for their meat and caviar, industrial pollution, and invasive species. Habitat degradation and reduced access to spawning sites because of dam construction and poor water use practices are the most obvious changes affecting Paddlefish (Dillard et al. 1986; USFWS 1990; NatureServe 2022).

Water use practices (e.g., channelization, gravel dredging, etc.) and the construction and operation of dams and impoundments have restricted access to spawning areas, interrupted migrations, altered flow regimes, dewatered streams, reduced spring flooding, and eliminated backwater nursery and feeding areas (Graham 1997; Pflieger 1997; NatureServe 2022). Stocked Paddlefish in New York have been known to go through the Kinzua Dam on the Allegheny River which may directly lead to increased mortality because the dam is not equipped with fish passage (Budnik et al. 2014; Carlson et al. 2016). Although, fish stocked into New York have been found alive downstream of the Kinzua Dam in Pennsylvania. Upstream passage on Conewango Creek was restored in 2014 and as a result, it is possible that Paddlefish could periodically move back into New York from the Allegheny River in Pennsylvania.

“Industrial pollution is severe along the Ohio River and tributaries to the Mississippi River, and problems with municipal wastes occur at many sites” (Sparrowe 1986; NatureServe 2022). Siltation of spawning grounds may exacerbate threats to Paddlefish spawning.

As many countries clamped down on the sturgeon caviar industry across the globe, demand for Paddlefish caviar skyrocketed in the late 1900s (USFWS 1992). This led to increased Paddlefish caviar prices and incentivized criminals to poach large amounts of Paddlefish. Because of the slow sexual maturation of Paddlefish, over-harvesting in certain areas quickly decimated populations across the country (USFWS 1992; COSEWIC 2008). Despite that, the Paddlefish caviar industry is still present in some states. Because Paddlefish sexes are difficult to differentiate, it is not unheard of for 4-5 males to be sacrificed for each female with eggs (NatureServe 2022). There is also a substantial Paddlefish sport fish snagging industry. In states where fishing for Paddlefish is legal, there are strict regulations such as quotas, length limits, creel limits, or protected zones in place (Graham 1997; Graham and Rasmussen 1998; NatureServe 2022). As a result of the increased popularity of Paddlefish caviar, the Convention on International Trade in Endangered Species (CITES) listed Paddlefish under Appendix II in order to regulate and place strict restrictions on international trade (NatureServe 2022).

Invasive species such as the Silver Carp and Bighead Carp, Round Goby, Sea Lamprey, spiny water flea, and zebra mussels may directly and indirectly affect Paddlefish populations through competition for resources, predation on eggs and early life stage Paddlefish, and introduced diseases and parasites (Paukert and Scholten 2009; Pegg et al. 2009; Argent et al. 2016).

Loss of genetic integrity may be an issue due to the releases of inbred hatchery fish (NatureServe 2022). Propellor strikes from fishing boats have also been reported.

The strict spawning requirements and slow sexual maturation of Paddlefish combined with the above threats make conservation difficult. Paddlefish spawning conditions may no longer be present in New York and other states. For example, current spring water temperatures in New York may be too cold for Paddlefish spawning. However, as waters continue to warm with climate change, spring water temperatures in New York may become more optimal for Paddlefish spawning over time.

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

“The recovery of this species to its historic northeast range may hinge on continuing stocking efforts, development of fish-passage structures, conservation lockages, and improvement and protection of suitable spawning habitats” (Argent et al. 2016).

A 1983 symposium titled *Paddlefish—A Threatened Resource* started a national conversation about the status of Paddlefish and efforts that can be taken to preserve populations. The book had three recommendations to maintain sustainable Paddlefish populations (Paukert and Scholten 2009):

-Management agencies should consider regional management.

-Individual states, particularly where commercial fisheries occur, should more closely evaluate the status of the Paddlefish populations.

-Agencies should develop reasonable management objectives.

Another symposium was held in 2006 that “highlighted advances and new knowledge of Paddlefish propagation, genetics, reproduction, recruitment, and movements that built on research and information presented at the 1983 symposium” (Paukert and Scholten 2009). Although progress was made since the 1983, data gaps related to recruitment and reproduction were acknowledged (Paukert and Scholten 2009). “Earlier fears of a basin-wide collapse in Paddlefish stocks should continue to diminish if resource managers are successful in combating overfishing and continued habitat destruction, which will always threaten the long-term viability of Paddlefish stocks throughout the Mississippi River basin” (Bettoli et al. 2009).

Stocking in New York stopped in 2015 and no reproduction has been recorded. The last record of stocked fish in New York was in 2018 in the Allegheny Reservoir. Although stocking has stopped in New York, stocking continues to occur in other states in tandem with tagging and tracking of stocked fish when feasible.

The 2005 State Wildlife Action Plan included the following recommendations:

-Paddlefish and Atlantic salmon populations will continue to be restored with hatchery stocking as described in management plans.

The 2015 State Wildlife Action Plan included the following recommendations:

-Continue Paddlefish population restoration in the Allegheny watershed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Site/Area Management |
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Land/Water Management | Habitat & Natural Process Restoration |
| **5.** Species Management | Species Recovery |
| **6.** Species Management | Species Re-introduction |
| **7.** Species Management | Ex-situ Conservation |
| **8.** Law & Policy | Policies and Regulations |

**Table 3:** Recommended conservation actions for Paddlefish.

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# Species Status Assessment Cover Sheet

**Species Name:** Pugnose Shiner **Date Updated:** January 2023

**Current Status:** Endangered – SGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** S1S2

**Distribution:** Pugnose Shiners are found from western New York and eastern Ontario west to southeastern North Dakota, south to northern Iowa, Illinois, Wisconsin, Michigan, northern Indiana, and northern Ohio. In New York, they are native to 3 of 18 watersheds (St. Lawrence, Ontario, and Oswego), but have been extirpated from the Oswego watershed.

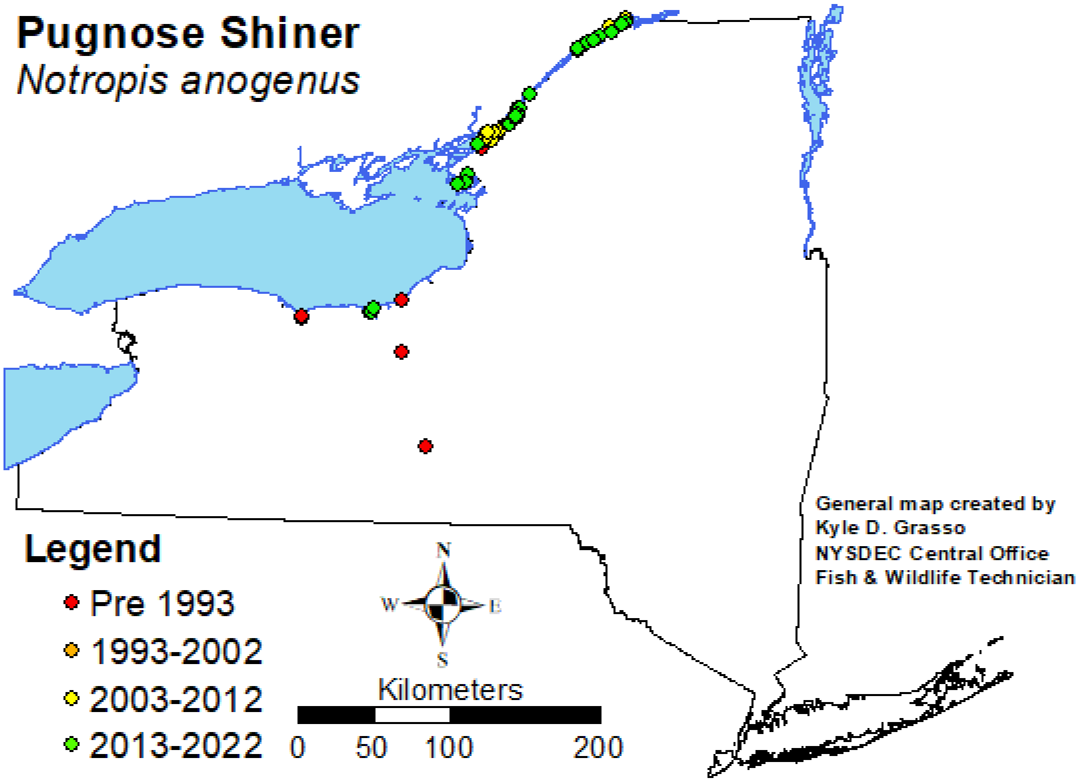
**Habitat:** The Pugnose Shiner inhabits the clear, slow-moving waters (pools and runs) of low gradient streams, lakes, and bays with heavy vegetation and sand, mud, marl, or gravel substrate. Aquatic plants are a more important limiting factor than substrate.

**Life History:** Due to their elusive nature and preference for dense vegetation, there is much uncertainty surrounding Pugnose Shiner biology. Pugnose Shiners reach an age of three and become sexually mature at the age of one or two. Spawning typically occurs from mid-May to July depending on their geographic location. In Michigan, spawning has been recorded in June and July. Mature females can carry up to 1275 eggs but may not lay them all at once. Younger females produce eggs later in the season and older females will spawn multiple times throughout the season. Spawning likely occurs in shallow water (2 m maximum depth), with dense vegetation and a sand, silt, and gravel substrate. After spawning, the Pugnose Shiner does not guard its young.

**Threats:** The main threats to Pugnose Shiner include habitat loss and degradation (removal/control of aquatic vegetation and destruction of wetlands from shoreline development), decreased water quality (increased turbidity from sedimentation), exotic species, and climate change.

**Population trend:** In New York, the Pugnose Shiner is native to 3 of 18 watersheds (St. Lawrence, Ontario, and Oswego), but has been extirpated from the Oswego watershed. Pugnose Shiners appear to be expanding in the St. Lawrence River with increased occurrences in the upper and lower reaches of the St. Lawrence River in New York. A NYSDEC and SUNY Cobleskill collaborative recovery program was started in 2014 and led to the stocking of Chaumont Bay in Lake Ontario in 2016 and 2017. Populations appear to be stable in Chaumont Bay and Sodus Bay of Lake Ontario but may be at risk in Sodus Bay due to the introduction of water chestnut.

**Recommendation:** It is recommended that the Pugnose Shiner be downlisted from Endangered to Special Concern due to their expansion in the St. Lawrence River and the success of the recovery program in Chaumont Bay.



# Species Status Assessment

**Common Name:** Pugnose Shiner **Date Updated:** January 2023

**Scientific Name:** *Notropis anogenus* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Pugnose Shiner is in the class Actinopterygii and the family Cyprinidae (minnows and carps). The Pugnose Shiner is found from "western New York (Smith 1985) and eastern Ontario west to southeastern North Dakota, south to northern Iowa, Illinois (Smith 1979), Wisconsin (Becker 1983), Michigan (Bailey et al. 2004), northern Indiana, and northern Ohio (Trautman 1981)" (NatureServe 2022). In New York, they are native to 3 of 18 watersheds (St. Lawrence, Ontario, and Oswego), but have been extirpated from the Oswego watershed. Pugnose Shiners appear to be expanding in the St. Lawrence River with increased occurrences in the upper and lower reaches of the St. Lawrence River in New York. A NYSDEC and SUNY Cobleskill collaborative recovery program was started in 2014 and led to the stocking of Chaumont Bay in Lake Ontario in 2016 and 2017. Populations appear to be stable in Chaumont Bay and Sodus Bay of Lake Ontario but may be at risk in Sodus Bay due to the introduction of water chestnut. The Pugnose Shiner inhabits the clear, slow-moving waters (pools and runs) of low gradient streams, lakes, and bays with heavy vegetation and sand, mud, marl, or gravel substrate (COSEWIC 2013; NatureServe 2022). Aquatic plants are a more important limiting factor than substrate (MDNR 2016).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Endangered – SGCN

### b. Natural Heritage Program

i. **Global:** Vulnerable – G3

ii. **New York:** S1S2 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- American Fisheries Society: Threatened (8/1/2008)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Threatened (5/3/2013)

### Status Discussion:

In New York, the Pugnose Shiner is currently listed as Endangered and SGCN. They are globally ranked as Vulnerable by NatureServe.

Comments from COSEWIC: Designated Special Concern in April 1985. Status re-examined and designated Endangered in November 2002. Status re-examined and designated Threatened in May 2013. Status re-examined and confirmed as Threatened in 2019.

# II. Abundance and Distribution Trends

## a. North America

### i. Abundance

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

### ii. Distribution

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

## b. Northeastern U.S. (USWFS Region 5)

### i. Abundance

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

### ii. Distribution

**Declining:** _____ **Increasing:** ✓ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

## c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:** _____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:** _____

**NEW JERSEY** **Not Present:** ✓ **No Data:** _____

**PENNSYLVANIA** **Not Present:** ✓ **No Data:** _____

**VERMONT** **Not Present:** ✓ **No Data:** _____

**QUEBEC** **Not Present:** ✓ **No Data:** _____

**ONTARIO** **Not Present:** _____ **No Data:** _____

### i. Abundance

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

### ii. Distribution

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Pop. status in last 10-20 years confirmed in 2019

**Listing Status:** Threatened **SGCN?:** N/A

## d. New York

### i. Abundance

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

### ii. Distribution

**Declining:** _____ **Increasing:** ✓ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

The short-term trend over the last 10 years is relatively stable or slowly declining (<30%). Long term trends indicate a decline of 30-70% (NatureServe2022).

A 2019 progress update of Pugnose Shiner recovery in Ontario indicated that since 2008 the presence of seven populations that were observed before 2008 has been re-confirmed and nine new populations were also identified. "The newly identified populations may be the result of increased search effort and education about Pugnose Shiner and may not represent actual population increases, but rather increased knowledge about the distribution of the species" (Carlson et al. 2019).

In New York, the Pugnose Shiner is native to 3 of 18 watersheds (St. Lawrence, Ontario, and Oswego), but has been extirpated from the Oswego watershed. They appear to be expanding in the St. Lawrence River with increased occurrences in the upper and lower reaches. A NYSDEC and SUNY Cobleskill collaborative recovery program was started in 2014 and led to the stocking of Chaumont Bay in Lake Ontario in 2016 and 2017. A 2018 post stocking evaluation indicated the presence of three year classes and "survival of stocked fish and evidence of wild production of this rare species occurred sooner than anticipated". "With continued reproductive success, a naturally reproducing population of Pugnose Shiners is expected to become established in Chaumont Bay" (Carlson et al. 2019). The stocking program has since ended, and 2020 surveys continued to show survival of fish within the bay. They also appear to be stable in Sodus Bay but may be at risk due to the introduction of water chestnut.

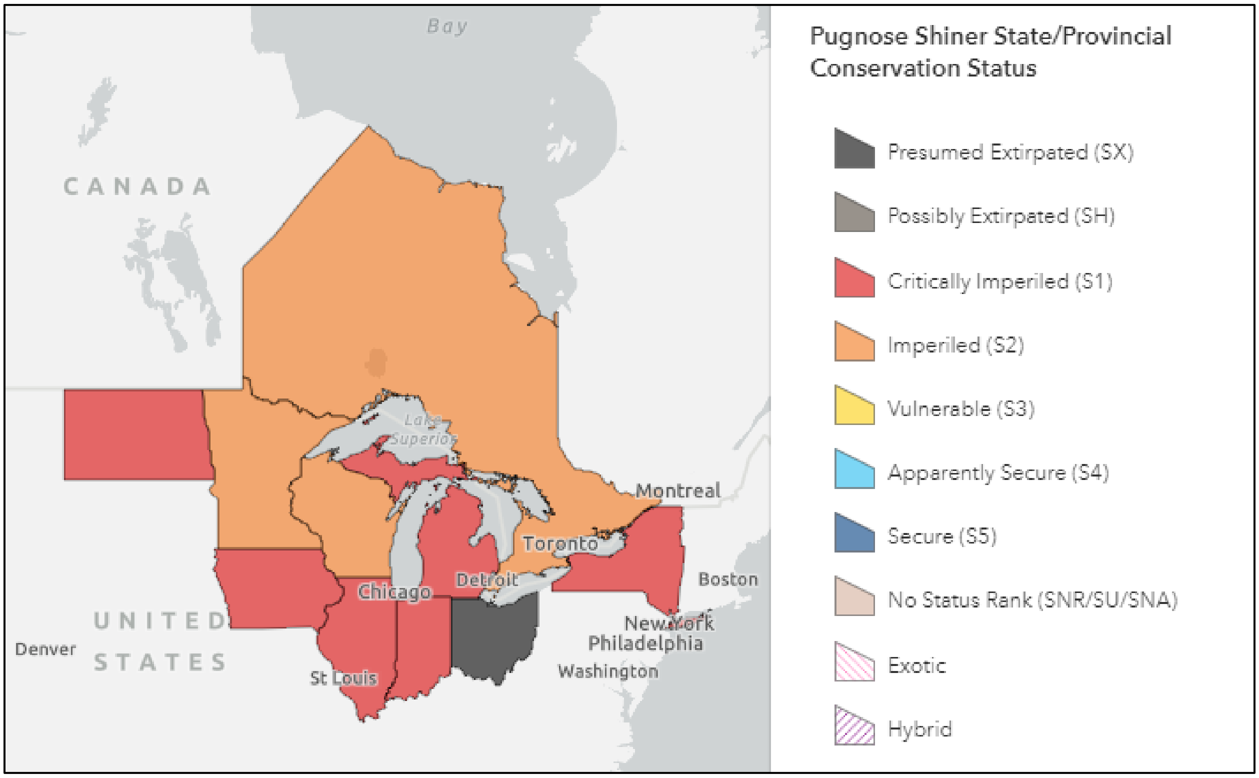


**Figure 1:** Pugnose Shiner distribution and status (Source: NatureServe 2022).

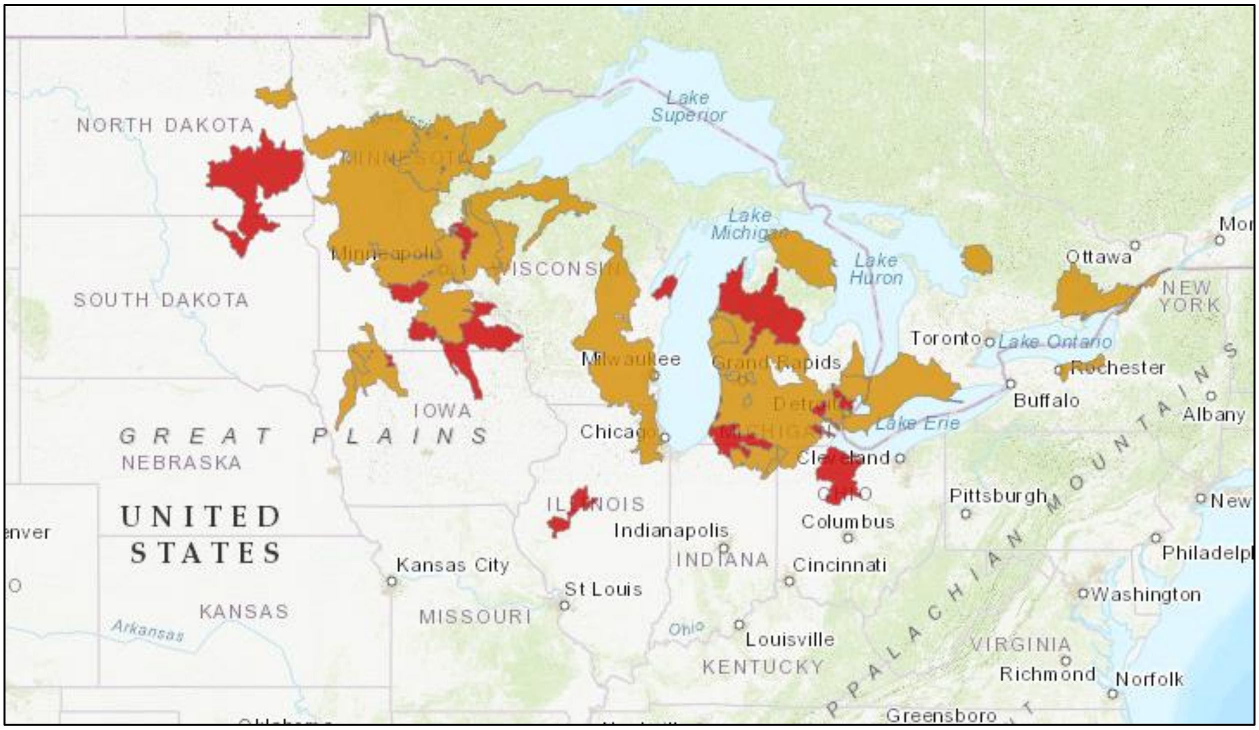


**Figure 2:** Pugnose Shiner distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

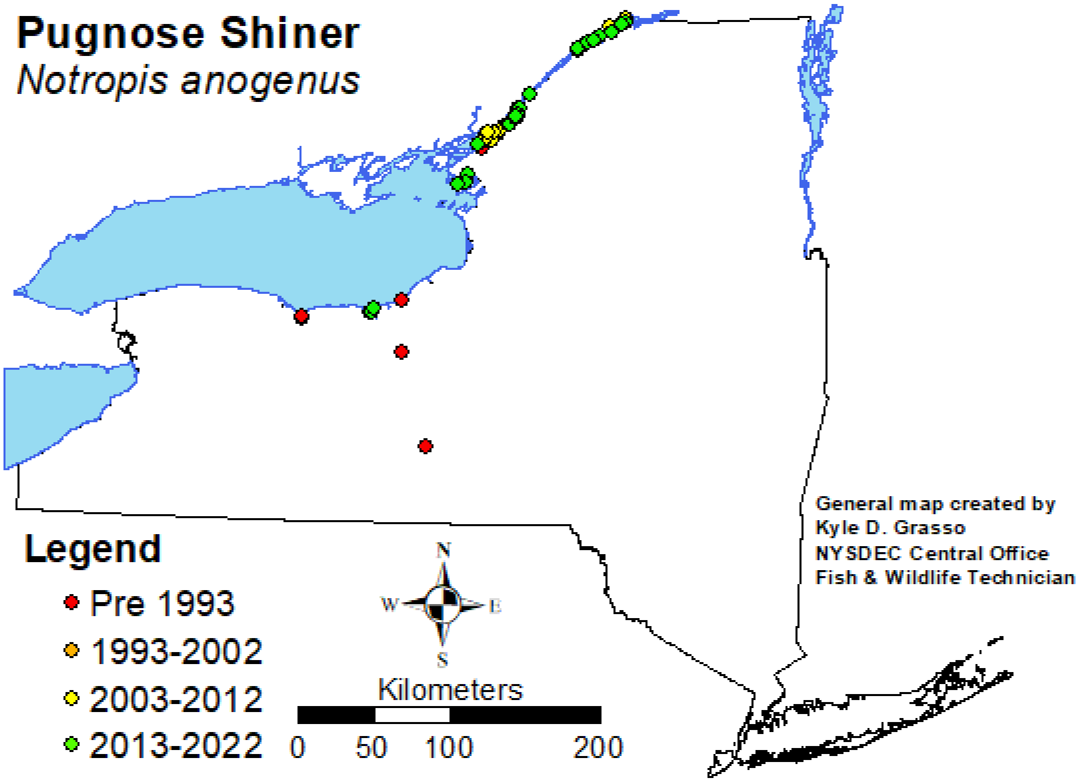


**Figure 3:** Records of Pugnose Shiner in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 12 | 6 | 6-10% |
| **1993-2002** | 15 | 2 | 6-10% |
| **2003 - 2012** | 31 | 2 | 6-10% |
| **2013 - 2022** | 76 | 3 | 6-10% |

**Table 1:** Records of Pugnose Shiner in New York.

### Details of historic and current occurrence:

Historically, the Pugnose Shiner has been reported from the Thousand Islands of the St. Lawrence River, two bays of Lake Ontario (Little Sodus and Irondequoit Bays) and two areas to the north and south of Cayuga Lake before the 1900's (Fall Creek and Montezuma Marsh) (Carlson et al. 2016).

In the St. Lawrence River, sampling since the 1990s has shown an expansion within the upper and lower reaches of the river in New York. They have not been reported in Little Sodus Bay or Irondequoit Bay since 1939, however newly recorded populations in Sodus Bay from 1997 appear to be stable, but may be at risk due to the introduction of water chestnut. A 2014 NYSDEC and SUNY Cobleskill collaborative recovery program led to the stocking of Chaumont Bay in Lake Ontario in 2016 and 2017. A 2018 post stocking evaluation indicated the presence of three year classes and “survival of stocked fish and evidence of wild production of this rare species occurred sooner than anticipated”. “With continued reproductive success, a naturally reproducing population of Pugnose Shiners is expected to become established in Chaumont Bay” (Carlson et al. 2019). The stocking program has since ended, and 2020 surveys continued to show survival of stocked fish within the bay.

Similar efforts to catch this species in Cayuga Lake (mouth of Fall Creek) were unsuccessful in 1997, and current habitat conditions do not look favorable there or in Montezuma Marsh.

### New York's Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____
**76-99%:**_____
**51-75%:**_____
**26-50%:**_____
**1-25%:** ✓

**Classification of New York Range**

**Core:**_____
**Peripheral:** ✓
**Disjunct:** ✓
**Distance to core population:**
Core population to the west

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Small river to medium mainstem river and Lake Ontario bays

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:** ✓ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

The Pugnose Shiner inhabits the clear, slow-moving waters (pools and runs) of low gradient streams, lakes, and bays with heavy vegetation and sand, mud, marl, or gravel substrate (COSEWIC 2013; NatureServe 2022). Aquatic plants are a more important limiting factor than substrate (MDNR 2016). They are extremely intolerant to habitat degradation from siltation and turbidity and are therefore a good indicator of environmental quality (Becker 1983; Smith 1985; Barbour et al. 1999; COSEWIC 2022). Pugnose Shiners were typically collected together with Blackchin Shiners during seining. They are typically found in the shallows during the summer and move to deeper water during the rest of the year (Smith 1979; Trautman 1981; Becker 1983; Smith 1985; Page and Burr 2011; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Due to their elusive nature and preference for dense vegetation, there is much uncertainty surrounding Pugnose Shiner biology (COSEWIC 2013). Pugnose Shiners reach an age of 3 and become sexually mature at the age of 1 or 2 (Becker 1983; COSEWIC 2013). Spawning typically occurs from mid-May to July depending on their geographic location. In Michigan, spawning has been recorded in June and July (Smith 1985). Mature females can carry up to 1275 eggs but may not lay them all at once. Younger females produce eggs later in the season and older females will spawn multiple times throughout the season (Becker 1983; MDNR 2016; COSEWIC 2013). Spawning likely occurs in shallow water (2 m maximum depth), with dense vegetation and a sand, silt, and gravel substrate (Leslie and Timmins 2002; COSEWIC 2013). After spawning, the Pugnose Shiner does not guard its young.

## VI. Threats *(from NY CWCS Database or newly described)*

The main threats to Pugnose Shiner include habitat loss and degradation (removal/control of aquatic vegetation and destruction of wetlands from shoreline development), decreased water quality (increased turbidity from sedimentation), exotic species, and climate change (Bailey 1959; Trautman 1981; COSEWIC 2013). Shoreline development and destruction of the littoral zone vegetation may have been the main causes of Pugnose Shiner extirpation from two lakes in southern Wisconsin (COSEWIC 2013). The loss of quality habitat when the Montezuma Marsh was drained in the early 1900s was poorly documented, but the elimination of Pugnose Shiner there was echoed with the elimination of Bigeye Chub, Redfin Shiner, and Sauger from the same areas. In one Wisconsin lake, Pugnose Shiner disappeared after eutrophication and invasion of Eurasian milfoil, so aquatic invasives are a likely threat (Lyons 1989). Whole-lake herbicide treatments have also been considered a threat (NatureServe 2022). The Pugnose Shiner was classified as “moderately vulnerable” to predicted climate change in an assessment of vulnerability conducted by the New York Natural Heritage Program (Schlesinger et al. 2011).

The quality of habitat in submerged aquatic vegetation could be at risk in Sodus Bay where water chestnut has become established, and Eurasian milfoil is established throughout nearly all of New York’s major waters.

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

**Yes:** ✓ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Pugnose Shiner is currently listed as an endangered species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Policies that protect water quality and aquatic vegetation should be promoted. "Monitoring and maintaining riparian areas around lakes and streams to avoid siltation as well as avoiding the removal of in-lake vegetation should be encouraged" (MDNR 2016).

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat research:

-Inventory the habitat requirement requirements of this species and note the influence of the invasive milfoil.

Life history research:

-Life history studies need to be done, and sampling techniques must be improved in order to carry out surveys. We know very little about where they live in large water bodies.

The 2015 State Wildlife Action Plan included the following recommendations:

-Monitor Pugnose Shiner population and habitat use in the St. Lawrence watershed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Invasive/Problematic Species Control |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Pugnose Shiner.

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# Species Status Assessment Cover Sheet

**Species Name:** Redfin Shiner

**Date Updated:** January 2023

**Current Status:** Special Concern – SGCN

**Updated By:** Kyle Grasso

**Current NHP Rank:** S1S2

**Distribution:** The Redfin Shiner occurs in the Great Lakes and Mississippi River Basin from western New York to Minnesota, and south to Louisiana and Gulf drainages west to Texas. In New York, the Redfin Shiner has been recorded in 4 of 18 watersheds (Allegheny, Erie-Niagara, Ontario, and Oswego).

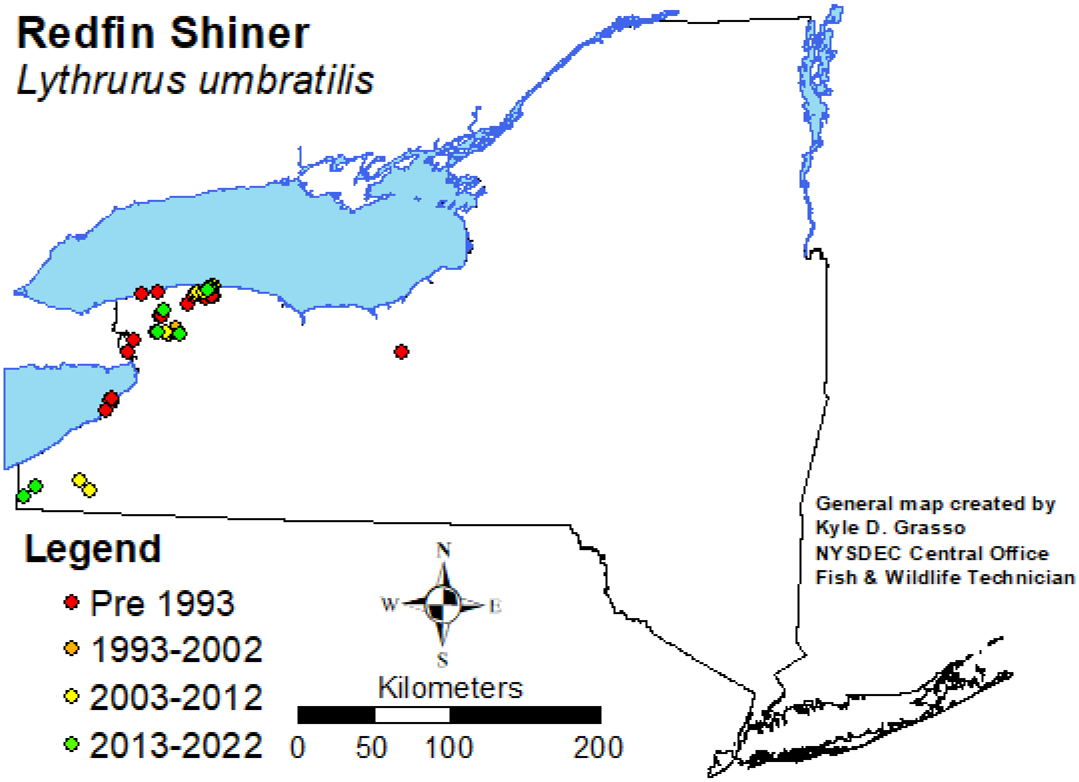
**Habitat:** The Redfin Shiner inhabits headwaters, creeks, and small to medium rivers in a variety of ecological settings, from slow-flowing bayous to high-gradient upland streams. However, they are typically found in pools of low to moderate gradient streams with sand and gravel bottoms, submerged aquatic vegetation, and often in turbid water.

**Life History:** Redfin Shiners have a relatively short life span, seldom exceeding 3 summers in Wisconsin and 1.5 years in Mississippi. Sexual maturity is reached usually in the second or third summer in Wisconsin and in 1 year in Mississippi. Spawning occurs from July to mid-August in Wisconsin and late April to late August in Mississippi. Spawning in Pennsylvania likely occurs slightly earlier than July. Hunter and Wisby (1961), Hunter and Hasler (1965), and Snelson and Pflieger (1975) reported males guarding territories above Green Sunfish, *Lepomis cyanellus*, nests in Wisconsin, and those of other sunfish elsewhere. They suggested that the Redfin Shiners were not bothered by the sunfish because they maintained territories above sunfish nests, not directly on the bottom. They also postulated that milt and ovarian fluid from the sunfish attracted the shiners and triggered spawning behavior. Trautman (1981) observed Redfin Shiners spawning over sand and gravel in sluggish riffles and pools with some current.

**Threats:** The Redfin Shiner is not highly sensitive to environmental change in other parts of its range, but its remaining habitat needs to be protected. While the Redfin Shiner can tolerate some turbidity, their preferred stream habitat is under increasing pressure from human activities, such as farming and residential development.

**Population trend:** In New York, the Redfin Shiner has been recorded in 4 of 18 watersheds (Allegheny, Erie-Niagara, Ontario, and Oswego). They are most commonly found in the Allegheny, Erie-Niagara, and Ontario watersheds, and there is only one record in the Oswego watershed. Smith (1985) reported the Redfin Shiner as uncommon and stated that it appeared to be present in fewer localities than it was a few years ago. Although rare, they appear to be stable in the Allegheny, Erie-Niagara, and Ontario watersheds.

**Recommendation:** It is recommended that the Redfin Shiner remain listed as Special Concern due to their restricted range and rarity in New York.



# Species Status Assessment

**Common Name:** Redfin Shiner **Date Updated:** January 2023

**Scientific Name:** *Lythrurus umbratilis* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Redfin Shiner is in the class Actinopterygii and the family Cyprinidae (minnows and carps). The Redfin Shiner occurs in the Great Lakes and Mississippi River Basin from western New York to Minnesota, and south to Louisiana and Gulf drainages west to Texas. In New York, the Redfin Shiner has been recorded in 4 of 18 watersheds (Allegheny, Erie-Niagara, Ontario, and Oswego) (Carlson et al. 2016). They are most commonly found in the Allegheny, Erie-Niagara, and Ontario watersheds, and there is only one record in the Oswego watershed. Although rare, they appear to be stable in the Allegheny, Erie-Niagara, and Ontario watersheds (Carlson et al. 2016). The Redfin Shiner inhabits headwaters, creeks, and small to medium rivers in a variety of ecological settings, from slow-flowing bayous to high-gradient upland streams. However, they are typically found in pools of low to moderate gradient streams with sand and gravel bottoms, submerged aquatic vegetation, and often in turbid water (Stauffer et al. 2016; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Special Concern – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S1S2 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Not at Risk (4/1/1988)

### Status Discussion:

In New York, the Redfin Shiner is currently listed as Special Concern and SGCN. They are globally ranked as Secure by NatureServe.

COSEWIC designated it as Not at Risk in April 1988. They are restricted in Canada to southern Ontario where populations are low in numbers but stable and reproducing. In 2015 it was considered a low priority candidate for re-assessment.

They are listed as Threatened in Wisconsin and Special Concern in Minnesota. In Iowa they have been used as a bait minnow and in central Missouri they're the most common minnow (Scott and Crossman 1973; Pflieger 1997).

# II. Abundance and Distribution Trends

## a. North America

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:**________________________________________

## b. Northeastern U.S. (USWFS Region 5)

### i. Abundance

**Declining:**_✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:**_✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:**________________________________________

## c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:**_✓__ **No Data:**_____

**MASSACHUSETTS** **Not Present:**_✓__ **No Data:**_____

**NEW JERSEY** **Not Present:**_✓__ **No Data:**_____

**VERMONT** **Not Present:**_✓__ **No Data:**_____

**QUEBEC** **Not Present:**_✓__ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Last 30 years

**Listing Status:** Endangered – S2 **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_✓__ **Unknown:**_____

**Time Frame Considered:** Low priority candidate for re-assessment in 2015

**Listing Status:** Not at risk (2015) **SGCN?:** N/A

## d. New York

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

Redfin Shiners are secure globally but are Endangered in Pennsylvania. However, population sizes in Pennsylvania have remained consistent over several decades despite low overall numbers (Stauffer et al. 2016).

In New York, the Redfin Shiner has been recorded in 4 of 18 watersheds (Allegheny, Erie-Niagara, Ontario, and Oswego) (Carlson et al. 2016). They are most commonly found in the Allegheny, Erie-Niagara, and Ontario watersheds, and there is only one record in the Oswego watershed. Smith (1985) reported the Redfin Shiner as uncommon and stated that it appeared to be "present in fewer localities than it was a few years ago." Although rare, they appear to be stable in the Allegheny, Erie-Niagara, and Ontario watersheds (Carlson et al. 2016).

