

**Ontario Species at Risk Evaluation Report for Spotted
Gar (*Lepisosteus oculatus*)**

Committee on the Status of Species at Risk in Ontario
(COSSARO)

Assessed by COSSARO as Endangered

June 2016

Final

Lépisosté tacheté (*Lepisosteus oculatus*)

Le lépisosté tacheté est l'une des deux espèces de lépisostés indigènes du Canada, l'autre étant le lépisostée osseux (*Lepisosteus osseus*). Les populations de lépisosté tacheté dans le monde sont isolées les unes des autres, et on compte dans sa distribution celles des bassins versants des Grands Lacs et de la rivière Mississippi. Même si en Ontario le lépisosté tacheté a une forte structure génétique, on n'y recense pas d'unités désignables.

En Ontario, on retrouve le lépisosté tacheté dans trois milieux humides isolés du lac Érié (baie de la Longue Pointe, parc national de la Pointe Pelée et baie Rondeau), et bien que des spécimens aient été relevés dans le havre Hamilton et le lac East (lac Ontario), un échantillonnage ciblé n'aura pas permis de conclure qu'il s'agissait d'un nouvel habitat. D'après les données relatives à la génétique et à la surveillance, le lépisosté tacheté peut passer de l'un à l'autre de ces trois sites, mais est peu susceptible de traverser les eaux libres, préférant se frayer lentement un chemin en eau peu profonde, parmi la végétation. Il atteint sa maturité sexuelle à l'âge de 3 ans, et la femelle peut pondre plus de 10 000 œufs. Adapté à une température d'eau élevée et à un faible taux d'oxygène, le lépisosté tacheté peut vivre jusqu'à 10 ans. Bien que la population soit tenace dans deux des trois habitats canadiens, l'espèce est sensible à la dégradation de son habitat, notamment la perte de territoire due à l'invasion par des plantes non indigènes, le retrait de la végétation aquatique indigène, la turbidité et la charge en éléments nutritifs. Les données sur les variations de la taille de la population et le nombre d'habitats sont absentes ou difficilement fiables vu le manque de registres historiques, la grande instabilité des efforts de surveillance et les signalements non confirmés de la présence du lépisosté tacheté.

L'espèce est considérée comme en voie de disparition en raison du degré de fragmentation, de la réduction projetée de l'étendue de l'habitat et de la vulnérabilité continue à l'égard des perturbations de l'habitat. Il s'agit d'une dégradation par rapport à son ancien statut d'espèce menacée.

Cette publication hautement spécialisée «COSSARO Candidate Species at Risk Evaluation for Spotted Gar» n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir des renseignements en français, veuillez communiquer avec le ministère des Richesses naturelles et des Forêts au recovery.planning@ontario.ca.

Executive summary

The Spotted Gar (is one of only two gars native to Canada; the other is the Longnose Gar (*Lepisosteus osseus*). The global distribution of the Spotted Gar is disjunct and includes populations in the Great Lakes and the Mississippi River drainage basins. While the Spotted Gar in Ontario does exhibit significant genetic structuring, it does not have Designatable Units.

In Ontario, the Spotted Gar occurs in three isolated wetlands in Lake Erie (Long Point Bay, Point Pelee National Park and Rondeau Bay) and while confirmed single specimens were collected in Hamilton Harbour and East Lake (Lake Ontario), no others have been collected at those sites despite targeted sampling. Genetic and tracking data indicate the Spotted Gar may move among the three Ontario locations, but they are not likely to cross open water. Spotted Gar prefer slow moving shallow waters with vegetation and they sexually mature at age 3. Females may lay over 10,000 eggs. This species is adapted to high water temperatures and low oxygen and can live to 10 years of age. While estimated population sizes are robust at two of their three Canadian locations, they are vulnerable to local habitat degradation through loss of suitable habitat from non-native plant invasion, removal of native aquatic vegetation, turbidity and nutrient loading. Changes in population size and location number are not available or are not reliable, due to a lack of historical records, widely varying monitoring efforts and unconfirmed reports of Spotted Gar.

This species was assessed as Endangered based upon the degree of fragmentation, a projected decline in habitat area and ongoing vulnerability to habitat modification. This was an uplisting from the former status of Threatened.

