

# **Ontario Species at Risk Evaluation Report for**

## **Eastern Sand Darter**

### **dard de sable**

### ***Ammocrypta pellucida***

West Lake population

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

West Lake population

Assessed by COSSARO as Endangered

November 2022

*Final*

## Executive summary

Eastern Sand Darter (*Ammocrypta pellucida*) is a small-bodied fish of the genus *Ammocrypta*, and is the only member of its genus that occurs in Canada and the United States. Its body is translucent, slender and elongate, and it is a species that utilizes sand and clean gravel habitats in rivers and lakes. It is a short-lived species with a maximum age of 4 years, and it feeds primarily on benthic invertebrates. It exhibits fossorial behaviour. It is considered a species that has low dispersal ability, considered able to move within a stream system, but unlikely to disperse far as it is a sedentary species (COSEWIC 2022, IN PRESS).

More recent studies by Ginson et al. (2015, as cited in COSEWIC 2022, IN PRESS) revealed distinct genetic variation between drainage systems, but connectivity within the river systems. Through these studies, the genetic structure of the Canadian populations indicated genetic discreteness between the Québec population, the West Lake population (Lake Ontario watershed) and the Southwestern Ontario population. As a result, 3 designatable units were identified in Canada, and two occur in Ontario, namely the DU1 Southwestern Ontario population and DU3 West Lake population. DU2 is the third designatable unit, the Québec population. Formerly only two designatable units were identified in 2009 as Québec and Ontario.

Eastern Sand Darter also occurs in the United States and is imperiled or critically imperiled to vulnerable in 7 of the 9 states where it occurs. The global range of Eastern Sand Darter includes the Ohio River basin in Ohio, Indiana, Illinois, Kentucky, West Virginia, and Pennsylvania. It has been recorded from the Lake Huron, Lake St. Clair, Lake Erie, and Lake Ontario watershed in Michigan, Ohio, New York, Pennsylvania, and Ontario. It also occurs further east in the St. Lawrence River and Lake Champlain watershed in Québec, Vermont, and New York.

Ontario data trends indicate a retraction of its range and extirpation from the Lake Huron system for the Southwestern Ontario population. Three populations (Ausable River, Catfish Creek and Big Otter Creek) are considered extirpated, and one new population was discovered in Detroit River, since the last COSEWIC assessment (COSEWIC 2022, IN PRESS). Threats to the Southwestern Ontario population include habitat changes (quality and quantity) and invasive species.

The West Lake population represents a new population not identified during the last assessment, in the nearshore areas off Sandbanks Provincial Park. The population occurs at a single location defined by a single ongoing threat of invasive species, namely Round Goby (*Neogobius melanostomus*).

Threat of climate change to this species is unknown, but it is assumed changes to temperature and precipitation will alter stream hydrology and habitat.

Global ranking for Eastern Sand Darter is G4 (Apparently Secure).

National ranking for Canada is N2 (Imperiled) and the United States is N4 (Apparently Secure). It is listed as S2 (Imperiled) in Ontario and Québec, in subnational ranks. It is

listed as S1 (Critically Imperiled) in Pennsylvania, Vermont, and Michigan; S2 (Imperiled) in New York, S3 (Vulnerable) in Ohio, West Virginia and Illinois, and S4 (Apparently Secure) in Kentucky and Indiana.

Eastern Sand Darter is classified as Threatened under Schedule 1 of the federal Species at Risk Act and as Endangered under Ontario's Endangered Species Act, 2007 at the time of this assessment. Critical habitat identified under the Species at Risk Act covers 187km<sup>2</sup> in Ontario.

The COSEWIC 2022 (IN PRESS) status assessment classified the Southwestern Ontario (DU1) and the West Lake (DU3) populations as Threatened, whereas the Québec population (DU2) was assessed as Special Concern.

# 1. Eligibility for Ontario status assessment

## 1.1. Eligibility conditions

### 1.1.1. Taxonomic distinctness

Eastern Sand Darter (*Ammocrypta pellucida*) (Putnam 1863) is a small member of the perch family (Percidae). It is the only member of the genus to occur in Ontario.

### 1.1.2. Designatable units

Analysis of genetic structure identifies three discrete populations, DU1 is Southwestern Ontario, DU2 Québec, and DU3 West Lake. The genetic differentiation indicates isolation of approximately 10,000 years (COSEWIC 2022, IN PRESS).