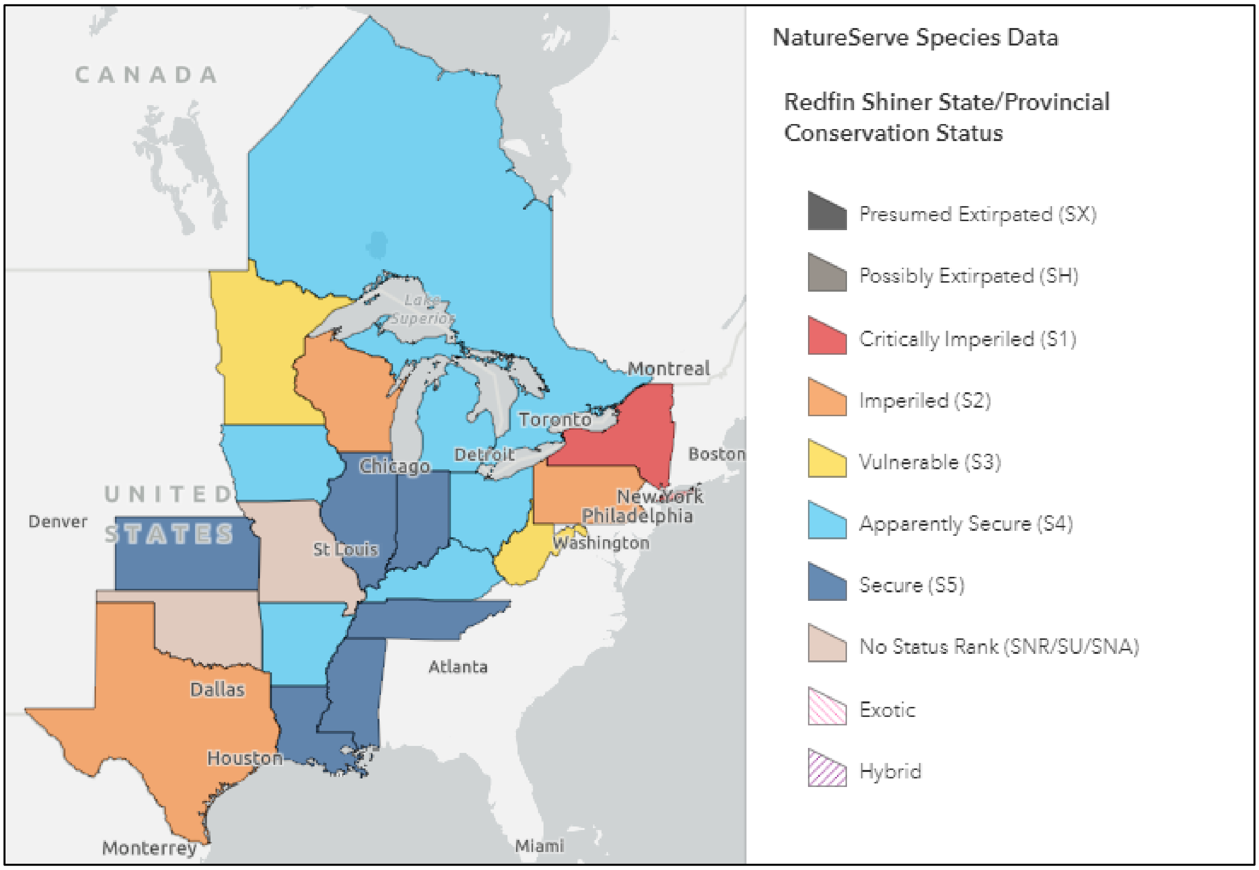


**Figure 1:** Redfin Shiner distribution and status (Source: NatureServe 2022).

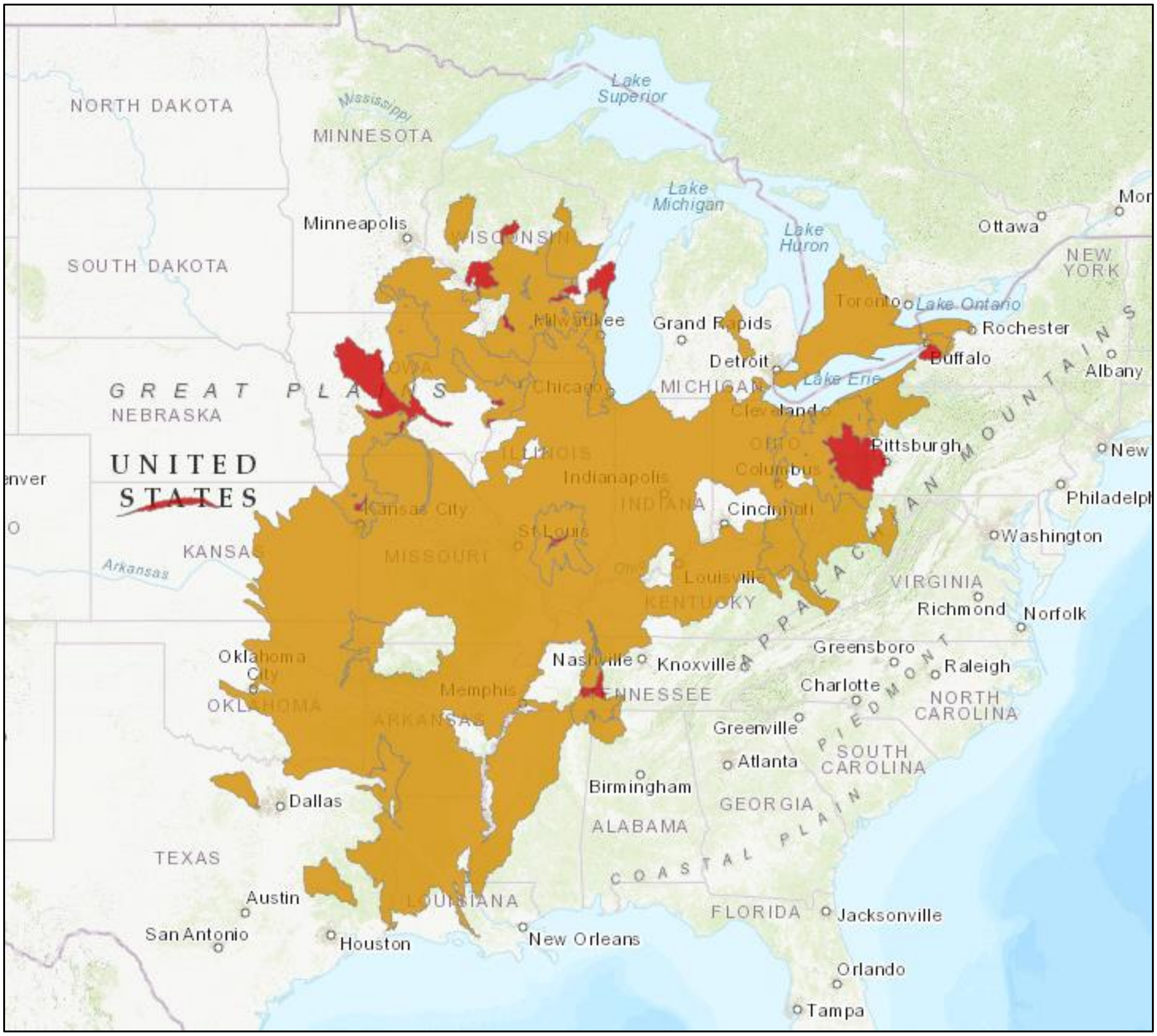


**Figure 2:** Redfin Shiner distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

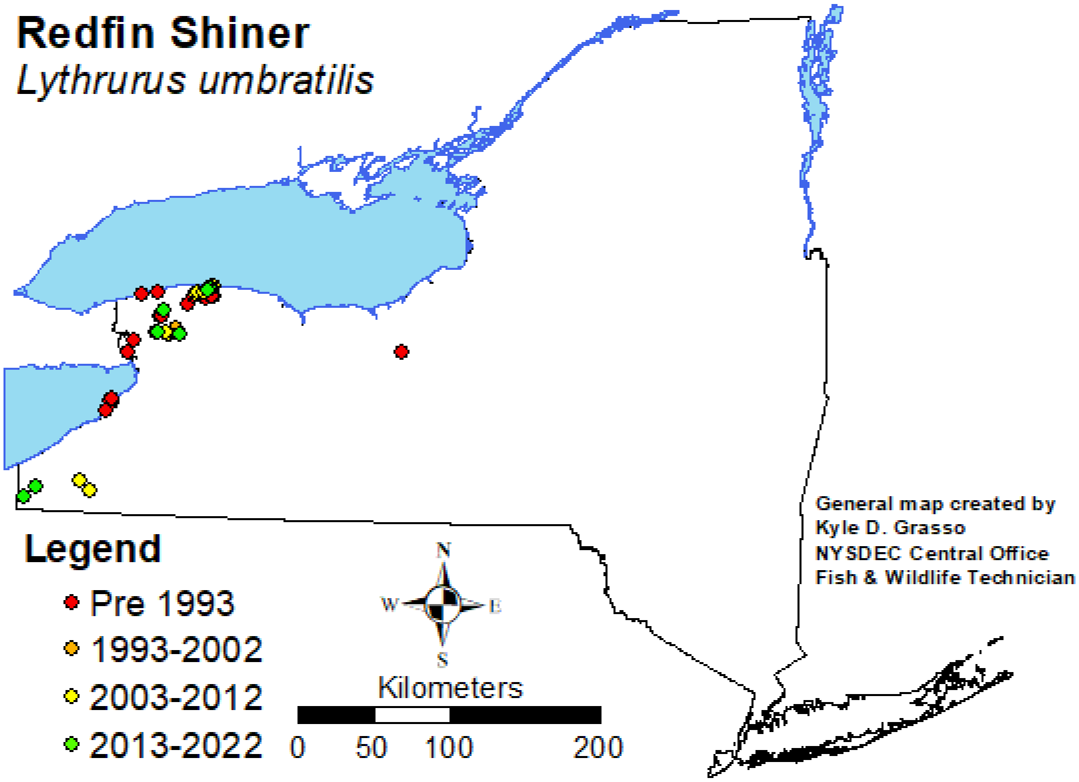


**Figure 3:** Records of Redfin Shiner in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 23 | 17 | 6-10% |
| **1993-2002** | 3 | 3 | 6-10% |
| **2003 - 2012** | 34 | 5 | 6-10% |
| **2013 - 2022** | 13 | 5 | 6-10% |

**Table 1:** Records of Redfin Shiner in New York.

### Details of historic and current occurrence:

In the 1920-30s this species was rare in New York and only recorded in 14 waterbodies. Within that time period, the tributaries of Lake Ontario where Redfin Shiners were found include Oak Orchard Creek, Eighteenmile Creek, East Branch Twelvemile Creek, and Johnson Creek. The tributaries of Lake Erie where Redfin Shiners were found include the Erie Canal and Muddy Creek. Smith (1985) reported this species from a Lake Erie tributary near Sturgeon Point in 1949. The one record of Redfin Shiner in the Oswego watershed was in the Montezuma Marsh prior to 1900 (Carlson et al. 2016).

Most recent records per waterbody where Redfin Shiner have been recorded since the 1980s:

-Ontario Watershed: Deep Pond (2003), Johnson Creek (2015), Unnamed Water (2018)

-Erie Watershed: Mud Creek (2007), Murder Creek (2015), Tonawanda Creek (2016)

-Allegheny Watershed: Cassadaga Creek (2005), French Creek (2018)

-Oswego Watershed: No records

The earliest Allegheny watershed record was 2005 and it is assumed they were there earlier but were below detection levels.

### 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%:**_____ | **Peripheral:**_✓__ |
| **51-75%:**_____ | **Disjunct:**_____ |
| **26-50%:**_____ | **Distance to core population:** |
| **1-25%:**_✓__ | _Core pop. to the south and west_____ |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to medium tributary rivers

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_✓__ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_____ **No:**_✓__

**Indicator Species?** **Yes:**_____ **No:**_✓__

### Habitat Discussion:

The Redfin Shiner inhabits headwaters, creeks, and small to medium rivers in a variety of ecological settings, from slow-flowing bayous to high-gradient upland streams. However, they are typically found in pools of low to moderate gradient streams with sand and gravel bottoms, submerged aquatic vegetation, and often in turbid water (Stauffer et al. 2016; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Redfin Shiners have a relatively short life span, seldom exceeding 3 summers in Wisconsin and 1.5 years in Mississippi. Sexual maturity is reached usually in the second or third summer in Wisconsin and in 1 year in Mississippi (Becker 1983; Matthews and Heins 1984; NatureServe 2022). Spawning occurs from July to mid-August in Wisconsin and late April to late August in Mississippi (Becker 1983; Matthews and Heins 1984). Stauffer et al. (2016) stated that spawning in Pennsylvania likely occurs slightly earlier than July. Cross (1967) reported spawning taking place when water temperatures reached 70°F in Kansas (Stauffer et al. 2016). Hunter and Wisby (1961), Hunter and Hasler (1965), and Snelson and Pflieger (1975) reported males guarding territories above Green Sunfish, *Lepomis cyanellus*, nests in Wisconsin, and those of other sunfish elsewhere. They suggested that the Redfin Shiners were not bothered by the sunfish because they maintained territories above sunfish nests, and not directly on the bottom. They also postulated that "milt and ovarian fluid from the sunfish attracted the shiners and triggered spawning behavior" (Smith 1985). Trautman (1981) observed "Redfin Shiners spawning over sand and gravel in sluggish riffles and pools with some current" (Smith 1985). Spawning takes place when females approach courting males where they vibrate together and broadcast their milt and eggs to the substrate below (Hunter and Wisby 1961; Hunter and Hasler 1965; Smith 1985). Fecundities can range from 220- 900 (Matthews and Heins 1984; Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

"The Redfin Shiner is not highly sensitive to environmental change in other parts of its range, but its remaining habitat needs to be protected" (NYSDEC 2013). "While the Redfin Shiner can tolerate some turbidity, their preferred stream habitat is under increasing pressure from human activities, such as farming and residential development" (MDNR 2013). The loss of quality habitat when the Montezuma Marsh was drained in the early 1900s was poorly documented, but the elimination of Redfin Shiner there was echoed with the elimination of Bigeye Chub, Pugnose Shiner, and Sauger from the same areas.

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

Stocking may be beneficial across its entire historic New York range.

The 2005 State Wildlife Action Plan included the following recommendations:

<u>Habitat research:</u>

-Inventory and assess losses of habitat and of this species in tributaries of Western Lake Ontario. This would be followed by considering remediation efforts.

Population monitoring:

- Its status in New York needs to be determined. The circumstance of one of the recent records for both the Redfin Shiner and the Longear Sunfish being from the same locations, Tonawanda Creek near Millersport, and Johnson Creek near Kuckville, deserves further study. Sampling at several sites in Tonawanda Creek and the Niagara River in 1998-2000 did not confirm of its presence there.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |
| **4.** Species Management | Ex-situ Conservation |
| **5.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Redfin Shiner.

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# Species Status Assessment

**Common Name:** River redhorse **Date Updated:**

**Scientific Name:** *Moxostoma carinatum* **Updated by:**

**Class:** Osteichthyes

**Family:** Catastomidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The river redhorse occurs in the eastern half of the United States and in southeastern Canada. Its preferred habitat is rivers with clean gravel. The range and abundance have been relatively stable to declining in the last 30 years. In New York, it is present only in the eastern basin of the Allegheny watershed, where it was first documented in 1978. Though restricted, the population appears to be secure.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** Not listed; SGCN

### b. Natural Heritage Program

i. **Global:** G4

ii. **New York:** S2? **Tracked by NYNHP?:** Yes

### Other Ranks:

-Species of Northeast Regional Conservation Concern (Therres 1999)
Canadian Species at Risk Act (SARA) Schedule 1/Annexe 1 Status: SC (13Dec2007)
Committee on the Status of Endangered Wildlife in Canada (COSEWIC): Special Concern (29Apr2006)

### Status Discussion:

River redhorse is globally ranked as Apparently Secure and ranked in New York as Imperiled. It is uncommon to rare and has declined greatly from historic times (NatureServe 2012).

## II. Abundance and Distribution Trends

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **North America** | Yes | Stable | Stable | Over past 10 years | | Choose an item. |
| **Northeastern US** | Yes | Unknown | Unknown | | | Choose an item. |
| **New York** | Yes | Stable | Stable | 1977-2013 | | Choose an item. |

| Region | Present? | Abundance | Distribution | Time Frame | Listing status | SGCN? |
|---|---|---|---|---|---|---|
| **Connecticut** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Massachusetts** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **New Jersey** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Pennsylvania** | Choose an item. | Choose an item. | Choose an item. | | Not listed | Yes |
| **Vermont** | No | Choose an item. | Choose an item. | | | Choose an item. |
| **Ontario** | Yes | Declining | Declining | | Special Concern | Choose an item. |
| **Quebec** | Yes | Declining | Declining | | Species at Risk | Choose an item. |

*Column options*
**Present?:** Yes; No; Unknown; No data; (blank) or Choose an Item
**Abundance and Distribution:** Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
**SGCN?:** Yes; No; Unknown; (blank) or Choose an item

### Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

There are monitoring programs carried out by the Rare Fish Unit, 1998-2012.

### Trends Discussion *(insert map of North American/regional):*

Over the last 10 years, this species has shown trend of relatively stable to decline of 30%. Numbers have diminished in the United States since 1925 (Scott and Crossman 1973). After severe declines in Pennsylvania during the 1970s and 1980s, populations have increased. Populations in Ohio are now believed to be stable after declines in the 1940s. In Kansas the river redhorse formerly was common; in the last 20 years only one record has been documented. Populations are declining in Canada (NatureServe 2012).

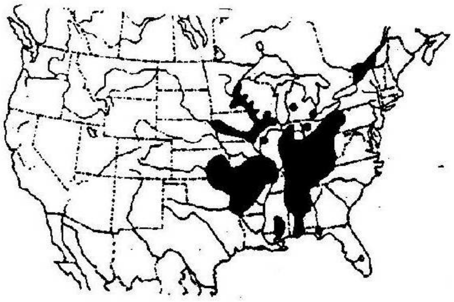
In New York, river redhorse has historically been found in 4 waters and their range is not declining (or gone or dangerously sparse) in the eastern sub-basin of the one watershed. The population has been recognized here for 20 years and is poorly understood. The frequency of occurrence in samples from 1998-2006 was very low (1%) and it was only in the 20 mile reach of the Allegheny River. There were 7 records, all occurring since 1978.

The distribution of this species among sub-basins (HUC 10) within the one watershed has changed in a similar pattern, with records from all the units in the recent period. There were records from 4 of the units for all time periods, and they were all caught in recent times. This narrowly restricted area was in the 20 mi reach of the Allegheny River. There have been only 11 site records for this species, all since 1978. Also, four of these were since 1993.

| Watershed name | Total # HUC10 | Early only | Recent only | both |
|---|---|---|---|---|
| Allegheny | 4 | 0 | 4 | 0 |

**Table 1**. Records of rare fish species in hydrological units (HUC-10) are shown according to their watersheds in early and recent time periods (before and after 1977) to consider loss and gains. Further explanations of details are found in Carlson (2012).

Family: Catostomidae
Common name: River Redhorse
Scientific name: Moxostoma carinatum



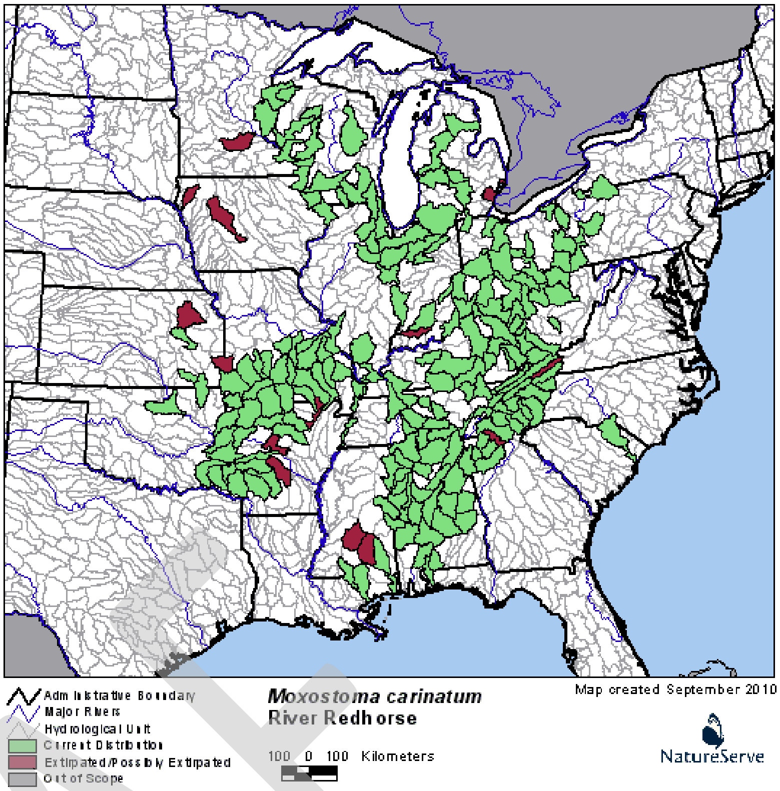


**Figure 1**. National range map of river redhorse (Page and Burr 1991, NatureServe 2012).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

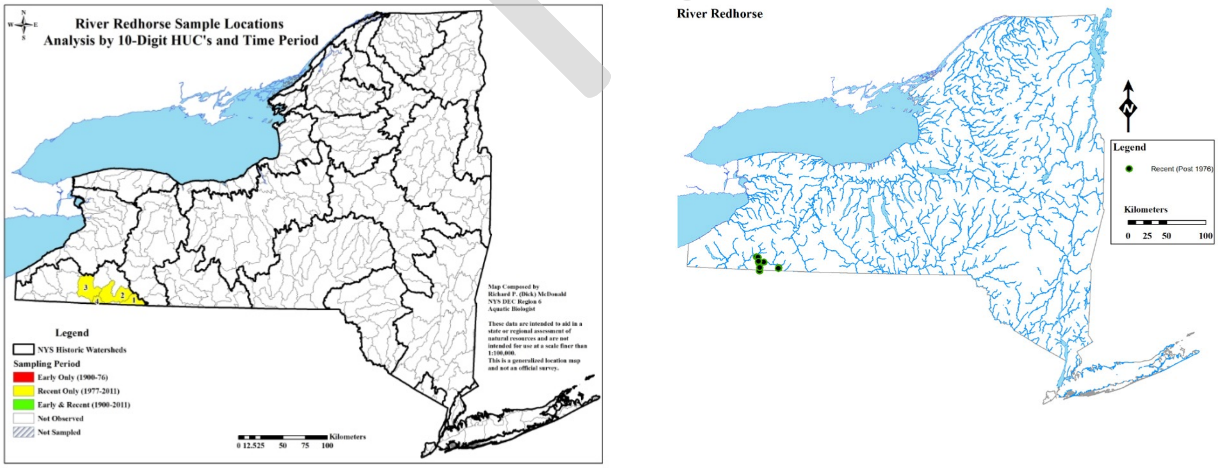


**Figure 2.** River redhorse distribution in New York, depicting fish sampled before 1977 and from 1977 to current time, shown with the corresponding HUC-10 units where they were found and the number of records.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| 🟥 |  | 0 |  |
| 🟧 |  |  |  |
| 🟨 |  | 11 | 1/18 watersheds |
| 🟩 |  |  |  |

**Table 2.** Records of river redhorse in New York.

### Details of historic and current occurrence:

This species was not reported in 1937 in the biological survey of the Allegheny watershed. It was likely present but not recorded until 1978.

River redhorse was first detected in New York in 1978 after the impoundment of Allegheny Reservoir, and it has since been known in Allegheny Reservoir (Becker 1982), the Allegheny River (1980), Tunungwant Creek (1978), Oswayo Creek (1998) and Dodge Creek (2003). Perhaps the impounded conditions of Allegheny Reservoir favored the species. Other recent records by DEC are unconfirmed and remain suspect.

This species is uncommon to rare with a discontinuous distribution throughout its range (NatureServe 2012).

### New York's Contribution to Species North American Range:

| Percent of North American Range in NY | Classification of NY Range | Distance to core population, if not in NY |
|---|---|---|
| 1-25% | Peripheral | 450 miles |

*Column options*

**Percent of North American Range in NY**: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item

**Classification of NY Range**: Core; Peripheral; Disjunct; (blank) or Choose an item

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

Medium River, Low Gradient, Assume Moderately Buffered, Warm

Reservoir/Artificial Impoundment

**a. Size/Waterbody Type:**

**b. Geology:**

**c. Temperature:**

**d. Gradient:**

### Habitat or Community Type Trend in New York

| Habitat Specialist? | Indicator Species? | Habitat/ Community Trend | Time frame of Decline/Increase |
|---|---|---|---|
| Yes | Yes | Unknown |  |

*Column options*

**Habitat Specialist and Indicator Species**: Yes; No; Unknown; (blank) or Choose an item

**Habitat/Community Trend**: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

### Habitat Discussion:

The river redhorse is found in larger streams (sometimes lakes) with moderate currents. Adults generally occupy moderate to swift water over clean gravel, boulders, and rubble, or in deep, fast-flowing portions of pools. Small individuals are often found in pool shallows and backwaters (NatureServe 2012). Parker (1988) felt it has the most restrictive habitat requirements of the redhorse species.

This species spawns in excavated nests over gravel and gravel-rubble in shoals or large runs (Lee et al. 1980, Becker 1983). Some medium-sized creeks or small rivers are ascended for spawning, but juveniles do not stay long in these smaller waterways.
They are intolerant of pollution and heavy siltation (NatureServe 2012). Its habitat vulnerability, distribution and trend in the Allegheny River is unknown for New York, but in Pennsylvania these habitats had earlier been severely polluted (Cooper 1985).

## V. Species Demographics and Life History

| Breeder in NY? | Non-breeder in NY? | Migratory Only? | Summer Resident? | Winter Resident? | Anadromous/ Catadromous? |
|---|---|---|---|---|---|
| Yes | Choose an item. | Choose an item. | Yes | Yes | Choose an item. |

*Column options*
**First 5 fields**: Yes; No; Unknown; (blank) or Choose an item
**Anadromous/Catadromous**: Anadromous; Catadromous; (blank) or Choose an item

### Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

River redhorse has an intermediate length life span; maximum longevity is 16 years. An estimate of maturity at three years may be an underestimate. Spawning takes place in the spring (NatureServe 2012).

## VI. Threats *(from NY 2015 SWAP or newly described)*

Jenkins and Burkhead (1994) feel this species is one of the least numerous species. It is also said to be trophically and behaviorally the most divergent of the redhorse species. It has fared poorly over the last 100 years, because of impoundments, siltation, and pollution. Habitat alteration, such as channelization, has also been identified as a major threat. These threats act as limiting factors because the redhorse seems to be inflexible in its habitat requirements and is intolerant of pollution and heavy siltation. It is vulnerable to major pollution events (such as toxic spills).

Siltation may be the reason the redhorse has a disjunct distribution (Scott and Crossman 1973). One major reason for the river redhorse's intolerance of turbidity and siltation is that the major food items of this fish require clean gravel-sand stream bottoms and are very susceptible to reduction or extirpation through excessive siltation. Food resources also are sensitive to toxicants. Food resource reductions in turn reduce redhorse populations (NatureServe 2012).

Shooting or gigging of spawners may contribute to local declines. In Oklahoma, the main threats are multiple impoundments in the Illinois River and chicken-farm runoff that enters the river from Arkansas.

In Quebec, this species is declining due to the removal of adults and habitat deterioration (Natureserve 2012).

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

**Yes:** _✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law.

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

Obtain better life-history information (NatureServe 2012). Large river habitat makes protection difficult. Identification requires very thorough examinations and often this includes sacrificing the fish.

Conservation actions following IUCN taxonomy are categorized in the table below.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| Land/Water Protection | Resource/Habitat Protection |
| Land/Water Management | Habitat/Natural Process Restoration |
| External Capacity Building | Alliance & Partnership Development |

**Table 3.** Recommended conservation actions for river redhorse.

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for the river redhorse.

**Habitat Research:**
---- Inventory the habitat requirements of this species and compare it to what's available in the literature, as part of the State Wildlife Grants project of 2004.

**Habitat Restoration:**
---- Habitat losses and restoration are part of a State Wildlife Grants project from 2003 that are directed at the Allegheny watershed.

**Population Monitoring:**
---- Surveys of the Allegheny River and Allegheny Reservoir during the time of spawning should be completed, and representative samples of all redhorse should be closely examined or preserved

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| | |
|---|---|
| **Originally prepared by** | Doug Carlson and Amy Mahar |
| **Date first prepared** | April 16, 2012 |
| **First revision** | July 16, 2013 (Samantha Hoff) |
| **Latest revision** | Transcribed March 2024 |

# Species Status Assessment Cover Sheet

**Species Name:** Round Whitefish **Date Updated:** January 2023
**Current Status:** Endangered – SGCN **Updated By:** Lisa Holst
**Current NHP Rank:** S1S2

**Distribution:** Round Whitefish lives in lakes with a well oxygenated deep zone and is native to seven of 18 watersheds in the New York and the Adirondack Mountains. Also, it has been known as non-native to the Oswegatchie watershed (previously stocked) with no records since 1955. Most of its range has decreased and it is extirpated from the Mohawk watershed. Records from Lake Ontario (Ontario watershed) occasionally come from Canada, and it has been assume that records from New York are stray fish. Today, Round Whitefish is still known to be in only six of its historic sites, all in the Adirondacks. A stocking program has established three additional self-sustained populations within its former range. This accounts for 9 sustained populations.

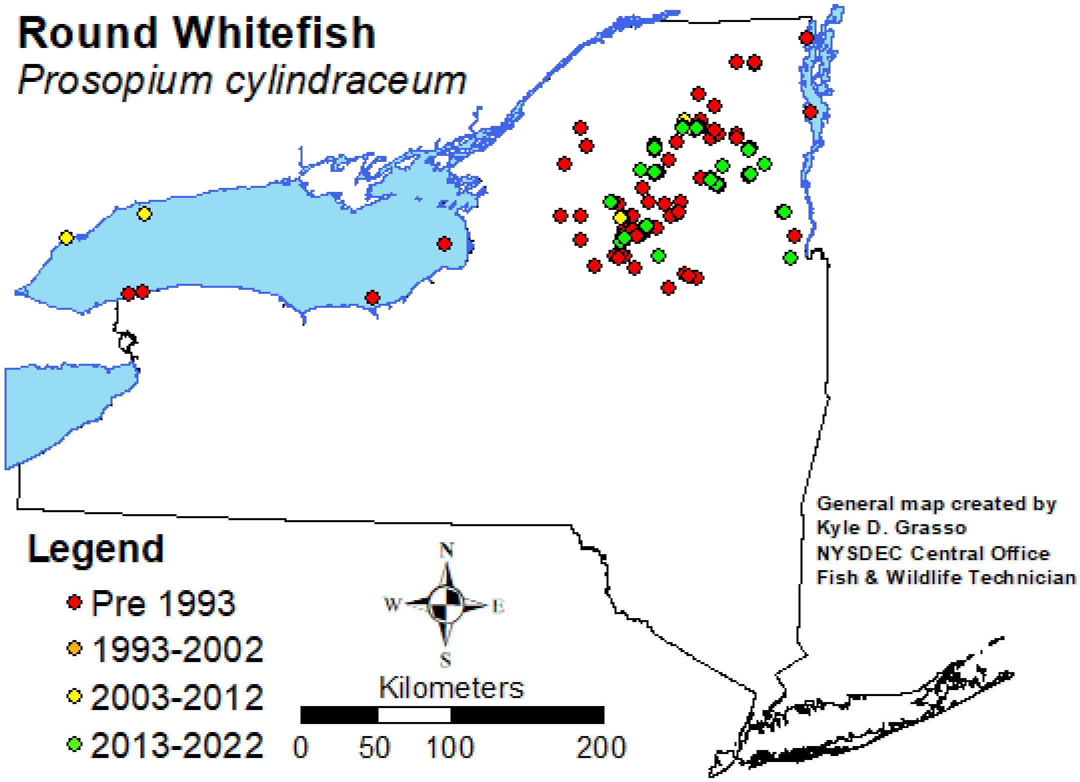
**Habitat:** Round Whitefish spawn in late fall to early winter in NY, often after ponds have frozen. Spawning occurs over gravel, cobble, sand, or rubble at depths of a few centimeters to 2 meters or more in shoals of lakes or at river mouths.

**Life History:** Eggs are broadcast over the spawning area with no parental care. Eggs hatch after approximately 140 days at 36°F (Smith 1985). A single female may carry 2,000 to 10,000 eggs. Newly hatched young begin to feed on plankton, then "as they grow their diet switches to benthic invertebrates, with mayflies, caddis flies, midge larvae and small molluscs appearing most commonly in their stomachs" (Werner 2004). The young reach 3-4.5 inches by the end of the first year of life. Both sexes become mature when they reach about 12 inches in length at age 3-4. Adult Round Whitefish rarely live longer than 13 years.

**Threats:** Invasive species, acidification, siltation, climate change.

**Population trend:** The continuing loss of native and other suitable waters to invasive competitors to Round Whitefish keeps the vulnerability of this species high. Lack of widespread recruitment thus far in stocked ponds is also troubling. The upward trend in the number of populations is solely due to stocking efforts.

**Recommendation:** It is recommended that the Round Whitefish be downlisted from Endangered to Threatened in light of the increased number of waters where it is currently extant, and the presence of a captive broodstock water for further restoration. Threats remain high.



# Species Status Assessment

**Common Name:** Round Whitefish **Date Updated:** January 2023

**Scientific Name:** *Prosopium cylindraceaum* **Updated by:** Lisa Holst

**Class:** Actinopterygii

**Family:** Salmonidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Round Whitefish has a distinctive torpedo-like shape and an inferior mouth. They are dark olive or brown dorsally fading to silvery white on the belly. Pectoral and pelvic fins may be brownish or yellowish (Smith 1985). They are benthic feeders on insects, mollusks, crustaceans, fish and fish eggs. The Round Whitefish occurs from Alaska in the northwest to Labrador and New England in the east. With the exception of Lake Erie, its distribution includes the Great Lakes. Round Whitefish live in lakes with a well oxygenated deep zone and is native to 7 of 18 watersheds in the Adirondack Mountains. It also occupies rivers in the northern part of its range and has been taken in brackish water in Hudson Bay (Smith 1985). It has also been known as non-native to the Oswegatchie watershed (previously stocked) with no records since 1955. It is extirpated from the Upper Hudson watershed. Its distribution within its historic range in NY had shrunk to 6 sites by 2007. A stocking program has targeted 24 additional lakes within the former range of Round Whitefish with documented reproduction in four of the stocked sites. One of the four to achieve reproduction Trout Pond, was subsequently invaded by smallmouth bass and has since declined below detection. Survival in a number of others has been recorded, but no further reproduction has been detected. Round Whitefish declined primarily due to warm water predators and acidification and remain threatened by these factors. Many waters across the Adirondacks are recovering from past acidification, but invasive species are continuing to spread and have invaded at least three of the six remaining endemic ponds. Recovery of the species remains quite fragile.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Endangered – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S1S2 **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Not Evaluated
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)
- New Hampshire: Threatened – S1

**Status Discussion:**

The species has a wide range across the Arctic drainages from North America and Asia. In North America it is found throughout Canada and as far south as northwestern Connecticut. It is considered common and secure throughout the majority of its range. It is critically imperiled in New Hampshire, New York, and Vermont. It was last observed in the Housatonic River, CT in 1996. Two populations remain in NH, but one is on the verge of disappearing. Distribution and status in Maine is poorly understood, though some populations are known to be declining and there is recruitment failure. Recent surveys of four northeastern Vermont lakes, where there had been historic occurrences of Round Whitefish populations, now appear to be limited to a single population in Lake Willoughby.

Its distribution within its historic range in NY had shrunk to 6 sites by 2007. A stocking program has targeted 24 additional lakes within the former range of Round Whitefish with documented reproduction in four of the stocked sites. One of the four to achieve reproduction, Trout Pond, was subsequently invaded by smallmouth bass and has since declined below detection. Survival in a number of other stocked ponds has been recorded, but no further reproduction has been detected.

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**__✓__ **Unknown:**_____

**Time Frame Considered:** Last 30 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 20 years

### c. Adjacent States and Provinces

**MASSACHUSETTS** **Not Present:**__✓__ **No Data:**_____

**NEW JERSEY** **Not Present:**__✓__ **No Data:**_____

**PENNSYLVANIA** **Not Present:**__✓__ **No Data:**_____

**CONNECTICUT** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**__✓__

**Time Frame Considered:** Last 30 years

**Listing Status:** Not Listed/SNR (nonnative?) **SGCN?:** Yes

**VERMONT** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**__✓__ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 20 years (list updated 2/2022)

**Listing Status:** Not Listed – S1 **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 20 years

**Listing Status:** S4 **SGCN?:**_____

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 20 years

**Listing Status:** S4 **SGCN?:**_____

**d. New York**

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 30 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit and a study by Steinhart et al. (2007).

**Trends Discussion** *(insert map of North American/regional):*

In the northeastern US, this species is in decline due to climate change, invasive species and habitat loss. The Canadian and Asian Artic portions of the species range seem secure. Losses in the northeastern US are unlikely to improve without intervention and continued supportive management of the species.

