

COSSARO Candidate Species at Risk Evaluation
for
Round Hickorynut, *Obovaria subrotunda*

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

Assessed by COSSARO as Endangered

Obovarie ronde (*Obovaria subrotunda*)

L'obovarie ronde est une espèce de moule d'eau douce brun foncé qui tient son nom de sa forme arrondie. Les adultes sont relativement petits, atteignant une longueur d'environ 6 cm, et vivent attachés à des substrats de gravier et de sable dans les rivières et les zones de delta de lac peu profondes. Les adultes préfèrent un débit d'eau moyen pour leur permettre de filtrer les algues et les bactéries avec leurs branchies. Tout comme les autres espèces de moules d'eau douce, les larves vivent en parasite sur un poisson-hôte pendant une partie de leur développement. L'obovarie ronde se trouvait historiquement dans 12 États et dans la province de l'Ontario. La plupart des populations américaines sont en déclin et l'espèce est récemment disparue de deux États. L'obovarie ronde est disparue d'environ 90 % de son aire de répartition historique au Canada. Les populations des rivières Grand et Thames en Ontario sont disparues et la population de la rivière Sydenham est probablement près de disparaître. La menace la plus importante qui pèse sur les populations d'obovarie ronde est la moule zébrée, qui colonise les substrats et supplante les moules indigènes. La seule population importante de l'espèce qui reste au Canada se trouve dans une zone peu profonde du lac Ste-Claire près de l'île Walpole, bien qu'on ignore si cette population continue de se reproduire avec succès. L'obovarie ronde est désignée comme étant **en voie de disparition** en Ontario.

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PART 1

CURRENT STATUS AND DISTRIBUTION

Current Designations:

GRANK – G4 (NatureServe, accessed 15/05/2013)
NRANK Canada –N1 (NHIC, accessed 15/05/2013)
COSEWIC – Endangered (COSEWIC, 2013)
SARA – Endangered (Environment Canada, 2013)
ESA 2007 – Endangered
SRANK – S1 (NHIC, accessed 15/05/2013)

Distribution in Ontario:

Surveys conducted since 2001 reveal that Round Hickorynut is now restricted in Ontario to Lake St. Clair Delta and the Sydenham River, which are collectively considered to be a single location because the Sydenham River is a major tributary of Lake St. Clair (COSEWIC, 2013).

Distribution and Status Outside Ontario:

Round Hickorynut is found throughout the Tennessee, Cumberland, and Ohio river systems in the United States from western Pennsylvania and peninsular Michigan west to eastern Illinois, although they may now be extirpated from Illinois and New York (Cummings and Mayer, 1992; Parmalee and Bogan, 1998; Watters et al., 2009; Strayer and Jirka, 1997).

PART 2

ELIGIBILITY FOR ONTARIO STATUS ASSESSMENT

2.1 APPLICATION OF ELIGIBILITY CRITERIA

Taxonomic Distinctnes

Yes The species is recognized as the Round Hickorynut, *Obovaria subrotunda* (Rafinesque, 1820).

Designatable Units

The Canadian population of *Obovaria subrotunda* remains as one Designatable Unit (Turgeon et al., 1998; COSEWIC 2003, 2013).

Native Status

Yes In Canada, *O. subrotunda* is known only from southern Ontario. The earliest record of the Round Hickorynut in Canada is two fresh whole shells collected in 1890 from Lake Erie at Kingsville by J.T. McQueen (specimens held by the Canadian Museum of Nature; cat. no. 002448). Since then it has been found in other locations in the western basin of Lake Erie (particularly around Pelee Island), Lake St. Clair, and the Welland, Grand, Detroit, Thames and Sydenham rivers (COSEWIC, 2003).

Presence/Absence

Present. In Ontario, Round Hickorynut continues to be found in Lake St. Clair Delta and the Sydenham River (COSEWIC, 2013).