The Ontario populations are split into DU1 and DU3. The DU3 West Lake population represents a new discovery of a population since the 2009 COSEWIC assessment. A new population was also discovered in the DU1 Southwestern Ontario population in Detroit River in 2013 for a total of 7 populations in the DU1.

COSEWIC 2022 (IN PRESS) indicates all 27 populations of the DU2 Québec population occur within the provincial boundaries of Québec. No NHIC records were provided for the Québec population (DU2) in Ontario. The EOO of the Québec population is estimated at 13,811km<sup>2</sup>, and the index of area of occupancy (IAO) at 560km<sup>2</sup> (COSEWIC 2022, IN PRESS). The Québec population has increased, largely attributed to increased sampling effect (Richard *et al.* 2018, as cited in COSEWIC 2022 (IN PRESS)).

### 1.1.3. Native status

Eastern Sand Darter is native to Ontario.

### 1.1.4. Occurrence

The global range of Eastern Sand Darter includes the Ohio River basin in Ohio, Indiana, Illinois, Kentucky, West Virginia, and Pennsylvania. It has been recorded from the Lake Huron, Lake St. Clair, Lake Erie, and Lake Ontario watershed in Michigan, Ohio, New York, Pennsylvania, and Ontario. It also occurs further east in the St. Lawrence River and Lake Champlain watershed in Québec, Vermont, and New York.

## 1.2. Eligibility results

Eastern Sand Darter (*Ammocrypta pellucida*) is eligible for status assessment in Ontario.

## 2. Background information

### 2.1. Current designations

- GRANK: G4 Apparently Secure (NatureServe 2022)
- IUCN: Least Concern (19 October 2011)
- NRANK Canada: N2
- COSEWIC: Threatened (May 11, 2022) (COSEWIC 2022, IN PRESS)
- SARA: Threatened (Schedule 1)
- ESA 2007: Endangered (Nov. 2009)
- SRANK: S2\_ (ranked in 2009)

### 2.2. Distribution in Ontario

When assessed in 2009 only two designatable units for the species were identified, the Ontario and Québec populations. The COSEWIC (2022, IN PRESS) update includes new information and knowledge about the species including two new locations in Ontario in 2013 and confirmation of distinct genotypes. Three designatable units were identified and assessed as DU1 Southwestern Ontario population, DU2 Québec population and DU3 West Lake population. DU1 and DU3 occur in Ontario.

The West Lake population (DU3) was discovered at this location in 2013 and is a new location since the last assessment (COSEWIC 2022, IN PRESS). It was found in habitat adjacent to the barrier sand dune of a provincially protected area (Sandbanks Provincial Park) (Reid and Dextrase 2017).

### 2.3. Distribution, status and the broader biologically relevant geographic range outside Ontario

The Endangered Species Act requires that COSSARO consider the broader biologically geographic range (BBRGR) outside of Ontario and that if the BBRGR would result in a species classification indicating a lower level of risk to the survival of the species than would result if COSSARO considered the condition of the species inside Ontario only, COSSARO's classification of a species shall reflect the lower level of risk to the survival of the species. The BBRGR is discussed in section 3.3.2 of this species assessment report. Rescue effect that is not the same as the BBRGR is discussed in section 3.3.3 of this species assessment report.

The adjacent jurisdiction's populations of Eastern Sand Darter are considered Critically Imperiled (S1) to Vulnerable (S3). The New York population of Eastern Sand Darter (S2 Imperiled) is considered to have been declining from 1989 until the 2013 status assessment, and especially the populations of Lake Erie which may be affected by the increase in Round Goby (*Neogobius melanostomus*) (New York State 2013). The

populations to the northeast are contiguous to the DU2 Québec population in Canada, unlikely to disperse to Ontario populations. Abundance appears to be stable in the northern New York range (New York State 2013) with a possible range expansion (similar to Canada’s DU3 Québec population).