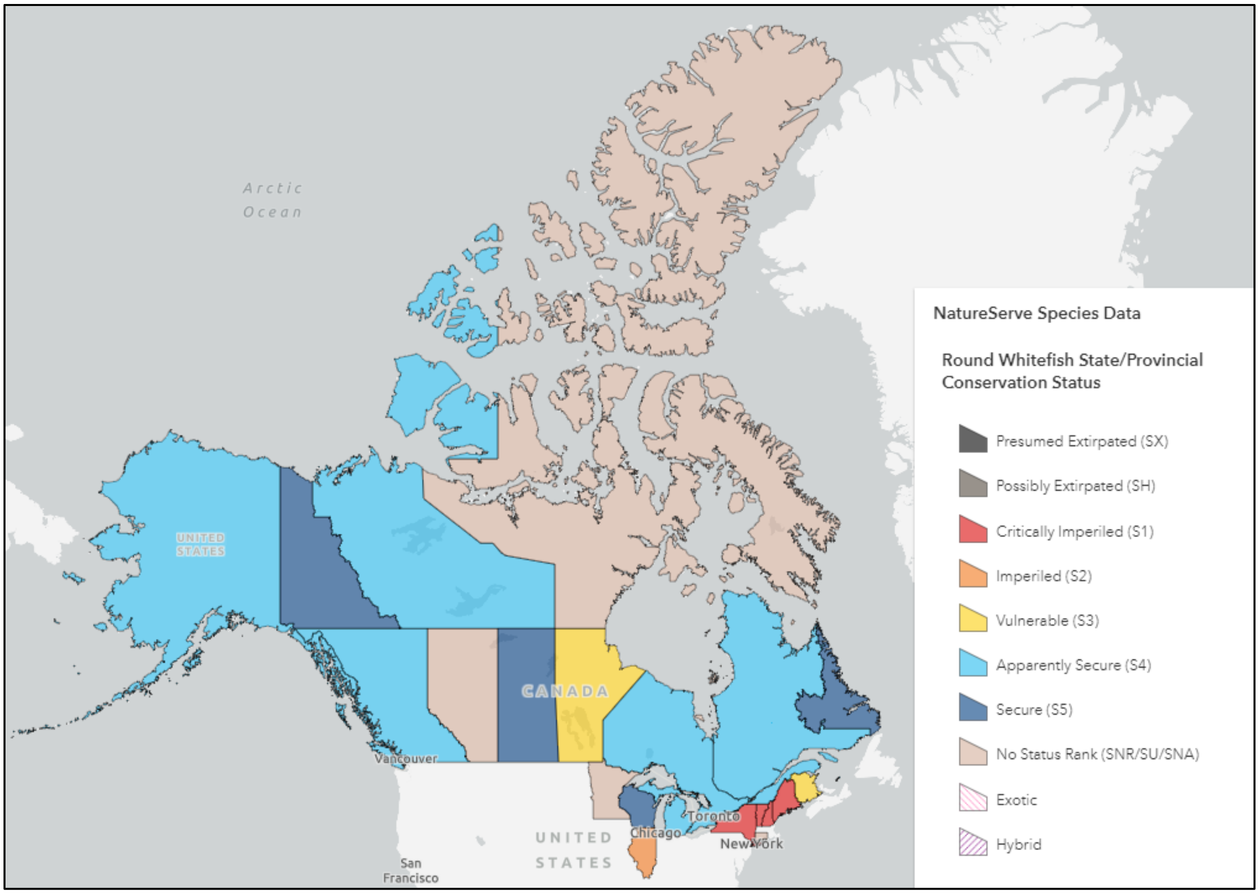


**Figure 1:** Round Whitefish distribution and status (Source: NatureServe 2022).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

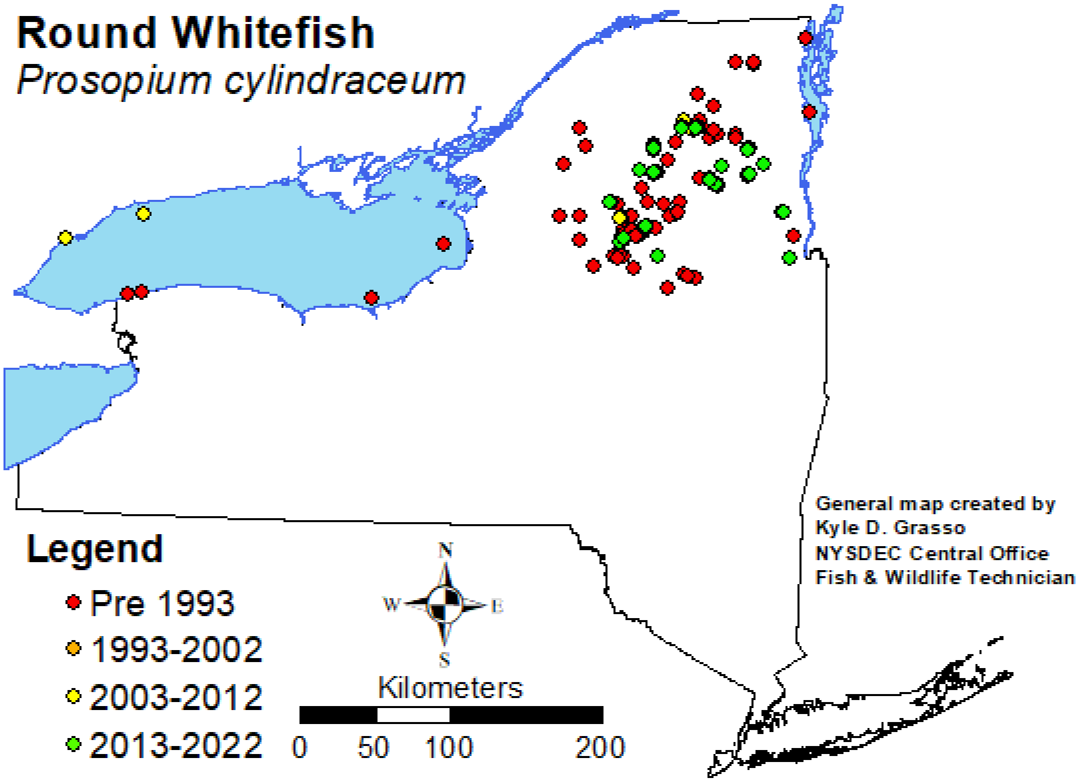


**Figure 2:** Records of Round Whitefish in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 140 | 68 | 11-25% |
| **1993-2002** | 31 | 9 | 11-25% |
| **2003 - 2012** | 192 | 20 | 11-25% |
| **2013 - 2022** | 71 | 19 | 11-25% |

**Table 1:** Records of Round Whitefish in New York.

### Details of historic and current occurrence:

In New York State, Round Whitefish were native to Lake Ontario and waters in the Adirondack Mountains and were introduced widely into additional waters between 1895 and 1918 as a potential sport fish. Early reports from the Commissioners of Fisheries, Game, and Forests of the State of New York document their presence in at least 86 waters, including waters not known to have supported Round Whitefish previously. The species experienced a rapid decline in the mid-20th century and by 1979 the number of ponds supporting Round Whitefish had fallen to 15 (Conely et al. 2019; Steinhart et al. 2007).

Despite its listing ad endangered in New York, Round Whitefish distribution within its historic range in NY had shrunk to six sites by 2007. Of those six sites, three have been documented to have invasive species in them. A stocking program has targeted 24 additional lakes within the former range and documented reproduction in four of the stocked sites. One of the four to achieve reproduction, Trout Pond, was subsequently invaded by smallmouth bass and has since declined below detection. Survival in a number of other stocked ponds has been recorded, but no further reproduction has been detected.

**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%:_____ | Peripheral:_✓___ |
| 51-75%:_____ | Disjunct:_____ |
| 26-50%:_____ | Distance to core population: |
| 1-25%:_✓___ | _________________________________ |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

a. **Size/Waterbody Type:** Summer-stratified Monomictic Lake/Oligotrophic Dimictic Lake/Great Lake

b. **Geology:** Low-moderately buffered

c. **Temperature:** Cold

d. **Gradient:** Low, lentic

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_✓___ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:**____________________________________________

**Habitat Specialist?** **Yes:**_✓___ **No:**_✓___

**Indicator Species?** **Yes:**_✓___ **No:**_✓___

### Habitat Discussion:

Habitat availability for Round Whitefish is shrinking due to climate change, invasive species, and chloride mediated lake alterations. Of the historic waters known to support Round Whitefish, most of the largest like Blue Mountain Lake, and the Raquette and Fulton chains of lakes are unavailable for restoration due to invasive species. A scant few like West Lake in the West Canada Wilderness are recovering from acidification, but recent changes to the federal Clean Air Act implementing regulations threaten this recovery.

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The Round Whitefish is a medium-sized fish, averaging 8-12 inches in length and occasionally reaching 22 inches. Its body shape is long and tubular with a nearly round midsection (hence its name). Its head is short and its mouth is small and inferior (snout extends beyond lower jaw). A single flap exists between the nostrils, distinguishing it from other whitefishes and ciscoes. The Round Whitefish is olive-brown on top shading to silver below. Young Round Whitefish have rows of black spots (called parr marks) similar to those of young trout and salmon.

Round Whitefish spawn in late fall to early winter in NY, often after ponds have frozen. Spawning occurs over gravel, cobble, sand, or rubble at depths of a few centimeters to 2 meters or more (Smith 1985; Normandeau 1969; Werner 2004) in shoals of lakes or at river mouths. Males arrive to spawning areas first and eggs are broadcast over the spawning area with no parental care (Werner 2004). Eggs hatch after approximately 140 days at 36°F (Smith 1985). A single female may carry 2,000 to 10,000 eggs (Werner 2004).

Newly hatched young begin to feed on plankton, then “as they grow their diet switches to benthic invertebrates, with mayflies, caddis flies, midge larvae and small molluscs appearing most commonly in their stomachs” (Werner 2004). The young reach 3-4.5 inches by the end of the first year of life. Both sexes become mature when they reach about 12 inches in length at age 3-4. Adult Round Whitefish rarely live longer than 13 years.

## VI. Threats *(from NY CWCS Database or newly described)*

- Invasive species (primarily rainbow smelt, black bass, yellow perch)
- Climate change
- Lake acidification
- Spawning habitat loss through siltation

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Round Whitefish is currently listed as an endangered species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

- Continue to reclaim and restock geomorphically suitable waters with Round Whitefish and compatible native species like lake trout and heritage strain brook trout.
- Continue to monitor extant waters for the presence of Round Whitefish and invasive species.

The 2005 State Wildlife Action Plan included the following recommendations:

Population Monitoring:

-Studies are being conducted to determine the causes of population declines and losses within the Adirondack region, especially the impact of acid rain and invasive species.

Relocation/Reintroduction:

-Establish populations.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Site/Area Management |
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Land/Water Management | Habitat & Natural Process Restoration |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Round Whitefish.

## VII. References

Carlson, D. M., R. Daniels, and J. Wright. 2016. Atlas of inland fishes of New York. New York State Education Department. Albany, New York. 362 pp.

Conley, A. K., M. D. Schlesinger, T. G. Howard, L. Holst, and J. Daley. 2019. Habitat suitability and management options for maintaining Round Whitefish (*Prosopium cylindraceum*) in Adirondack ponds. New York Natural Heritage Program and New York State Department of Environmental Conservation, Albany, NY.

NatureServe. 2022. NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available at: <https://explorer.natureserve.org> (Accessed: July 14, 2022).

Normandeau, D. A. 1969. Life history and ecology of Round Whitefish *Prosopium cylindraceaum* (Pallas) of Newfound Lake, Bristol, New Hampshire. Trans. Am. Fish. Soc. 98(1): 7-13.

Smith, C. L. 1985. The inland fishes of New York State. New York State Department of Environmental Conservation. Albany, New York. 522 pp.

Werner, R. G. 2004. Freshwater fishes of the northeastern United States: A field guide. Syracuse University Press. Syracuse, New York. 335 pp.

# Species Status Assessment Cover Sheet

**Species Name:** Sauger

**Date Updated:** January 2023

**Current Status:** Not Listed – HPSGCN

**Updated by:** Jeff Loukmas

**Current NHP Rank:** S1

**Distribution:** The Sauger is found in the St. Lawrence River, Great Lakes, Hudson Bay, and Mississippi River basins from Quebec to Alberta and southward to northern Louisiana. In New York, Sauger were known to inhabit the Lake Erie, Lake Ontario, St. Lawrence River, and Lake Champlain drainage basins

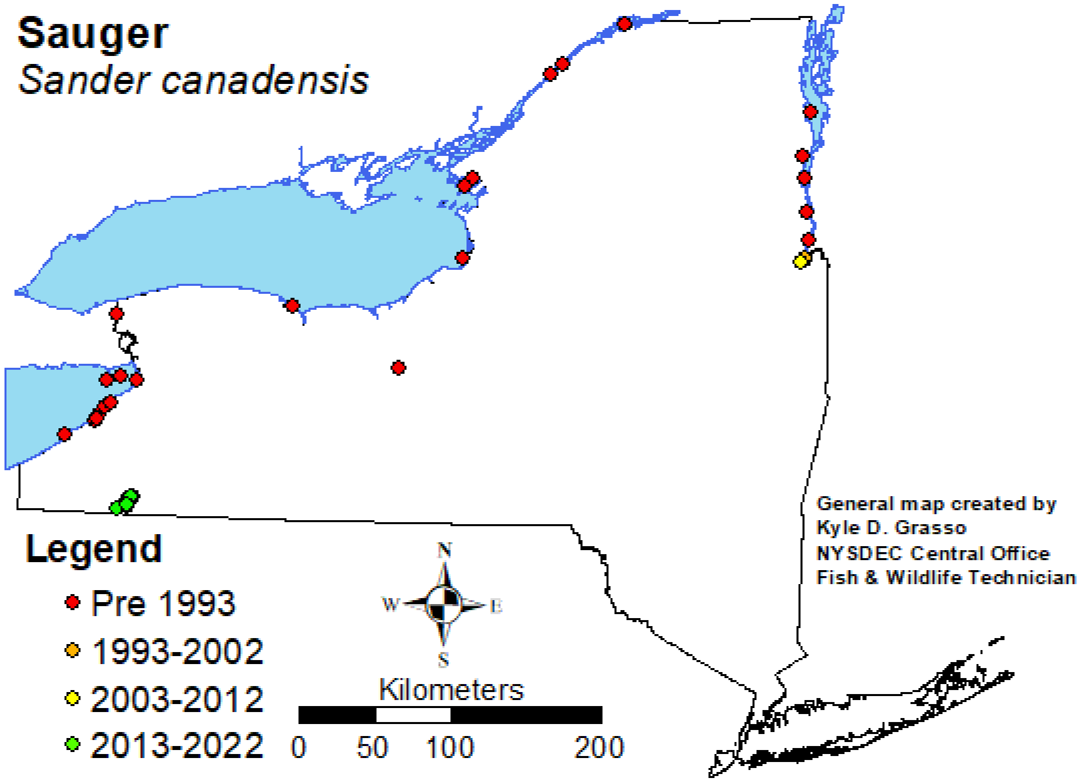
**Habitat:** Sauger typically occur in large turbid rivers and lakes. The highly migratory nature of Sauger reflects their dependence on unimpeded access to the wide diversity of physical habitats that are present in large river and lake systems. Physiological adaptations, such as a highly advanced light-gathering retina, allow Sauger to thrive in low light environments, and thus turbidity is considered a key component of suitable habitat.

**Life History:** The average lifespan of Sauger is about 7 years old, but this varies by location. In the north, males sexually mature in 2-3 years and females mature in 4-6 years. During late winter adult Sauger begin to migrate to spawning locations. Spawning commences when water temperatures reach about 43 - 55 F. Females deposit 9,000 to 200,000 eggs, depending on size of fish, and leave the area soon after spawning. No parental care is provided and eggs hatch in 1 to 4 weeks. Sauger are the most migratory percid in North America and have been found to move great distances in large river systems. These long migrations are most often linked to the need to find suitable spawning habitats and the return trip to non-spawning “home” locations.

**Threats:** Threats to the Sauger include impoundments, low water flows, channelization, pollution and siltation near spawning bars, contaminants, changes (more clarity) in lake turbidity, and introgressive hybridization with Walleye.

**Population trend:** The Great Lakes/St. Lawrence populations are now extirpated. Lake Champlain had the last known viable population in New York, but the last confirmed record was in 2010 and it may now be extirpated from the lake. In 2014 the New York State Department of Environmental Conservation began a stocking program to establish a self-sustaining Sauger population in the upper Allegheny River watershed. Monitoring for this program indicates that stocked fish are surviving and growing well, and there are some indications that spawning is taking place.

**Recommendation:** It is recommended that the Sauger be listed as Special Concern due to the unknown status of Lake Champlain populations and the ongoing restoration efforts.



# Species Status Assessment

**Common Name:** Sauger **Date Updated:** January 2023

**Scientific Name:** Sander canadensis **Updated by:** Jeff Loukmas

**Class:** Osteichthyes (bony fishes)

**Family:** Percidae (perch)

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

Sauger are North American members of the true perch family, Percidae, and closely resemble Walleye in both appearance and function. They typically occur in large turbid rivers and lakes and their highly migratory nature reflects their dependence on the diversity of physical habitats that are present in these systems. Their historical range included the St. Lawrence River, Great Lakes, Hudson Bay, and Mississippi River basins from Quebec to Alberta and southward to northern Louisiana. Sauger are common and considered a popular sportfish in portions of their range, but have been declining or disappearing from the Great Lakes and the periphery of their range. In New York, Sauger were known to inhabit the Lake Erie, Lake Ontario, St. Lawrence River and Lake Champlain drainage basins, but the Great Lakes/St. Lawrence watershed populations are now extirpated. Lake Champlain had the last known viable population in New York, but the last confirmed record was in 2010 and it may now be extirpated from the lake. In 2014 the New York State Department of Environmental Conservation began a stocking program to establish a self-sustaining Sauger population in the upper Allegheny River watershed. Monitoring for this program indicates that stocked fish are surviving and growing well, and there are some indications that spawning is taking place.

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – HPSGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S1 **Tracked by NYNHP?:** No

**Other Ranks:**

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)

**Status Discussion:**

The Sauger is globally ranked as Secure due to a large number of locations and subpopulations, but their New York state rank is Critically Imperiled because the species has declined or become extirpated from most of its historical range within the state (NatureServe 2022).

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:** _____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:** _____

**NEW JERSEY** **Not Present:** ✓ **No Data:** _____

**PENNSYLVANIA** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** No

**VERMONT** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S1 **SGCN?:** Yes

**ONTARIO** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** _____ **Unknown:** ✓

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** _____ **Unknown:** ✓

**Time Frame Considered:** _____

**Listing Status:** Not Listed – S4 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**_✓_

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:**_✓_

**Time Frame Considered:**_____________________________________

**Listing Status:** Not Listed – S5 **SGCN?:** N/A

**d. New York**

**i. Abundance**

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:**_✓_ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Since 1950s

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. Annual boat electrofishing surveys in the Allegheny Reservoir. Angler creel surveys in Lake Champlain, 2021-2022. Annual NYSDEC warmwater gillnetting surveys in Lake Erie and Lake Ontario.

**Trends Discussion** (*insert map of North American/regional*):

Sauger are widely distributed across eastern and central North America and their historical range included the St. Lawrence River, Great Lakes, Hudson Bay, and Mississippi River basins from Quebec to Alberta and south to northern Louisiana. It was introduced to several Gulf and Atlantic coast drainages. However, the once thriving Lake Erie population is now considered “regionally extinct” and Sauger are declining in abundance or disappearing from other portions of their range, especially at the periphery. Despite this, populations do still exist in the lower Saint Lawrence River drainage and in Lake Winnebago in the upper Great Lakes drainage.

In New York, this species has likely been extirpated in the Erie, Ontario, Oswego and St. Lawrence watersheds. The population in South Bay of Lake Champlain was studied in the 1960s, and in 1983 and 1984. After a Sauger was caught in the southern part of Lake Champlain in 2010, NYSDEC began a monitoring program to help track its occurrence, but none have since been recorded there. The Sauger population nearest to Lake Champlain is in Lake Saint-Pierre, Québec, and these lakes are connected via the Richelieu River. In 2017, an assessment of the Lake Saint-Pierre population determined that it was suitable for use as a potential brood stock source option for a Lake Champlain restoration effort. A draft plan to restore the Lake Champlain Sauger population has been developed (Loukmas 2019), but implementation of the plan is on hold pending development of a more comprehensive fisheries management plan for the lake.

In the Allegheny River, Sauger are common in the 60 mile stretch of river above Pittsburgh (to Lock and Dam 9) and are found as far north as Warren, Pennsylvania, but are blocked from the New York portion of the watershed by the Kinzua Dam. In 2014, a reintroduction program was initiated to establish a self-sustaining Sauger population above the dam. Annual monitoring has documented good survival and growth of multiple stocked year classes and some evidence that spawning is taking place (Brewer et al. 2021).

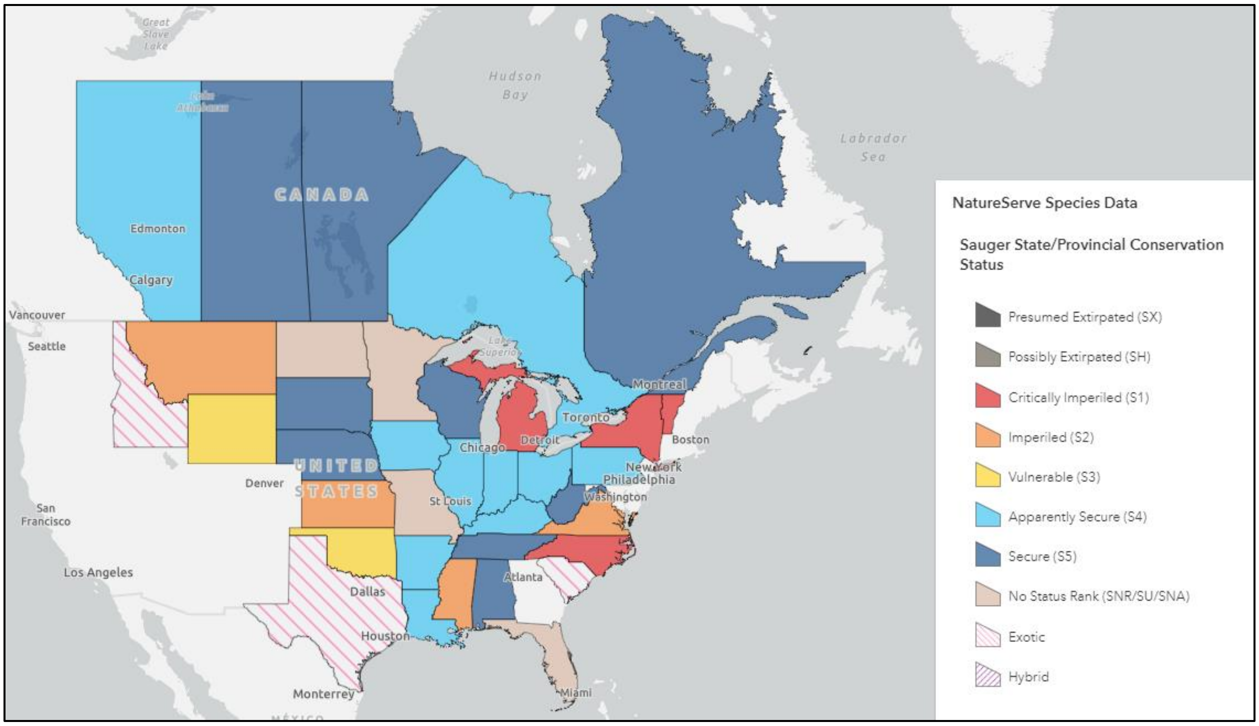


**Figure 1:** Sauger distribution and status (Source: NatureServe 2022).

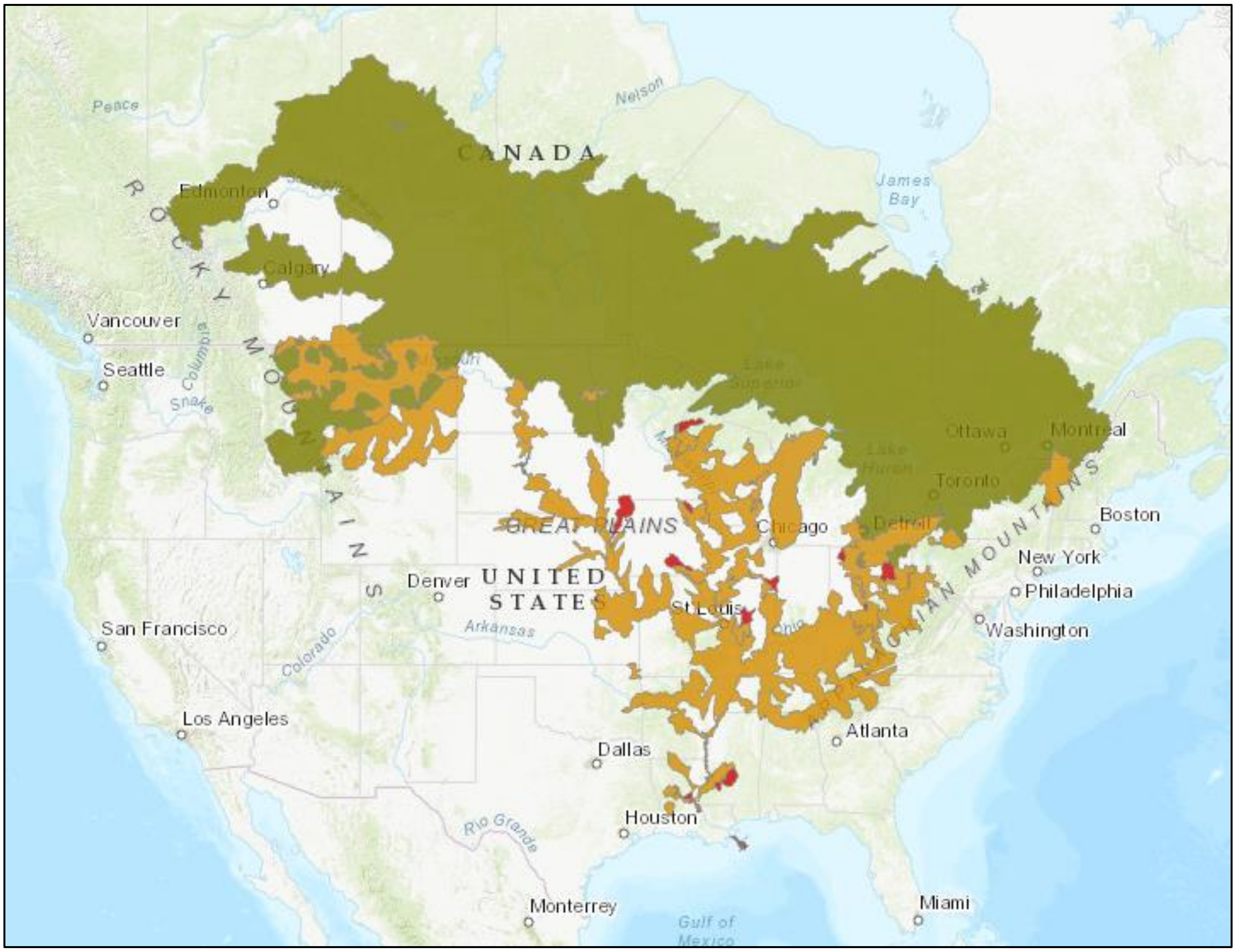


**Figure 2:** Sauger distribution.
Brown=Extant, Green=Probably Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

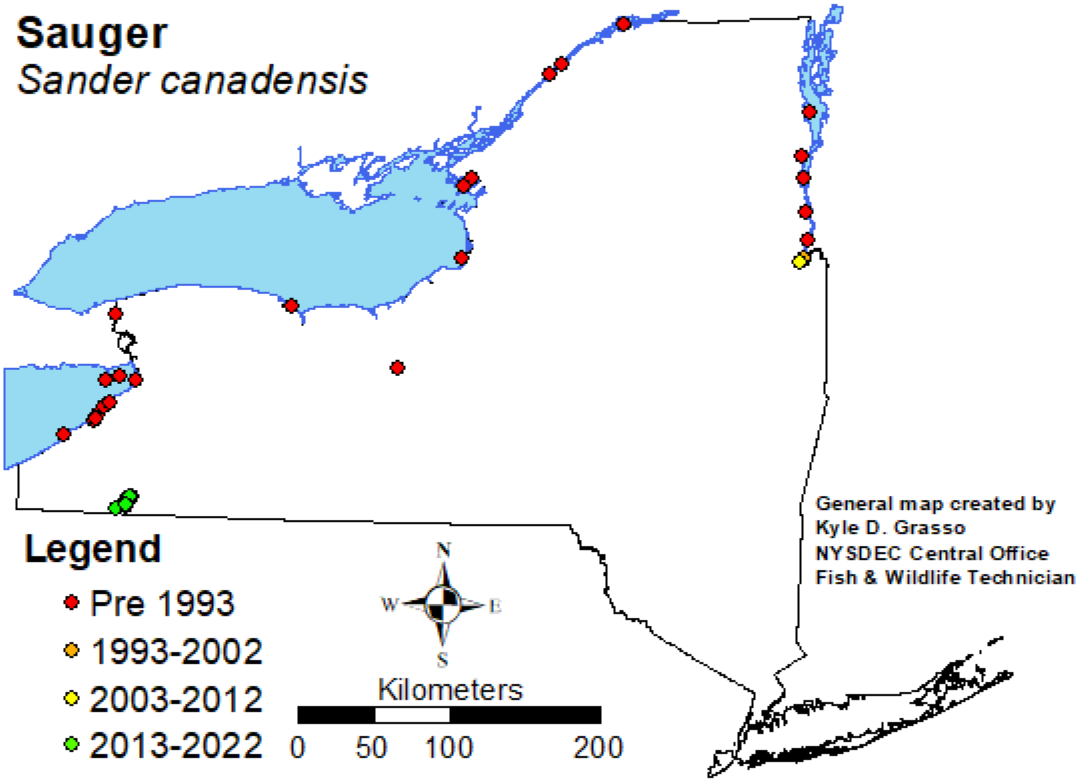


**Figure 3:** Records of Sauger in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 33 | 7 | 11-25% |
| **1993-2002** | 1 | 1 | 11-25% |
| **2003 - 2012** | 1 | 1 | 11-25% |
| **2013 - 2022** | 48 | 1 | 11-25% |

**Table 1:** Records of Sauger in New York.

### Details of historic and current occurrence:

Sauger were commonly caught in Lake Erie and peaked in the commercial landings around 1916. However, it decreased gradually to very low levels by 1956. It appears to be extirpated in Lake Ontario, but was reported as abundant in the mid-1800s in Burlington Bay (Ontario). The Allegheny River had Sauger as far upstream as Warren, PA, but there are no historical records from the New York portion of the river, 30 miles upstream (Fowler 1909, 1919). Another early record of interest is from Cayuga Lake (Meek 1884) and possibly associated with Seneca River (Greeley 1928).

Sauger have become extirpated in New York's watersheds of the Erie-Niagara, Ontario, Oswego and St. Lawrence River, and likely also in Lake Champlain. Some of the recent catches were reported by Anderson (1978), Aquatec (1988), Nettles et al. (2005) and E. Zollweg of DEC (2010). A restoration program that was initiated in 2014 in the Allegheny watershed has established a population of multiple year classes of stocked fish, with some indications of spawning (Brewer at al. 2021).

### New York’s Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:**_✓___

**Classification of New York Range**

**Core:**_____

**Peripheral:**_✓___

**Disjunct:**_____

**Distance to core population:**

Core pop. to the NW and SW

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Small rivers to medium mainstem rivers and large lakes

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to low-moderate gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_✓___ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:**_____________________________________

**Habitat Specialist?** **Yes:**_✓___ **No:**_____

**Indicator Species?** **Yes:**_____ **No:**_✓___

### Habitat Discussion:

Sauger typically occur in large turbid rivers and lakes (Becker 1983). The highly migratory nature of Sauger reflects their dependence on unimpeded access to the wide diversity of physical habitats that are present in large river and lake systems. Physiological adaptations, such as a highly advanced light-gathering retina, allow Sauger to thrive in low light environments, and thus turbidity is considered a key component of suitable habitat (Crance 1987). Other important riverine habitat features include low channel slope and deep, low-velocity pools (Crance 1987, Hesse 1994). Diverse, natural river channels are preferred over relatively simple, uniform channelized segments (Hesse 1994). River impoundments and lakes can be seasonally important as overwintering and pre- and post spawning habitats (Nelson 1968, Pitlo 1992). In large lakes and reservoirs, Sauger may depend on lentic habitats year-round, only using tributaries during spawning (Ickes et al. 1999). It prefers sand and gravel runs, sandy and muddy pools and backwaters. In rivers, it spawns in deep rocky runs, while in lakes it spawns along sandy and rocky shores and over rocky reefs at depths of 0.6-3.6 m. (NatureServe 2022). Spawning areas in the Great Lakes were inventoried by Goodyear et al. (1982).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Sauger have an intermediate length life span. In the north, males sexually mature in 2-3 years and females mature in 4-6 years (Scott and Crossman 1973). During late winter adult Sauger begin to migrate to spawning locations. Spawning commences when water temperatures reach about 43 - 55 F; spawning can last for 2 weeks or more (Nelson 1968, Pitlo 1992, Etnier and Starnes 1993). Females deposit 9,000 to 200,000 eggs, depending on size of fish, and leave the area soon after spawning (Etnier and Starnes 1993, Rohde et al. 1994, Ross 2001). No parental care is provided and eggs hatch in 1 to 4 weeks, depending on water temperature; the higher the water temperature, the sooner the eggs will hatch (Nelson 1968, Smith 2002, Pitlo et al. 2004). Young Sauger grow rapidly, attaining half their maximum adult size in two years. Growth is positively related to water temperature and is typically faster in reservoirs than in rivers. Southern Sauger grow faster than those in the north, but northern Sauger tend to live longer and can attain the same ultimate size as their southern counterparts (Scott and Crossman 1973, Boshung and Mayden 2004). The average lifespan of Sauger is about 7 years old, but this varies by location (Preigel 1969). Sauger are the most migratory percid in North America and have been found to move great distances in large river systems (Collette et al. 1977, Pegg et al. 1997, Jaeger et al. 2005). These long migrations are most often linked to the need to find suitable spawning habitats and the return trip to non-spawning “home” locations (Mammoliti 2007).

## VI. Threats *(from NY CWCS Database or newly described)*

The Sauger is perhaps New York’s most imperiled fish species. There is only one known location where it currently exists, and the status of that population is unknown; because of the scarcity of records over the last 15 years it is at risk of extirpation. The reasons for the decline of Sauger in Lake Champlain are unknown, therefore threats specific to this population cannot be assessed at this time.

In general, Sauger are highly migratory, spawn in few specialized areas, and rely on a diverse mix of habitats with high turbidities, flowing waters, and natural temperatures throughout their lifespan. They have evolved to benefit from the continuity and complexity of large river and lake systems (Mammoliti 2007). These characteristics make Sauger highly sensitive to habitat fragmentation and alterations. Migration barriers, operation of impoundments, low water flows, and channelization have all been implicated as causes of Sauger population declines (Regier et al. 1969, Hesse 1994, Pegg et al. 1997, McMahon and Gardner 2001, Jaeger et al. 2005).

The elimination of this species in western Lake Erie is recognized as resulting from pollution and siltation near spawning bars, contaminants, changes (more clarity) in lake turbidity and introgressive hybridization with Walleye (Leach and Nepszy 1976, Ryan et al. 2003). Overharvest may have contributed to its demise since the species exhibits slow growth and late maturity. Also, the development of a salmonid fishery may have increased the abundance of predators to a number sufficient to reduce Walleye, Sauger and smelt.

The loss of quality habitat when the Montezuma Marsh was drained in the early 1900s was poorly documented, but the elimination of Sauger there was echoed with the elimination of Bigeye Chub, Pugnose Shiner, and Redfin Shiner from the same areas.

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

**Yes:** _✓_ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations. Sportfishing regulations set to restrict take under the authority of the NYS Fish and Wildlife Law (Article 11) and detailed in NYCRR Title 6.

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

In 2013, the New York State Department of Environmental Conservation implemented a Conservation Management Plan to restore Sauger to their native watersheds (Loukmas 2013). Initial restoration efforts are being directed towards the Allegheny River watershed, where a stocking program is being conducted to establish a self-sustaining population (Brewer et al. 2021). Surveys have documented good growth and survival of stocked fish, which are encouraging signs for establishing the population. Fish will be stocked through 2023 and then a full evaluation will take place to determine the status of the population and guide future management.

A draft plan to restore the Lake Champlain Sauger population was developed (Loukmas 2019), but implementation of the plan is on hold pending the development of a more comprehensive fisheries management plan for Lake Champlain. Potential broodstock sources, methods and facilities for raising fish, and appropriate stocking details (numbers of fish needed, locations, etc.) are the criteria detailed in the draft plan.

Fishing for Sauger is prohibited in New York State while restoration work is being conducted.

The 2005 Comprehensive Wildlife Conservation Strategy includes recommendations for the following actions for the Sauger:

<u>Fact Sheet:</u>

-Develop fact sheet on Sauger.

<u>Habitat Monitoring:</u>

-Monitor habitat for changes in turbidity.

<u>Habitat Research:</u>

-Research habitat requirements for Sauger in New York.

<u>Life History Research:</u>

-Research biology of Sauger as it relates to hybridization with Walleye.

<u>Population Monitoring:</u>

-Monitor for presence in Lake Champlain watershed to determine whether or not species is decline in this watershed.

-Monitor existing Sauger populations in Lake Champlain and the Poultney River.

The 2015 State Wildlife Action Plan includes the following recommendations for Sauger:

-Restore Sauger and monitor population in the Allegheny watershed

-Assess Sauger population and habitat use, and restore historic habitats where feasible in Lake Erie

-Lake Champlain - Assess Sauger population and habitat use, and restore habitat where feasible in Lake Champlain

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***[https://www.iucnredlist.org/resources/conservation-actions-classification-scheme](https://www.iucnredlist.org/resources/conservation-actions-classification-scheme)***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource/Habitat Protection |
| **2.** Land/Water Management | Habitat/Natural Process Restoration |
| **3.** Land/Water Management | Invasive/Problematic Species Control |
| **4.** Species Management | Species Reintroduction |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Sauger.

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# Species Status Assessment Cover Sheet

**Species Name:** Silver Chub **Date Updated:** January 2023

**Current Status:** Endangered – Non-SGCN (due to presumed extirpation) **Updated By:** Kyle Grasso

**Current NHP Rank:** SH

**Distribution:** Silver Chub have a wide distribution from Manitoba south to Minnesota, east throughout the Upper Mississippi, Ohio, and Lake Erie drainages, and south to the Gulf Coast from Alabama to Texas. In New York, their historic range consists of the shores of Lake Erie, Lake Ontario, and the mouths of tributary creeks; however, they have not been caught in New York since 1928 and are considered extirpated.