2.2 ELIGIBILITY RESULTS

1. The putative taxon or DU is valid. **Yes**
2. The taxon or DU is native to Ontario. **Yes**
3. The taxon or DU is present in Ontario, extirpated from Ontario or extinct? **Present**

PART 3

ONTARIO STATUS BASED ON COSSARO EVALUATION CRITERIA

3.1 APPLICATION OF PRIMARY CRITERIA (Rarity and Declines)

1. Global Rank

Not in any category. G4

2. Global Decline

Threatened. Short-term decline of 10-30%, long-term decline of 30-50% (NatureServe 2013). This may be an underestimate, because Round Hickorynut is ranked as either S1, S2, SH, or SX in 10 of the 14 states and provinces in which it occurs (NatureServe, 2013), including states within and beyond 'northeastern North America'.

3. Northeastern North America Ranks

Threatened. S1, S2, SH, or SX in 67% of jurisdictions (6/9) in northeastern North America.

4. Northeastern North America Decline

Endangered. Accurate counts are lacking, because of difficulties associated with obtaining unbiased and complete samples. However, Round Hickorynut is a very uncommon species that is clearly declining throughout much of its range in the U.S.A. For example, it once occurred in four of the 25 drainages in Illinois but is now thought to have been extirpated from that state (Cummings and Mayer, 1997). It is also thought to have been extirpated in New York (Mayer and Jirka, 1997). Elsewhere, it is found throughout the state of Ohio, but only in very small numbers, and is absent from multiple previously occupied sites in Michigan (COSEWIC, 2003, and references therein). Therefore, an unquantified but generally recognized drastic population decline or range contraction has occurred in Northeastern North America.

5. Ontario Occurrences

Endangered. *Obovaria subrotunda* has not been found in Lake Erie since 1991, largely due to the invasion of the Zebra Mussel (*Dreissena polymorpha*) (Mackie and Claudi 2010) which colonizes substrate and swamps native species. The Round Hickorynut is thought to have been extirpated from the Thames River since the early twentieth century (COSEWIC 2003). Extensive searches led to the conclusion that the species is also extirpated from the upper and lower Grand River (COSEWIC, 2013, and references therein). According to NHIC (accessed May, 2013), there are nineteen element occurrences, although this summary was last updated in 2004 and may be an overestimate. Since 1996, the only live specimens collected have come from the St. Clair delta and the Sydenham River (Round Hickorynut and Kidneyshell Recovery Strategy, 2010). A live individual was collected from the Sydenham River in 2012 (S. Gibson, pers. comm.).

6. Ontario Decline

Endangered. The current extent of occurrence (EO) for Round Hickorynut in Ontario is 120 km², which represents a decline of 92% since 2001 (due to loss of populations from Detroit River, Thames River, Grand River and offshore waters of Lake St. Clair, Lake Erie), and an overall decline of 99% (COSEWIC, 2013). The overall estimated trend in decline in numbers of Round Hickorynut in the last 10 years is between 75% and 95%, which yields a 99% overall historical decline (COSEWIC, 2013).

7. Ontario's Conservation Responsibility

Not in any category. Although precise numbers from throughout the range are lacking, the healthiest remaining populations in North America are in the Duck River, Tennessee, and the Ontario waters of the St. Clair delta in Lake St. Clair (COSEWIC, 2003). However, the sites in Ontario comprise only ~1% of the Round Hickorynut global range (Round Hickorynut and Kidneyshell Recovery Strategy, 2010), and are therefore unlikely to comprise ≥10% of the global population.

3.2 APPLICATION OF SECONDARY CRITERIA (Threats and Vulnerability)

8. Population Sustainability

Endangered. Although no population viability analysis is available, the overall decline of 99% in terms of both numbers and extent of occurrence (i.e., extirpations) provides definite evidence of reproductive or recruitment failure in Ontario.

9. Lack of Regulatory Protection for Exploited Wild Populations

Not in any category. The species was listed under Schedule 3 of Ontario's *Endangered Species Act, 2007* (ESA) and receives species protection under this Act, and will receive habitat protection effective June, 2013.