**Table 1. Condition of the Species in Adjacent Jurisdictions and Broader Biologically Relevant Geographic Range**

Adjacent Jurisdictions	Biologically Relevant to DU3 (n/a, yes, no)	Condition (NatureServe Explorer 2022)	Notes & Sources
Québec	No	S2	Genetic differentiation between 3 designatable units indicates isolation for ~10,000 years (COSEWIC 2022, IN PRESS)
Pennsylvania	No	S1	
Vermont	No	S1	
Michigan	No	S1	
New York	Yes	S2	
Illinois	No	S3	
Ohio	No	S3	
West Virginia	No	S3	
Kentucky	No	S4	
Indiana	No	S4	

## 2.4. Ontario conservation responsibility

About 10 to 20% of the Eastern Sand Darter’s global range occurs in Canada, and of that, about 50% occurs in Ontario (Edwards et al. 2007, Fisheries and Oceans Canada 2012).

## 2.5. Direct threats

COSEWIC (2022, IN PRESS) confirmed threats for the West Lake population of Eastern Sand Darter as Medium-High. Invasive species is identified as the single threat to this location. Limiting factors considered relevant to the threat assessment include quality of available habitats, availability of food resources and population recovery capacity.

## 2.6. Specialized life history or habitat use characteristics

The species is associated with sand and clean gravel dominant substrates, and is sensitive to siltation (DFO Unpublished data, as cite in COSEWIC 2022, IN PRESS). This species uses sandbars and exhibits fossorial behaviour. Within river systems, the species is strongly associated with suitable habitat (sandbars, shallow pools and sandy raceways of streams and rivers) and individuals aggregate in these areas (DFO 2012). Lentic populations are often associated with wave-protected sandy beaches, sand dunes, sandy shores and shallow bays (DFO 2012, Reid and Dextrase 2017). As a habitat specialist, it is not flexible to habitat changes. Low fecundity of the Eastern Sand Darter may also contribute to population declines (DFO 2012).

This species may serve as a host species for the glochidia of the Endangered Round Hickorynut (*Obovaria subrotunda*) (COSEWIC 2003).

## 2.7. Existing Conservation and Recovery Actions

Eastern Sand Darter is listed as Threatened under Schedule 1 of the federal *Species at Risk Act*, and as Endangered under Ontario's *Endangered Species Act*, 2007. The provincial listing provides species and habitat protection, whereas the federal listing provides species protection but not automatic habitat protection. Critical habitat was identified under SARA in the Sydenham, Thames and Grand rivers, Big Creek and in Long Point Bay of Lake Erie receive protection. The federal *Fisheries Act* provides general habitat protection. Protection is also provided under:

- The Provincial Policy Statement (PPS) under the provincial *Planning Act*;
- *Lakes and Rivers Improvement Act*,
- *Nutrient Management Act*,
- *Environmental Protection Act*,
- *Water Resources Act*, and
- *Source Water Protection Act*.

The species is not listed in the United States under the *Endangered Species Act*.

Eastern Sand Darter occurs in waters off protected areas of Rondeau, Komoka and Sandbanks provincial parks.

DFO (2012) published the federal recovery status for Ontario populations of Eastern Sand Darter. Short and long-term objectives include research and monitoring, management and habitat protection, and stewardship and education. Ecosystem recovery strategies have been prepared for Ausable, Grand, Sydenham, and western Lake Erie watershed (COSEWIC 2022, IN PRESS). Actions implemented include initiatives to improve the health of streams and watersheds, identification of important habitats and research to address knowledge gaps.

### 3. Ontario status assessment

#### 3.1. Application of endangered/threatened status in Ontario

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

Not enough data to inform Criteria A.

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

B1. EOO 5km<sup>2</sup> meets criteria for B1 Endangered of EOO <5000km<sup>2</sup>.

COSEWIC calculations (COSEWIC 2022, IN PRESS) were used for the assessment of criteria B.

B2. IAO of 16km<sup>2</sup> meetings criteria for B2 Endangered of IAO < 500km<sup>2</sup>.

a) Occurs at 1 location, therefore meets criteria for B2(a) Endangered.

b) Inferred continuing decline in habitat quality due to Round Goby meets criteria for B2b(iii, iv).

c) Not enough information is available.

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

Not applicable. No population estimate is available.

##### 3.1.4. Criterion D – Very small or restricted total population

Not applicable. No population estimate is available.

##### 3.1.5. Criterion E – Quantitative analysis

Quantitative analysis not completed.

#### 3.2. Application of Special Concern in Ontario

Not applicable.



