Ontario Species at Risk Evaluation Report for Northern Sunfish (*Lepomis peltastes*)

Great Lakes - Upper St. Lawrence Populations

Saskatchewan - Nelson River Populations

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

Great Lakes - Upper St. Lawrence Populations

Assessed by COSSARO as Special Concern

Saskatchewan - Nelson River Populations

Assessed by COSSARO as Not at Risk

December 2016

Final

Crapet du Nord (*Lepomis peltastes*)

Le crapet du Nord est un membre coloré et de petite taille de la famille des centrarchidés, que l'on retrouve dans le Nord-Ouest et le Sud de l'Ontario, divisé en deux unités désignables : les populations des Grands Lacs et du haut Saint-Laurent, et les populations de la rivière Saskatchewan et du fleuve Nelson. Certains organismes et administrations considèrent que le crapet du Nord est une sous-espèce du crapet à longues oreilles (*Lepomis megalotis peltastes*), tandis que d'autres considèrent qu'il s'agit d'une espèce à part entière (*Lepomis peltastes*), c'est d'ailleurs le cas du COSEPAC (2016).

Bien qu'on le retrouve dans les plans d'eau chaude peu profonds et végétalisés, le crapet du Nord ne tolère pas l'envasement et la sédimentation, et sa présence est considérée comme un signe de qualité de l'eau. Les données disponibles sur cette espèce ne permettent pas de déterminer les effectifs et les tendances des populations, et ce, pour aucune des unités désignables. On a observé un déclin appréciable des populations au Québec, et on présume qu'il en est de même dans le Sud de l'Ontario compte tenu des tendances en matière d'habitat. Les principales menaces qui pèsent sur l'espèce sont l'envasement et la turbidité, qui sont le fruit du développement humain, notamment agricole, en particulier dans le Sud de l'Ontario, et de l'expansion de l'aire de répartition d'espèces aquatiques envahissantes, telles que le gobie à taches noires dans le Sud de la province, et l'écrevisse à taches rouges, le crapet vert, l'achigan à grande bouche et l'achigan à petite bouche dans le Nord-Ouest de l'Ontario.

On estime que 25 % de l'aire de répartition du crapet du Nord se trouve en Ontario. La plupart des provinces et États voisins de l'Ontario sont d'avis que la population de l'espèce est préoccupante, à l'exception du Michigan, qui estime qu'elle n'est pas en péril. Le crapet du Nord ne se disperse pas facilement et est considéré comme un mauvais colonisateur, ce qui laisse peu de place à l'immigration de source externe.

À l'heure actuelle, le crapet du Nord ne figure pas dans la liste de la *Loi sur les espèces en péril* (Canada) ni dans celle de la *Loi sur les espèces en voie de disparition* (Ontario). Cette espèce était considérée comme une seule unité, et a reçu la désignation « non en péril » en avril 1987. Dans le cadre d'une nouvelle évaluation réalisée récemment par le COSEPAC, le crapet du Nord a été divisé en deux unités désignables : les populations de la rivière Saskatchewan et du fleuve Nelson et les populations des Grands Lacs et du haut Saint-Laurent. En Ontario, l'unité « populations de la rivière Saskatchewan et du fleuve Nelson » du crapet du Nord est considérée comme une espèce non en péril, tandis que l'unité « populations des Grands Lacs et du haut Saint-Laurent » est considérée comme une espèce préoccupante, compte tenu de la la menace liée à la qualité de l'eau à grande échelle, du recul (non quantifié) que l'on a récemment observé en matière d'abondance et de zone d'occupation, et du fait qu'une grande partie de l'aire de répartition de l'espèce se trouve en Ontario.

Cette publication hautement spécialisée «COSSARO Candidate Species at Risk Evaluation for Northern Sunfish» *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 Northern Sunfish is a small, colourful member of the sunfish family occurring in northwestern and southern Ontario, in two Designatable Units (DUs), the Great Lakes - Upper St. Lawrence populations and the Saskatchewan - Nelson River populations. Some authorities and jurisdictions consider Northern Sunfish to be a subspecies of the Longear Sunfish, *Lepomis megalotis peltastes*, while others consider it a full species, *Lepomis peltastes*. Northern Sunfish is considered to be a full species by COSEWIC (2016).