1. Background information

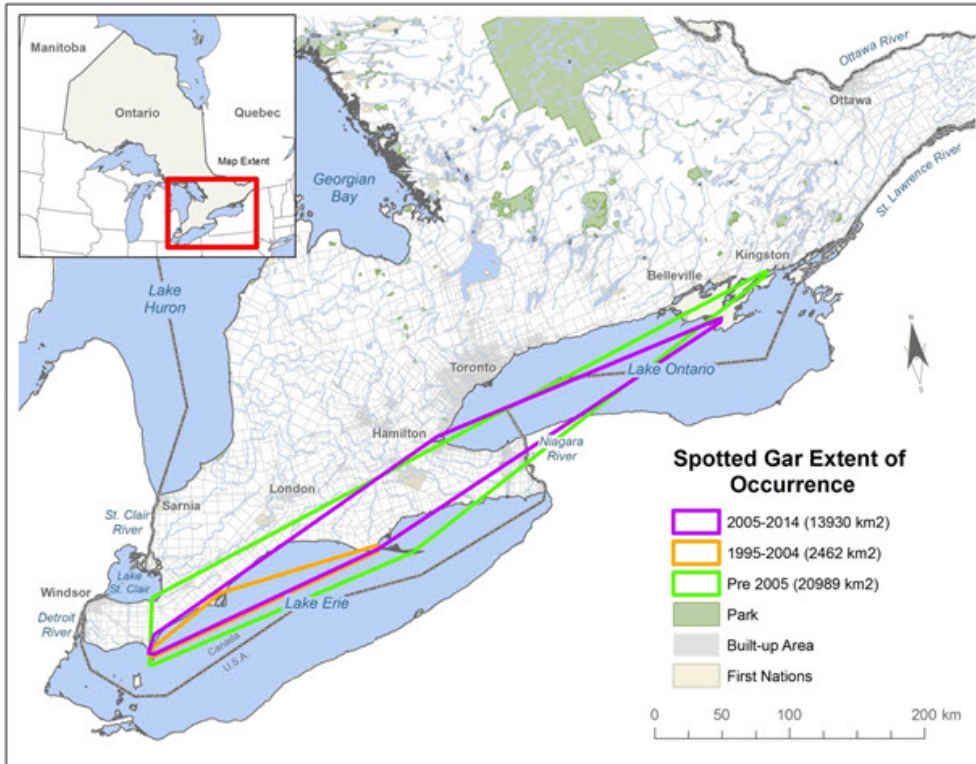
1.1. Current designations

- GRANK: G5 (NatureServe 2016)
- NRANK Canada: N1
- COSEWIC: Endangered (November 2015)
- SARA: Threatened (Schedule 1)
- ESA 2007: Threatened (2008)
- SRANK: S1

1.2. Distribution in Ontario

The Spotted Gar occurs in southwestern Ontario in three wetland areas in Lake Erie (Long Point Bay, Point Pelee National Park and Rondeau Bay); however, individual fish have been captured in Lake Ontario (Hamilton Harbour and East Lake) – see Figure 1. While historical records indicate Spotted Gar in St. Lawrence River and Lake St. Clair, those observations have not been confirmed and are not included in the Ontario distribution of the Spotted Gar.

Figure 1. Current and historical distribution of Spotted Gar with Extent of Occurrence in Ontario. Pre-2005 polygon includes unconfirmed reports of Spotted Gar in the St. Lawrence River and Lake St Clair. Source: COSEWIC 2015 (reproduced with permission).



1.3. Distribution and status outside Ontario

The Spotted Gar is found in 18 states and in Canada (only in Ontario). They have a wide range, with a major gap between the southern US and the Great Lakes distributions. Its global rank is G5, but in states bordering Lake Erie, the Spotted Gar is ranked S2S3 (state Special Concern) in Michigan, S1 (state Endangered) in Ohio and S1 (state endangered) in Pennsylvania. NatureServe does not report this species from New York, Minnesota, Manitoba or Quebec.

1.4. Ontario conservation responsibility

The proportion of the Spotted Gar's global range in Ontario is estimated to be much less than 5%.

1.5. Direct threats

The most severe threat to Ontario Spotted Gar is habitat modification, including draining, shoreline modification, siltation and vegetation removal (Bouvier & Mandrak 2010). Habitat modification is listed as a high threat at Point Pelee and Rondeau Bay, Aquatic vegetation removal is a high threat at Rondeau Bay and Turbidity, sediment loading and nutrient loading are listed as High threats at Rondeau Bay and Long Point

Bay based on the COSEWIC threats calculator (COSEWIC 2015). The Point Pelee location has experienced high levels of such habitat modification in the past; however no additional modification is on-going or planned. Invasive aquatic plants represent a medium but on-going threat at all three sites, especially Common Reed (*Phragmites australis australis*) and Eurasian Water-milfoil (*Myriophyllum spicatum*). This threat is equally present at all three locations and their dense growth excludes both adult and juvenile Spotted Gar resulting in habitat loss (COSEWIC 2015). Finally, pollution from agricultural and urban runoff (nutrient and turbidity) poses a high threat to Spotted Gar at the Rondeau Bay and Long Point Bay sites (COSEWIC 2015), while the Point Pelee location is at low risk from pollution. The combination of these three habitat impacts represent a present and continuing threat to each of the three locations; however none of the threats are likely to affect more than one location at a time.