### 3.3. Status category modifiers

#### 3.3.1. Ontario's conservation responsibility

About 10 to 20% of the Eastern Sand Darter's global range occurs in Canada, and of that, about 50% occurs in Ontario (Edwards et al. 2007, DFO 2012).

#### 3.3.2. Status modification based on level of risk in broader biologically relevant geographic range

Adjacent jurisdictions rank species as imperilled to critically imperilled. No status modifications based on broader biologically relevant geographic range have been applied.

#### 3.3.3. Rescue Effect

The Eastern Sand Darter is considered to have limited ability to disperse, has very specific habitat requirements, and Canadian populations are isolated between rivers (Gibson et al. 2015, as cited in COSEWIC 2022, IN PRESS). The species is adapted to a benthic and sedentary lifestyle.

For the West Lake population, dispersal from New York is seen as unlikely. The population in New York is considered imperilled (S2).

Immigration is considered unlikely to improbable from neighboring jurisdictions. Bordering populations are classified as imperilled to critically imperilled. While individuals would be considered well adapted to survive in Ontario, the sedentary nature, specific substrate requirements, and sensitivity to habitat alterations make it very unlikely for this species to traverse distances required to provide a rescue effect.

### 3.4. Other status categories

#### 3.4.1. Data deficient

Not applicable.

#### 3.4.2. Extinct or extirpated

Not applicable.

#### 3.4.3. Not at risk

Not applicable.

## 4. Summary of Ontario status

Eastern Sand Darter (*Ammocrypta pellucida*) West Lake population meets the criteria for Endangered based on B1B2a2b(iii,iv).

## 5. Information sources

COSEWIC. 2022. IN PRESS. COSEWIC assessment and status report on the Eastern Sand Darter *Ammocrypta pellucida*, Southwestern Ontario population, Québec population and West Lake population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxi + 74 pp.  
(<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>).

Edwards, A., Boucher, J., and B. Cudmore. 2007. Recovery strategy for the eastern sand darter (*Ammocrypta pellucida*) in Canada [Proposed Species at Risk Act Recovery Strategy Series, Fisheries and Oceans Canada, Ottawa. vii + 50pp.

DFO (Fisheries and Oceans Canada). 2012. Recovery Strategy for Eastern Sand Darter (*Ammocrypta pellucida*) in Canada: Québec Populations. Fisheries and Oceans Canada. Ottawa, Ontario. vii + 56 pp.

Ontario Ministry of Natural Resources. 2013. Recovery Strategy for the Eastern Sand Darter (*Ammocrypta pellucida*) in Ontario. Ontario Recovery Strategy Series. Ontario Ministry of Natural Resources, Peterborough, Ontario. iii+ 5 pp + Appendix vii + 58 pp. Adoption of Recovery Strategy for the Eastern Sand Darter (*Ammocrypta pellucida*) in Canada: Ontario populations (Fisheries and Oceans Canada 2012).

Michigan State University. N.d. Michigan Natural Features Inventory: *Ammocrypta pellucida*, eastern sand darter. Website:  
<https://mnfi.anr.msu.edu/species/description/11397/Ammocrypta-pellucida> [accessed October 23, 2022].

NatureServe. 2022. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Web site: <http://explorer.natureserve.org> [accessed October 23, 2022].

New York State. 2013. Species Status Assessment Eastern Sand Darter. Department of Environmental Conservation. Website:  
[https://www.dec.ny.gov/docs/wildlife\\_pdf/sqcn sanddarter.pdf](https://www.dec.ny.gov/docs/wildlife_pdf/sqcn sanddarter.pdf) [accessed on October 31, 2022].

Reid, S.M., and A.J. Dextrase. 2014. First record of *Ammocrypta pellucida* (Aggasix, 1863) (*Actinopterygii:Perciformes*) from the Lake Ontario drainage basin. Check List 10:1201-1203.

Reid, S.M., and A.J. Dextrase. 2017. Monitoring lake populations of Eastern Sand Darter (*Ammocrypta pellucida*): a comparison of two seines. Journal of Freshwater Ecology, 32:1, 499-511.