Although it occurs in shallow, vegetated, warm waterbodies, the Northern Sunfish is intolerant of siltation and sedimentation and is considered an indicator of good water quality. There are insufficient data for this species to determine population or abundance trends for either DU. Apparent population declines have occurred in Québec, and are inferred in southern Ontario based upon habitat trends. Major threats are siltation and turbidity resulting from agricultural and other human development, particularly in southern Ontario, and expanding or invasive aquatic species, such as Round Goby in southern Ontario, and Rusty Crayfish, Green Sunfish, and Largemouth and Smallmouth Bass in northwestern Ontario.

An estimated 25% of the species' range occurs in Ontario. Most jurisdictions adjacent to Ontario reflect concerns about the population status of this species, except for Michigan where it is considered secure. The Northern Sunfish does not readily disperse and is considered a poor colonizer, and thus there is little potential for rescue effect.

Northern Sunfish are not currently listed under the federal Species at Risk Act or the provincial Endangered Species Act. The species was considered a single unit and designated Not at Risk in April 1987. Northern Sunfish was recently re-assessed by COSEWIC as two separate designatable units (DUs); the Saskatchewan – Nelson River populations and Great Lakes – Upper St. Lawrence populations. In Ontario, the Saskatchewan – Nelson River populations of Northern Sunfish are assessed as Not at Risk while the Great Lakes – Upper St. Lawrence populations are assessed as Special Concern due to widespread water quality threats, the unquantified but apparent recent decline in abundance and area of occupancy, and the significant portion of the global distribution contained within Ontario

1. Background information

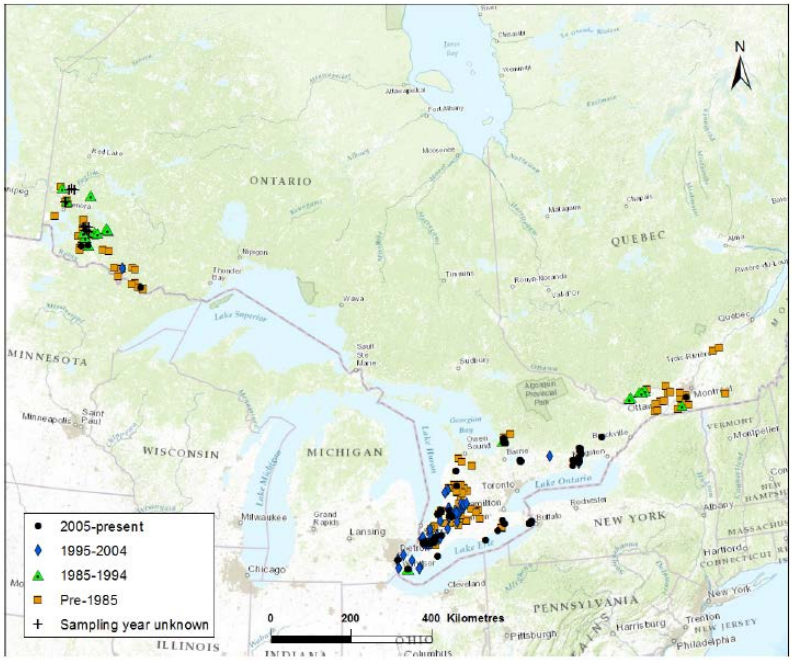
1.1 Current Designations

- GRANK: G5 (NatureServe 2016)
- NRANK Canada: N3 (COSEWIC 2016; Ontario Freshwater Fishes Life History Database 2016). (NatureServe [2016] indicates NNR)
- COSEWIC:
  - Northern Sunfish Saskatchewan - Nelson River populations – Not at Risk (April 2016) (COSEWIC 2016)
  - Great Lakes - Upper St. Lawrence populations - Special Concern (April 2016) (COSEWIC 2016)
- SARA:
  - Saskatchewan - Nelson River populations - No schedule, no status (SARA 2016b)
  - Great Lakes - Upper St. Lawrence populations - No schedule, no status (SARA 2016a)
- ESA 2007: NA
- SRANK: S3

1.2 Distribution in Ontario

The Northern Sunfish is found in two disjunct areas in Ontario, the northwest and the south. In northwestern Ontario, it is found from Quetico Provincial Park westward through the Rainy River area to Lake of the Woods. In southern Ontario it occurs in both southeastern and southwestern Ontario south of the southern tip of Georgian Bay, primarily off the Canadian Shield and occurring in watersheds flowing into lakes Ontario, Erie, St. Clair, and Huron including Georgian Bay (COSEWIC 2016) (Figure 1). COSEWIC (2016) consider there to be “many” locations in both populations (much greater than 10 locations for each subpopulation based upon siltation and contaminants as the principal threats).

