

Species Status Assessment

Class: Osteichthyes (bony fishes)
Family: Acipenseridae (sturgeon)
Scientific Name: *Acipenser fulvescens*
Common Name: Lake sturgeon

Species synopsis:

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, 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 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 and Legal Protected Status

- i. **Federal** Not Listed **Candidate:** No
ii. **New York** Threatened, SGCN

b. Natural Heritage Program Rank

- i. **Global** G3G4
ii. **New York** S1S2 **Tracked by NYNHP?** Yes

Other Rank:

Species of Northeast Regional Conservation Concern (Therres 1999)
(COSEWIC): E: Winnipeg River – English River, Western Hudson Bay, Saskatchewan River, Nelson River, and Red-Assiniboine Rivers – Lake Winnipeg populations, T: Great Lakes – Upper St. Lawrence populations, SC: Lake of the Woods – Rainy River and Southern Hudson Bay – James Bay populations
IUCN Red List Category: Least Concern

(CITES): Appendix II
American Fisheries Society: Threatened (all states)

Status Discussion:

Lake sturgeon is globally ranked as Vulnerable/Apparently Secure. This species was historically abundant and widespread in rivers and lakes from southern Canada to the southeastern United States. Currently, the distribution and abundance are much reduced as a result of historical overfishing, dams, and water pollution. Many populations continue to be negatively affected by physical barriers to migration, loss, and degradation of spawning and nursery areas, and (in some areas) fishing pressures or illegal harvest, but major declines have largely ceased and populations have stabilized (at relatively low abundance levels) or increased in some areas as a result of substantial ongoing recovery efforts. In New York, lake sturgeon has a state rank of Critically Imperiled/Imperiled and it is listed as Endangered, Threatened, or Special Concern in 19 of 20 states throughout its range (NatureServe 2012).

II. Abundance and Distribution Trends

a. North America

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: Past 10 years (NatureServe 2012)

b. Regional

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Regional Unit Considered: Region 5 - Northeast

d. NEW YORK

No data _____

i. Abundance

___ declining ___ increasing ___ X stable ___ unknown

ii. Distribution:

___ declining ___ X increasing ___ stable ___ unknown

Time frame considered: _____

Monitoring in New York.

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

Trends Discussion:

The lake sturgeon is found primarily in freshwater lakes and large rivers in the midwestern and northeastern North America, but also occurs in the brackish waters of the Hudson Bay and the St. Lawrence River. It inhabits both the Mississippi and Great Lakes drainages.

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 2012). 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).

In New York, lake sturgeon has historically been found in 8 waters; it is still found in all 8 waters and sustained in 6 waters. The range has declined, or is gone or dangerously sparse, in 5 of the 9 watersheds where it occurs. Abundance is low but perhaps stable in the St. Lawrence and Grasse rivers; there may be increases in abundance in the lower Niagara but population numbers are still low. Recovery appears to be underway in the stocked waters. Habitat appears to be stable but losses may accelerate due to the presence of invasive species.

The distribution of this species among sub-basins (HUC 10) within each watershed has changed in a similar pattern, with records from fewer units in the recent period. Overall, there are records from 40 of the units for all time periods, and from recent times there are 29 units, or a minor loss of its former range. Statewide, the number of individual site records for this species has been 620 for all time periods, 589 in the last 30 years, and over 200 since 1993.