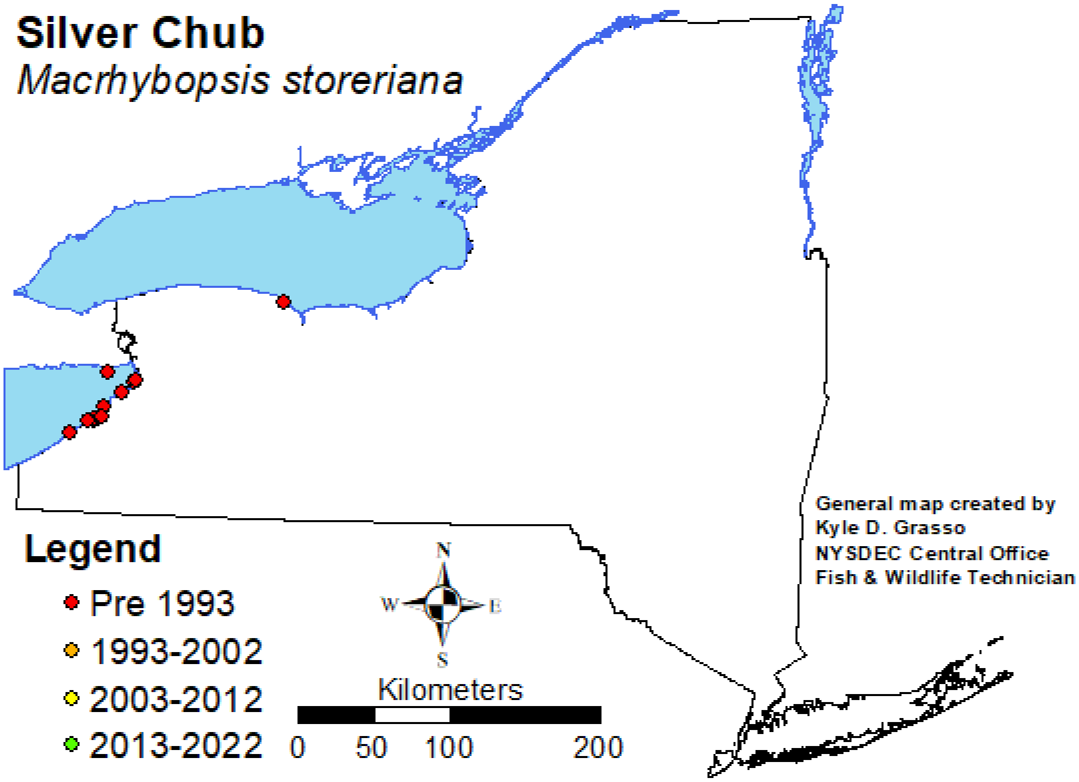
**Habitat:** Silver Chubs inhabit the backwaters of large lakes and the pools of sluggish, low gradient, large streams with sand, silt, and gravel substrate. They are not typically associated with aquatic vegetation. In Lake Erie, they've been caught at depths up to 20 meters deep. Silver Chubs migrate from deep water to shallow waters in spring, which is likely a positive thermotropic response. Robison and Buchanan (1992) stated that the species appears to be tolerant of siltation and turbidity; however, in Ohio, they reached greatest abundance over substrates of clean gravel and sand and appeared to be susceptible to many types of pollutants.

**Life History:** Silver Chubs can live for 3-4 years and typically reach maturity at 2+ years. Kinney (1954) reported that in western Lake Erie, spawning occurs in open water from mid-June through mid-August, peaking the last week in June and first week in July. Spawning occurs at water temperatures between 20.8-22.7°C, and probably occurs earlier in warmer bays and later in open lake. Goodyear et al. (1982) suggested that Silver Chub historically spawn over clean gravel substrates in tributaries of Lake Erie. Trautman (1981) reported that many individuals died after spawning and observed significant mortalities along Lake Erie beaches.

**Threats:** Threats to the Silver Chub include poor water quality (nutrient and sediment loading and contaminants), habitat degradation, low food supply, and competition with invasive species.

**Population trend:** In New York, their historic range consists of the shores of Lake Erie, Lake Ontario, and the mouths of tributary creeks; however, they have not been caught along the shores of New York since 1928 and are considered extirpated.

**Recommendation:** It is recommended that the Silver Chub be delisted because they have not been recorded in New York since 1928 and are considered extirpated.



# Species Status Assessment

**Common Name:** Silver Chub **Date Updated:** January 2023

**Scientific Name:** *Macrhybopsis storeriana* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Silver Chub is in the class Actinopterygii and the family Cyprinidae (minnows and carps). The Silver Chub has a wide distribution from Manitoba south to Minnesota, east throughout the Upper Mississippi, Ohio, and Lake Erie drainages, and south to the Gulf Coast from Alabama to Texas (NatureServe 2022). In New York, their historic range consists of the shores of Lake Erie, Lake Ontario, and the mouths of tributary creeks; however, they have not been caught along the shores of New York since 1928 and are considered extirpated (Carlson et al. 2016). Silver Chubs inhabit the backwaters of large lakes and the pools of sluggish, low gradient, large streams with sand, silt, and gravel substrate (Boyko and Staton 2010; Stauffer et al. 2016; NatureServe 2022). In Lake Erie, they've been caught at depths up to 20 meters deep (Kinney 1954; Trautman 1981; Stauffer et al. 2016).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Endangered – Non-SGCN (due to presumed extirpation)

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** SH **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC): See Status Discussion

### Status Discussion:

In New York, the Silver Chub is currently listed as Endangered. However, they are currently listed as a Non-SGCN because they have not been recorded in New York since 1928 and are presumed extirpated. The Silver Chub is globally ranked as Secure by NatureServe.

In Pennsylvania, the Silver Chub was removed from the Endangered Species List in 2010. "The Silver Chub was listed as endangered based on a limited number of collections and apparent low numbers. Field surveys conducted throughout the historic Pennsylvania range since 1990 have documented an expansion in range and population size compared to pre-1990 information. These species were considered extirpated during the first half of the 20th century; however, recent electrofishing and benthic trawl surveys have documented a more or less continuous distribution throughout the Ohio River and lower reaches of the Monongahela and Allegheny Rivers" (2010 58 Pa. Code Ch. 75 Rules and Regulations - 40 Pa.B. 3664).

In Canada, "the species was considered a single unit and designated Special Concern in April 1985. Status re-examined and confirmed in May 2001. Split into two populations in May 2012. The "Great Lakes - Upper St. Lawrence populations" unit was designated Endangered in May 2012.

The “Saskatchewan - Nelson River populations” unit was designated Not at Risk in May 2012” (COSEWIC 2012).

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** PA recently found stable pops.

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:** ✓ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**_____

**QUEBEC** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

**ONTARIO** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Great Lakes pop. designated Endangered in 2012

**Listing Status:** Endangered – S2 **SGCN?:** N/A

## d. New York

### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** No records since 1928 (presumed extirpated)

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. Near shore habitats in Lake Erie and Lake Ontario have been sampled many times since 1928 and no Silver Chubs have been recorded.

**Trends Discussion** *(insert map of North American/regional):*

In New York, their historic range consists of the shores of Lake Erie, Lake Ontario, and the mouths of tributary creeks; however, they have not been caught along the shores of New York since 1928 and are considered extirpated (Carlson et al. 2016).

This species was reported to be common in Lake Erie and at the mouths of larger creeks around 1929 (Smith 1985). “In Lake Erie, a dramatic decline in the Silver Chub began in the late 1940s. Silver Chub began reappearing in Ontario Ministry of Natural Resources (OMNR) mid-water trawls and bottom gillnets in 1967. Abundances increased gradually to the mid-1990s, then increased dramatically by the late 1990s, and have since fallen precipitously during the 2000s” (COSEWIC 2012). The declines in the mid-1900s were observed at the same time that *Hexagenia* numbers plummeted (Trautman 1981; Stauffer et al. 2016). The declines were also attributed to changes in water quality, food availability, and habitat alteration (Scott and Crossman 1971; Smith 1985; Stauffer et al. 2016).

Evermann and Kendall (1902) stated that this species was “found only in Long Pond at Charlotte where but three specimens were obtained.” Smith (1985) presumed this report to be an error, but Dymond et al. (1929) reported that Silver Chubs were caught near Toronto and in the Bay of Quinte, which lends credibility to the early report from Long Point. The spotty distribution of this species in Lake Ontario suggests that there may not have been an established population in the lake, but only occasional outmigrants from Lake Erie” (Carlson et al. 2016).

In Pennsylvania, the Silver Chub was removed from the list of endangered species in 2010. “The Silver Chub was listed as endangered based on a limited number of collections and apparent low numbers. Field surveys conducted throughout the historic Pennsylvania range since 1990 have documented an expansion in range and population size compared to pre-1990 information. These species were considered extirpated during the first half of the 20th century; however, recent electrofishing and benthic trawl surveys have documented a more or less continuous distribution throughout the Ohio River and lower reaches of the Monongahela and Allegheny Rivers” (2010 58 Pa. Code Ch. 75 Rules and Regulations - 40 Pa.B. 3664).

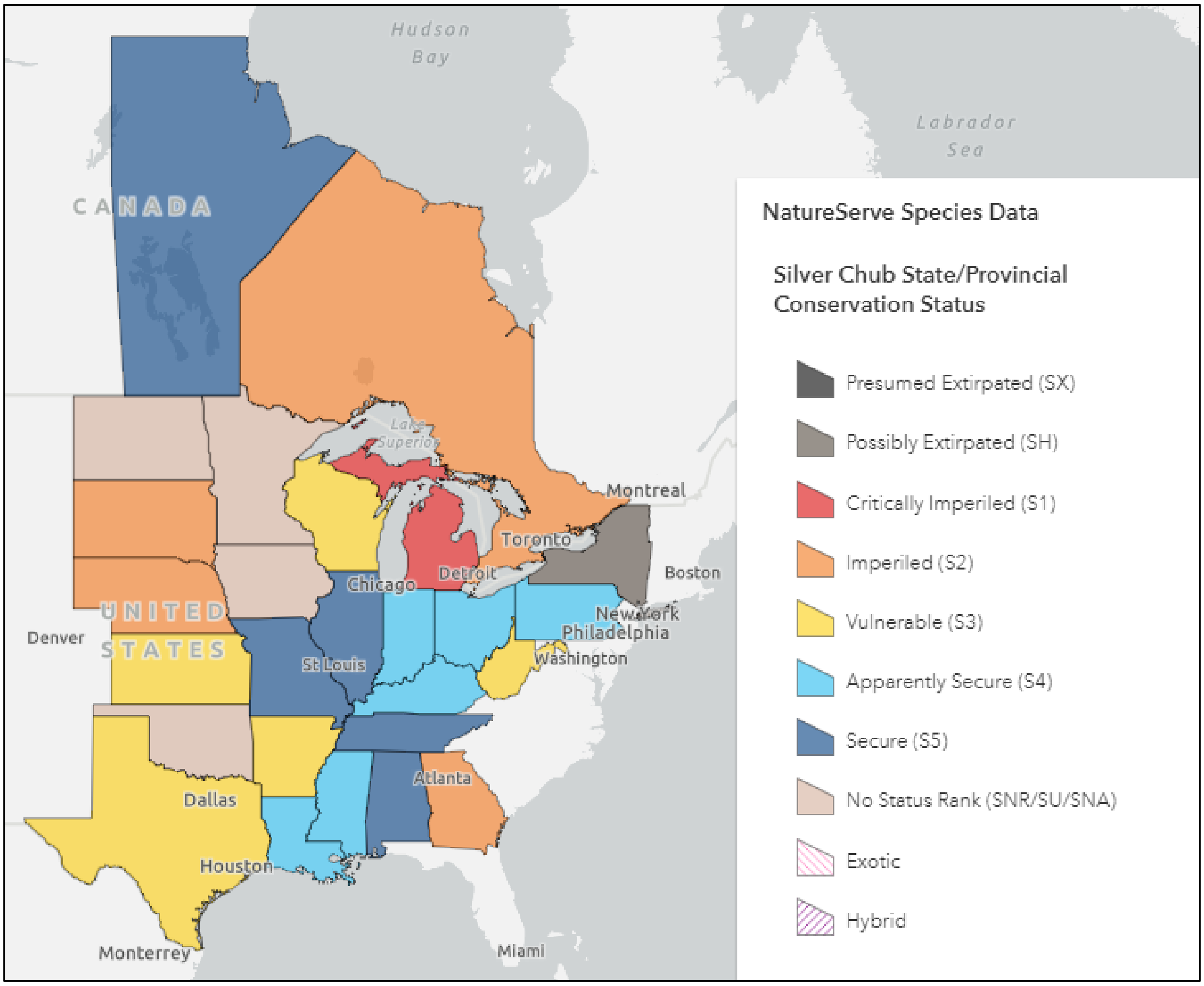


**Figure 1:** Silver Chub distribution and status (Source: NatureServe 2022).

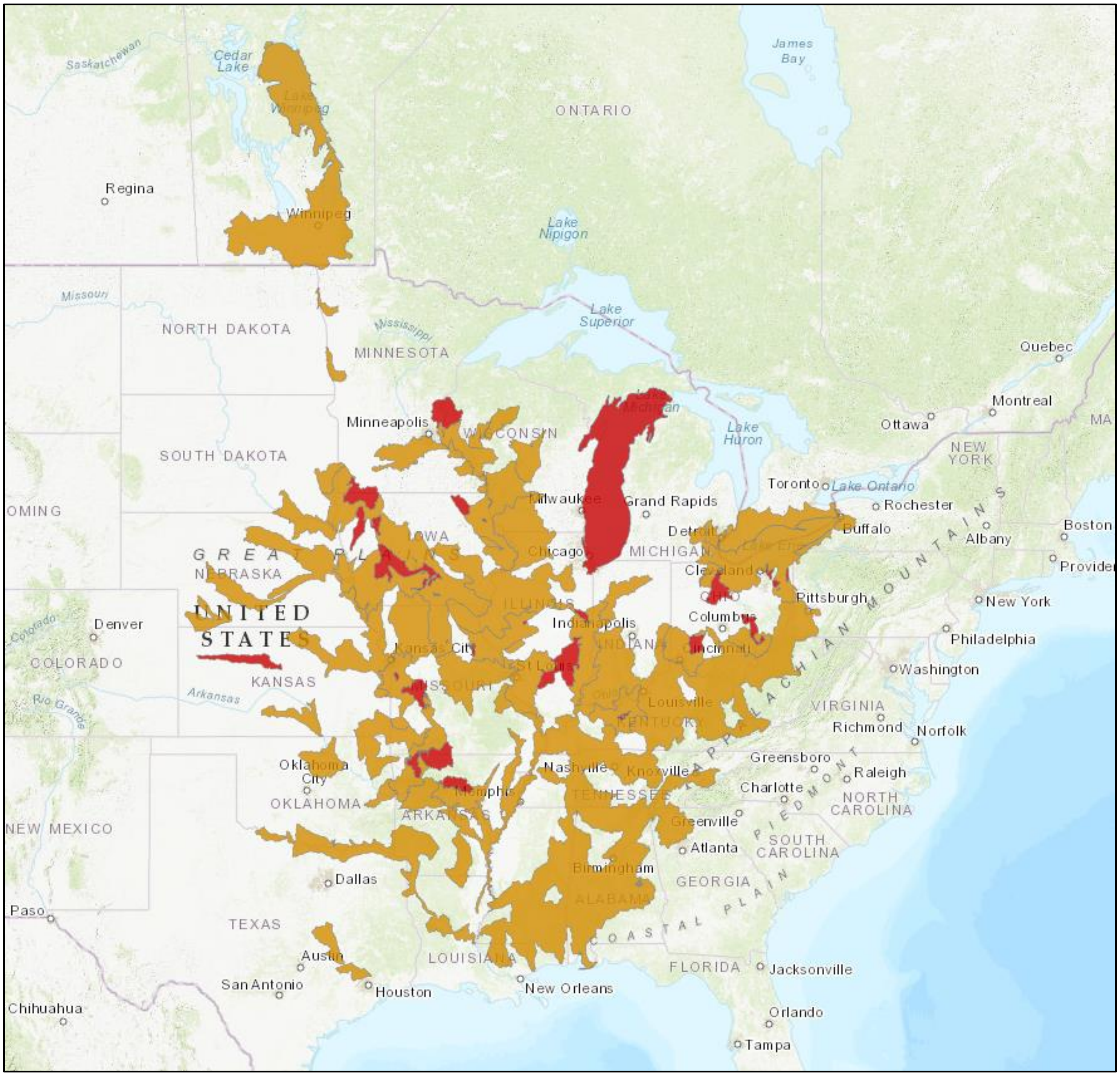


**Figure 2:** Silver Chub distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

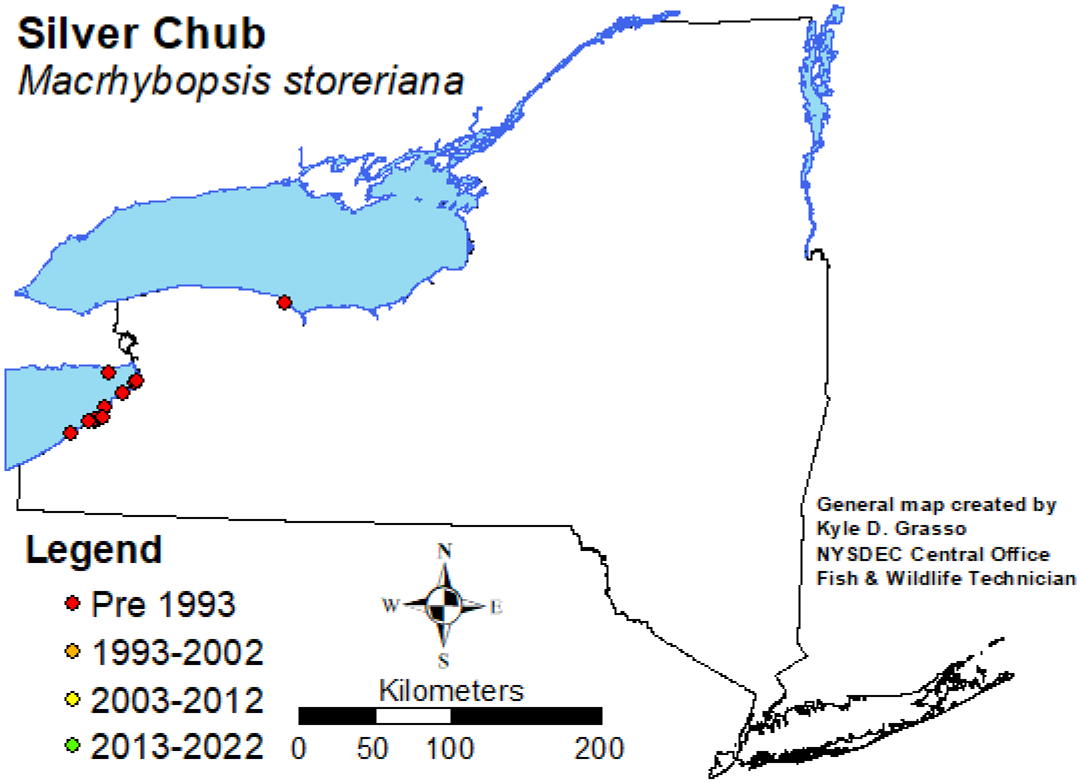


**Figure 3:** Records of Silver Chub in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 15 | 6 | 0-5% |
| **1993-2002** | 0 | 0 | 0% |
| **2003 - 2012** | 0 | 0 | 0% |
| **2013 - 2022** | 0 | 0 | 0% |

**Table 1:** Records of Silver Chub in New York.

### Details of historic and current occurrence:

In New York, their historic range consists of the shores of Lake Erie, Lake Ontario, and the mouths of tributary creeks; however, they have not been caught along the shores of New York since 1928 and are considered extirpated (Carlson et al. 2016).

This species was reported to be common in Lake Erie and at the mouths of larger creeks around 1929 (Smith 1985). “In Lake Erie, a dramatic decline in the Silver Chub began in the late 1940s. Silver Chub began reappearing in Ontario Ministry of Natural Resources (OMNR) mid-water trawls and bottom gillnets in 1967. Abundances increased gradually to the mid-1990s, then increased dramatically by the late 1990s, and have since fallen precipitously during the 2000s” (COSEWIC 2012). The declines in the mid-1900s were observed at the same time that *Hexagenia* numbers plummeted (Trautman 1981; Stauffer et al. 2016). The declines were also attributed to changes in water quality, food availability, and habitat alteration (Scott and Crossman 1971; Smith 1985; Stauffer et al. 2016).

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Dymond et al. (1929) reported that Silver Chubs were caught near Toronto and in the Bay of Quinte, which lends credibility to the early report from Long Point. The spotty distribution of this species in Lake Ontario suggests that there may not have been an established population in the lake, but only occasional outmigrants from Lake Erie" (Carlson et al. 2016).

**New York's Contribution to Species North American Range:**

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:**_✓_

**Classification of New York Range**

**Core:**_____

**Peripheral:**_✓_

**Disjunct:**_____

**Distance to core population:**

Core pop. to the south and west

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Medium tributary rivers and large lakes

**b. Geology:** Low to moderately buffered

**c. Temperature:** Cool to transitional cool

**d. Gradient:** Low gradient

**Habitat or Community Type Trend in New York**

**Declining:**_____ **Stable:**_✓_ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:**_____________________________

**Habitat Specialist?** **Yes:**_____ **No:**_✓_

**Indicator Species?** **Yes:**_____ **No:**_✓_

**Habitat Discussion:**

Silver Chubs inhabit the backwaters of large lakes and the pools of sluggish, low gradient, large streams with sand, silt, and gravel substrate (Boyko and Staton 2010; Stauffer et al. 2016; NatureServe 2022). "Sometimes associated with hard substrates such as gravel, rubble, boulder, or bedrock (Kinney 1954; Trautman 1981)" (Boyko and Staton 2010). They are not typically associated with aquatic vegetation (COSEWIC 2012). In Lake Erie, they've been caught at depths up to 20 meters deep (Kinney 1954; Trautman 1981; Stauffer et al. 2016). "Silver Chubs migrate from deep water to shallow waters in spring, which is likely a positive thermotropic response" (Stauffer et al. 2016). "Robison and Buchanan (1992) stated that the species appears to be tolerant of siltation and turbidity; however, in Ohio, it reached greatest abundance over substrates of clean gravel and sand and appeared to be susceptible to many types of pollutants (Trautman 1981). In Winnipeg, the species is found in the Assiniboine and Red rivers, which can be very turbid as a result of clay soils" (Boyko and Staton 2010).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Silver Chubs can live for 3-4 years and typically reach maturity at 2+ years (Kinney 1954; Parker et al. 1987; COSEWIC 2012; Stauffer et al. 2016). "The Silver Chub spawns in May and June in Iowa, and in June and July in Wisconsin (Harlan and Speaker 1956; Becker 1983)" (Stauffer et al. 2016). Kinney (1954) reported that "in western Lake Erie, spawning occurs in open water from mid-June through mid-August, peaking the last week in June and first week in July" (Stauffer et al. 2016). Scott and Crossman (1973), Werner (2004), and NatureServe (2022) agreed with Kinney (1954), that it probably spawns in open water. "Spawning occurs at water temperatures between 20.8-22.7°C, and probably occurs earlier in warmer bays and later in open lake" (Stauffer et al. 2016). Goodyear et al. (1982) suggested that Silver Chub historically spawn over clean gravel substrates in tributaries of Lake Erie (COSEWIC 2012). "Trautman (1981) reported that many individuals died after spawning and observed significant mortalities along Lake Erie beaches" (Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Silver Chub include poor water quality (nutrient and sediment loading and contaminants), habitat degradation, low food supply, and competition with invasive species (COSEWIC 2012; Boyko and Staton 2010). "Eutrophication and its effects on water quality, such as low oxygen levels, and on the invertebrate food supply are likely related to the perceived near extirpation of Silver Chub in Lake Erie in the 1960s" (COSEWIC 2012). "Although some threats to the species have decreased in recent years (e.g., nutrient loading in Lake Erie), the extent to which they are currently impacting the species needs to be evaluated" (Boyko and Staton 2010). Although some studies have stated Silver Chubs are tolerant of siltation, they will move to clearer water and gravelly substrates under high levels of siltation (NatureServe 2022).

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

**Yes:**__✓__ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Silver Chub is currently listed as an endangered species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Since there have not been any Silver Chub records in New York since 1928 and they are presumed extirpated, stocking will likely be the only possible mode of reintroduction. However, there may no longer be any suitable habitat in their historic New York range.

The 2005 State Wildlife Action Plan included the following recommendations for extirpated fishes:

Habitat Monitoring:

-Inventories will be completed in all areas where restoration might be practical.

Relocation/reintroduction:

-Re-establish, if feasible, populations of those endangered fish species now believed to be extirpated from New York.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Site/Area Management |
| **3.** Land/Water Management | Habitat/Natural Process Restoration |
| **4.** Species management | Species Re-introduction |
| **5.** Species management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Silver Chub.

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# Species Status Assessment Cover Sheet

**Species Name:** Spoonhead Sculpin **Date Updated:** January 2023

**Current Status:** Endangered – Non-SGCN (due to presumed extirpation) **Updated By:** Kyle Grasso

**Current NHP Rank:** SH

**Distribution:** The Spoonhead Sculpin can be found in the St. Lawrence-Great Lakes and Arctic systems from Southern Quebec to Yukon and the Northwest Territories and south into Montana. The only New York records of Spoonhead Sculpin are in Lake Erie and Lake Ontario.

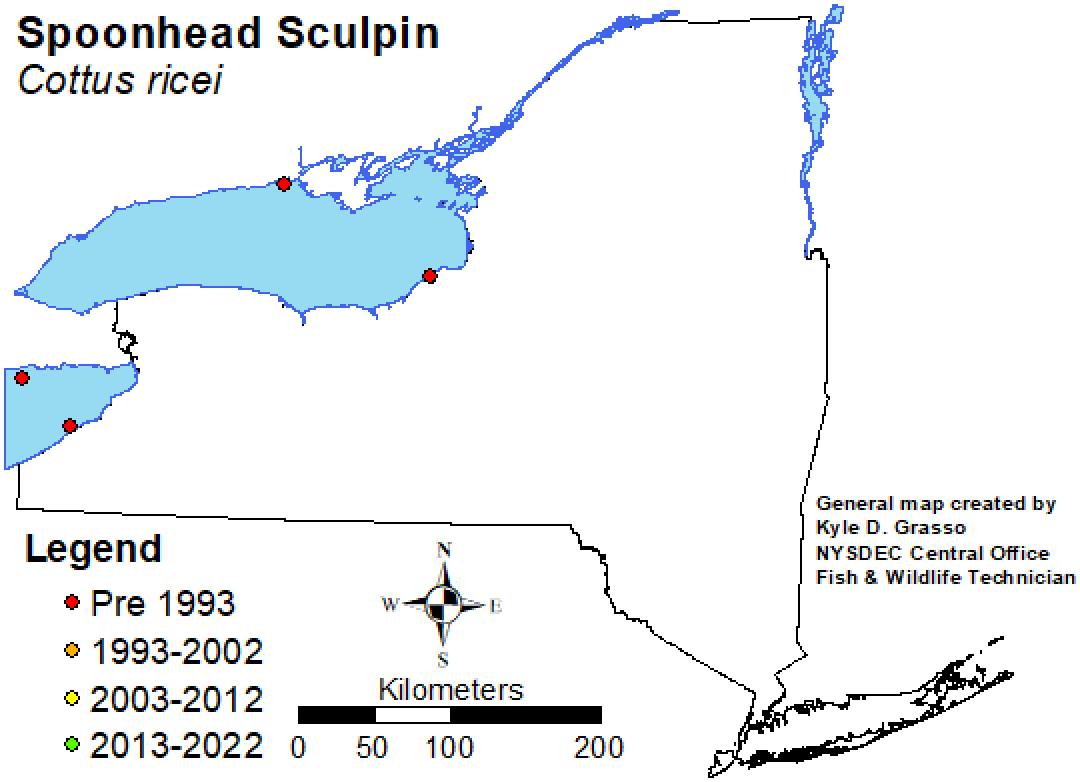
**Habitat:** In New York, the Spoonhead Sculpin was known to inhabit the deeper waters of Lake Ontario and Lake Erie. In Canada, they also occur on the rocky bottoms of swift waters in streams and large rivers. They have been taken from 22-150 m in the Great Lakes. Their depth distribution in lakes may be an artifact of temperature and light penetration. They are generally found in shallower water in turbid lakes and deeper water in clear lakes.

**Life History:** The average lifespan of Spoonhead Sculpin is 6 years, and they typically reach sexual maturely by age 2. Delisle and Vliet (1968) reported that milt was exuded from males collected at 42.7 m and 4.5°C from a Quebec lake on August 1. Scott and Crossman (1973) noted that females from Ontario contained larger eggs in August than in June or July, but only very small eggs in December. Males decide the location of a nesting spot, usually being underneath a rock. Females lay up to 1600 eggs that adhere to the bottom of the rock. Males guard and fan eggs until they hatch. Egg deposition to hatch time is generally 2-3 weeks, averaging 21 days.

**Threats:** No major threats are known. Causes of the decline at the southern extreme of the range in the lower Great Lakes are unknown but might include pesticide and herbicide pollution, predation by or competition with Alewife, habitat degradation due to siltation, chronic trace contaminant exposure, or shifts in species composition in the deep-water communities. Increasing water temperatures due to climate change is a possible future threat to the cold-adapted Spoonhead Sculpin.

**Population trend:** The only New York records of Spoonhead Sculpin are in Lake Erie and Lake Ontario. The last Lake Ontario record was in 1942 and the last Lake Erie record was 1950. Trawling surveys have occurred in both lakes for years and have documented a recovery of Deepwater Sculpin in Lake Ontario in the last 20 years. The Spoonhead Sculpin was not reported in any of these trawling surveys, so it is likely that they are extirpated from New York.

**Recommendation:** It is recommended that the Spoonhead Sculpin be delisted because they have not been recorded in New York since 1950 and are presumed extirpated.



# Species Status Assessment

**Common Name:** Spoonhead Sculpin **Date Updated:** January 2023

**Scientific Name:** *Cottus ricei* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cottidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Spoonhead Sculpin is in the class Actinopterygii and the family Cottidae. The Spoonhead Sculpin can be found in the St. Lawrence-Great Lakes and Arctic basins from southern Quebec to Yukon and the Northwest Territories and south into Montana (Stauffer et al. 2016; NatureServe 2022). The only New York records of Spoonhead Sculpin are in Lake Erie and Lake Ontario (Smith 1985). The last Lake Ontario record was in 1942 and the last Lake Erie record was 1950 (Carlson et al. 2016). Trawling surveys have occurred in both lakes for years and have documented a recovery of Deepwater Sculpin in Lake Ontario in the last 20 years. The Spoonhead Sculpin was not reported in any of these trawling surveys, so it is likely that they are extirpated from New York (Weidel et al. 2019). In New York, the Spoonhead Sculpin was known to inhabit the deeper waters of Lake Ontario and Lake Erie. In Canada, it also occurs on the rocky bottoms of swift waters in streams and large rivers (Smith 1985; Baker et al. 2014; Stauffer et al. 2016). It has been taken from depths of 22-150 m in the Great Lakes (Scott and Crossman 1973).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Endangered – Non-SGCN (due to presumed extirpation)

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** SH **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern

**Status Discussion:**

In New York, the Spoonhead Sculpin is currently listed as Endangered. However, they are currently listed as a Non-SGCN because they have not been seen since 1942 in Lake Ontario, 1950 in Lake Erie, and they are presumed extirpated. The Spoonhead Sculpin is globally ranked as Secure by NatureServe.

Comments from COSEWIC: Although the species may be declining in Lake Erie, and possibly extirpated from Lake Ontario, it is common throughout the rest of its widespread range in Canada. Designated Not at Risk in April 1989. More recently (2015) considered a medium priority candidate for re-assessment.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** No catches in Lake Erie or Ontario since 1950

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:** ✓ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** No catches in Lake Erie since 1950

**Listing Status:** Extirpated – SX **SGCN?:** No

**ONTARIO** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:** Designated not at risk in 1989

**Listing Status:** Not Listed – S4 **SGCN?:** N/A

**QUEBEC** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:**_____ **Unknown:** ✓

**Time Frame Considered:** Designated not at risk in 1989

**Listing Status:** Not Listed – S5? **SGCN?:** N/A

### d. New York

**i. Abundance**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last caught in Lake Ontario in 1942 and Erie in 1950

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Annual bottom trawl surveys are done in Lake Ontario by state and federal agencies.

**Trends Discussion** *(insert map of North American/regional):*

According to NatureServe, the Spoonhead Sculpin has disappeared from much of the southern extreme of the range in the lower Great Lakes region, however, the short-term trend in the last 10 years is uncertain but likely relatively stable (≤10% change) over the vast majority of the range. This species is in decline in all of the Great Lakes except Lake Superior where it is still common (Houston 1990; Potter and Fleischer 1992). There are no records of this species in Lake Huron since 1973 (Potter and Fleischer 1992).

In New York, Spoonhead Sculpin have been found in Lake Erie and Lake Ontario (Smith 1985). The last Lake Ontario record was in 1942 and the last Lake Erie record was 1950 (Smith 1985; Carlson et al. 2016). Trawling surveys have occurred in both lakes for years and have documented a recovery of Deepwater Sculpin in Lake Ontario in the last 20 years. The Spoonhead Sculpin was not reported in any of these trawling surveys, so it is likely that they are extirpated from New York (Weidel et al. 2019).

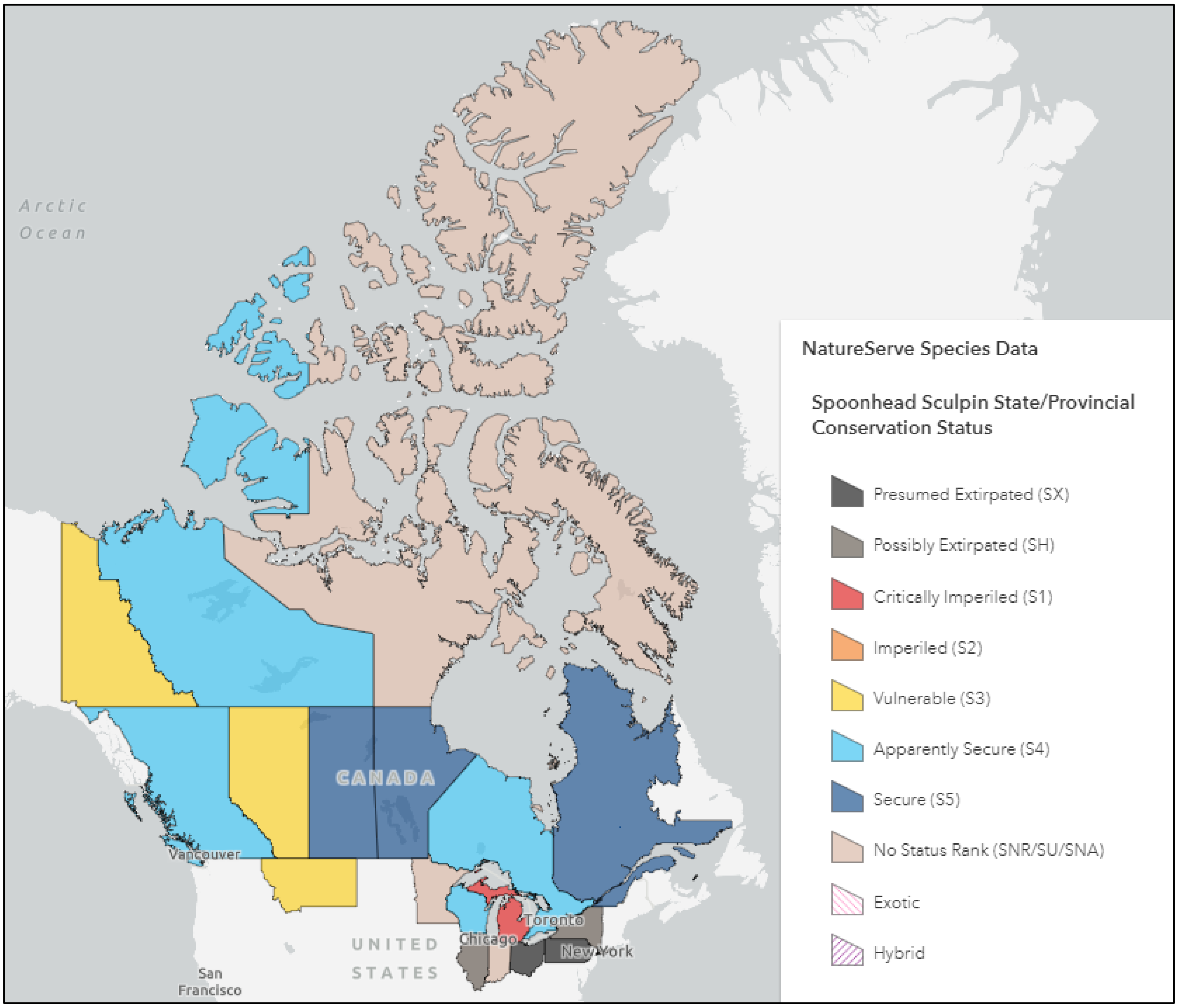


**Figure 1:** Spoonhead Sculpin distribution and status (Source: NatureServe 2022).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

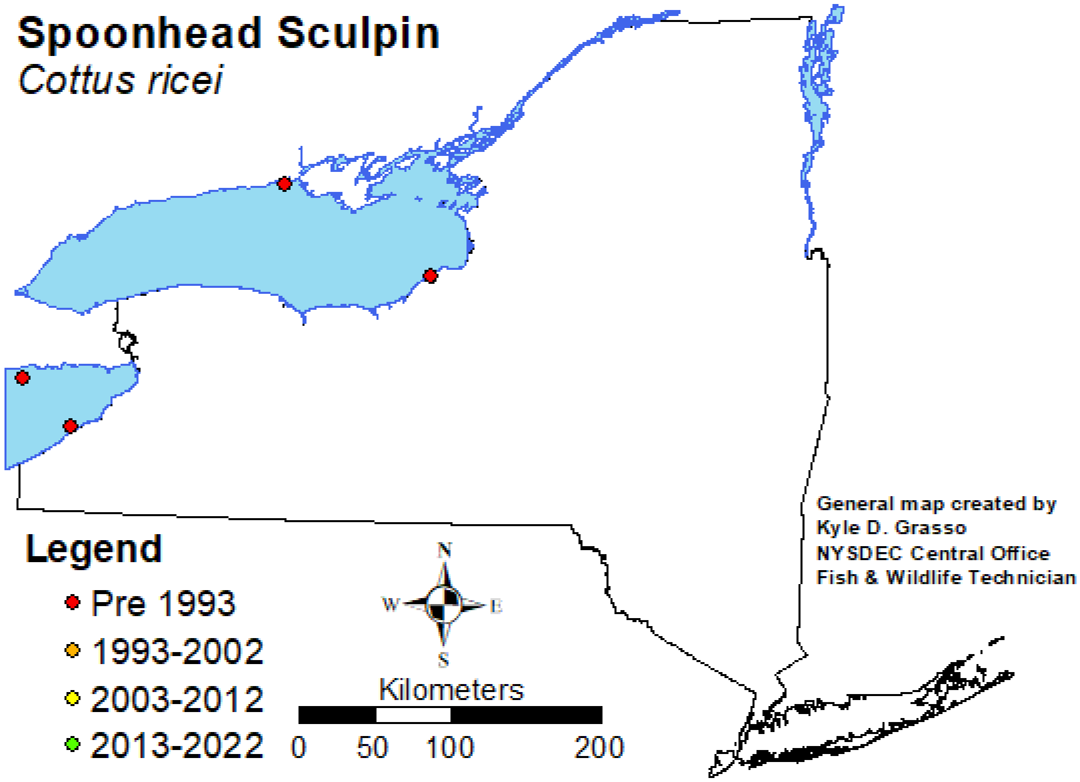


**Figure 2:** Records of Spoonhead Sculpin in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 4 | 2 | 0-5% |
| **1993-2002** | 0 | 0 | 0% |
| **2003 - 2012** | 0 | 0 | 0% |
| **2013 - 2022** | 0 | 0 | 0% |

**Table 1:** Records of Spoonhead Sculpin in New York.

### Details of historic and current occurrence:

In New York, Spoonhead Sculpin have been found in Lake Erie and Lake Ontario (Smith 1985). In Lake Erie, “Greeley (1929) reported an off-shore catch near Dunkirk, but he was referring to reports by Fish (1929, 1932), who reported the catch location farther north in Ontario. The only documented New York catch was from the stomach of a Burbot taken near Dunkirk in 1928 (Fish 1932). The last record from Lake Erie was farther west in Ohio in 1950 (Trautman 1981)” (Carlson et al. 2016).