Figure 1. Canadian distribution of Northern Sunfish, including Ontario. Source: COSEWIC 2016 (reproduced with permission).



1.3 Distribution and Status outside Ontario

In Canada the Northern Sunfish occurs in Ontario and in southwestern Quebec adjacent to the Ontario population. Quebec populations are declining, and only seven specimens from two locations have been reported since the last COSEWIC status report (COSEWIC 2016). Elsewhere there are two disjunct populations mirroring those in Canada: north-central Minnesota and states south of the lower Great Lakes and St. Lawrence River (e.g. Indiana, northern Ohio, lower Michigan, eastern Wisconsin and northeastern Illinois (COSEWIC 2016)). Although reported as common by Page and Burr (2011, cited in NatureServe 2016), populations are threatened in New York, patchy in Minnesota and Wisconsin, and declining in Ohio (see Appendix 2) (Fishes of Wisconsin 2016; New York Department of Environmental Conservation 2016). Populations in Michigan, which represents the core of global range, are considered secure (S5). There are several disjunct and probably relict populations scattered across southern Minnesota, western Wisconsin, southern Illinois, and Iowa (COSEWIC 2016). Some populations in Lake Ontario tributaries of New York have declined and are only sustained by stocking, and only one naturally sustained population remains (New York Department of Environmental Conservation 2016).

1.4 Ontario Conservation Responsibility

Ontario contains a substantial proportion of the species' global range, estimated as 25% of the global range portrayed in COSEWIC (2016). The vast majority of the Canadian range occurs in Ontario.

1.5 Direct Threats

The most serious threat to the Northern Sunfish is habitat degradation associated with siltation, and also with contaminants such as chloride (COSEWIC 2016). These threats are most influenced by agricultural practices, urban development and other human development. Water quality varies geographically – in some areas water quality continues to deteriorate, while in others it is improving (COSEWIC 2016). For example, in 14 watersheds monitored by the St. Clair Region Conservation Authority, overall water quality has improved in three watersheds, stablized in seven, and deteriorated in two (SCRCA 2016, cited in COSEWIC 2016). The threat has been well documented for the Sydenham River, where 85% of the forest cover has been converted to agriculture and tile drainage is widespread (Staton *et al.* 2003; COSEWIC 2016).

Invasive aquatic species are potential threats to Northern Sunfish, including Round Goby (*Neogobius melanostomus*) in the Great Lakes - Upper St. Lawrence DU and Rusty Crayfish (*Orconectes rusticus*) in the Saskatchewan - Nelson River DU. Northern Sunfish may also be impacted by centrarchid fish species that are aggressively expanding their range, such as Green Sunfish (*Lepomis cyanellus*), Largemouth Bass (*Micropterus salmoides)*, and Smallmouth Bass (*M. dolomieu*). These species are a particular concern in the northwestern Ontario range of Northern Sunfish.

1.6 Specialized Life History or Habitat Use Characteristics

Altough found in shallow, warm and vegetated waterbodies, the Northern Sunfish is usually found in clear waters, and is considered intolerant of siltation and turbidity (COSEWIC 2016). It is considered an indicator of clear, high quality warm-water habitat (Fishes of Wisconsin 2016).

The Northern Sunfish’s species’ limited movements within watersheds and low dispersal capabiltiy are considered to be the most important limiting factors (COSEWIC 2016).