1.6. Specialized life history or habitat use characteristics

The Spotted Gar requires shallow, slow moving clear water habitat with abundant vegetation. Spotted Gar adults are adapted for low oxygen, high temperature environments (they gulp air and gain oxygen through their swim bladder). Thus the Spotted Gar has no specialized habitat needs or life history characteristics.

2. Eligibility for Ontario status assessment

2.1. Eligibility conditions

2.1.1. Taxonomic distinctness

Yes Spotted Gar is a well described species both morphologically and genetically.

2.1.2. Designatable units

No: While genetic structure does exist in Ontario (Glass et al. 2015), the Spotted Gar do not attain DU status.

2.1.3. Native status

Yes: The Spotted Gar has been known in Ontario since 1913 (Point Pelee National Park) (COSEWIC 2015).

2.1.4. Occurrence

Extant: Spotted Gar have been captured in Ontario as recently as 2014 in large numbers (COSEWIC 2015).

2.2. Eligibility results

Spotted Gar (*Lepisosteus oculatus*) is eligible for status assessment in Ontario.

3. Ontario status assessment

3.1. Application of endangered or threatened status in Ontario

3.1.1. Criterion A – Decline in total number of mature individuals

Does not apply. While historical population size data are limited, recent data indicates population sizes are likely stable.

3.1.2. Criterion B – Small distribution range and decline or fluctuation

Meets Endangered under criterion B2ab(iii).

Spotted Gar meet the Endangered criteria as they have an index of area of occupancy of less than 500 km² (112 km²), occur at less than 5 locations (3) and have a projected decline in area and quality of habitat due to habitat modification, vegetation removal, turbidity and sediment and nutrient loading as well as invasive aquatic plants.

3.1.3. Criterion C – Small and declining number of mature individuals

Does not apply. Population numbers appear to be stable.

3.1.4. Criterion D – Very small or restricted total population

Does not apply. Estimated number of individuals exceed the criteria.

3.1.5. Criterion E – Quantitative analysis

Does not apply. None performed.

3.2. Application of Special Concern in Ontario

Does not apply.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Does not apply. Global Rank is G5 (secure) and Ontario has < 5% of the global distribution of Spotted Gar.

3.3.2. Rescue effect

Does not apply. While it may be possible for Spotted Gar to move from adjacent US habitat to augment the Ontario populations, it is highly unlikely. First the neighbouring populations are listed as S2 or S1 and are thus not common. Secondly, Spotted Gar are not likely to disperse such distances across unsuitable (deep water) habitat (NatureServe 2013).

3.4. Other status categories

3.4.1. Data deficient

Does not apply.

3.4.2. Extinct or extirpated

Does not apply.

3.4.3. Not at risk

Does not apply.

4. Summary of Ontario status

Spotted Gar (*Lepisosteus oculatus*) is classified as Endangered in Ontario based on meeting criterion B2ab(iii) as they have an index of area of occupancy of less than 500 km² (112 km²), occur at less than 5 locations (3) and two have a projected decline in area and quality of habitat.

5. Information sources

COSEWIC. 2015. [COSEWIC assessment and status report on the Spotted Gar *Lepisosteus oculatus* in Canada](#). Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 40 pp.

Bouvier, L.D. and N.E. Mandrak. 2010. Information in support of a Recovery Potential Assessment of Spotted Gar (*Lepisosteus oculatus*) in Canada. DFO Canadian Science Advisory Secretariat Research Document 2010/079. v + 23 pp.

Carman, S.M. 2002. Special Animal Abstract for *Lepisosteus oculatus* (Spotted Gar). Michigan Natural Features Inventory. Lansing, MI. 3 pp.

Glass, W.R., Corkum, L.D., and N.E. Mandrak. 2011. Pectoral fin ray aging: an evaluation of a non-lethal method for aging gars and its application to a population of the Threatened Spotted Gar. *Environmental Biology of Fishes* 90: 235-242.

Glass, W.R., Walter, R.P., Heath, D.D., Mandrak, N.E., and L.D. Corkum. 2015. Genetic structure and diversity of Spotted Gar (*Lepisosteus oculatus*) at its northern range edge; implications for conservation. *Conservation Genetics* 16:889-899.

NatureServe. 2013. [NatureServe Explorer: An online encyclopedia of life](#). Version 7.1. NatureServe, Arlington, Virginia. Accessed May 12, 2016.

Ohio Department of Natural Resources (DNR). 2016. [Species Guide: Spotted Gar](#). Division of Wildlife. Accessed May 25, 2016.