“Four specimens were collected from Lake Ontario off Oswego in 45-55 m of water in 1942 (CUMV 27836). These specimens have been lost, but we accept the record because the species has also been caught in the Canadian portion of the lake (Hubbs 1919)” (Carlson et al. 2016). Trawling surveys have occurred in both lakes for years and have documented a recovery of Deepwater Sculpin in Lake Ontario in the last 20 years. The Spoonhead Sculpin was not reported in any of these trawling surveys, so it is likely that they are extirpated from New York (Weidel et al. 2019).

### 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%:**_____ | **Peripheral:** ✓ |
| **51-75%:**_____ | **Disjunct:**_____ |
| **26-50%:**_____ | **Distance to core population:** |
| **1-25%:** ✓ | Core pop. in Great Lakes & Canada |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Large lakes

**b. Geology:** Low-moderately buffered

**c. Temperature:** Cold

**d. Gradient:** Low gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:** ✓ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:**_____ **No:** ✓

### Habitat Discussion:

In New York, the Spoonhead Sculpin was known to inhabit the deeper waters of Lake Ontario and Lake Erie. In Canada, they also occur on the rocky bottoms of swift waters in streams and large rivers (Smith 1985; Baker et al. 2014; Stauffer et al. 2016). "Its depth distribution in lakes may be an artifact of temperature and light penetration. It is generally found in shallower water in turbid lakes and deeper water in clear lakes (Houston 1990). In the Great Lakes, it has been taken at depths 22-150 m (Scott and Crossman 1973). In deep, stratified Canadian lakes it was reported at depths of 5-50m at a temperature range of 4-8°C, but in shallow, turbid lakes it was abundant at 5-10 m at temperatures as high as 18°C (Dadswell 1972)" (Stauffer et al. 2016). They have occasionally been found in brackish water (NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The life history of the Spoonhead Sculpin is poorly understood. The average lifespan of Spoonhead Sculpin is 6 years, and they typically reach sexual maturely by age 2 (Selgeby 1988; Sullivan et al. 2009; Baker et al. 2014). "Spawning of Spoonhead Sculpin in Alberta, generally occurs in the spring during April and May when water temperatures reach 6°C. Spawning can also occur in late summer to early fall in shallow gravel beds along the edge of lakes, streams, and rivers (Sullivan et. al 2009)" (Baker et al. 2014). "Delisle and Vliet (1968) reported that milt was exuded from males collected at 42.7 m and 4.5°C from a Quebec lake on August 1. Scott and Crossman (1973) noted that females from Ontario contained larger eggs in August than in June or July, but only very small eggs in December" (Stauffer et al. 2016). "Males decide the location of a nesting spot, usually being underneath a rock. Females lay up to 1600 eggs that adhere to the bottom of the rock. Males guard and fan eggs until they hatch. Egg deposition to hatch time is generally 2-3 weeks, averaging 21 days" (Baker et al. 2014).

## VI. Threats *(from NY CWCS Database or newly described)*

"No major threats are known in the vast majority of the range. Causes of the decline at the southern extreme of the range in the lower Great Lakes are unknown but might include pesticide and herbicide pollution, predation by or competition with Alewife, habitat degradation due to siltation, chronic trace contaminant exposure, or shifts in species composition in the deepwater communities (Houston 1990)" (NatureServe 2022). Increasing water temperatures due to climate change is a possible future threat to the cold-adapted Spoonhead Sculpin (Baker et al. 2014).

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

**Yes:**_✓_ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Spoonhead Sculpin is currently listed as an endangered species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

"The New York State Department of Environmental Conservation will continue to search for and report on Spoonhead Sculpins in New York waters" (NYSDEC 2013). Stocking may be the only possible means of restoration.

The 2005 State Wildlife Action Plan included the following recommendations for extirpated fishes:

Habitat Monitoring:

-Inventories will be completed in all areas where restoration might be practical.

Relocation/reintroduction:

-Re-establish, if feasible, populations of those endangered fish species now believed to be extirpated from New York.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Management | Site/Area Management |
| **2.** Land/Water Management | Invasive/Problematic Species Control |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |
| **4.** Species Management | Species Recovery |
| **5.** Species Management | Species Re-introduction |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Spoonhead Sculpin.

## VII. References

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# Species Status Assessment Cover Sheet

**Species Name:** Spotted Darter **Date Updated:** January 2023

**Current Status:** Threatened – HPSGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** S1

**Distribution:** The Spotted Darter has a spotty distribution within the Ohio River drainage from southwestern New York and northwestern Pennsylvania through Ohio to Indiana and south to Kentucky and West Virginia. In New York, it is only found within French Creek and West Branch French Creek in the extreme southwest of the state.

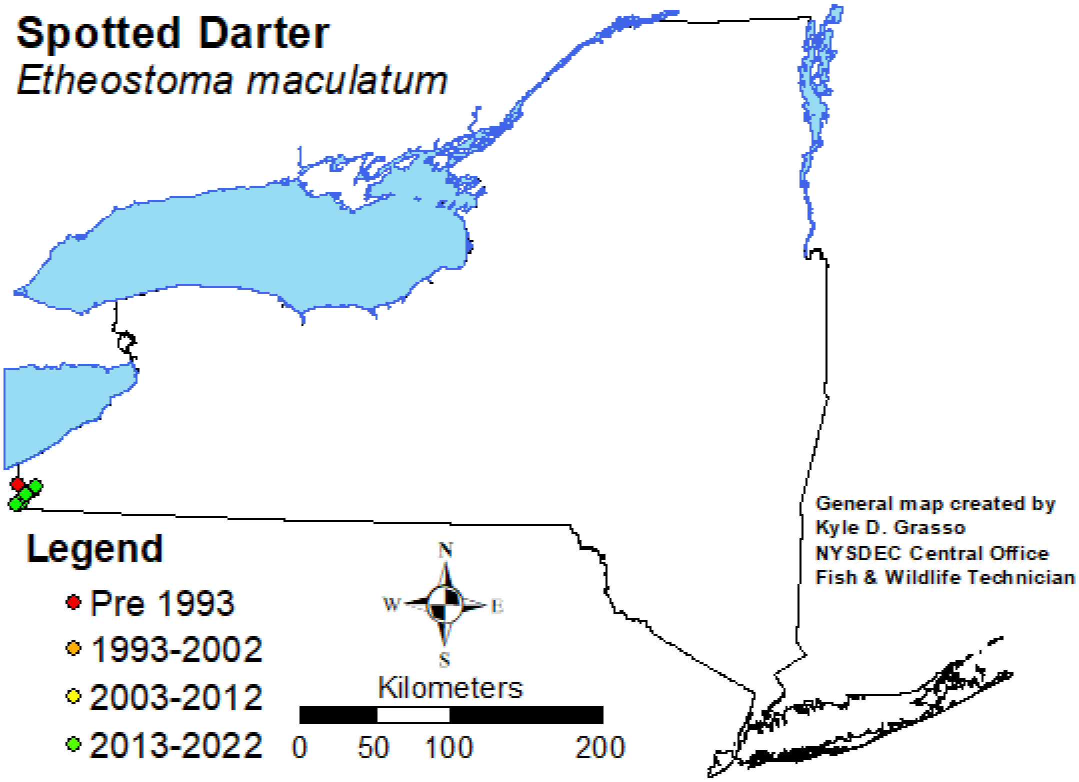
**Habitat:** Spotted Darters inhabit the fast, deeper riffles within small to medium-sized clear streams with gravel and rubble substrate. They've primarily been observed near large rubble and boulders. Because these darters use areas under rocks for refugia and reproduction, the availability of suitable crevices is more important than substrate size.

**Life History:** Spotted Darter can live up to 5 years. In Pennsylvania, females reached sexual maturity in 2 years. Raney and Lechner (1939) stated that spawning took place in the Pennsylvania portion of French Creek in May and early June when water temperatures reached 62.6°F. Females are known to spawn 2-4 times in a season with different males. Eggs are deposited in a wedge-shaped mass under flat stones in riffles that are 6-24 inches deep. Females collected in March in French Creek contained 200-400 eggs. Eggs are guarded by the males.

**Threats:** Threats to the Spotted Darter include siltation from poor land use habits, damming of flowing waters, changes in water quality, and introduction of non-native predator species. In New York, stream channel and bank alterations could have significant adverse effects. Several potential threats to French Creek's water quality and aquatic fauna have been identified including: 1) siltation from overgrazing, row cropping, road construction, and land clearing, 2) elevated nutrients from dairy animals' wastes, sewage plant failure and fertilizer spills and 3) pesticide threats from: catastrophic events and agricultural applications. The Round Goby has recently been recorded in French Creek which may negatively impact Spotted Darter populations.

**Population trend:** Although the New York range is restricted to French Creek West Branch French Creek, and abundance is low, the species appears to be secure. Stocking in collaboration with the state of Pennsylvania may occur in tandem with Gilt Darter stocking in the Allegheny River (where there are no New York Spotted Darter records). They were delisted from Threatened in Pennsylvania in 2015. Pennsylvania is now considered a stable stronghold for the species.

**Recommendation:** It is recommended that the Spotted Darter remain listed as Threatened due to their restricted range and vulnerability to environmental catastrophes.



# Species Status Assessment

**Common Name:** Spotted Darter **Date Updated:** January 2023

**Scientific Name:** *Etheostoma maculatum* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Percidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Spotted Darter is in the class Actinopterygii and the family Percidae (perches, walleyes, darters). The Spotted Darter has a spotty distribution within the Ohio River drainage from southwestern New York and northwestern Pennsylvania through Ohio to Indiana and south to Kentucky and West Virginia (Stauffer et al. 2016). In New York, they are only found within French Creek and West Branch French Creek in the extreme southwest of the state. Although their New York range is restricted to French Creek and West Branch French Creek and abundance is low, the species appears to be secure (Carlson et al. 2016). Spotted Darters inhabit the fast, deeper riffles within small to medium-sized clear streams with gravel and rubble substrate. They've primarily been observed near large rubble and boulders (Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Threatened – HPSGCN

### b. Natural Heritage Program

i. **Global:** Imperiled – G2

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Vulnerable
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)
- American Fisheries Society: Threatened (8/1/2008)

### Status Discussion:

In New York, the Spotted Darter is currently listed as Threatened and HPSGCN. They are globally ranked as Imperiled by NatureServe.

"Mayasich et al. (2004) reviewed the status of Spotted Darter for possible listing under the Endangered Species Act and determined that enough stable populations existed to preclude listing. They noted that it had been collected at new locations and "rediscovered" at some historic sites" (Stauffer et al. 2016). The species was petitioned to be federally listed under the Endangered Species Act in 2011, but the USFWS stated "that the petition and information readily available in our files do not provide substantial scientific or commercial information to indicate that other natural or manmade factors affecting the species' continued existence may present a threat to the Spotted Darter such that the petitioned action may be warranted." (USFWS 2011).

They were delisted from Threatened in Pennsylvania in 2015. They remain an SGCN in Pennsylvania. Pennsylvania is now considered a stable stronghold for the species (Stauffer et al. 2016).

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:** _____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:** _____

**NEW JERSEY** **Not Present:** ✓ **No Data:** _____

**VERMONT** **Not Present:** ✓ **No Data:** _____

**ONTARIO** **Not Present:** ✓ **No Data:** _____

**QUEBEC** **Not Present:** ✓ **No Data:** _____

**PENNSYLVANIA** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Delisted from threatened in 2015

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

### d. New York

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

"Mayasich et al. (2004) reviewed the status of Spotted Darter for possible listing under the Endangered Species Act and determined that enough stable populations existed to preclude listing. They noted that it had been collected at new locations and "rediscovered" at some historic sites. Jelks et al. (2008), however, considered it to be threatened range-wide with a downward trend" (Stauffer et al. 2016). The range-wide trend over the past 10 years is uncertain, but distribution and abundance probably are declining (NatureServe 2022).

It has been found in the Allegheny River, Ohio River, French Creek, and West Branch French Creek within Pennsylvania and was delisted from Threatened in 2015. Pennsylvania is now considered a stable stronghold for the species (Stauffer et al. 2016)."The species is now scarce and highly localized in Ohio. Trautman (1981) commented that the size of Spotted Darter populations in Ohio varied considerably. Bowers et al. (1992) also presented data indicating that Spotted Darter populations fluctuate considerably within short time periods" (NatureServe 2022).

Although their New York range is restricted to French Creek and West Branch French Creek and abundance is low, the species appears to be secure. Changing land use practices in the basin could affect in-stream habitat, distribution, and abundance of this species in the future (Carlson et al. 2016).

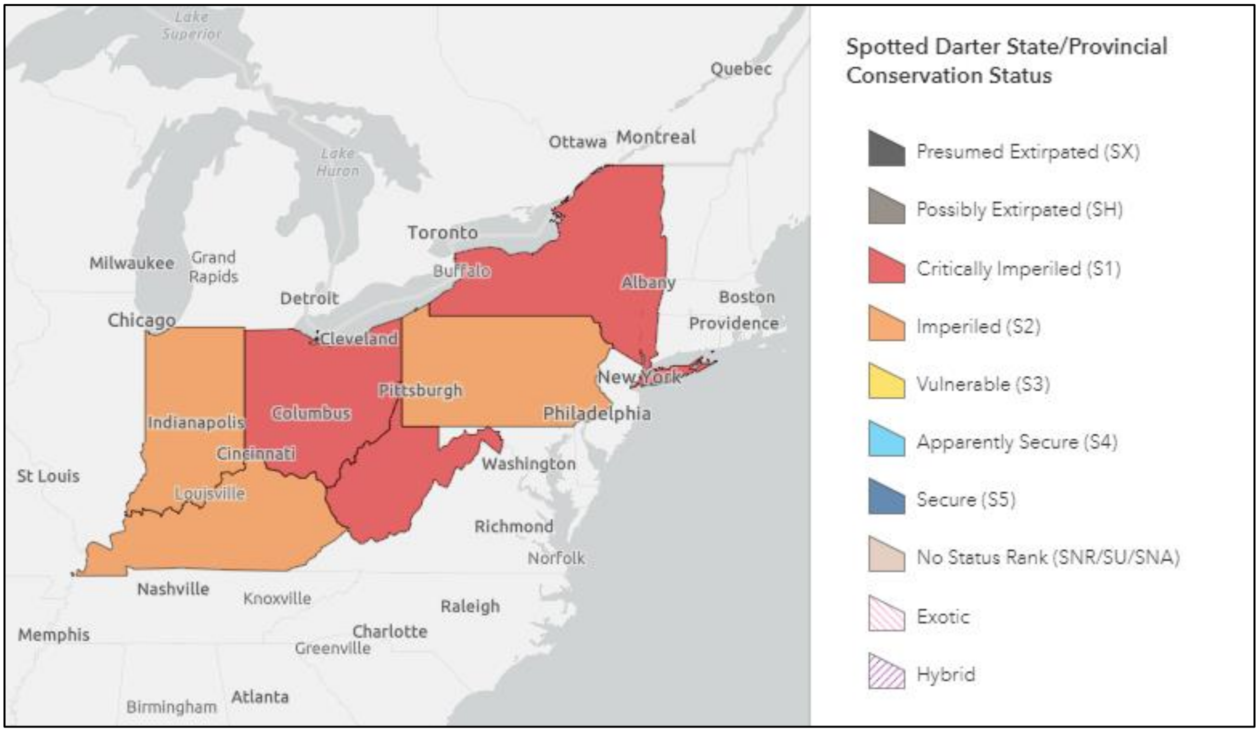


**Figure 1:** Spotted Darter distribution and status (Source: NatureServe 2022).

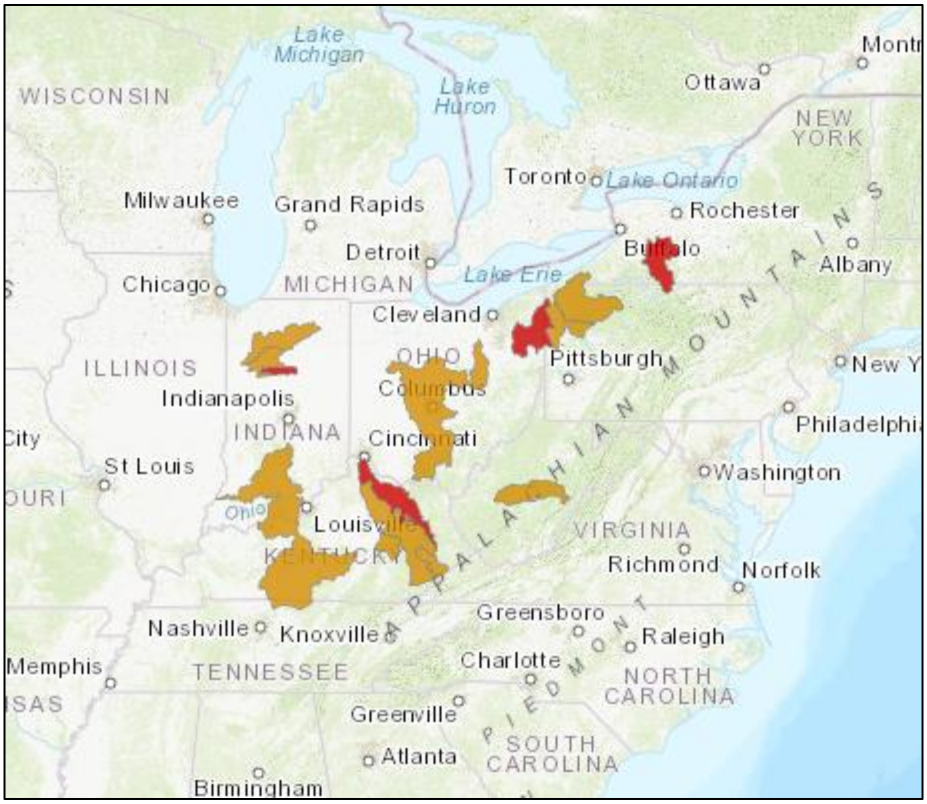


**Figure 2:** Spotted Darter distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

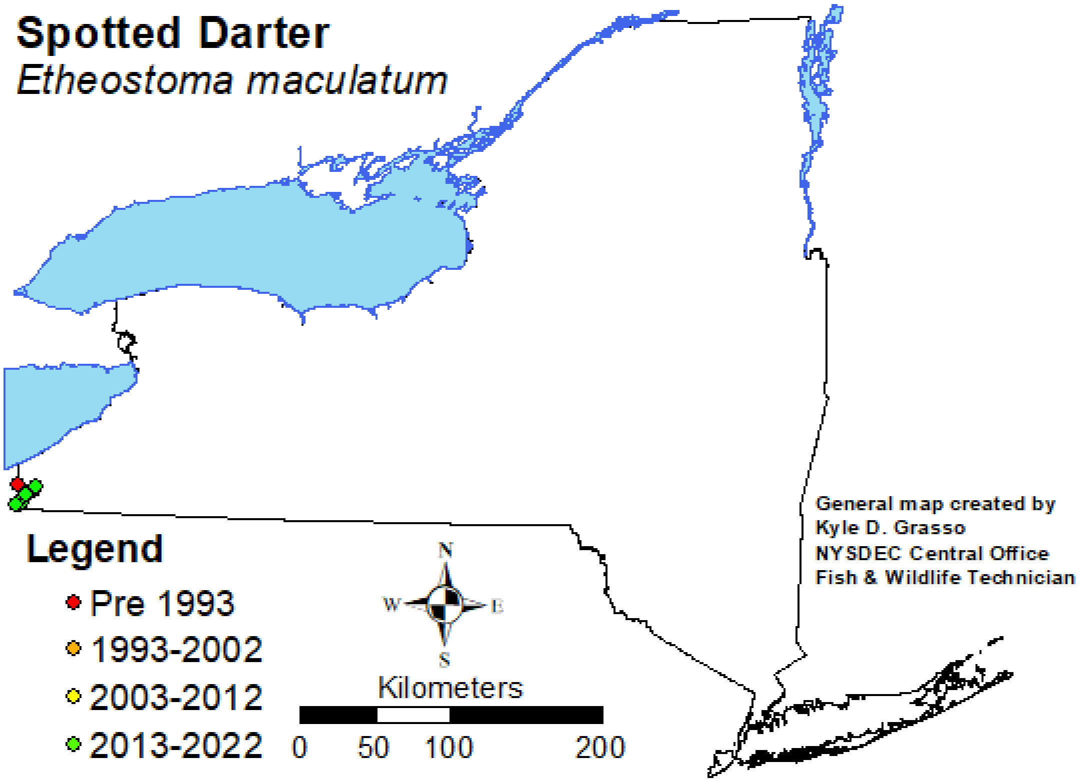


**Figure 3:** Records of Spotted Darter in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 21 | 2 | 0-5% |
| **1993-2002** | 2 | 1 | 0-5% |
| **2003 - 2012** | 1 | 1 | 0-5% |
| **2013 - 2022** | 15 | 1 | 0-5% |

**Table 1:** Records of Spotted Darter in New York.

### Details of historic and current occurrence:

The most thorough studies available from 1991-92 found Spotted Darter at 5 sites in French Creek, and the abundance and age structure were judged as that of a healthy, self-supporting population (Bowers et al. 1992). Since 2017, Spotted Darters have been caught at 8 different sites on French Creek. They were caught in West Branch French Creek in 1988 and have not been recorded there since. Sampling in the Pennsylvania portion of West Branch French Creek in 1992 found this species for the first and only time in Pennsylvania (letter from M. Gutowski, Penn. State Univ., to D. Bouton, Sept 30, 1992). Although the New York range is restricted to French Creek and West Branch French Creek and abundance is low, the species appears to be secure (Carlson et al. 2016).

### 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%:**_____ | **Peripheral:**_✓___ |

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Disjunct:** ✓

**Distance to core population:**

Core populations to the southwest

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Small river

**b. Geology:** Low-moderately buffered

**c. Temperature:** Transitional cool

**d. Gradient:** Low-moderate to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:** ✓

**Time frame of decline/increase:**_____________________________________________

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

### Habitat Discussion:

Spotted Darters inhabit the fast, deeper riffles within small to medium-sized clear streams with gravel and rubble substrate. They've primarily been observed near large rubble and boulders (Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). "Because these darters use areas under rocks both for refugia and reproduction, the availability of suitable crevices is more important than substrate size (Kessler and Thorpe 1993)" (Stauffer et al. 2016). Adults apparently spend the winter in areas somewhat deeper and with slower current (Raney and Lachner 1939; Trautman 1981; Kuehne and Barbour 1983; Stauffer et al. 2016).

## V. 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 *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The Spotted Darter has a relatively short life span. Individuals can live up to 5 years (Werner 2004). In Pennsylvania, females reached sexual maturity in 2 years (Raney and Lachner 1939;

Smith 1985; Stauffer et al. 2016). Spawning takes place from late May to late June into July depending on geographic location (NatureServe 2022). Raney and Lechner (1939) stated that spawning took place in the Pennsylvania portion of French Creek in May and early June when water temperatures reached 62.6°F (Smith 1985). Females are known to spawn 2-4 times in a season with different males (Smith 1985; NatureServe 2022). One male nest may contain eggs from multiple females (NatureServe 2022). Eggs are deposited in a wedge-shaped mass under flat stones in riffles that are 6-24 inches deep (NYSDEC 2013; Stauffer et al. 2016). Females collected in March in French Creek contained 200-400 eggs (Raney and Lechner 1939; Smith 1985). Eggs are guarded by the males.

## VI. Threats *(from NY CWCS Database or newly described)*

Threats to the Spotted Darter include siltation from poor land-use habits, damming of flowing waters, changes in water quality, and introduction of non-native predator species (Simon 2005; NatureServe 2022). In New York, Bowers et al. (1992) also noted that stream channel and bank alterations could have significant adverse effects. The restricted range in New York leaves them vulnerable should a catastrophic event occur.

According to The Nature Conservancy (1994), several potential threats to French Creek's water quality and aquatic fauna have been identified including: 1) siltation from overgrazing, row cropping, road construction, and land clearing, 2) elevated nutrients from dairy animals' wastes, sewage plant failure and fertilizer spills and 3) pesticide threats from: catastrophic events and agricultural applications. The Round Goby has recently been found in French Creek which may negatively impact Spotted Darter populations.

In West Virginia, stream sedimentation resulting from recent coal mining operations may be the biggest threat (Osier and Welsh 2007).

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

**Yes:** _✓_ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Spotted Darter is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

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

Bowers et al. (1992) indicates considerable annual variation in population size and density may occur. As a result, consistent sampling of French Creek should continue to assess the survivability and presence of the Spotted Darter.

"Actions are needed to control sediment runoff from mining, row crop agriculture, forestry, and degradation of riparian zones and aquatic habitat by livestock. Restoring riparian vegetation, fencing livestock from streams, and providing alternate water sources are recommended. In some areas, modifying dam releases and removal of small barriers, such as mill dams, might be considered. If habitat and water quality is improved, or barriers removed, reintroductions should be considered" (NatureServe 2022). "In the event reintroduction or population augmentation is believed to be necessary or beneficial, techniques should be developed to propagate Spotted Darters in captivity. Natural source populations appropriate for reintroduction into particular watersheds may not be large enough to remove individuals to be successful for these type projects" (NatureServe 2022). Stocking in collaboration with the state of Pennsylvania may occur in tandem with gilt darter stocking in the Allegheny River (where there are no New York Spotted Darter records but are found within the same watershed).

"The most immediate research need is to determine the actual current abundance of Spotted Darters throughout their range, movement/dispersal patterns, and metapopulation dynamics. This information will be necessary before we can determine the watershed area appropriate for sustaining viable Spotted Darter populations" (NatureServe 2022). "Also, a more complete understanding of life history (more details on seasonal habitat preferences and larval or juvenile habitat requirements, documenting for example) will help ensure management activities are appropriate to protect habitats and other factors necessary to complete all life history stages" (NatureServe 2022).

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat research:

-Inventory the habitat requirements of this species and protect critical areas, as in part of the State Wildlife Grants project in 2003 focusing on the Allegheny watershed. These efforts will be coordinated with similar programs in place by The Nature Conservancy.

Life history research:

-Data is needed on fish species interactions. Some of these interactions are described by Hansen (1983). Initial progress toward efforts at laboratory rearing was reported by Stauffer (1995).

Population monitoring:

-Data are needed on long term population trends.

The 2015 State Wildlife Action Plan included the following recommendations:

-Survey Spotted Darter populations and protect spawning habitats in the Allegheny watershed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection): https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Invasive/Problematic Species Control |
| **5.** Land/Water Management | Habitat & Natural Process Restoration |

| | |
|---|---|
| **6.** Species Management | Ex-situ Conservation |
| **7.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Spotted Darter.

## VII. References

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# Species Status Assessment Cover Sheet

**Species Name:** Streamline Chub **Date Updated:** January 2023

**Current Status:** Special Concern – Non-SGCN (Removed from SGCN list) **Updated By:** Kyle Grasso

**Current NHP Rank:** S1

**Distribution:** The Streamline Chub occurs in the Ohio River basin from southwestern New York to northern Indiana and south to Alabama. In New York it is only native to the Allegheny watershed.

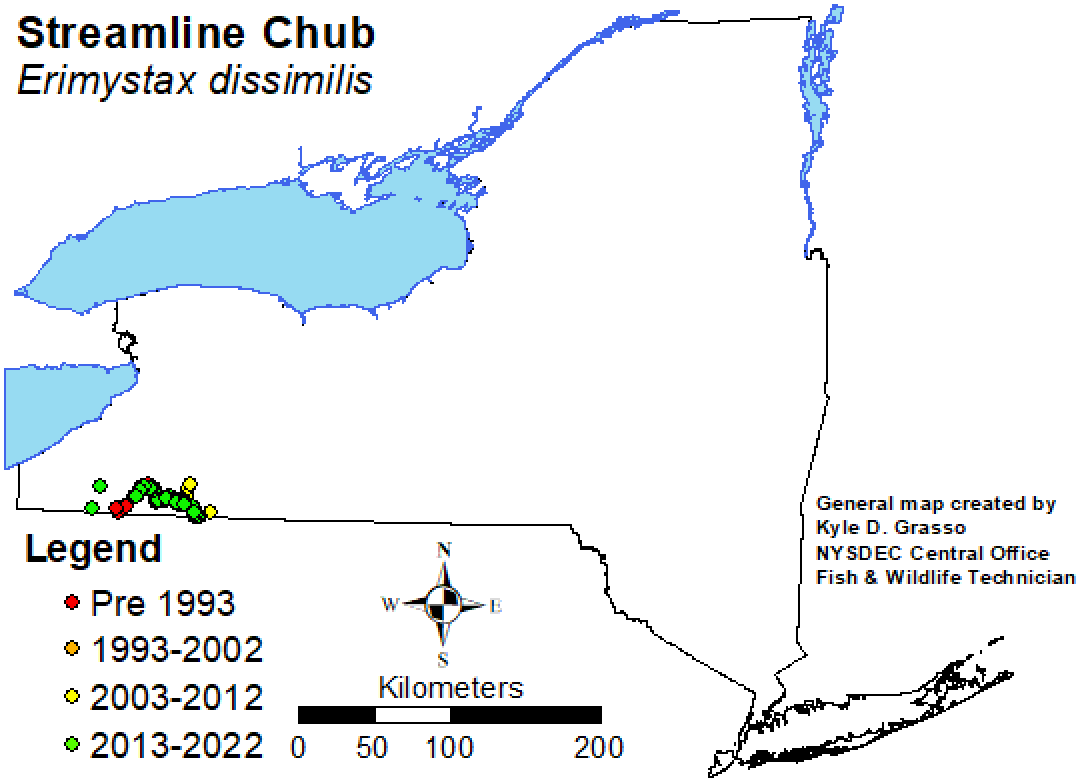
**Habitat:** The Streamline Chub inhabits the clear, warm waters of medium to large sized streams over clean gravel and cobble substrate. They can tolerate a wide variety of current velocities and stream habitats, as evidenced by their recent recovery/expansion in New York and Pennsylvania. Smith (1985) reported that they are often near the lower ends of riffles in water 1 to 4 feet deep. They are also found in moderate and slow runs and in well-flowing portions of pools. In French Creek, the Streamline Chub frequents deeper water during the day and moves to swift, shallow riffles at night.

**Life History:** Little is known about the life history of the Streamline Chub. The Streamline Chub is believed to live no longer than 2+ years and they likely reach sexual maturity in one year. Spawning occurs from early to mid-April through late May and begins when water temperatures reach approximately 15°C, with peak activity likely occurring in April. Breeding appears to be initiated by high water level and warming temperatures. Fecundity ranges from 225-1200 depending on the size of the female.

**Threats:** Little research has been done on threats to Streamline Chub. The primary known threats include pollution and siltation from poor land use practices. Trautman (1981) noted the disappearance of this species at a previously occupied site after the riffle became silted. In New York the Kinzua dam (completed in 1967) eliminated its habitat below Salamanca and effectively isolated the New York populations of Streamline Chub.

**Population trend:** In the last 20 years, Streamline Chub abundance and distribution have increased in New York and Pennsylvania. In New York, there has been a total of 177 records in the Allegheny River and it's tributaries in the last 20 years, compared to just 67 records in the years prior. Upstream passage in Conewango Creek was restored in 2014 and as a result, they have been recorded in Conewango Creek in 2017 and 2020. Overall, populations in New York and Pennsylvania are stable, and Pennsylvania is considered a stronghold for the species.

**Recommendation:** It is recommended that the Streamline Chub be delisted due to increases in their distribution and abundance over the last 20 years.



# Species Status Assessment

**Common Name:** Streamline Chub **Date Updated:** January 2023

**Scientific Name:** Erimystax dissimilis **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Streamline Chub is in the class Actinopterygii and the family Cyprinidae (minnows and carps). The Streamline Chub occurs in the Ohio River basin from southwestern New York to northern Indiana and south to Alabama (Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). In New York it is native to the Allegheny watershed. The watershed has seen increases in Streamline Chub abundance and distribution in the last 20 years. There has been a total of 177 records in the Allegheny River and it's tributaries in the last 20 years, compared to just 67 records in the years prior. Upstream passage on Conewango Creek was restored in 2014 and as a result, Streamline Chubs have been recorded in Conewango Creek in 2017 and 2020. Overall, populations in New York and Pennsylvania are stable, and Pennsylvania is considered a stronghold for the species (Stauffer et al. 2016). The Streamline Chub inhabits the clear, warm waters of medium to large sized streams over clean gravel and cobble substrate. They can tolerate a wide variety of current velocities and stream habitats, as evidenced by their recent expansion in New York and Pennsylvania (Lee et al. 1980; Smith 1985; Stauffer et al. 2016). Smith (1985) reported that they are "often near the lower ends of riffles in water 1 to 4 feet deep." They are also found in moderate and slow runs, and in well-flowing portions of pools (Jenkins and Burkhead 1994; Morse et al. 2009; Page and Burr 2011).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Special Concern – Non-SGCN (removed from SGCN list)

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern

**Status Discussion:**

In New York, the Streamline Chub is currently listed as Special Concern. However, they are currently listed as a Non-SGCN because they were removed from the SGCN list in 2015. The Streamline Chub is globally ranked as Apparently Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

## b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** _____ **Increasing:** ✓ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** ✓ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

## c. Adjacent States and Provinces

| | | |
|---|---|---|
| **CONNECTICUT** | **Not Present:** ✓ | **No Data:** _____ |
| **MASSACHUSETTS** | **Not Present:** ✓ | **No Data:** _____ |
| **NEW JERSEY** | **Not Present:** ✓ | **No Data:** _____ |
| **VERMONT** | **Not Present:** ✓ | **No Data:** _____ |
| **ONTARIO** | **Not Present:** ✓ | **No Data:** _____ |
| **QUEBEC** | **Not Present:** ✓ | **No Data:** _____ |
| **PENNSYLVANIA** | **Not Present:** _____ | **No Data:** _____ |

**i. Abundance**

**Declining:** _____ **Increasing:** ✓ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** ✓ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4S5 **SGCN?:** Yes

## d. New York

**i. Abundance**

**Declining:** _____ **Increasing:** ✓ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** ✓ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** (*insert map of North American/regional*):

“The Streamline Chub has disappeared from much of its original range and is generally uncommon and localized (Etnier and Starnes 1993; Page and Burr 2011).” “In Pennsylvania, however it has expanded significantly during the past two decades as a result of improved water quality and is secure in the state" (Stauffer et al. 2016).

In the last 20 years, Streamline Chub abundance and distribution has also increased in New York. There has been a total of 177 records in the Allegheny River and it's tributaries in the last 20 years, compared to just 67 records in the years prior. Upstream passage on Conewango Creek was restored in 2014 and as a result, Streamline Chubs have been recorded in Conewango Creek in 2017 and 2020. Overall, populations in New York and Pennsylvania are stable, and Pennsylvania is considered a stronghold for the species (Stauffer et al. 2016).