2. Eligibility for Ontario Status Assessment

2.1 Eligibility Conditions

2.1.1. Taxonomic Distinctness

Yes. This is a distinct taxon, although the nomenclature has been applied inconsistently. Some authorities and jurisdictions consider it to be a subspecies of the Longear Sunfish, *Lepomis megalotis peltastes*, while others consider it a full species, *Lepomis peltastes.* Northern Sunfish is considered by COSEWIC (2016) to be a full species. The Longear Sunfish does not occur in Canada, and the two species overlap in the USA only in eastern Illinois and perhaps northeastern Ohio, although there is no indication that there are intergrades between the two species (COSEWIC 2016). There is no doubt that this is a viable and distinct taxon regardless of whether it is termed *Lepomis megalotis peltastes* or *Lepomis peltastes.*

2.1.2 Designatable Units

Yes. The Northern Sunfish in Ontario occurs in two geographically disjunct biogeographic zones, the Saskatchewan-Nelson Basin (DU1) and the Great Lakes-Upper St. Lawrence Basin (DU2) (COSEWIC 2016). These populations are separated by approximately 800 km, likely reflect different postglacial dispersal histories, and are considered two distinct designatable units (COSEWIC 2016). The significance of genetic differences between these two populations has not been studied and is unknown.

2.1.3. Native Status

Yes. Northern Sunfish is a native species that has been documented in Canada since at least 1924 (COSEWIC 2016).

2.1.4. Occurrence

Extant. Current or records exist for both designatable units.

2.2 Eligibility Results

Northern Sunfish (*Lepomis peltastes*) 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

Saskatchewan-Nelson River populations (DU1): Does not apply. Population trends are unknown, although “probably stable” (COSEWIC 2016). Much of the population is protected within Quetico Provincial Park.

Great Lakes-Upper St. Lawrence populations (DU2): Does not apply. Population trends are unknown.

3.1.2. Criterion B – Small Distribution Range and Decline or Fluctuation

Saskatchewan-Nelson River populations (DU1): Does not apply. Although the IAO (208 km^2) based upon the discrete method meets the threshold for Endangered, the number of locations greatly exceeds the threshold and the population is not severely fragmented. There is no indication of a population decline although data are very limited beyond basic distribution data.

Great Lakes-Upper St. Lawrence populations (DU2): Does not apply. Although the IAO (764km^2) based upon the discrete method meets the IAO threshold for Threatened and the IAO and/or habitat quality may have declined, the population is not fragmented, there are a large number of locations, and there are not extreme fluctuations in EO, IAO, number of locations, or number of mature individuals.

3.1.3. Criterion C – Small and Declining Number of Mature Individuals

Saskatchewan-Nelson River populations (DU1): Insufficient information. The number of mature individuals is unknown although likely to exceed thresholhds.

Great Lakes-Upper St. Lawrence populations (DU2): Insufficient Information. Number of mature individuals unknown although likely to exceed thresholhds.

3.1.4. Criterion D – Very Small or Restricted Total Population

Saskatchewan-Nelson River populations (DU1): Insufficient information. The number of mature individuals is unknown, as are population trends, although undoubtedly exceeds population thresholds.

Great Lakes-Upper St. Lawrence populations (DU2): Insufficient Information. Number of mature individuals unknown although undoubtedly exceeds thresholds.

3.1.5. Criterion E – Quantitative Analysis

Saskatchewan-Nelson River populations (DU1): Insufficient information. A population viability analysis has not been conducted.

Great Lakes-Upper St. Lawrence populations (DU2): Insufficient Information. A population viability analysis has not been conducted.

3.2 Application of Special Concern in Ontario

Ontario contains a significant portion (approximately 25%) of the global distribution of this species, distributed between two DUs.

Saskatchewan-Nelson River populations (DU1): Does not apply. Northern Sunfish in the Saskatchewan-Nelson Rivers DU is potentially widely affected by the range expansion of native centrarchids such as Smallmouth Bass and Green Sunfish, and the species is declining elsewhere. Siltation and sedimentation are not considered major threats, although some forestry impacts are possible. Although the threats calculator indicated that the threat from forestry has “negligible impacts since forestry uses buffer zones to reduce impact” (COSEWIC 2016), shoreline buffer zones are now being applied less completely and some harvesting is permitted (Steedman 2000; OMNR 2010). The potential impact of these threats is not considered sufficient to support designation of the Saskatchewan-Nelson Rivers DU as Special Concern.

Great Lakes-Upper St. Lawrence populations (DU2): Ontario contains a significant portion (approximately 25%) of the global distribution of this species, distributed between two DUs. The Great Lakes-Upper St. Lawrence DU of Northern Sunfish in southern Ontario warrants consideration of Special Concern status as the species is very vulnerable to sedimentation and siltation. Its spatial distribution is limited and somewhat patchy, and it is likely that the index of area of occupancy and abundance have both declined. Populations in adjacent areas of Québec appear to have declined significantly. Although water quality is improving in some areas and declining in others, overall the threats of siltation, contaminants and invasive threats are considered high.