## Appendix 1: Technical summary for Ontario

Species: Eastern Sand Darter (*Ammocrypta pellucida*)

### Demographic information

Demographic attribute	Value	DU3
Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.	2 _ years	2 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes/No/Unknown based on _____.	Unknown
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	___% decline or Unknown	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	___% [reduction or increase] or Unknown	Unknown
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	___% [reduction or increase] or Unknown	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.	___% [reduction or increase] or Unknown	Unknown
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. Yes/No/Unknown b. Yes/No/Unknown c. Yes/No/Unknown	a. n/a

Demographic attribute	Value	DU3
Are there extreme fluctuations in number of mature individuals?	Yes/No/Unknown	No

## Extent and occupancy information in Ontario

Extent and occupancy attributes	Value	DU3
Estimated extent of occurrence (EOO).  <i>If value in COSEWIC status report is not applicable, then use <a href="http://geocat.kew.org">geocat.kew.org</a>. State source of estimate.</i>	___ km <sup>2</sup>	2010-2018: 5 km <sup>2</sup> (minimum convex polygon), 16 km <sup>2</sup> (EOO=IAO) 2000-2009: unknown Pre-2000: unknown
Index of area of occupancy (IAO).  <i>If value in COSEWIC status report is not applicable, then use <a href="http://geocat.kew.org">geocat.kew.org</a>. State source of estimate.</i>	___ km <sup>2</sup>	2010-2018: 16km <sup>2</sup> 2000-2009: unknown Pre-2000: unknown
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. Yes/No/Unknown b. Yes/No/Unknown	a. No b. n/a
Number of locations. <i>See Definitions and Abbreviations on COSEWIC and IUCN websites for more information on the term "location". Use plausible range to reflect uncertainty if appropriate.</i>	Insert number or range of numbers.	Based on invasive species threat: 1

<b>Extent and occupancy attributes</b>	<b>Value</b>	<b>DU3</b>
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	Insert if available	1
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes/No/Unknown	n/a
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes/No/Unknown	n/a
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes/No/Unknown	n/a
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes/No/Unknown	n/a
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes/No/Unknown	Yes, in quality
Are there extreme fluctuations in number of populations?	Yes/No/Unknown	n/a
Are there extreme fluctuations in number of locations?	Yes/No/Unknown	n/a
Are there extreme fluctuations in extent of occurrence?	Yes/No/Unknown	No
Are there extreme fluctuations in index of area of occupancy?	Yes/No/Unknown	No

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

The West Lake population of Eastern Sand Darter has an unknown number of mature individuals.

## Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

### Threats

A threats calculator was completed for this population (COSEWIC 2022, IN PRESS). Overall threat was assessed as medium-low for the West Lake population. Invasive species are identified as a medium to low threat to the West Lake population of Eastern Sand Darter. Pollution is considered negligible. Climate change impacts are unknown, and modifications to natural systems is considered not applicable. This population occurs entirely within the protected area of Sandbanks Provincial Park.

### Rescue effect

Rescue effect attribute	Value		DU3
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Yes/No/Unknown/Probably/Possibly		Yes
Status of outside population(s) most likely to provide immigrants to Ontario	Insert status		New York S2 Imperiled
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Yes/No/Unknown/Probably/Possibly		Possibly, but identified as unlikely
Would immigrants be adapted to survive in Ontario?	Yes/No/Unknown/Probably/Possibly		Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Yes/No/Unknown/Probably/Possibly		Yes
Are conditions deteriorating in Ontario?	Yes/No/Unknown/Probably/Possibly		Yes, due to invasive Round Goby
Are conditions deteriorating in Ontario?	Yes/No/Unknown/Probably/Possibly		Yes, in quality
Is the species of conservation concern in bordering jurisdictions?	Yes/No/Unknown/Probably/Possibly		Yes
Is the Ontario population considered to be a sink?	Yes/No/Unknown/Probably/Possibly		No
Is rescue from outside populations likely?	Yes/No/Unknown/Probably/Possibly		No

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## Sensitive species

This is not a data sensitive species.



## Acronyms

COSEWIC: Committee on the Status of Endangered Wildlife in Canada  
COSSARO: Committee on the Status of Species at Risk in Ontario  
ESA: Endangered Species Act  
EO: Element occurrence (as defined by NHIC)  
EOO: extent of occurrence  
GRANK: global conservation status assessments  
IAO: index of area of occupancy  
IUCN: International Union for Conservation of Nature and Natural Resources  
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  
S4: Apparently Secure  
S5: Secure  
IUCN: International Union for Conservation of Nature and Natural Resources  
CDSEPO: Le Comité de détermination du statut des espèces en péril en Ontario