10. Direct Threats

Endangered. The two strongest threats to Round Hickorynut are pollution (urban waste water, industrial and agricultural pollution) and invasive species (Dreissenids and Round Goby), with climate change (water quantity) identified as a less compelling threat (COSEWIC, 2013). Zebra mussels likely pose the greatest threat: approximately 64% of the sites where *O. subrotunda* was historically collected in Ontario are in sites that are now heavily colonized by zebra mussels (COSEWIC, 2013). It is not known why *O. subrotunda* and other species of unionids living in the shallow waters of the St. Clair delta have so far avoided the zebra mussel invasion, although it is possible that the numbers of veligers reaching and/or settling in the area may vary from year to year depending on wind direction, currents and water levels (Zanatta et al. 2002). The St. Clair "refuge" from zebra mussels may be temporary: several of the species known to be most susceptible to the zebra mussel have declined in Lake St. Clair, and overall infestation rates are higher than in other refuge sites in Lake Erie. If the Lake St. Clair population of *O. subrotunda* eventually succumbs to the zebra mussel, this will likely

mean that the species has been extirpated from Canada (COSEWIC, 2003).

11. Specialized Life History or Habitat-use Characteristics

Threatened. The Round Hickorynut is an obligate parasite unable to complete its early life stages without a suitable host. An association between the Round Hickorynut and the Eastern Sand Darter (*Ammocrypta pellucida*), itself a species at risk, suggests a possible host relationship (DFO 2012), although this has not been conclusively demonstrated. Other host fishes for the Round Hickorynut in Canada are the Blackside Darter (*Percina maculata*), Fantail Darter (*Etheostoma flabellare*) and Iowa Darter (*Etheostoma exile*). The Round Hickorynut is reliant on habitat that is conducive to Zebra Mussel colonization, and is thus at risk due to their habitat loss to invasive species.

3.3 COSSARO EVALUATION RESULTS

1. Criteria satisfied in each status category

ENDANGERED – [3/2]
THREATENED – [2/1]
SPECIAL CONCERN – [0/0]

ENDANGERED – [2]
THREATENED – [0]
SPECIAL CONCERN – [0]

2. Data Deficiency

No.

3. Status Based on COSSARO Evaluation Criteria

The application of COSSARO evaluation criteria suggests that **Round Hickorynut** is **Endangered** in Ontario.

PART 4

ONTARIO STATUS BASED ON COSEWIC EVALUATION CRITERIA

4.1 APPLICATION OF COSEWIC CRITERIA

Regional (Ontario) COSEWIC Criteria Assessment

Criterion A (Decline in Total Number of Mature Individuals):

Endangered A2ace

Subcriterion (a), (c) and (e) are applicable as there (a) has been a decline in the total population of between 75% and 95% and (c) a decline in EO of 92% over the past 10 years caused by the effects of introduced taxa and pollution (e). Although the causes for the decline are understood, they have not ceased and are not easily reversible. Declines over 3 generations would be larger.

Criterion B (Small Distribution Range and Decline or Fluctuation):

Endangered B1ab(i,ii,iii,iv,v) + 2ab(i,ii,iii,iv,v)

EO and IAO are well below thresholds for Endangered (B1 and B2) and meets “a” (fewer than 5 locations). Because there is an observed continuing decline in EO; IAO; area, extent and quality of habitat; number of populations; and number of mature individuals due to invasive species and agricultural and urban pollution subcriteria i, ii, iii, iv, and v under (b) are all applicable.

Criterion C (Small and Declining Number of Mature Individuals):

Not met I likely >10,000 individuals; COSEWIC, 2013).

Criterion D (Very Small or Restricted Total Population):

Threatened D2

D2 Threatened is applicable as there are fewer than 5 locations and the species is prone to the effects of human activities that can rapidly alter required habitat within a very short time.

Criterion E (Quantitative Analysis):

Not done (no information on birth rate, death rate, demographic variation, temporal variation, etc.).

Rescue Effect

No. The nearest Round Hickorynut populations in the U.S.A. are in Michigan. It is not likely that rescue will occur from Illinois populations. Rescue could occur from tributaries of Lake St. Clair in Michigan because *O. subrotunda* occurs in Clinton River and Belle River in the St. Clair River drainage but is not likely because the population in Michigan is also declining; even if migration occurred, survival is not likely because the Zebra

Mussel infestation throughout Lake St. Clair has eliminated most of the suitable habitat.