3.3 Status Category Modifiers

3.3.1. Ontario’s conservation responsibility

Approximately 25% of the species’ global range is in Ontario (section 1.4).

3.3.2. Rescue effect

The Northern Sunfish does not readily disperse, and is considered a poor colonizer, indicating a low likelihood of rescue effect (COSEWIC 2016).

Saskatchewan-Nelson River populations (DU1): There is a gap in distribution between Minnesota populations and those in northwestern Ontario, suggesting virtually no potential for rescue effect.

Great Lakes-Upper St. Lawrence populations (DU2): Populations in adjacent Québec are very low and in decline.

3.4 Other Status Categories

3.4.1. Data Deficient

Does not apply to either DU. Although there is limited information on population numbers or trends, there is sufficient information that this modifier does not apply.

3.4.2. Extinct or Extirpated

Does not apply to either DU.

3.4.3 Not at Risk

Saskatchewan-Nelson River populations considered not at risk as they do not qualify for listing based on any of the criteria above.

Great Lakes-Upper St. Lawrence populations – Not at Risk does not apply.

4. Summary of Ontario Status

The Saskatchewan-Nelson Rivers DU of Northern Sunfish is classified as Not at Risk in Ontario, because of its apparently stable populations and limited threats. The Great Lakes-Upper St. Lawrence DU of Northern Sunfish is classified as Special Concern in Ontario because of widespread water quality threats, the unquantified but apparent recent decline in abundance and area of occupancy as well as serious decline in adjacent areas of Québec, and the significant portion of the global distribution contained within Ontario.

5. Information Sources

COSEWIC. 2016. COSEWIC assessment and status report on the Northern Sunfish *Lepomis peltastes*, Saskatchewan-Nelson River populations and the Great Lakes-Upper St. Lawrence populations, in Canada. Committee of the Status of Species at Risk in Canada, Ottawa ON. xv + 51 pp.

Fishes of Wisconsin. 2016. Longear Sunfish: Fishes of Wisconsin. Accessed on October 20 2016.

NatureServe 2016. NatureServe Explorer: An online encyclopedia of life [web application]. Accessed on October 18 2016.

New York Department of Environmental Conservation. 2016. Northern Sunfish Lepomis peltastes: New York State Fish Atlas. Accessed on October 22 2016.

Ontario Freshwater Fishes Life History Database. 2016. Northern Sunfish. Accessed on October 18 2016.

OMNR (Ontario Ministry of Natural Resources). 2010. Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales. Queen's Printer for Ontario, Toronto, Ontario. 211 pp.

Page, L.M. and B.M. Burr. 2011. Peterson Field Guide to Freshwater Fishes of North America North of Mexico. 2nd edition. Houghton Mifflin Harcourt, Boston MA. xix + 663 pp.

SARA Registry 2016a. Species profile: Northern Sunfish Great Lakes - Upper St. Lawrence populations. Accessed on October 18 2016

SARA Registry 2016b. Species profile: Northern Sunfish Saskatchewan - Nelson River populations. Accessed on October 18 2016.

St. Clair Region Conservation Authority. 2013. St. Clair Region Conservation Authority watershed report card 2013. Accessed on November 25 2016.

Staton, S.K., A. Dextrase, J.L. Metcalf-Smith, J. DiMaio, M. Nelson, J. Parish, B.

Kilgour, and E. Holm. 2003. Status and trends on Ontario's Sydenham River ecosystem in relation to aquatic species at risk. Environmental Monitoring and Assessment 88: 283-310.

Steedman, R.J., 2000. Effects of experimental clearcut logging on water quality in three small boreal forest lake trout (*Salvelinus namaycush*) lakes. Canadian Journal of Fisheries and Aquatic Sciences 57(S2): 92-96.