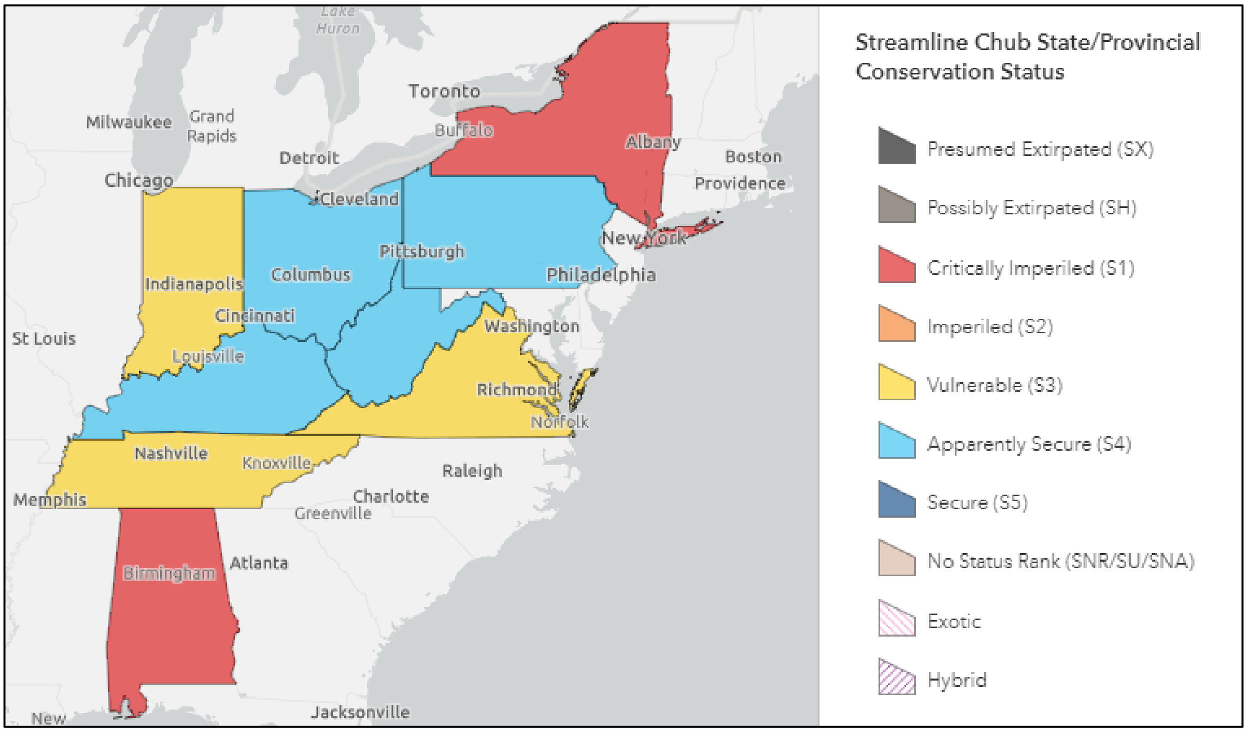


**Figure 1:** Streamline Chub distribution and status (Source: NatureServe 2022).

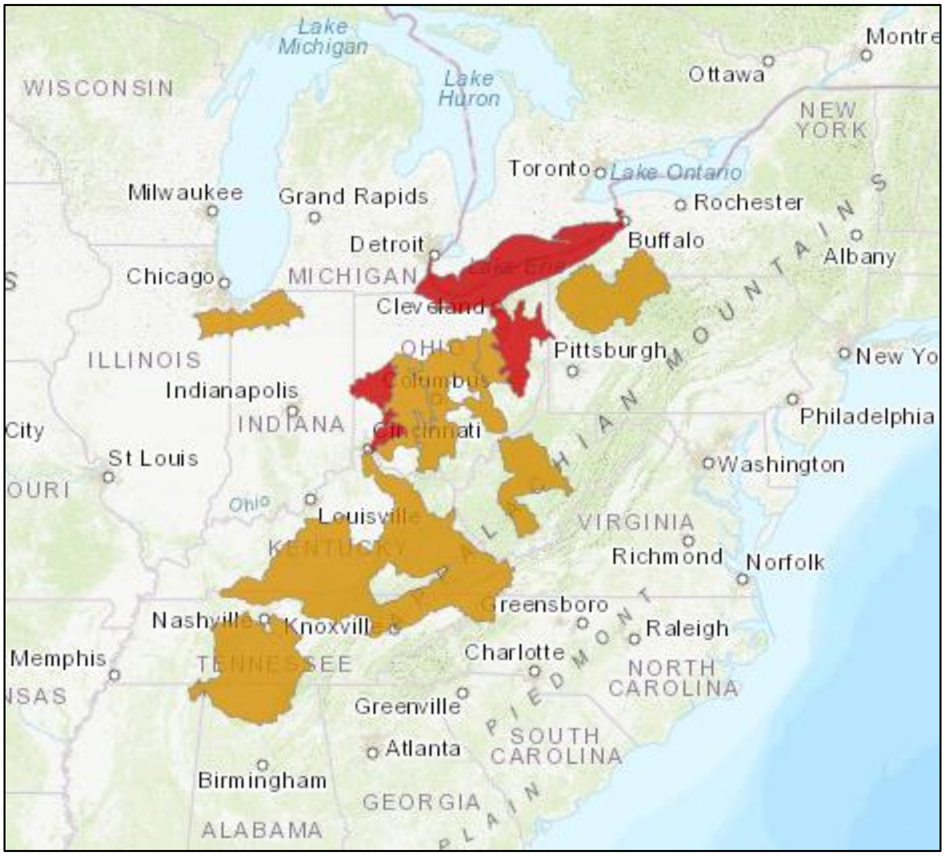


**Figure 2:** Streamline Chub distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

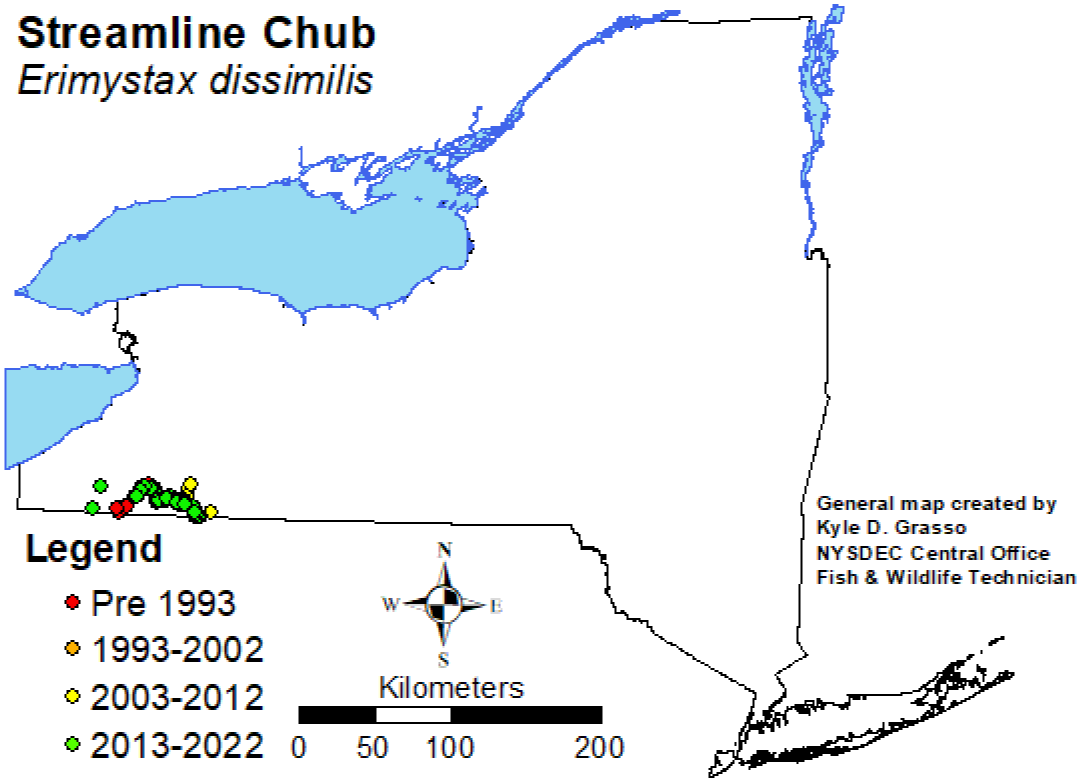


**Figure 3:** Records of Streamline Chub in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 42 | 6 | 0-5% |
| **1993-2002** | 25 | 4 | 0-5% |
| **2003 - 2012** | 58 | 4 | 0-5% |
| **2013 - 2022** | 122 | 5 | 0-5% |

**Table 1:** Records of Streamline Chub in New York.

### Details of historic and current occurrence:

The Streamline Chub is only native to the Allegheny watershed in New York. Historically, they were present in the Allegheny River and its neighboring tributaries including Olean Creek, Oswayo Creek, Haskell Creek, Tunungwant Creek, and Newton Run. It was recorded in the Allegheny River as early as 1927 (Leigey et al. 1955; Eaton et al. 1982; Carlson et al. 2016). In the last 20 years abundance and distribution have increased in New York and Pennsylvania (Stauffer et al. 2016). In New York, there has been a total of 177 records in the Allegheny River and it's tributaries in the last 20 years, compared to just 67 records in the years prior. Upstream passage on Conewango Creek was restored in 2014 and as a result, Streamline Chubs have been recorded in Conewango Creek in 2017 and 2020. Overall, populations in New York and Pennsylvania are stable, and Pennsylvania is considered a stronghold for the species (Stauffer et al. 2016).

### 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%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:** ✓

**Peripheral:** ✓

**Disjunct:**_____

**Distance to core population:**

Core pop. to the southwest

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Small to medium mainstem rivers

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:** ✓ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:**_____ **No:** ✓

**Indicator Species?** **Yes:**_____ **No:** ✓

### Habitat Discussion:

The Streamline Chub inhabits the clear, warm waters of medium to large sized streams over clean gravel and cobble substrate. They can tolerate a wide variety of current velocities and stream habitats, as evidenced by their recent recovery/expansion in New York and Pennsylvania (Lee et al. 1980; Smith 1985; Stauffer et al. 2016). Smith (1985) reported that they are “often near the lower ends of riffles in water 1 to 4 feet deep.” They are also found in moderate and slow runs, and in well-flowing portions of pools (Jenkins and Burkhead 1994; Morse et al. 2009; Page and Burr 2011). “In French Creek, the Streamline Chub frequents deeper water during the day and moves to swift, shallow riffles at night” (Stauffer et al. 2016).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Little is known about the life history of the Streamline Chub (Smith 1985; Werner 2004). The Streamline Chub is believed to live no longer than 2+ years and they likely reach sexual maturity in one year (Jenkins and Burkhead 1994; Stauffer et al. 2016). “Spawning occurs from early to mid-April through late May and begins when water temperatures reach approximately 15°C, with peak activity likely occurring in April (Harris 1986, Jenkins and Burkhead 1994). Breeding appears to be initiated by high water level and warming temperatures” (Stauffer et al. 2016). Fecundity ranges from 225-1200 depending on the size of the female (Stauffer et al. 2016).

## VI. Threats *(from NY CWCS Database or newly described)*

Little research has been done on threats to Streamline Chub. The primary known threats include pollution and siltation from poor land use practices (Trautman 1981; Smith 1985; NatureServe 2022). Trautman (1981) noted the disappearance of this species at a previously occupied site after the riffle became silted. In New York, pollution and the Kinzua dam (completed in 1967) eliminated its habitat below Salamanca and effectively isolated the New York populations of Streamline Chub (Smith 1985). Upstream passage on Conewango Creek was restored in 2014 which helps increase connectivity between previously separated populations in New York and Pennsylvania.

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

**Yes:** ✓ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

Similarly to the Longhead Darter, measures are needed to reduce runoff into areas used by the Streamline Chub. When construction is needed near water systems, steps should be taken to reduce siltation as much as possible. This could include disturbing only the work area to maintain as much vegetation as possible to reduce runoff, working in phases to allow for more centralized control of sedimentation, using sediment traps or ditches to direct runoff away from the river, stabilizing soil by seeding, mulching, use of blankets, or wool binders. Protect slopes by using silt fences or fiber rolls. Logging and farming practices near waters can increase siltation or pollution. Encourage practices that maintain a riparian buffer to control pollution. Gravel and boulders should not be disturbed or removed from the river as they are necessary for spawning and provide refuge from predators. Any alteration to the flow of water may affect upstream movement to spawning areas. Consider removing any barriers to allow free movement. Studies are needed to determine spawning dates, larval habitat needs, and movement patterns in New York (NYNHP 2022).

The 2005 State Wildlife Action Plan included the following recommendations:

<u>Habitat restoration:</u>

-Habitat losses and restoration are part of a State Wildlife Grants project from 2003 that is directed at the Allegheny watershed.

Population monitoring:

-Surveys of the Allegheny River and tributaries should occur at 10-20 year intervals to evaluate species trends.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Management | Site/Area Management |
| **2.** Land/Water Management | Habitat & Natural Process Restoration |
| **3.** Species Management | Species Recovery |
| **4.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Streamline Chub.

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# Species Status Assessment Cover Sheet

**Species Name:** Swallowtail Shiner **Date Updated:** January 2023

**Current Status:** Not Listed – HPSGCN **Updated By:** Kyle Grasso

**Current NHP Rank:** S2

**Distribution:** Swallowtail Shiners are found from the Susquehanna River drainage in New York south to the Santee River drainage in South Carolina. In New York, they are native to the Chemung, Delaware, and Susquehanna watersheds, and are considered nonnative to the Lower Hudson and Oswego watersheds.

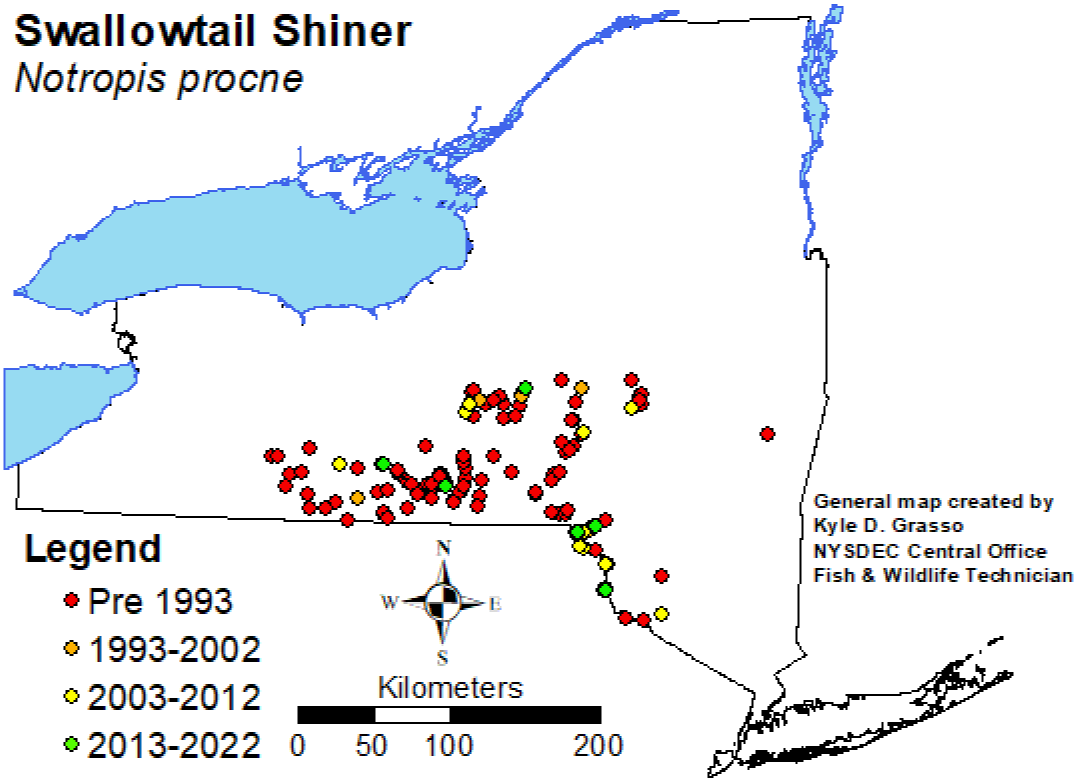
**Habitat:** Swallowtail Shiners inhabit warm, low to moderate gradient creeks and small to large rivers with clear to often turbid water. Historically, they have also been recorded in a few lakes in New York. They are most frequently found in pools and slow runs with sand, gravel, or ruble substrates. They appear to be tolerant of heavy siltation and sandy substrate but avoid deeper pools and rapid water. They are usually seen in schools near the bottom.

**Life History:** The Swallowtail Shiner typically lives about 3 years and reaches sexual maturity in 1-2 years. The Swallowtail Shiner spawns from mid-May to late July in Virginia, and late spring or early summer in Pennsylvania. Raney (1947) collected females with well-developed eggs in the Susquehanna River drainage, in New York in July. Spawning was observed in riffles over 4-12 inches deep over sand and fine gravel when the water temperature was 78°F. Males guarded territories, maintaining distances of 4-18 inches. Females are courted to the male's territories where the males will grasp the females and drop to the bottom together where the eggs are laid and fertilized.

**Threats:** Stauffer et al (2016) suggested that populations in the Susquehanna River system in Pennsylvania may be declining due to the introduction of the Mimic Shiner. The Mimic Shiner has also expanded its range in New York and may be outcompeting Swallowtail Shiner in some rivers. Other threats to the Swallowtail Shiner include nutrient enrichment (i.e., from agricultural practices), municipal discharge, urban runoff and sewer discharge, land development, and river modifications (e.g., dams, channelization, and bridge construction).

**Population trend:** In New York, Swallowtail Shiners are native to the Chemung, Delaware, and Susquehanna watersheds, and are considered nonnative to the Lower Hudson and Oswego watersheds. Historically found in up to 50 waterbodies across the state, there are only 19 records in 12 waterbodies since 2003. Their range and abundance have significantly declined in the Chemung and Susquehanna watersheds since the mid-1900s. These declines are possibly linked to the introduction of the Mimic Shiner. Overall, current Swallowtail Shiner populations appear to be most stable in the Delaware watershed.

**Recommendation:** It is recommended that the Swallowtail Shiner be listed as Threatened due to the significant range declines in the Chemung and Susquehanna watersheds.



# Species Status Assessment

**Common Name:** Swallowtail Shiner **Date Updated:** January 2023

**Scientific Name:** *Notropis procne* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Swallowtail Shiner is in the class Actinopterygii and the family Cyprinidae (minnows and carps). Swallowtail Shiners are found from the Susquehanna River drainage in New York south to the Santee River drainage in South Carolina (NatureServe 2022). In New York, they are native to the Chemung, Delaware, and Susquehanna watersheds, and are considered nonnative to the Lower Hudson and Oswego watersheds (Carlson et al. 2016). Although they're considered nonnative to the Lower Hudson and Oswego watersheds, they were likely introduced early (Carlson et al. 2016). Historically found in up to 50 waterbodies across the state, there are only 19 records in 12 waterbodies since 2003. Their range and abundance have significantly declined in the Chemung and Susquehanna watersheds since the mid-1900s. The Chemung watershed has seen the greatest declines, with only one record in the last 20 years (Carlson et al. 2016; NYNHP 2022). These declines are possibly linked to the introduction of the Mimic Shiner (Stauffer et al. 2016; NYNHP 2022). Overall, current Swallowtail Shiner populations appear to be most stable in the Delaware watershed (Carlson et al. 2016). The Mimic Shiner has not been recorded in the Delaware watershed; however, further spread could endanger these more stable Swallowtail Shiner populations. Swallowtail Shiners inhabit warm, low to moderate gradient creeks and small to large rivers with clear to often turbid water (Smith 1985; Stauffer et al. 2016; NYNHP 2022; NatureServe 2022). They are most frequently found in pools and slow runs with sand, gravel, or ruble substrates (Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016). They appear to be tolerant of heavy siltation and sandy substrate but avoid deeper pools and rapid water (Smith 1985; Stauffer et al. 2016; NYNHP 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – HPSGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S2 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need Watchlist (Feb. 2022 RSGCN draft list)

### Status Discussion:

The Swallowtail Shiner is not currently federally listed or listed in the state of New York. However, they are currently listed as a HPSGCN in New York. The Swallowtail Shiner is globally ranked as Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:** _____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:** _____

**VERMONT** **Not Present:** ✓ **No Data:** _____

**ONTARIO** **Not Present:** ✓ **No Data:** _____

**QUEBEC** **Not Present:** ✓ **No Data:** _____

**NEW JERSEY** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**ii. Distribution**

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Status review done in 2016

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

**PENNSYLVANIA** **Not Present:** _____ **No Data:** _____

**i. Abundance**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**ii. Distribution**

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Populations may be declining (2016)

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

## d. New York

### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Widespread declines since early to mid 1900s

## Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

## Trends Discussion *(insert map of North American/regional):*

The range wide trend over the last 10 years is unknown but probably relatively stable or slowly declining (NatureServe 2022). “Populations in the Susquehanna River system in Pennsylvania may be declining, as a result of the introduction of the Mimic Shiner, *Notropis volucellus*. There may be a decline in the Delaware River as well, but more survey work is needed to determine its current status in both drainages” (Stauffer et al. 2016).

In New York, Swallowtail Shiners are native to the Chemung, Delaware, and Susquehanna watersheds, and are considered nonnative to the Lower Hudson and Oswego watersheds (Carlson et al. 2016). Historically found in up to 50 waterbodies across the state, there are only 19 records in 12 waterbodies since 2003. Their range and abundance have significantly declined in the Chemung and Susquehanna watersheds since the mid-1900s. The Chemung watershed has seen the greatest declines, with only one record in the last 20 years (Carlson et al. 2016; NYNHP 2022). These declines are possibly linked to the introduction of the Mimic Shiner (Stauffer et al. 2016; NYNHP 2022). Populations appear to be more stable in the Delaware watershed (Carlson et al. 2016). The Mimic Shiner has not been recorded in the Delaware watershed; however, further spread could endanger these more stable Swallowtail Shiner populations. Although the Swallowtail Shiner is considered nonnative to the Lower Hudson and Oswego watersheds, they were likely introduced early (Carlson et al. 2016). In the Oswego watershed, they have only been recorded twice since 1950 (Catherine Creek in 1972 and 2019) (Carlson et al. 2016). Smith (1985) suggested they occurred here as result of post glacial colonization, migration from the old Seneca Canal, or bait bucket transfer (Carlson et al. 2016). In the Lower Hudson watershed, “three specimens were collected in 1884 from the Hudson River at Castleton (USNM 36765). No Swallowtail Shiners have been found in the Hudson River drainage since. This collection appears to be an anomaly and suggests a resemblance to the cases of *Notropis amoenus* and *Percina peltata*, two other Delaware River drainage fishes that somehow gained access to the Lower Hudson watershed” (Carlson et al. 2016).

“Some of the shiner species are often under-reported in stream surveys, particularly when field procedures are not connected to archived samples and identifications are difficult. This is unfortunate when major declines in their populations go unnoticed. The southern watersheds of New York may have fallen victim to these kinds of oversights, particularly the Swallowtail Shiner, Comely Shiner, and Satinfin Shiner” (Carlson 2013).

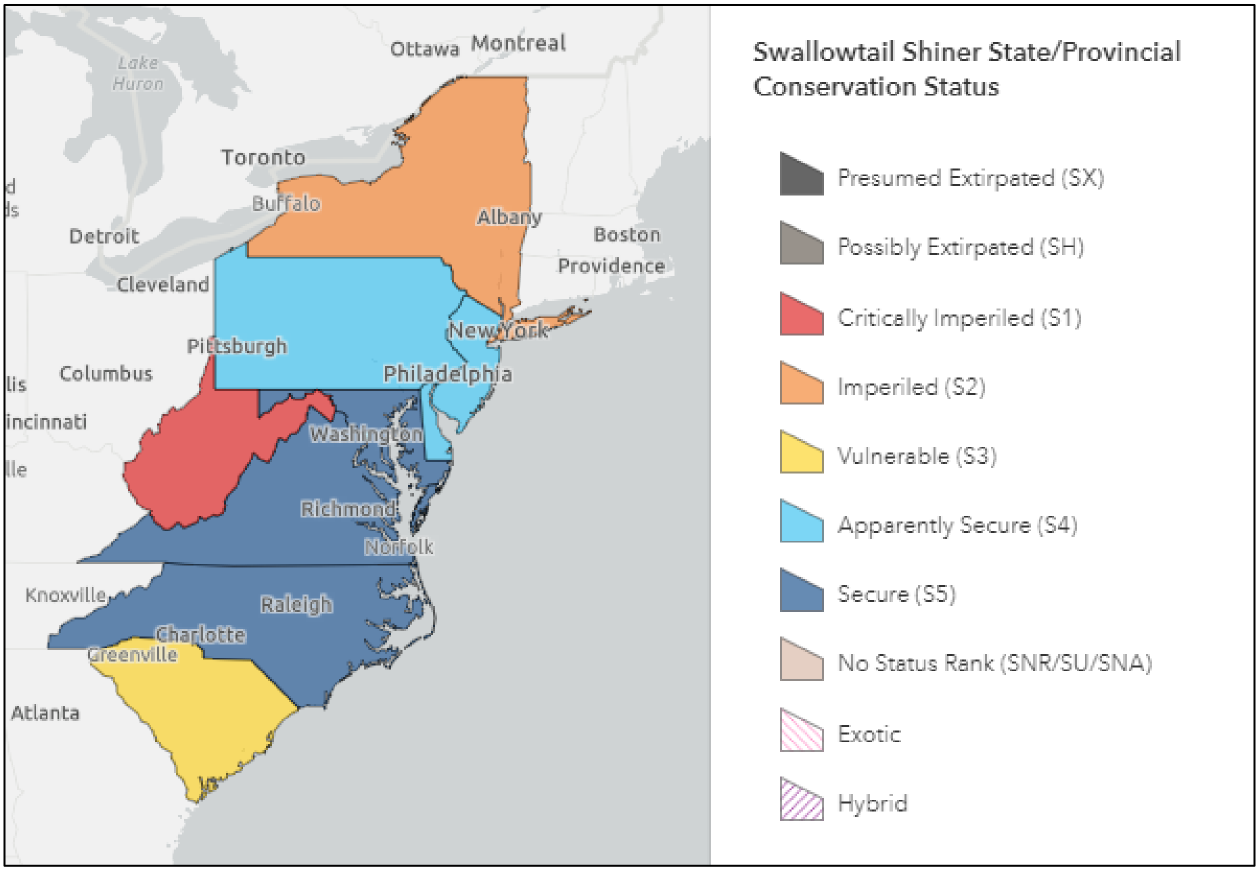


**Figure 1:** Swallowtail Shiner distribution and status (Source: NatureServe 2022).

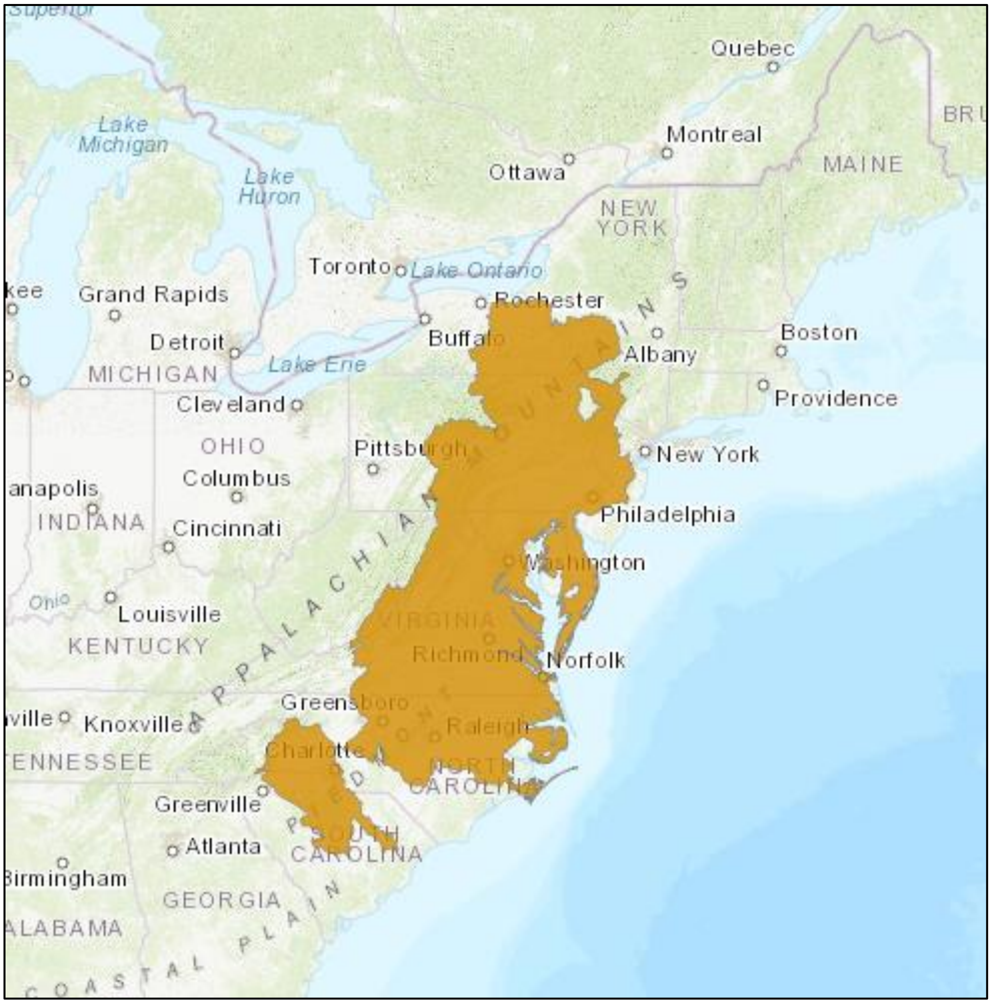


**Figure 2:** Swallowtail Shiner distribution (Source: IUCN Redlist).

## III. New York Rarity (*provide map, numbers, and percent of state occupied*)

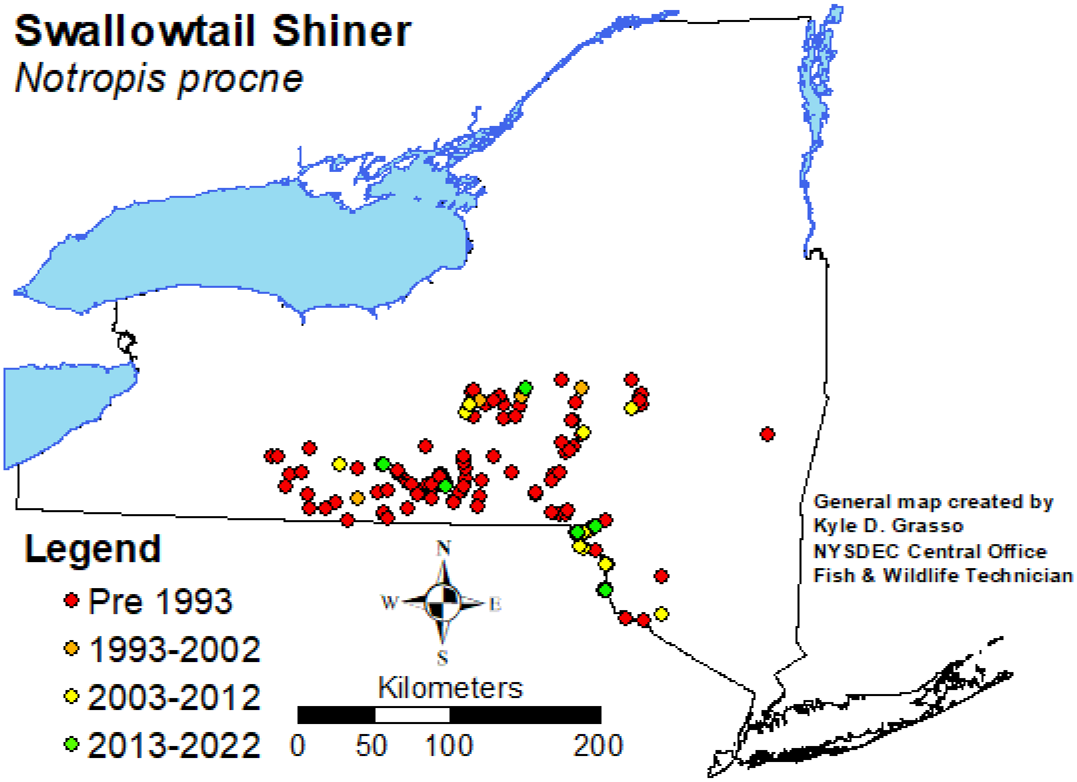


**Figure 3:** Records of Swallowtail Shiner in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 146 | 50 | 11-25% |
| **1993-2002** | 10 | 8 | 11-25% |
| **2003 - 2012** | 13 | 9 | 11-25% |
| **2013 - 2022** | 6 | 5 | 11-25% |

**Table 1:** Records of Swallowtail Shiner in New York.

### Details of historic and current occurrence:

In New York, Swallowtail Shiners are native to the Chemung, Delaware, and Susquehanna watersheds, and are considered nonnative to the Lower Hudson and Oswego watersheds (Carlson et al. 2016). Historically found in up to 50 waterbodies across the state, there are only 19 records in 12 waterbodies since 2003. Swallowtail Shiners were first caught in the Chemung, Delaware, and Susquehanna watersheds in 1937, 1935, and 1926 respectively. The last record within the Chemung watershed was in a tributary to Mud Creek in 2002, and they may be extirpated from the watershed. The last Swallowtail Shiner records from the Delaware and Susquehanna watersheds are from 2017 and 2016 respectively. Their range and abundance have significantly declined in the Chemung and Susquehanna watersheds since the mid-1900s. These declines are possibly linked to the introduction of the Mimic Shiner (Stauffer et al. 2016; NYNHP 2022). Populations appear to be more stable in the Delaware watershed (Carlson et al. 2016). The Mimic Shiner has not been recorded in the Delaware watershed; however, further spread could endanger these more stable Swallowtail Shiner populations.

Although the Swallowtail Shiner is considered nonnative to the Oswego and Lower Hudson, they were likely introduced early (Carlson et al. 2016). In the Oswego watershed, Swallowtail Shiners were caught in Fall Creek, near Ithaca, in 1899, Catherine Creek, near Montour Falls, in 1927, and Shequaga Creek in 1944. They've only been caught twice in the watershed since (Catherine Creek in 1972 and 2019) (Carlson et al. 2016). Smith (1985) suggested they occurred here as result of post glacial colonization, migration from the old Seneca Canal, or bait bucket transfer (Carlson et al. 2016). In the Lower Hudson watershed, "three specimens were collected in 1884 from the Hudson River at Castleton (USNM 36765). No Swallowtail Shiners have been found in the Hudson River drainage since. This collection appears to be an anomaly and suggests a resemblance to the cases of *Notropis amoenus* and *Percina peltata*, two other Delaware River drainage fishes that somehow gained access to the Lower Hudson watershed" (Carlson et al. 2016).

"Some of the shiner species are often under-reported in stream surveys, particularly when field procedures are not connected to archived samples and identifications are difficult. This is unfortunate when major declines in their populations go unnoticed. The southern watersheds of New York may have fallen victim to these kinds of oversights, particularly the Swallowtail Shiner, Comely Shiner, and Satinfin Shiner" (Carlson 2013).

### New York's Contribution to Species North American Range:

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:**__✓__

**Classification of New York Range**

**Core:**_____

**Peripheral:**__✓__

**Disjunct:**_____

**Distance to core population:**

Core populations to the south

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to medium mainstem rivers

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to warm

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:**__✓__

**Time frame of decline/increase:**_____________________________________

**Habitat Specialist?** **Yes:**__✓__ **No:**_____

**Indicator Species?** **Yes:**__✓__ **No:**_____

### Habitat Discussion:

Swallowtail Shiners inhabit warm, low to moderate gradient creeks and small to large rivers with clear to often turbid water (Smith 1985; Stauffer et al. 2016; NYNHP 2022; NatureServe 2022). Historically, they have also been recorded in a few lakes in New York (Carlson et al. 2016; NYNHP 2022). They are most frequently found in pools and slow runs with sand, gravel, or ruble substrates (Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016). They appear to be tolerant of heavy siltation and sandy substrate but avoid deeper pools and rapid water (Smith 1985; Stauffer et al. 2016; NYNHP 2022). They are usually seen in schools near the bottom (Smith 1985; NYNHP 2022).

# V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The Swallowtail Shiner typically lives about 3 years and reaches sexual maturity in 1-2 years (Smith 1985; Jenkins and Burkhead 1994; Stauffer et al. 2016; NatureServe 2022; NYNHP 2022). "The Swallowtail Shiner apparently spawns from mid-May to late July in Virginia, and late spring or early summer in Pennsylvania (Fowler 1909; Jenkins and Burkhead 1994). Raney (1947), who observed breeding behavior, collected females with well-developed eggs in the Susquehanna River drainage, in New York, on 10 July 1938" (Stauffer et al. 2016). In the Covington River near Washington, D.C. in 1946, spawning activities and ripe females were observed in riffles over 4-12 inches deep over sand and fine gravel when the water temperature was 78°F (Raney 1947). "Males guarded territories, maintaining distances of 4-18 inches" (Smith 1985). Females are courted to the male's territories where the males will grasp the females and drop to the bottom together where the eggs are laid and fertilized (Raney 1947; Smith 1985; Stauffer et al. 2016). "After spawning, the pair separated gently, and the female drifted downstream while the male returned to guarding his territory. Spawning continued after a few minutes and Raney estimated that it would take several days to deposit all of a females complement of eggs" (Smith 1985).

# VI. Threats *(from NY CWCS Database or newly described)*

There have been no studies to assess Swallowtail Shiner threats, limiting factors or overall vulnerability. Stauffer et al (2016) suggested that populations in the Susquehanna River system in Pennsylvania may be declining due to the introduction of the Mimic Shiner. The Mimic Shiner has also expanded its range in New York and may be outcompeting Swallowtail Shiner in some rivers (Stauffer et al. 2016; NYNHP 2022). The Mimic Shiner has not been recorded in the Delaware watershed; however, further spread could endanger these more stable Swallowtail Shiner populations.

"General threats include nutrient enrichment (i.e., from agricultural practices), municipal discharge, urban runoff and sewer discharge, and river modifications (e.g., dams, channelization, and bridge construction)" (NYNHP 2022). Kubach and Scott (2015) stated that loss of forested land, removal of riparian cover, land development, siltation, and hydrologic alterations (channelization and construction of impoundments) threaten the species in South Carolina.

"Some of the shiner species are often under-reported in stream surveys, particularly when field procedures are not connected to archived samples and identifications are difficult. This is unfortunate when major declines in their populations go unnoticed. The southern watersheds of

New York may have fallen victim to these kinds of oversights, particularly the Swallowtail Shiner, Comely Shiner, and Satinfin Shiner” (Carlson 2013).

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

**Yes:** __✓__ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations. Introductions of invasive species are regulated but difficult to enforce and not all harmful species are regulated.