Special Concern Status

Not applicable.

4.2 COSEWIC EVALUATION RESULTS

Criteria satisfied in each status category

ENDANGERED – [yes]
THREATENED – [yes]
SPECIAL CONCERN – [N/A]

2. Data Deficiency

No.

3. Status Based on COSEWIC Evaluation Criteria

The application of COSEWIC evaluation criteria suggests that **Round Hickorynut** is **Endangered** in Ontario.

PART 5

ONTARIO STATUS DETERMINATION

5.1 APPLICATION OF COSSARO AND COSEWIC CRITERIA

COSSARO and COSEWIC criteria give the same result. **Yes**

5.2 SUMMARY OF STATUS EVALUATION

Round Hickorynut is classified as **Endangered** in Ontario.

Round Hickorynut (*Obovaria subrotunda*) is a species of freshwater mussel that is named for its rounded shape and dark brown colour. Adults are relatively small, growing to about 6 cm long, and live attached to gravel and sand substrates in rivers and shallow lake delta regions. Adults prefer moderately-flowing water so that they can filter algae and bacteria with their gills. As with other freshwater mussel species, the larva is parasitic on a fish host for a portion of its development. Round Hickorynut historically occurred in 12 states and the province of Ontario. Most populations in the United States are in decline, and it has been recently extirpated from two states. The Round Hickorynut has been lost from approximately 90% of its historical range in Canada. Populations in the Grand and Thames rivers in Ontario are extirpated, and the Sydenham River population is probably close to extirpation. The biggest threat to Great Lakes Round Hickorynut populations is Zebra Mussels, which colonize substrate and swamp native mussels. The only significant Round Hickorynut population remaining in Canada is in a shallow area of Lake St. Clair near Walpole Island, although it is not known whether or not this population is continuing to successfully reproduce.

Information Sources

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2. Community and Aboriginal Traditional Knowledge Sources.

There was no known Community or Aboriginal Traditional knowledge on this species.

3. Acknowledgements

APPENDIX 1

NORTHEASTERN NORTH AMERICA STATUS RANK AND DECLINE

	Subnational Rank	Sources	Decline	Source
CT	Not present	NatureServe 2013		
DE	Not present	NatureServe 2013		
IL	SX	NatureServe 2013		
IN	S1	NatureServe 2013	Recognized but unquantified decline	Tiemann, 2005
IA	Not present	NatureServe 2013		
LB	Not present	NatureServe 2013		
KY	S3S5	NatureServe 2013	Recognized but unquantified decline	Cicerello and Schuster 2003
MA	Not present	NatureServe 2013		
MB	Not present	NatureServe 2013		
MD	Not present	NatureServe 2013		
ME	Not present	NatureServe 2013		
MI	S1	NatureServe 2013	Recognized but unquantified decline	Michigan Natural Features Inventory, 2004.
MN	Not present	NatureServe 2013		
NB	Not present	NatureServe 2013		
NF	Not present	NatureServe 2013		
NH	Not present	NatureServe 2013		
NJ	Not present	NatureServe 2013		
NS	Not present	NatureServe 2013		
NY	SH	NatureServe 2013		
OH	S4	NatureServe 2013	Widely distributed but sporadic	Hoggarth et al., 2007
ON	S1	NatureServe 2013		
PA	S1	NatureServe 2013	Recognized but unquantified decline	Pennsylvania Fish and Boat Commission, 2012
PE	Not present	NatureServe 2013		
QC	Not present	NatureServe 2013		
RI	Not present	NatureServe 2013		
VA	Not present	NatureServe 2013		
VT	Not present	NatureServe 2013		

WI	Not present	NatureServe 2013		
WV	S3	NatureServe 2013	Limited distribution (although information sources somewhat dated).	Zeto et al., 1987; Morris and Taylor, 1992

Occurs as a native species in 9 of 29 northeastern jurisdictions

Strank or equivalent information available for 9 of 9 jurisdictions = (100%)

S1, S2, SH, or SX in 6 of 9 = (67%)