Appendix 1: Technical Summary for Ontario

Species: Northern Sunfish, Saskatchewan – Nelson River populations (DU1)

Demographic information

Demographic attribute	Value
Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.	4 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Probable
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?	N/A
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 (EOO).	22,100 km^2
Index of area of occupancy (IAO). 208 km^2 based upon discrete method (likely an underestimate)	208 km^2

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?)	a. No b. No Populations in Minnesota are extremely fragmented (Fishes of Wisconsin 2016)
Number of locations (*as defined by COSEWIC*).	Many ≫ 10 locations based upon siltation and contaminants as the principal threats
Number of NHIC Element Occurrences	N/A
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	No
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	No
Is there an observed, inferred, or projected continuing decline in number of subpopulations?	No
Is there an observed, inferred, or projected continuing decline in number of locations?	No
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Unknown. The ranges of potential predators and competitors are expanding
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

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

Sub-population (or total population)	Number of mature individuals
Northwestern Ontario	Unknown

Quantitative analysis (population viability analysis conducted)

Not applicable.

Rescue effect

Rescue effect attribute	Value
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	No/unlikely Species does not disperse readily, and is considered a poor colonizer
Would immigrants be adapted to survive in Ontario?	Probably
Is there sufficient suitable habitat for immigrants in Ontario?	Unknown. Predator and competitor species are expanding range into Northern Sunfish range.
Is the species of conservation concern in bordering jurisdictions?	Possibly declining. Erratic distribution in Minnesota and Wisconsin; some recent extirpations & threatened status in Wisconsin (see Appendix 2).
Is rescue from outside populations reliant upon continued intensive recovery efforts?	No

Species: Northern Sunfish, Great Lakes - Upper St. Lawrence populations (DU2)

Demographic information

Demographic attribute	Value
Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.	4 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	No
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	% decline or 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?	a. No b. Probably c. No
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. *(Request value from MNRF or use http://geocat.kew.org/)*	122,200 km^2 Estimate of Ontario EO using GEOCAT, based upon distribution maps in COSEWIC (2016)
Index of area of occupancy (IAO). *(Request value from MNRF or use http://geocat.kew.org/)*	764 km^2 for Ontario and Québec, using the discrete method (2x2 km grids) (COSEWIC 2016). Only a small proportion of sites are in Québec.

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?)	a. No b. No
Number of locations (*as defined by COSEWIC*).	Many ≫ 10 locations based upon siltation and contaminants as the principal threats
Number of NHIC Element Occurrences	N/A
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Probable
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Probable
Is there an observed, inferred, or projected continuing decline in number of subpopulations?	No
Is there an observed, inferred, or projected continuing decline in number of locations?	No
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes/No Water quality declining in some watersheds, improving in others
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

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

Sub-population (or total population)	**Number of mature individuals**
Southern Ontario	Unknown

Quantitative analysis (population viability analysis conducted)

Not applicable.

Rescue effect

Rescue effect attribute	Value
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	No/unlikely Species does not disperse readily, and is considered a poor colonizer
Would immigrants be adapted to survive in Ontario?	Probably
Is there sufficient suitable habitat for immigrants in Ontario?	Unknown
Is the species of conservation concern in bordering jurisdictions?	Possibly declining. Erratic distribution in Minnesota and Wisconsin; some recent extirpations & threatened status in Wisconsin and New York; secure in Michigan (see Appendix 2).
Is rescue from outside populations reliant upon continued intensive recovery efforts?	No

Appendix 2: Adjoining Jurisdiction Status Rank and Decline

Jurisdiction	Subnational Rank	Population Trend	Sources
Ontario	S3	Unknown	NatureServe 2016
Quebec	S2	Inferred decline in Québec; only seven specimens from two locations have been reported since the last COSEWIC status report	COSEWIC (2016)
Manitoba	Not Present	N/A	N/A
Michigan	S5 (*L. megalotis peltastes*)	Secure – reported from 49 collection sites and representing 7.7% of collections examined	Fishes of Wisconsin (2016)
Minnesota	SNR	Limited and patchy distribution	NatureServe 2016
Nunavut	Not Present	N/A	N/A
New York	SNR	Classified as Threatened. Native to 3 of 18 watersheds in western/central NY. Major declines in Lake Ontario tributaries, no longer detectable in one watershed. Has been stocked since 2006 with only one remaining natural population.	New York Department of Environmental Conservation (2016)
Ohio	SNR	Declines in distribution and abundance noted	Fishes of Wisconsin (2016)
Pennsylvania	SNR	Unknown	NatureServe 2016
Wisconsin	S2 (*L. megalotis peltastes*)	Limited and patchy distribution Threatened (since 1979)	Fishes of Wisconsin (2016)