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

“Little is known about the reasons for Swallowtail Shiner declines in New York. Additional research is needed to determine threats, habitat requirements, and best management practices. It appears that *Notropis volucellus* (Mimic Shiner) may be outcompeting Swallowtail Shiners (pers comm Douglas Carlson 2017). Research focusing on the effects of Mimic Shiner on native shiners may help guide management practices. Water quality requirements and pollution tolerance are unknown” (NYNHP 2022). Stocking of Swallowtail Shiners may be a viable solution if declines in the Chemung and Susquehanna watersheds continue. However, the presence of Mimic Shiners in these watersheds may make recovery difficult.

“Management needs are difficult to recommend until additional research addresses reasons for population declines. It is assumed that any practices that reduce water pollution would benefit the aquatic community. Restoration of riparian vegetation will help control nonpoint pollution. Agricultural practices that reduce the amount of runoff from livestock and crops could reduce nutrient enrichment and excess sedimentation. It is possible that Mimic Shiners were introduced in different areas of the state by fishermen discarding unused bait. Public education may help reduce this practice” (NYNHP 2022).

The 2005 State Wildlife Action Plan included the following recommendations:

<u>Habitat restoration:</u>

-Habitat losses and restoration are part of a State Wildlife Grants project from 2003 that are directed at the Susquehanna watershed.

<u>Population monitoring:</u>

-More sampling is needed in the Susquehanna and Delaware Basins.

The 2015 State Wildlife Action Plan included the following recommendations:

-Assess Swallowtail Shiner population and habitat in the Delaware and Susquehanna watersheds.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Resource & Habitat Protection |
| **2.** Land/Water Management | Invasive/Problematic Species Control |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |
| **4.** Species Management | Species Recovery |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Swallowtail Shiner.

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# Species Status Assessment Cover Sheet

**Species Name:** Swamp Darter

**Date Updated:** January 2023

**Current Status:** Threatened – SGCN

**Updated By:** Kyle Grasso

**Current NHP Rank:** S1

**Distribution:** Swamp Darters can be found along the Atlantic Coast from southeastern Maine down to Florida, west along the Gulf Coast into Texas, and slightly north into Oklahoma, Arkansas, Missouri, Tennessee, and Kentucky. In New York, they are currently only found within the Peconic River watershed on Long Island.

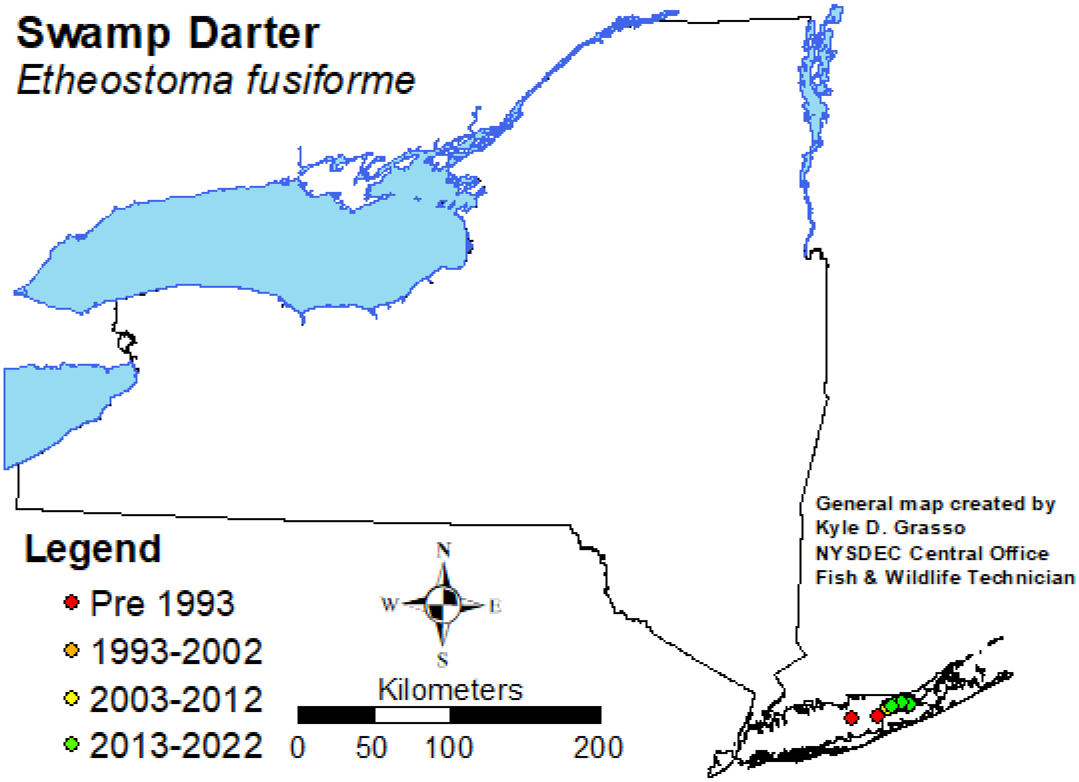
**Habitat:** Swamp Darters inhabit the slow-moving waters of swamps, ponds, and streams often over mud and detritus near abundant vegetation (sometimes over sand or gravel). They tolerate a wide range of water temperatures, oxygen levels (down to 2.1 mg/l), and pH values (5.7-7.2). They can thrive in tannin-stained acidic waters and there are reports of increasing abundances as its habitat became acidic.

**Life History:** Swamp Darters mature after their first summer and rarely live through their second summer. Spawning typically occurs from March-June depending on their geographic location. Specimens collected in late April from Lake Ronkonkoma began spawning activities in the aquarium almost immediately and spawning in the wild occurred in early May on Long Island and in New Jersey. Spawning takes place when females and males move up to the surface of the water within aquatic vegetation. They will swim side by side while the females deposit eggs onto the vegetation and the males fertilize them. The eggs will take around 10 days to hatch at which point the fry become pelagic for about a month until they settle to the bottom where they will spend most of their lives.

**Threats:** Threats to the Swamp Darter include groundwater pumping/dewatering, environmental catastrophes, habitat removal/alteration from development, predation, pollution, and loss of preferred vegetative cover to invasive plant species.

**Population trend:** In New York, the Swamp Darter was historically found in 11 waterbodies before 1993. They have been recorded in 6 of those historic waterbodies in the last 30 years; however, they've also been reported in an additional 9 waterbodies in that same period, totaling 15 waterbodies over the last 30 years. All of the current records come from the Peconic River watershed on Long Island. There has not been a Swamp Darter record in Lake Ronkonkoma or Lower Lake/Carmans River since 1979. Although the current range in New York is restricted, the population appears to be stable.

**Recommendation:** It is recommended that the Swamp Darter remain listed as Threatened due to their restricted range and vulnerability to low water conditions and environmental catastrophes on Long Island.



# Species Status Assessment

**Common Name:** Swamp Darter **Date Updated:** January 2023

**Scientific Name:** *Etheostoma fusiforme* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Percidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Swamp Darter is in the class Actinopterygii and the family Percidae (perches, walleyes, darters). The Swamp Darter can be found along the Atlantic Coast from southeastern Maine down to Florida, west along the Gulf Coast into Texas, and slightly north into Oklahoma, Arkansas, Missouri, Tennessee, and Kentucky. In New York, they are currently only found within the Peconic River watershed on Long Island. The Swamp Darter was historically found in 11 waterbodies before 1993. They have been recorded in 6 of those historic waterbodies in the last 30 years; however, they've also been reported in an additional 9 waterbodies in that same period, totaling 15 waterbodies over the last 30 years. All of the current records come from the Peconic River watershed on Long Island. Although the current range in New York is restricted, the population appears to be stable (Carlson et al. 2016). Swamp Darters inhabit the slow-moving waters of swamps, ponds, and streams often over mud and detritus near abundant vegetation (sometimes over sand or gravel). They tolerate a wide range of water temperatures, oxygen levels (down to 2.1 mg/l), and pH values (5.7-7.2) (Lee et al. 1980; Schmidt 1983; Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022; NYNHP 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Threatened – SGCN

### b. Natural Heritage Program

i. **Global:** Secure – G5

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

**Other Ranks:**

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)

**Status Discussion:**

In New York, the Swamp Darter is currently listed as Threatened and SGCN. They are globally ranked as Secure by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

i. **Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

ii. **Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**b. Northeastern U.S. (USWFS Region 5)**

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**c. Adjacent States and Provinces**

**PENNSYLVANIA** **Not Present:** ✓ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**_____

**ONTARIO** **Not Present:** ✓ **No Data:**_____

**QUEBEC** **Not Present:** ✓ **No Data:**_____

**CONNECTICUT** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S2 **SGCN?:** Yes

**MASSACHUSETTS** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

**NEW JERSEY** **Not Present:**_____ **No Data:**_____

**i. Abundance**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**ii. Distribution**

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

## d. New York

### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:**_✓_ **Unknown:**_____

### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:**_✓_ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit. Region 1 fisheries staff have conducted repeated surveys for Banded Sunfish (*Enneacanthus obesus*) and Swamp Darter (*Etheostoma fusiforme*) in 30+ ponds since 2018.

**Trends Discussion** *(insert map of North American/regional):*

According to NatureServe, the range wide trend over the past 10 years is unknown but probably relatively stable. The last record of Swamp Darter in Pennsylvania was in 1911 and they are presumed extirpated due to habitat degradation and destruction (Stauffer et al. 2016).

In New York, the Swamp Darter was historically found in 11 waterbodies before 1993. They have been recorded in 6 of those historic waterbodies in the last 30 years; however, they've also been reported in an additional 9 waterbodies in that same period, totaling 15 waterbodies over the last 30 years. All of the current records come from the Peconic River watershed on Long Island. There has not been a Swamp Darter record in Lake Ronkonkoma or Lower Lake/Carmans River since 1979.

Although the current range in New York is restricted, the population appears to be stable (Carlson et al. 2016). Region 1 surveys of 25 waterbodies in 2019 resulted in Swamp Darter records within 2 waterbodies, although dense vegetation encountered in most of the ponds made it difficult to seine. It is assumed that they were likely present in more ponds (O'Riordan 2019). This may have been the case for historic samples as well.

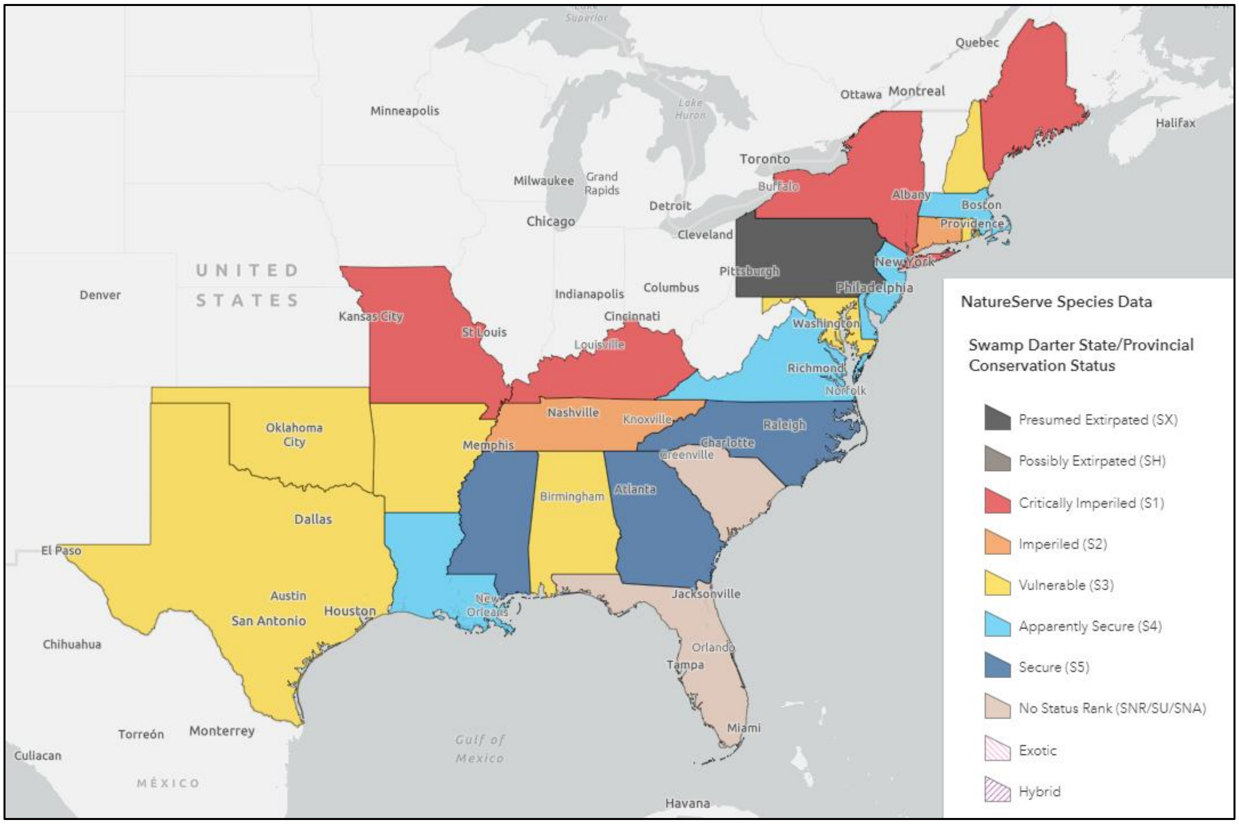


**Figure 1:** Swamp Darter distribution and status (Source: NatureServe 2022).

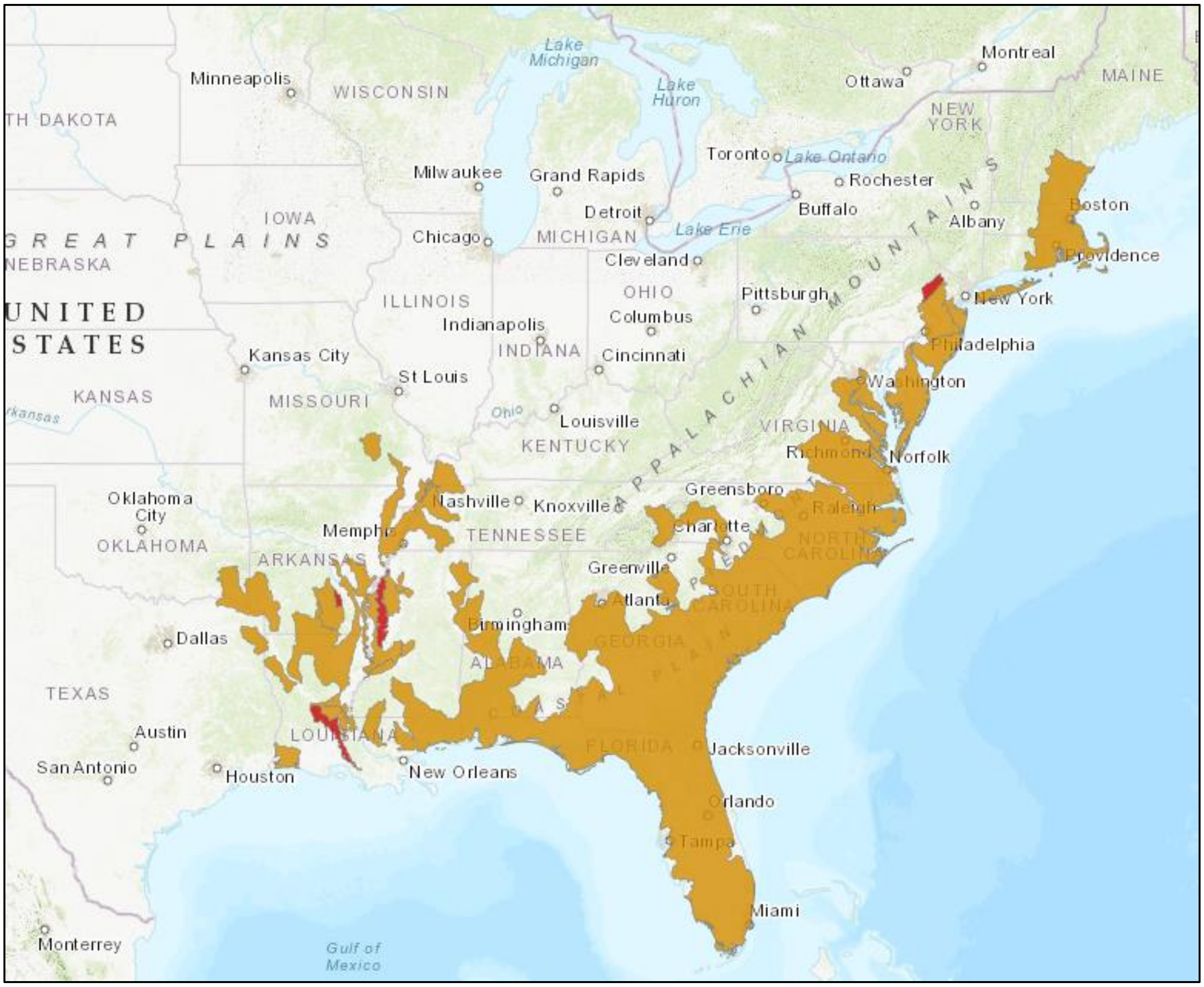


**Figure 2:** Swamp Darter distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

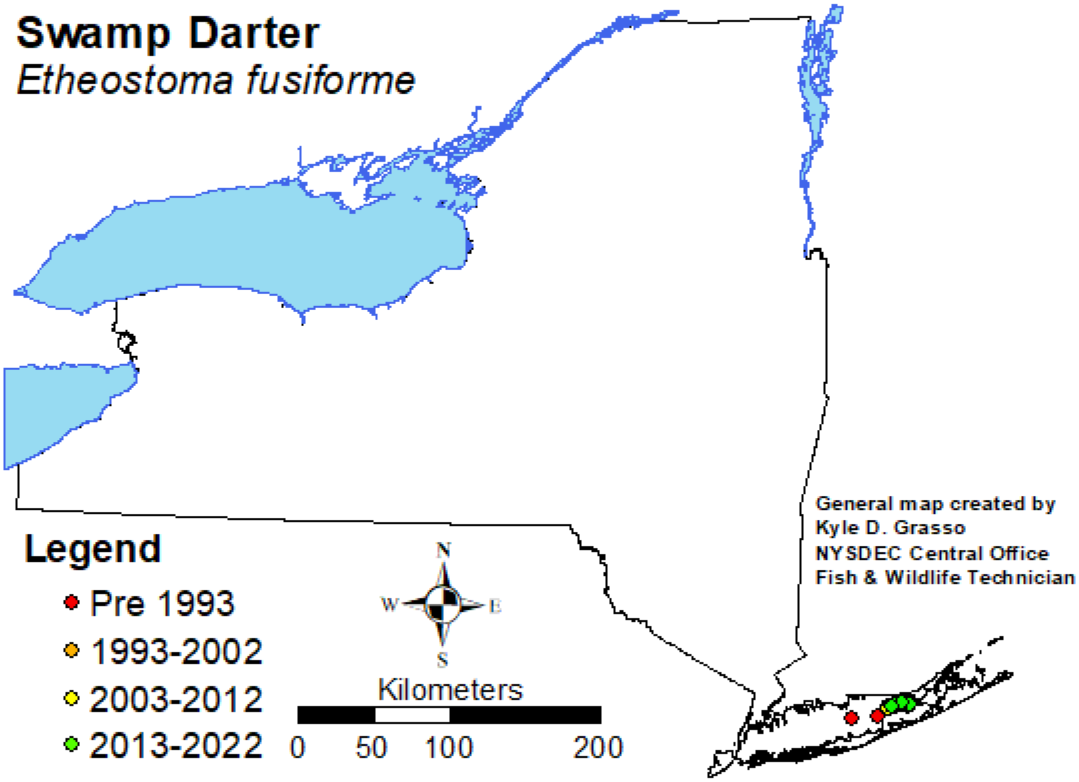


**Figure 3:** Records of Swamp Darter in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 31 | 11 | 0-5% |
| **1993-2002** | 5 | 4 | 0-5% |
| **2003 - 2012** | 14 | 9 | 0-5% |
| **2013 - 2022** | 20 | 7 | 0-5% |

**Table 1:** Records of Swamp Darter in New York.

### Details of historic and current occurrence:

In New York, the Swamp Darter was historically found in 11 waterbodies before 1993. They have been recorded in 6 of those historic waterbodies in the last 30 years; however, they’ve also been reported in an additional 9 waterbodies in that same period, totaling 15 waterbodies over the last 30 years. All of the current records come from the Peconic River watershed on Long Island. There has not been a Swamp Darter record in Lake Ronkonkoma or Lower Lake/Carmans River since 1979.

Although the current range in New York is restricted, the population appears to be stable (Carlson et al. 2016). Region 1 surveys of 25 waterbodies in 2019 resulted in Swamp Darter records within 2 waterbodies, although dense vegetation encountered in most of the ponds made it difficult to seine. It is assumed that they were likely present in more ponds (O’Riordan 2019). This may have been the case for historic samples as well.

**New York's Contribution to Species North American Range:**

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:**__✓__

**Classification of New York Range**

**Core:**_____

**Peripheral:**__✓__

**Disjunct:**_____

**Distance to core population:**

Core population to the southwest

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Small rivers and creeks as well as small coastal ponds

**b. Geology:** Low-moderately buffered

**c. Temperature:** Warm

**d. Gradient:** Low to low-moderate gradient

**Habitat or Community Type Trend in New York**

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:**__✓__

**Time frame of decline/increase:**_____________________________________________

**Habitat Specialist?** **Yes:**_____ **No:**__✓__

**Indicator Species?** **Yes:**_____ **No:**__✓__

**Habitat Discussion:**

Swamp Darters inhabit the slow-moving waters of swamps, ponds, and streams often over mud and detritus near abundant vegetation (sometimes over sand or gravel). They tolerate a wide range of water temperatures, oxygen levels (down to 2.1 mg/l), and pH values (5.7-7.2). They can thrive in tannin-stained acidic waters and there are reports of increasing abundances as its habitat became acidic (Lee et al. 1980; Schmidt 1983; Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022; NYNHP 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Swamp Darters mature after their first summer and rarely live through their second summer (Collette 1962; NYNHP 2022). Spawning typically occurs from March-June depending on their geographic location (Whitworth et al. 1968; Page 1983; NatureServe 2022). “Specimens collected in late April from Lake Ronkonkoma began spawning activities in the aquarium almost immediately” and spawning in the wild occurred in early May on Long Island and in New Jersey (Fletcher 1957; Collette 1962; Smith 1985). Spawning takes place when females and males move up to the surface of the water within aquatic vegetation. They will swim side by side while the females deposit eggs onto the vegetation and the males fertilize them. The eggs will take around 10 days to hatch at which point the fry become pelagic for about a month until they settle to the bottom where they will spend most of their lives (Fletcher 1957; Collette 1962; Schmidt 1983; Smith 1985; NYNHP 2022).

## VI. Threats *(from NY CWCS Database or newly described)*

Due to their geographic restriction on Long Island, Swamp Darters are vulnerable to environmental catastrophes. Fortunately, several of the occupied ponds are isolated and without surface water connections to the Peconic system. Ground water pumping can lower water levels and threaten these waters during drought conditions (NYNHP 2022). Low water levels in Zeeks Pond (on Brookhaven Nat. Lab) in 2002 were thought to have caused the Swamp Darters to become extirpated (NYSDEC 2005 SWAP). “Banded sunfish and Swamp Darter have been reported by the DEC to recover from drought conditions in past years (1990s) recolonizing connected ponds within the drainage area, therefore changes in their range are likely to be related to the water table levels” (O’Riordan 2019).

Other possible threats include habitat removal/alteration from development, largemouth bass predation, and loss of preferred vegetative cover to invasive plant species such as of phragmites, which can outcompete native vegetation such as sweet pepper bush (*Clethra alnifolia*) and smartweed (*Polygonum* spp) (O’Riordan 2019). Swamp Darters have wide water quality tolerances and are therefore not particularly environmentally sensitive, however pollution may be a threat (Lee et al. 1980; Schmidt 1983; Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022; NYNHP 2022).

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

**Yes:** _✓_ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

The Swamp Darter is currently listed as a threatened species in New York and is protected by Environmental Conservation Law (ECL) section 11-0535 and the New York Code of Rules and Regulations (6 NYCRR Part 182). A permit is required for any proposed project that may result in a take of a species listed as Threatened or Endangered, including, but not limited to, actions that may kill or harm individual animals or result in the adverse modification, degradation or destruction of habitat occupied by the listed species.

Those regulatory mechanisms will not address drought, invasive species, or groundwater withdrawals.

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

Regular sampling for presence and abundance should continue to occur in historic, current, as well as neighboring waterbodies on Long Island. Water levels and ground water pumping activities should be monitored especially on dry years to avoid adverse effects to Swamp Darters (Carlson 2005; Keeler 2006; NYNHP 2022). Permit reviews may be necessary for existing and new ground water wells on Long Island to avoid excessive drawdown and ensure ponds provide adequate habitat (NYSDEC 2005 SWAP). Land use should be controlled to protect habitat from development and prevent the destruction of occupied waterbodies on Long Island. Some ponds that experienced severe water withdrawals may need to be restored in order to reestablish populations of Swamp Darters where this species once occurred (Keeler 2006).

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat monitoring:

-Complete surveys on submerged aquatic vegetation and floating woody mats in areas still inhabited by this species and monitor water levels or depths on dry years.

Habitat research:

-Define preferred habitat in order to guide future restoration efforts and focus habitat protection efforts.

Population monitoring:

-Continued monitoring of the Long Island populations.

Relocation/reintroduction:

-Establish populations after dewatering of streams and lakes due to groundwater withdrawals. Zeeks Pond suffered this in 2002 and restorative measures are needed.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| Conservation Actions | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Invasive/Problematic Species Control |
| **5.** Land/Water Management | Habitat & Natural Process Restoration |
| **6.** Species Management | Species Re-introduction |
| **7.** Species Management | Ex-situ Conservation |

| | |
|---|---|
| **8.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Swamp Darter.

## VII. References

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Stauffer, J. R., Jr., R. W. Criswell, and D. P. Fischer. 2016. The fishes of Pennsylvania. Cichlid Press. El Paso, Texas. 556 pp.

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# Species Status Assessment Cover Sheet

**Species Name:** Tonguetied Minnow

**Date Updated:** January 2023

**Current Status:** Not Listed – SGCN

**Updated By:** Kyle Grasso

**Current NHP Rank:** S2

**Distribution:** Tonguetied Minnow range includes three disjunct areas within the Ohio and Genesee river basins: two northern populations in the Allegheny and Genesee river drainages of New York and Pennsylvania, a midwestern population in the Greater Miami and Little Miami rivers of Ohio, and a southern population in the New River drainage of West Virginia, Virginia, and North Carolina. In New York, they are only native to the Allegheny and Genesee watersheds.

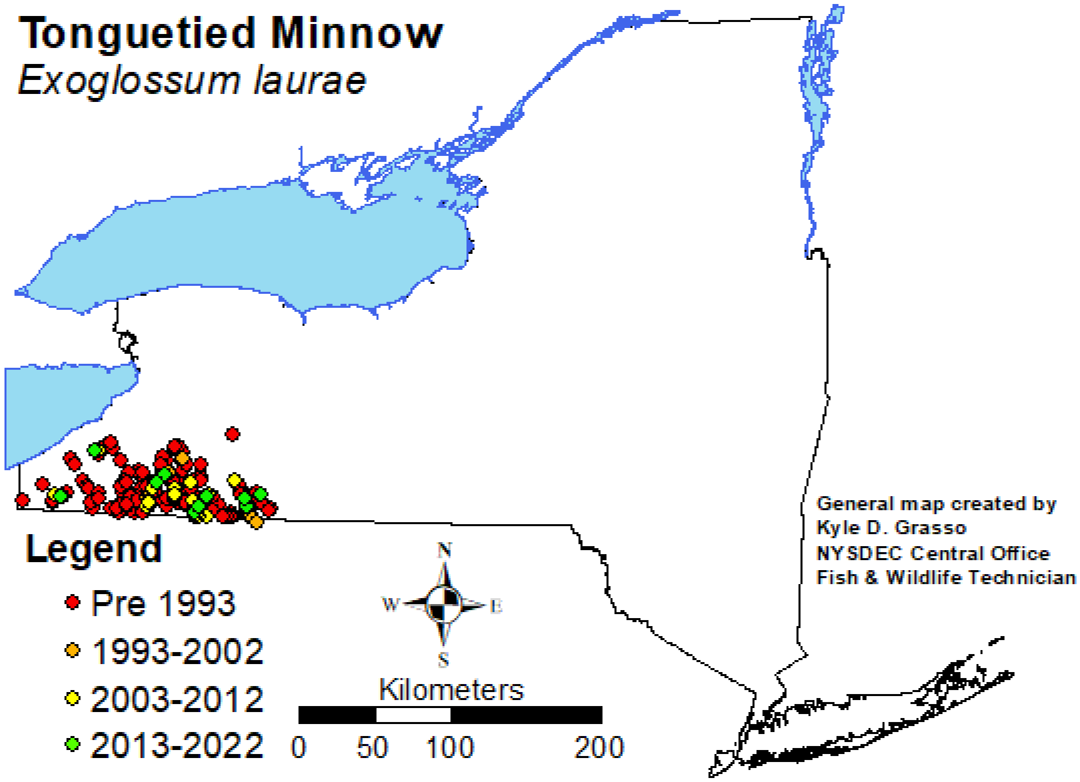
**Habitat:** The Tonguetied Minnow inhabits small creeks and medium-sized streams of moderate gradient with cool, silt-free water. They are typically found at the deeper edges of pools and runs with slow to moderate current over rubble, gravel, and boulder substrates. Zimmerman (2011) reported a reliance on forested and undercut stream banks and alternating riffle-pool habitats. Trautman (1981) stated that they are seldom taken at water temperatures above 21°C.

**Life History:** The Tonguetied Minnow typically lives a maximum of 4 years and will reach sexual maturity before the age of 2. Spawning typically occurs in May and June when water temperatures are 57-70°C. Raney (1939) observed the spawning behavior of the Tonguetied Minnow in the Allegheny River and Marvin Creek in Pennsylvania. Males use gravel and pebbles to construct circular nests 6 to 18 inches in diameter. Nests are typically built in 12 inches of water near cover in slow to moderate current. Males will guard nests as they wait for the females to release their eggs. After spawning, the eggs and young are left unguarded. Jenkins and Burkhead (1994) reported fecundities as high as 1,800.

**Threats:** The main threats to the Tonguetied Minnow include habitat loss and degradation associated with agriculture and development (e.g., siltation and channelization), predation from non-native fish, and interspecific hybridization with the Cutlip Minnow. Warming water temperatures due to climate change may also play a role in future conservation.

**Population trend:** In New York, the Tonguetied Minnow is native to the Allegheny and Genesee watersheds. Although, the Tonguetied Minnow has never been particularly abundant in either watershed (especially in the Genesee watershed), there have been decreases in abundance and large range loss in the Allegheny watershed since the mid-1900s. They also appear to be getting increasingly rare in the Genesee watershed. Historically, and to this day, the Tonguetied Minnow has inhabited the Genesee River only above Middle Falls (Portageville Falls), while the Cutlip Minnow inhabited the river below the falls.

**Recommendation:** It is recommended that the Tonguetied Minnow be listed as Threatened due to their rarity and the declines in abundance and range seen across the Allegheny and Genesee watersheds in New York.



# Species Status Assessment

**Common Name:** Tonguetied Minnow **Date Updated:** January 2023

**Scientific Name:** *Exoglossum laurae* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Cyprinidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Tonguetied Minnow is in the class Actinopterygii and the family Cyprinidae (minnows and carps). The Tonguetied Minnow has four distinct populations within the Ohio and Genesee river basins: two northern populations in the Allegheny and Genesee watersheds of New York and Pennsylvania, a midwestern population in the Greater Miami and Little Miami river systems of Ohio, and a southern population in the New River watershed of West Virginia, Virginia, and North Carolina (Lee et al. 1980; Smith 1985; Stauffer et al. 2016). The Tonguetied Minnow is thought to contain two distinct lineages: the ancient Teays River and the Pittsburgh River. The ancient Teays River lineage contains the southern population in the New River watershed of West Virginia, Virginia, and North Carolina. The Pittsburgh River lineage contains the two northern populations in the Allegheny and Genesee watersheds of New York and Pennsylvania, and the midwestern population in the Greater Miami and Little Miami river systems of Ohio (Hocutt et al.1978; Hocutt 1979; Hocutt et al.1986; Oswald et al. 2020a). In New York, the Tonguetied Minnow is native to the Allegheny and Genesee watersheds. Although, the Tonguetied Minnow has never been particularly abundant in either watershed (especially in the Genesee watershed), there have been decreases in abundance and large range loss in the Allegheny watershed since the mid-1900s. They also appear to be getting increasingly rare in the Genesee watershed. The Tonguetied Minnow inhabits small creeks and medium-sized streams of moderate gradient with cool, silt-free water. They are typically found at the deeper edges of pools and runs with slow to moderate current over rubble, gravel, and boulder substrates (Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – SGCN

### b. Natural Heritage Program

i. **Global:** Apparently Secure – G4

ii. **New York:** S2 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern
- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)

### Status Discussion:

The Tonguetied Minnow is not currently federally listed or listed in the state of New York. However, they are currently listed as an SGCN in New York. The Tonguetied Minnow is globally ranked as Apparently Secure by NatureServe. They are listed as SGCN in Pennsylvania, West Virginia, Virginia, and North Carolina, and Endangered in Ohio.

# II. Abundance and Distribution Trends

## a. North America

### i. Abundance

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

### ii. Distribution

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Since mid-1900s

## b. Northeastern U.S. (USWFS Region 5)

### i. Abundance

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

### ii. Distribution

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Since mid-1900s

## c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:** _____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:** _____

**NEW JERSEY** **Not Present:** ✓ **No Data:** _____

**VERMONT** **Not Present:** ✓ **No Data:** _____

**ONTARIO** **Not Present:** ✓ **No Data:** _____

**QUEBEC** **Not Present:** ✓ **No Data:** _____

**PENNSYLVANIA** **Not Present:** _____ **No Data:** _____

### i. Abundance

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

### ii. Distribution

**Declining:** _____ **Increasing:** _____ **Stable:** ✓ **Unknown:** _____

**Time Frame Considered:** Last 10-20 years

**Listing Status:** Not Listed – S4 **SGCN?:** Yes

## d. New York

### i. Abundance

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

### ii. Distribution

**Declining:** ✓ **Increasing:** _____ **Stable:** _____ **Unknown:** _____

**Time Frame Considered:** Since mid-1900s

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** *(insert map of North American/regional):*

The Tonguetied Minnow has four distinct populations within the Ohio and Genesee river basins: two northern populations in the Allegheny and Genesee watersheds of New York and Pennsylvania, a midwestern population in the Greater Miami and Little Miami river systems of Ohio, and a southern population in the New River watershed of West Virginia, Virginia, and North Carolina (Lee et al. 1980; Smith 1985; Stauffer et al. 2016). According to NatureServe, habitat has been lost or degraded due to siltation and “distribution and abundance have declined over the long term (10-50%), but the precise degree of decline is unknown.” The trend over the last 10 years is unknown, but likely relatively stable. Trautman (1981) and Zimmerman (2011) reported a range reduction in Ohio, and Jenkins and Burkhead (1994) noted low or extirpated populations in the New River watershed in Virginia (Stauffer et al. 2016). “This species appears to be stable in Pennsylvania, although it is seldom taken in large numbers” (Stauffer et al. 2016).

In New York, the Tonguetied Minnow is native to the Allegheny and Genesee watersheds. Although, the Tonguetied Minnow has never been particularly abundant in either watershed (especially in the Genesee watershed), there have been decreases in abundance and large range loss in the Allegheny watershed since the mid-1900s. They also appear to be getting increasingly rare in the Genesee watershed.

Historically, and to this day, the Tonguetied Minnow has inhabited the Genesee River only above Middle Falls (Portageville Falls), while the Cutlip Minnow inhabited the river below the falls (Smith 1985; Carlson et al. 2016). There is no record of Tonguetied Minnow below Middle Falls, and Carlson et al. (2016) stated that there has been no record of Cutlip Minnow above the falls.