Appendix 1: Technical summary for Ontario

Species: Spotted Gar (*Lepisosteus oculatus*)

Demographic information

Demographic attribute	Value
Generation time. See Glass et al. (2011)	6 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals? Little historical quantitative data exists to determine demographic changes.	Unknown
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Unknown
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over any 10 years, or 3 generations, over a time period including both the past and the future.	Unknown
Are the causes of the decline a. clearly reversible and b. understood and c. ceased?	Not applicable
Are there extreme fluctuations in number of mature individuals?	Unknown

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence. Based on 2005-2014 sampling, excluding unconfirmed reports.	13,930 km ²
Index of area of occupancy (IAO). Based on 2005-2014 sampling, excluding unconfirmed reports.	112 km ²

<p>Is the total population severely fragmented? (i.e. is >50% of its total area of occupancy is in habitat patches that are (a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?) Although the three habitat patches housing Canadian Spotted Gar populations are separated, the size of all of them is capable of supporting minimal viable populations (COSEWIC 2015).</p>	<p>a. No b. No</p>
<p>Number of locations (<i>as defined by COSEWIC</i>). All three main occurrences of the Ontario Spotted Gar are relatively spatially restricted and are subject to habitat threats that are could affect the entire habitat area; however, those habitat patches are spatially separated such that it is unlikely that a single threat would affect more than one. Hence there are three locations.</p>	3
<p>Number of NHIC Element Occurrences</p>	8
<p>Is there an observed, inferred, or projected continuing decline in extent of occurrence? Ongoing sampling by OMNR and DFO indicate that the three locations are likely stable.</p>	No
<p>Is there an observed, inferred, or projected continuing decline in index of area of occupancy?</p>	No
<p>Is there an observed, inferred, or projected continuing decline in number of populations?</p>	No
<p>Is there an observed, inferred, or projected continuing decline in number of locations?</p>	No
<p>Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat? The threats to Spotted Gar habitat are still present, and there is reasonable expectation that Spotted Gar habitat will decline in extent and quality as invasive plants spread.</p>	Yes
<p>Are there extreme fluctuations in number of populations?</p>	No
<p>Are there extreme fluctuations in number of locations?</p>	No
<p>Are there extreme fluctuations in extent of occurrence?</p>	No
<p>Are there extreme fluctuations in index of area of occupancy?</p>	No

Number of mature individuals in each sub-population or total population (if known)

Sub-population (or total population)	N of mature individuals
Point Pelee (by capture-recapture (COSEWIC 2015))	483
Rondeau Bay (population density extrapolation (COSEWIC 2015))	8,121
Long Point Bay (21 captured since 1947, COSEWIC (2015))	Very small
TOTAL	8,604 (estimated)

Quantitative analysis (population analysis conducted)

Probability of extinction in the wild is Unknown.

Rescue effect

Rescue effect attribute	Likelihood
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Possible but unlikely due to open water habitat and low population sizes in neighbouring jurisdictions.
Would immigrants be adapted to survive in Ontario? Similar habitat makes it likely immigrants would survive.	Yes
Is there sufficient suitable habitat for immigrants in Ontario? Spotted Gar habitat is not yet limiting in Ontario.	Yes
Is the species of conservation concern in bordering jurisdictions? S2S3 in Michigan, S1 in Ohio and S1 in Pennsylvania.	Yes
Is rescue from outside populations reliant upon continued intensive recovery efforts? Rescue is highly unlikely.	No

Appendix 2: Adjoining jurisdiction status rank and decline

Information regarding rank and decline of Spotted Gar

Jurisdiction	Subnational rank	Population trend	Sources
Ontario	S1	Unknown, likely stable	NatureServe (2013)
Quebec	Not Present	N/A	NatureServe (2013)
Manitoba	Not Present	N/A	NatureServe (2013)
Michigan	S2S3	Unknown, likely stable. No longer found in several sites.	NatureServe (2013) Carman (2002)
Minnesota	Not Present	N/A	NatureServe (2013)
Nunavut	Not Present	N/A	NatureServe (2013)
New York	Not Present	N/A	NatureServe (2013)
Ohio	S1	Has declined, once common in some marshes and bays, now Endangered	NatureServe (2013) (Ohio DNR 2012)
Pennsylvania	S1	Unknown, likely stable	NatureServe (2013)
Wisconsin	Not Present	N/A	NatureServe (2013)

Acronyms:

AOO: area of occupancy

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

COSSARO: Committee on the Status of Species at Risk in Ontario

EOO: extend of occurrence

ESA: Endangered Species Act

GRANK: global conservation status assessments

IAO: index of area of occupancy

MNRF: Ministry of Natural Resources and Forestry

NHIC: Natural Heritage Information Centre

NNR: Unranked

NRANK: National conservation status assessment

SARA: Species at Risk Act

SNR: unranked

SRANK: subnational conservation status assessment

S1: critically imperiled

S2 : Imperiled

S3: Vulnerable