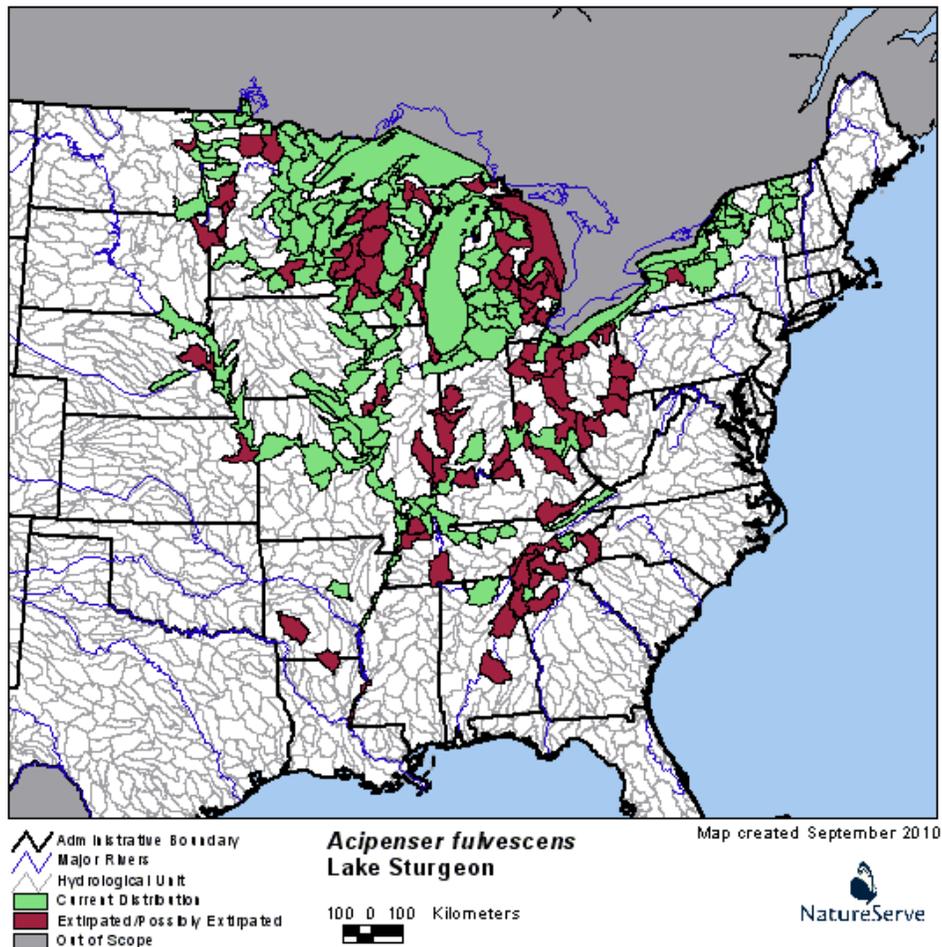


Figure 1. U.S. distribution of lake sturgeon (NatureServe 2012).

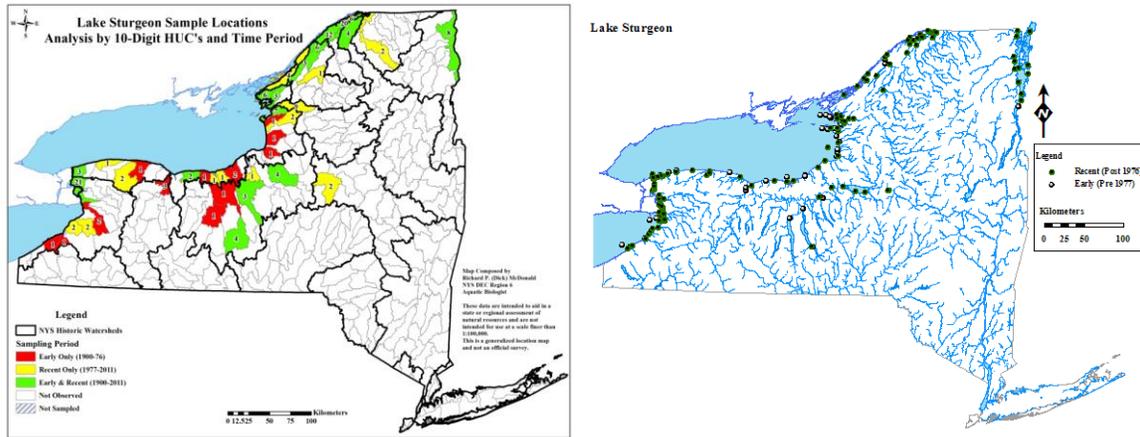


Figure 2. Lake sturgeon distribution in New York, depicting fish sampled before 1977 and from 1977 to present time, shown with the corresponding HUC-10 units where they were found and the number of records. Left map depicts the range of lake sturgeon in New York.

Watershed name	Total # HUC10	Early only	Recent only	both	Watershed status
Black	1	0	1	0	
Genesee	1	0	0	1	loss
Champlain	1			1	
Erie-Niagara	6	3	2	1	
Ontario	9	1		8	
Oswegatchie	3	0	1	2	
Oswego	6	2	1	3	loss
Raquette	1	0	0	1	
St. Law&SLCanada	5	0	3	2	
sum	40	11	13	16	
Mohawk	1		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). Watersheds where lake sturgeon are non-native are marked in grey.

III. New York Rarity, if known:

**This includes only native populations.*

Historic	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
prior to 1977	_____	<u>31</u>	<u>9 of 18 watersheds</u>
prior to 1980	_____	_____	_____
prior to 1990	_____	_____	_____

Details of historic 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.

Current	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
(since 1977)	_____	<u>589</u>	<u>7 of 18 watersheds</u>

Details of current occurrence:

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
<input type="checkbox"/> 100 (endemic)	<input type="checkbox"/> Core
<input type="checkbox"/> 76-99	<input checked="" type="checkbox"/> Peripheral
<input type="checkbox"/> 51-75	<input type="checkbox"/> Disjunct
<input type="checkbox"/> 26-50	Distance to core population:
<input checked="" type="checkbox"/> 1-25	<u>400 miles</u>

IV. Primary Habitat or Community Type:

1. Large/Great River, Low-Moderate Gradient, Assume Moderately Buffered, Warm
2. Medium River, Low-Moderate Gradient, Assume Moderately Buffered, Warm
3. Summer-stratified Monomictic Lake
4. Winter-stratified Monomictic Lake
5. Great Lakes Exposed Shoal

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:

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 2012).

V. New York Species Demographics and Life History

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

Species Demographics and Life History Discussion:

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 2012).

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:

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; 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 2012). Its limited spawning opportunities and late maturity are also factors affecting recovery times.

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). Illegal harvesting continues to threaten some lake sturgeon populations (COSEWIC 2006). 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 2012).

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).

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

No Unknown

Yes

The lake sturgeon is 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 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:

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 2012).

Conservation actions following IUCN taxonomy are categorized in the table.

Conservation Actions	
Action Category	Action
Land/Water Protection	Resource/Habitat Protection
Land/Water Management	Habitat/Natural Process Restoration
Land/Water Management	Site/Area Management
Land/Water Management	Invasive/Problematic Species Control
Species Management	Ex-situ Conservation
External Capacity Building	Alliance & Partnership Development

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for the lake sturgeon.

Captive Breeding:

---- Pyatskowitz (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.

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