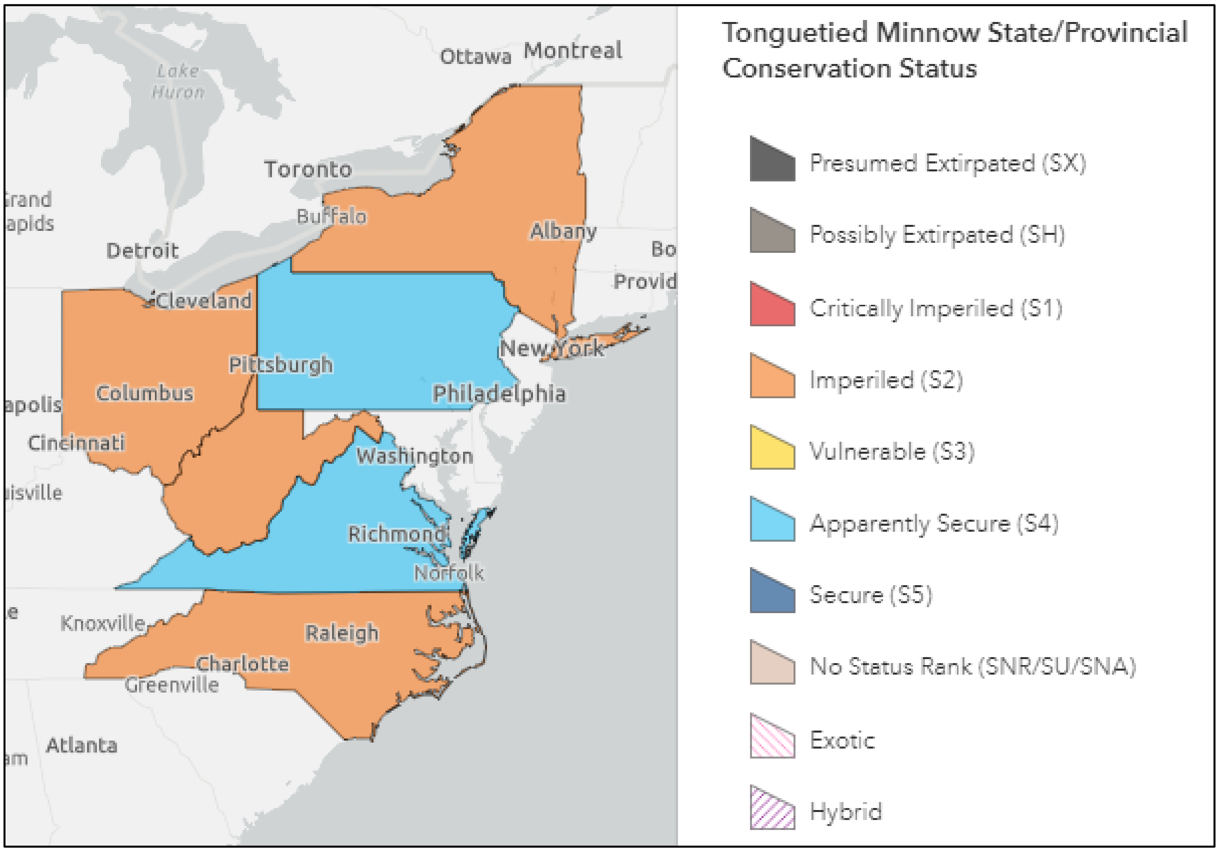


**Figure 1:** Tonguetied Minnow distribution and status (Source: NatureServe 2022).

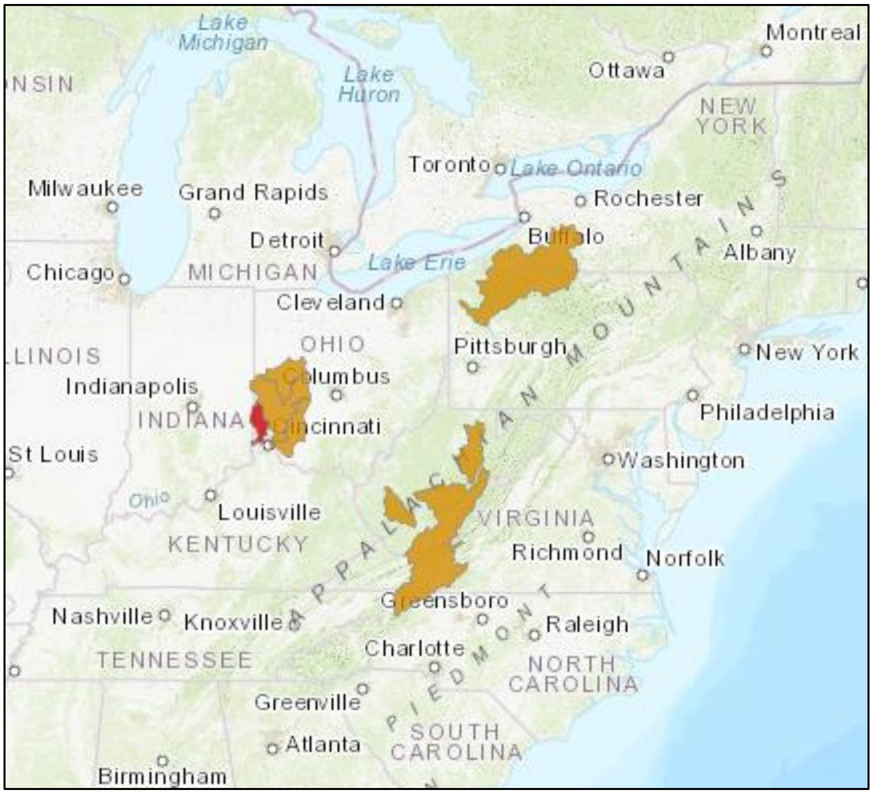


**Figure 2:** Tonguetied Minnow distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

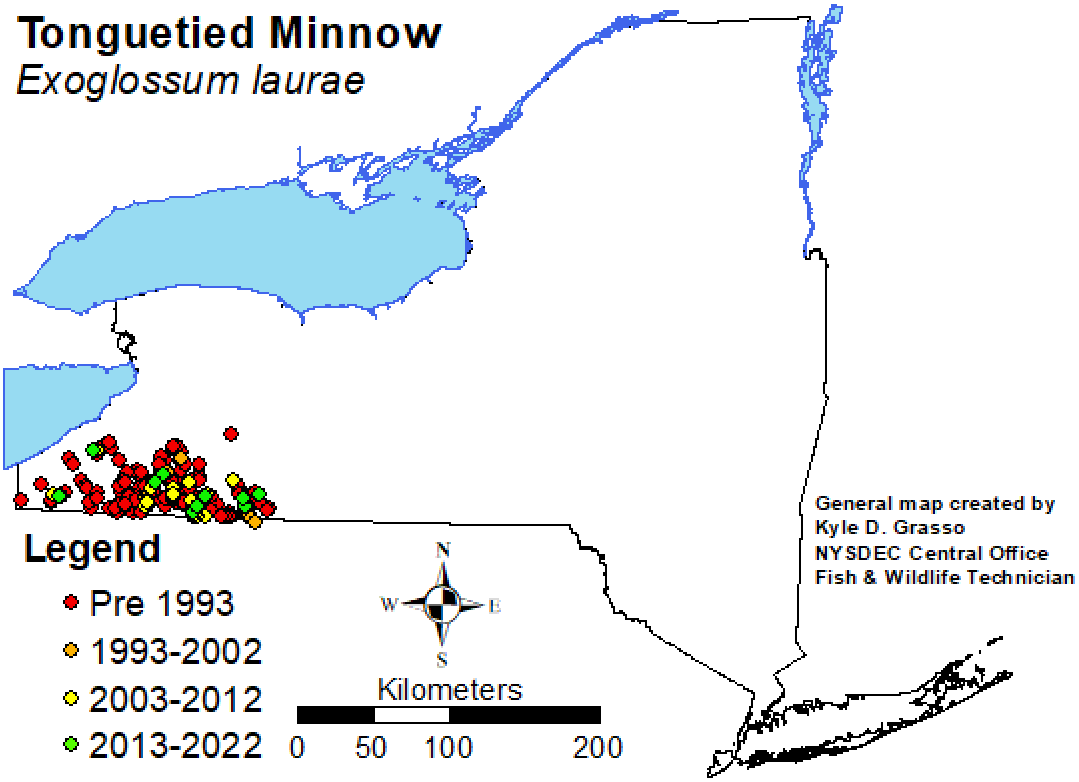


**Figure 3:** Records of Tonguetied Minnow in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 222 | 59 | 6-10% |
| **1993-2002** | 13 | 4 | 6-10% |
| **2003 - 2012** | 34 | 15 | 6-10% |
| **2013 - 2022** | 12 | 8 | 6-10% |

**Table 1:** Records of Tonguetied Minnow in New York.

### Details of historic and current occurrence:

In New York, the Tonguetied Minnow is native to the Allegheny and Genesee watersheds. The first record of the Tonguetied Minnow in the Allegheny watershed was in 1890 in Cassadaga Creek. In the last 10 years, there's been 9 records of tongetied minnow in the Allegheny watershed in the Allegheny River, Forks Creek, Dodge Creek, Goose Creek, Great Valley Creek, and West Branch Conewango Creek. The first records in the Genesee watershed were in 1926 in the Genesee River, Marsh Creek, Chenunda Creek, and Dyke Creek. In the last 10 years, there's only been 3 records in the Genesee watershed in the Genesee River and Dyke Creek. Although, the Tonguetied Minnow has never been particularly abundant in either watershed (especially in the Genesee watershed), there has been decreases in abundance and large range loss in the Allegheny watershed since the mid-1900s, and it may be increasingly rare in the Genesee watershed.

Historically, and to this day, the Tonguetied Minnow has inhabited the Genesee River only above Middle Falls (Portageville Falls), while the Cutlip Minnow inhabited the river below the falls (Smith 1985; Carlson et al. 2016). There is no record of Tonguetied Minnow below Middle Falls, and Carlson et al. (2016) stated that there has been no record of Cutlip Minnow above the falls.

**New York's Contribution to Species North American Range:**

**% of NA Range in New York**

**100% (endemic):**_____

**76-99%:**_____

**51-75%:**_____

**26-50%:**_____

**1-25%:**__✓__

**Classification of New York Range**

**Core:**_____

**Peripheral:**_____

**Disjunct:**__✓__

**Distance to core population:**

Part of the northern population

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to medium mainstem rivers

**b. Geology:** Low-moderately buffered to assume moderately buffered

**c. Temperature:** Transitional cool to cool

**d. Gradient:** Low to moderate-high gradient

### Habitat or Community Type Trend in New York

**Declining:**_____ **Stable:**_____ **Increasing:**_____ **Unknown:**__✓__

**Time frame of decline/increase:**_______________________________________

**Habitat Specialist?** **Yes:**__✓__ **No:**_____

**Indicator Species?** **Yes:**__✓__ **No:**_____

### Habitat Discussion:

The Tonguetied Minnow inhabits small creeks and medium-sized streams of moderate gradient with cool, silt-free water. They are typically found at the deeper edges of pools and runs with slow to moderate current over rubble, gravel, and boulder substrates (Lee et al. 1980; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). Zimmerman (2011) reported a reliance on forested and undercut stream banks and alternating riffle-pool habitats. Trautman (1981) stated that they are seldom taken at water temperatures above 21°C (Stauffer et al. 2016).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

The Tonguetied Minnow typically lives a maximum of 4 years and will reach sexual maturity before the age of 2 (Jenkins and Burkhead 1994; Stauffer et al. 2016; NatureServe 2022). Spawning typically occurs in May and June when water temperatures are 57-70°C (Raney 1939; Trautman 1981; Jenkins and Burkhead 1994; Stauffer et al. 2016). Raney (1939) observed the spawning behavior of the Tonguetied Minnow in the Allegheny River and Marvin Creek in Pennsylvania. Males use gravel and pebbles to construct circular nests 6 to 18 inches in diameter. Nests are typically built in 12 inches of water near cover in slow to moderate current. Males will guard nests as they wait for the females to release their eggs. Spawning may take place over an extended period of time, with males sometimes covering the eggs with gravel (Raney 1939; Smith 1985; Stauffer et al. 2016). Once spawning is finished, the eggs and young are left unguarded (Zimmerman 2011). Jenkins and Burkhead (1994) reported fecundities as high as 1,800.

## VI. Threats *(from NY CWCS Database or newly described)*

The main threats to the Tonguetied Minnow include habitat loss and degradation, predation from non-native fish, and interspecific hybridization with the Cutlip Minnow (Stauffer et al. 2016; Oswald et al. 2020a; Oswald et al. 2020b; NatureServe 2022). Warming water temperatures due to climate change may also play a role in future conservation. Tonguetied Minnow range reductions have been documented as a result of habitat loss and degradation related to agriculture and development (e.g., siltation, dredging, channelization) (Stauffer et al. 2016; Oswald et al. 2020a; NatureServe 2022). Introductions of non-native fishes have been frequent throughout the entire range of the Tonguetied Minnow. For example, large numbers of Brown Trout are stocked in all watersheds containing the Tonguetied Minnow (Oswald et al. 2020a, Oswald et al. 2020b). Oswald et al. (2020b) studied the habitat preferences of the Tonguetied Minnow and the Brown Trout in the Great Miami River and concluded that the Tonguetied Minnow is “is likely unable to avoid interspecific interactions, such as predation, posed by Brown Trout that are introduced for sportfishing”.

According to Oswald et al. (2020a), one of the foremost threats to the Tonguetied Minnow may be extinction through interspecific hybridization with the Cutlip Minnow. “Extirpation due to interspecific hybridization is especially serious for the Teays River lineage since it is confined solely to the New River. The Pittsburgh River lineage is threatened to a relatively lesser extent since it is distributed across three drainages. Within the Pittsburgh River lineage, only the Upper Genesee River displays an appreciable probability of interspecific hybridization” (Oswald et al. 2020a). The Genesee River is one of few, if not the only, waterbodies in New York that contain both tonguetied and Cutlip Minnow. Historically, and to this day, the Tonguetied Minnow has inhabited the Genesee River only above Middle Falls (Portageville Falls), while the Cutlip Minnow inhabited the river below the falls (Smith 1985; Carlson et al. 2016). The tonguetied and Cutlip Minnow may not be allopatric in the watershed, however the possibility of bait bucket releases moving Cutlip Minnow upstream or Tonguetied Minnow downstream remains. If the Cutlip Minnow was somehow able to make its way above Middle Falls of the Genesee River, Oswald et al. (2020a) believes that the Tonguetied Minnow would be “at serious risk of rather rapid extirpation by introgressive hybridization”.

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

**Yes:** _✓_ **No:** _____ **Unknown:** _____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York.

However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

Both the Teays River and the Pittsburgh River lineages "should be protected to preserve the evolutionary genetic legacy of the species" with the goals of "maintaining the range of diversity within taxa, preventing inbreeding, and sustaining among-population migration" (Oswald et al. 2020a). "A more comprehensive sample of Tonguetied Minnows within the New and Upper Genesee rivers is necessary to quantify accurately the extent of hybridization and introgression of non-native Cutlip Minnow alleles in these watersheds. A more closely examined and region-wide collection of museum specimens is also needed from the Upper Genesee River" (Oswald et al. 2020a). Although there is no record of Cutlip Minnow above Middle Falls (Portageville Falls), the Genesee River should be closely monitored for any signs of the Cutlip Minnow above the falls (Smith 1985; Carlson et al. 2016). As the only two current populations outside of the Cutlip Minnow range, the Great Miami and Little Miami and Allegheny populations should be protected from any possible Cutlip Minnow invasion. Stocking may be beneficial across its entire historic New York range. If stocking does occur, care should be used when choosing the source population in order to reduce the likelihood of further proliferation of Cutlip Minnow alleles (Oswald et al. 2020a). The relationship between the Tonguetied Minnow and its predators should continue to be studied for signs of any population level effects (Oswald et al. 2020b).

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):***
***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Habitat & Natural Process Restoration |
| **4.** Species Management | Species Recovery |
| **5.** Species Management | Ex-situ Conservation |
| **6.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Tonguetied Minnow.

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# Species Status Assessment Cover Sheet

**Species Name:** Western Pirate Perch
**Date Updated:** January 2023
**Current Status:** Not Listed – SGCN
**Updated By:** Kyle Grasso
**Current NHP Rank:** S1

**Distribution:** The Pirate Perch (both western and eastern) has a U-shaped distribution along the Atlantic Coast from New York to Florida, west along the Gulf Coast to Texas, and north along the Mississippi River to the Great Lakes. However, the Western Pirate Perch occurs along the Gulf Coast from Florida to Texas and north along the Mississippi River drainage to the Great Lakes drainage. In New York, the Western Pirate Perch is native to the bays and tributaries of Lake Ontario and Lake Erie.

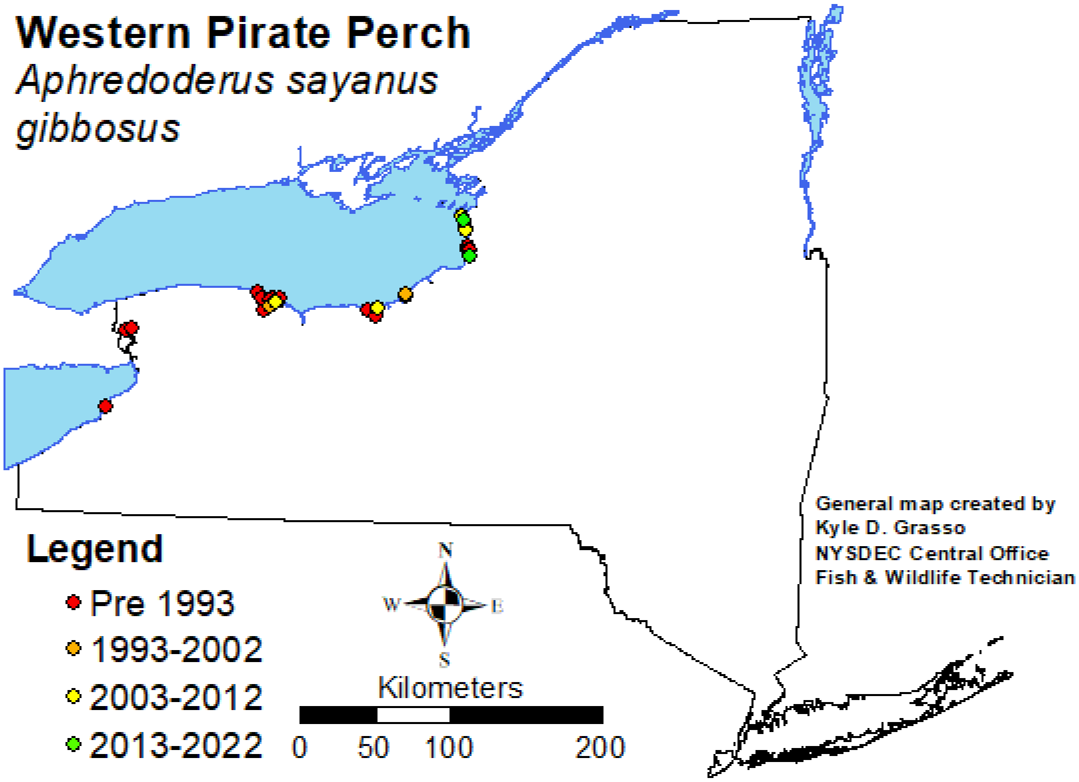
**Habitat:** Western Pirate Perch inhabit the quiet waters of rivers, ponds, swamps, marshes, and oxbows. They are often found in sluggish water with overhead cover and submerged aquatic vegetation over soft, muddy substrates.

**Life History:** Hall and Jenkins (1954) reported individuals living up to age 5 in Oklahoma. Sexual maturity is believed to be reached at age 1-2. The spawning period of the pirate perch varies latitudinally from winter in southern states through the spring in the north. Spawning was reported in February and March in Louisiana, and March through early May in Illinois. The most notable attribute of the pirate perch is the migration of the anus and urogenital pore anteriad to a jugular position as young mature. This allows both sexes of pirate perch to pass gametes from the urogenital pore through their mouth onto the substrate. Fletcher et al. (2004) observed spawning and described nesting behavior conducted in underwater root masses where narrow, deep canals provided spawning sites for aggregations of adults.

**Threats:** As an inhabitant of marshes, swamps, and oxbows, Western Pirate Perch may be subject to silting, draining, and dredging. In New York, they may be threatened by habitat loss due to the widespread residential development in Lake Ontario's bays. Western Pirate Perch populations might also be vulnerable to warming temperatures, as they are typically restricted to cooler areas.

**Population trend:** In New York, the Western Pirate Perch is native to the bays and tributaries of Lake Ontario and Lake Erie. Despite targeted effort in the Erie-Niagara watershed, the Western Pirate Perch has not been recorded since 1928 and is likely extirpated from the watershed. In the Ontario watershed, there has been a combination of range loss and expansion. They are often caught in low numbers in the Ontario watershed and are difficult to assess at these low abundance levels. Although their current range is restricted and abundance is low, they appear to be secure.

**Recommendation:** It is recommended that the Western Pirate Perch be listed as Threatened due to their restricted range, rarity/low abundance, and the declines seen since the early 1900s.



# Species Status Assessment

**Common Name:** Western Pirate Perch **Date Updated:** January 2023

**Scientific Name:** *Aphredoderus sayanus gibbosus* **Updated by:** Kyle Grasso

**Class:** Actinopterygii

**Family:** Aphredoderidae

**Species Synopsis** *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The Pirate Perch is in the class Actinopterygii and the family Aphredoderidae. The Pirate Perch is the only extant species in the family Aphredoderidae. Bailey et al. (1954) noted differences in a number of characters between Pirate Perch along the Atlantic States and those of the Mississippi Valley and Great Lakes. Boltz and Stauffer (1993) recognized two subspecies, the Eastern Pirate Perch (*Aphredoderus sayanus sayanus)* and the Western Pirate Perch (*Aphredoderus sayanus gibbosus*). However, April et al. (2011) found a maximal intraspecific genetic divergence of over 15%, which is closer to the level of divergence seen among genera (13.5%) and families (15.9%) than between sister species (5.7%). Burr and Warren (2020) stated that genetic evidence indicates “at least two highly diverged, undescribed cryptic species are now subsumed under the name A. sayanus.” Up to this date little genetic research has been done on the Eastern Pirate Perch vs. Western Pirate Perch, and New York may be one of few states that currently recognizes both (Burr and Warren 2020). There is an ongoing genetics study at the University of Minnesota that will hopefully shed more light on this. For the purpose of this assessment, the Eastern Pirate Perch and Western Pirate Perch will be largely treated as two species. The Pirate Perch (both Western Pirate Perch and Eastern Pirate Perch) has a U-shaped distribution along the Atlantic Coast from New York to Florida, west along the Gulf Coast to Texas, and north along the Mississippi River to the Great Lakes (Stauffer et al. 2016; NatureServe 2022). However, the Western Pirate Perch occurs along the Gulf Coast roughly from Florida to Texas and north along the Mississippi River drainage to the Great Lakes drainage (Burr and Warren 2020). In New York, the Western Pirate Perch is native to the bays and tributaries of Lake Ontario and Lake Erie. Despite targeted effort in the Erie-Niagara watershed, the Western Pirate Perch has not been recorded since 1928 and is likely extirpated from the watershed. In the Ontario watershed, there has been a combination of range loss and expansion. They are often caught in low numbers in the Ontario watershed and are difficult to assess at these low abundance levels. Although their current range is restricted and abundance is low, they appear to be secure (Carlson et al. 2016). The Western Pirate Perch inhabits the quiet waters of creeks and rivers, backwaters, swamps, marshes, and oxbows. They are often found in sluggish water with overhead cover and submerged aquatic vegetation over soft mud or muck substrates (Lee et al. 1980; Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022).

## I. Status

### a. Current legal protected Status

i. **Federal:** Not Listed **Candidate:** No

ii. **New York:** Not Listed – SGCN

### b. Natural Heritage Program

i. **Global:** T5 – Secure Subspecies

ii. **New York:** S1 **Tracked by NYNHP?:** Yes

### Other Ranks:

- IUCN Red List: Least Concern

- Northeast Species of Greatest Conservation Need (Feb. 2022 RSGCN draft list)

**Status Discussion:**

The Western Pirate Perch is not currently federally listed or listed in the state of New York. However, they are currently listed as an SGCN in New York. The Western Pirate Perch is globally ranked as a Secure Subspecies by NatureServe.

## II. Abundance and Distribution Trends

### a. North America

#### i. Abundance

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

#### ii. Distribution

**Declining:**_____ **Increasing:**_____ **Stable:** ✓ **Unknown:**_____

**Time Frame Considered:** Last 10-20 years

### b. Northeastern U.S. (USWFS Region 5)

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Since the early 1900s

### c. Adjacent States and Provinces

**CONNECTICUT** **Not Present:** ✓ **No Data:**_____

**MASSACHUSETTS** **Not Present:** ✓ **No Data:**_____

**NEW JERSEY** **Not Present:** ✓ **No Data:**_____

**VERMONT** **Not Present:** ✓ **No Data:**_____

**ONTARIO** **Not Present:** ✓ **No Data:**_____

**QUEBEC** **Not Present:** ✓ **No Data:**_____

**PENNSYLVANIA** **Not Present:**_____ **No Data:**_____

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

#### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Considered extirpated – Unsure of last record in PA

**Listing Status:** Extirpated – SX **SGCN?:** No

### d. New York

#### i. Abundance

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

### ii. Distribution

**Declining:** ✓ **Increasing:**_____ **Stable:**_____ **Unknown:**_____

**Time Frame Considered:** Since the early 1900s

**Monitoring in New York** *(specify any monitoring activities or regular surveys that are conducted in New York):*

Monitoring programs are carried out by the NYSDEC Rare Fish Unit.

**Trends Discussion** (*insert map of North American/regional*):

“The Pirate Perch is secure and stable throughout most of its range in the lower Mississippi River basin and on the Coastal Plain (Warren et al. 2000; Jelks et al. 2008), but somewhat disjunct and uncommon the northern periphery of its range in Iowa and the Lake Erie drainage, New York (Smith 1985)” (Burr and Warren 2020). Pirate Perch are extirpated from Ohio (Western Pirate Perch) and Pennsylvania (Eastern Pirate Perch) (Trautman 1981; Genoways and Brenner 1985; Burr and Warren 2020).The Western Pirate Perch is thought to be a relict species that has survived postglacial time in a few isolated pockets of favorable environment (Smith 1985).

In New York, the Western Pirate Perch is native to the bays and tributaries of Lake Ontario and Lake Erie. Despite targeted effort in the Erie-Niagara watershed, the Western Pirate Perch has not been recorded since 1928 and is likely extirpated from the watershed. In the Ontario watershed, there has been a combination of range loss and expansion. They are often caught in low numbers in the Ontario watershed and are difficult to assess at these low abundance levels. Although their current range is restricted and abundance is low, they appear to be secure (Carlson et al. 2016).

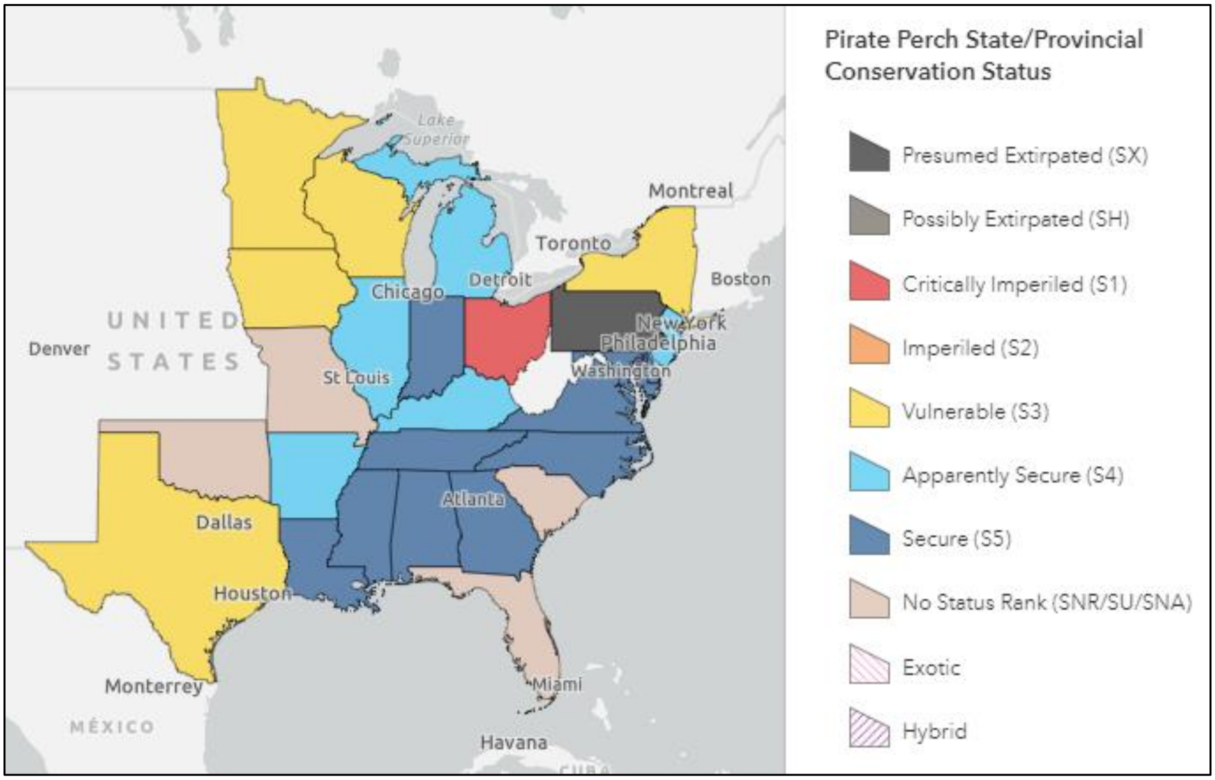


**Figure 1:** Pirate Perch (both western and eastern) distribution and status (Source: NatureServe 2022).

**Figure 2:** Pirate Perch (both western and eastern) distribution.
Brown=Extant, Red=Extirpated (Source: IUCN Redlist).

## III. New York Rarity *(provide map, numbers, and percent of state occupied)*

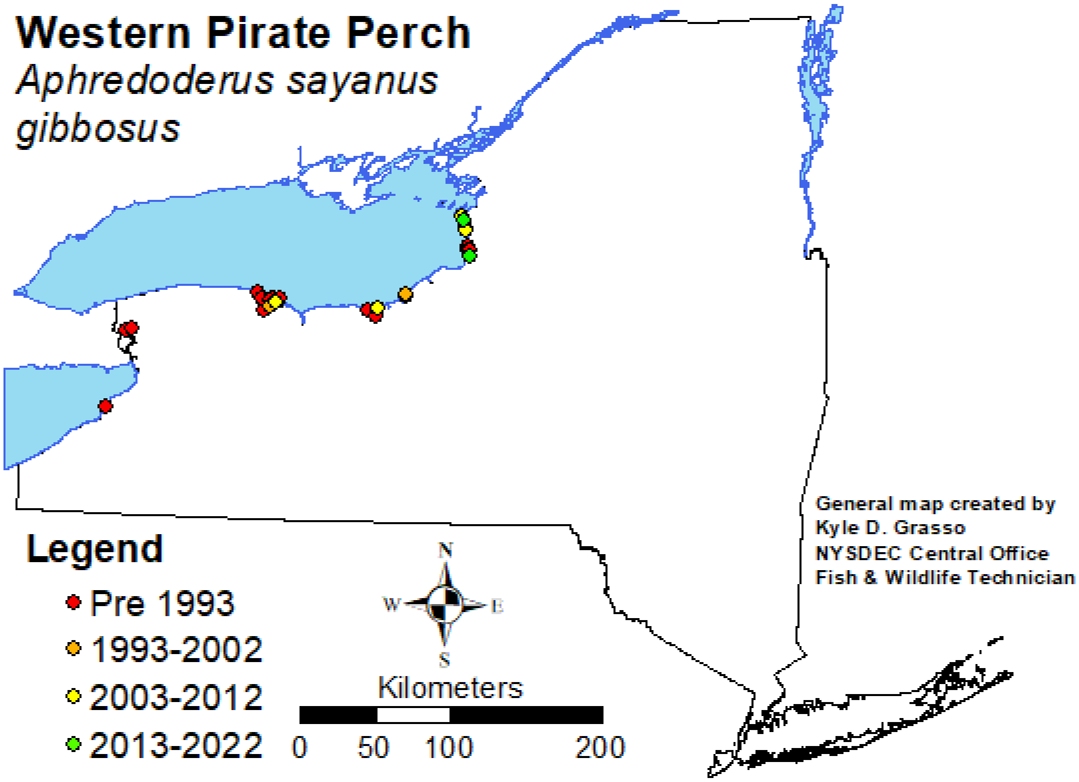


**Figure 3:** Records of Western Pirate Perch in New York.

| Years | # of Records | # of Waterbodies | % of State |
|---|---|---|---|
| **Pre 1993** | 34 | 13 | 0-5% |
| **1993-2002** | 8 | 3 | 0-5% |
| **2003 - 2012** | 33 | 9 | 0-5% |
| **2013 - 2022** | 4 | 3 | 0-5% |

**Table 1:** Records of Western Pirate Perch in New York.

### Details of historic and current occurrence:

In New York, the Western Pirate Perch is native to the bays and tributaries of Lake Ontario and Lake Erie. Western Pirate Perch were first reported from the Erie-Niagara and Ontario watersheds in 1927 and 1907 respectively. In the Erie-Niagara watershed, the Western Pirate Perch historically inhabited Cayuga Creek, Bergholtz Creek, and Muddy Creek. Despite targeted effort in the watershed, the Western Pirate Perch has not been recorded there since 1928 and is likely extirpated from the watershed (Carlson et al. 2016). In the Ontario watershed, they historically inhabited First Creek, West Creek, Salmon Creek, Buttonwood Creek, Sandy Creek, South Pond, Sodus Bay, and Braddock Bay. In the last 20 years, Western Pirate Perch have been recorded in Buttonwood Creek, Little Stony Creek, Deer Creek, Lakeview Pond, Black Pond, East Bay, and a few unnamed tributaries of these waters. The Western Pirate Perch was not previously known to inhabit Deer Creek, Little Stony Creek, Black Pond, Lakeview Pond, or East Bay. Targeted sampling in recent years has not resulted in catches in First Creek, Salmon Creek, West Creek, South Pond, and Sodus Bay (Carlson et al. 2016). They are often caught in low numbers in the

Ontario watershed and are difficult to assess at these low abundance levels. Although their current range is restricted and abundance is low, they appear to be secure.

**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%:_____ | Peripheral: ✓ |
| 51-75%:_____ | Disjunct:_____ |
| 26-50%:_____ | Distance to core population: |
| 1-25%: ✓ | Core pop. to the southwest |

## IV. Primary Habitat or Community Type *(from Northeast Aquatic Habitat Classification)*

**a. Size/Waterbody Type:** Creeks to small rivers and oxbows, marshes, and ponds

**b. Geology:** Low-moderately buffered to highly buffered

**c. Temperature:** Transitional cool

**d. Gradient:** Low to low-moderate gradient

**Habitat or Community Type Trend in New York**

**Declining:**_____ **Stable:** ✓ **Increasing:**_____ **Unknown:**_____

**Time frame of decline/increase:** Last 10-20 years

**Habitat Specialist?** **Yes:** ✓ **No:**_____

**Indicator Species?** **Yes:** ✓ **No:**_____

**Habitat Discussion:**

Western Pirate Perch inhabit the quiet waters of creeks and rivers, backwaters, swamps, marshes, and oxbows. They are often found in sluggish water with overhead cover and submerged aquatic vegetation over soft mud or muck substrates. Burr and Warren (2020) reported that Pirate Perch can tolerate periods of low dissolved oxygen and pHs as low as 4. During high flows, they seek refuge under overhanging banks and in weed beds (Lee et al. 1980; Smith 1985; Page and Burr 2011; Stauffer et al. 2016; NatureServe 2022). They are nocturnal feeders and become more active at night (Becker 1983; Stauffer et al. 2016; NatureServe 2022).

## V. 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** *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Life history differences between the Western Pirate Perch and Eastern Pirate Perch are unknown. As a result, this section will treat the Western Pirate Perch and Eastern Pirate Perch as one species. Hall and Jenkins (1954) reported individuals living up to age 5 in Oklahoma (Stauffer et al. 2016). Sexual maturity is believed to be reached at age 1-2 (Mansueti 1962; Becker 1983; Stauffer et al. 2016). “The spawning period of the Pirate Perch varies latitudinally from winter in southern states through the spring in the north. Spawning was reported in February and March in Louisiana (Fontenot and Rutherford 1999), and March through early May in Illinois (Poly and Wetzel 2003).” “The most notable attribute of the Pirate Perch is the migration of the anus and urogenital pore anteriad to a jugular position as young mature“ (Stauffer et al. 2016). This allows both sexes of Pirate Perch to pass gametes from the urogenital pore through their mouth onto the substrate (Martin and Hubbs 1973; Boltz and Stauffer 1986; Stauffer et al. 2016). “Fletcher et al. (2004) observed spawning in situ and described nesting behavior conducted in underwater root masses where narrow, deep canals provided spawning sites for aggregations of adults” (Stauffer et al. 2016). Fecundities can range from 100-400 (Fletcher et al. 2004). Eggs will take roughly 5-6 days to hatch (Martin and Hubbs 1973; NatureServe 2022). Smith (1985) reported that both sexes guard nests and the young. Poly and Wetzel (2003) and Fletcher et al. (2004) reported that parental care did not occur.

## VI. Threats *(from NY CWCS Database or newly described)*

As an inhabitant of marshes, swamps, and oxbows, Western Pirate Perch may be subject to silting, draining, and dredging (MDNR 2016). In New York, they may be threatened by habitat loss due to the widespread residential development in Lake Ontario’s bays. “Pirate Perch abundance and presence-absence in the Coastal Plain of Maryland was strongly and negatively related to urbanization, showing steep abundance and presence-absence declines when urbanization affected ≥12 and ≥13.8% of the watershed, respectively” (Utz et al. 2009). Western Pirate Perch populations might also be vulnerable to warming temperatures, as they are typically restricted to cooler areas.

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

**Yes:**_✓_ **No:**_____ **Unknown:**_____

**If yes, describe mechanism and whether adequate to protect species/habitat:**

The Protection of Waters Program provides protection for rivers, streams, lakes, and ponds under Article 15 of the NYS Conservation Law which regulates excavation and fill in waters of New York. However, not all streams are protected, and agricultural activities are exempted from the Part 661 regulations.

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

Sampling of historic and modern waterbodies should be done to monitor and further understand Western Pirate Perch. MDNR (2016) suggests that water quality should be maintained or improved, and efforts to minimize siltation should be encouraged near Western Pirate Perch habitat. Stocking of Western Pirate Perches in their historic range in the Erie-Niagara watershed or in the Ontario watershed to bolster current populations may be an option.

The 2005 State Wildlife Action Plan included the following recommendations:

Habitat research:

-Research habitat requirements for this subspecies in tributaries of Lake Ontario.

Population monitoring:

-There should be more surveys on bays of Lake Ontario and the nearby streams for this species.

***Complete Conservation Actions table using IUCN conservation actions taxonomy at link below. Use headings 1-6 for Action Category (e.g., Land/Water Protection) and associated subcategories for Action (e.g., Site/Area Protection):*** ***https://www.iucnredlist.org/resources/conservation-actions-classification-scheme***

| **Conservation Actions** | |
|---|---|
| **Action Category** | **Action** |
| **1.** Land/Water Protection | Site/Area Protection |
| **2.** Land/Water Protection | Resource & Habitat Protection |
| **3.** Land/Water Management | Site/Area Management |
| **4.** Land/Water Management | Invasive/Problematic Species Control |
| **5.** Land/Water Management | Habitat & Natural Process Restoration |
| **6.** Species Management | Species Re-introduction |
| **7.** Species Management | Ex-situ Conservation |
| **8.** Law & Policy | Policies and Regulations |

**Table 2:** Recommended conservation actions for Western Pirate Perch.

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