COSSARO Candidate Species at Risk Evaluation

for

Kidneyshell (*Ptychobranchus fasciolaris*)

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

Assessed by COSSARO as Endangered

June, 2013

FINAL

Ptychobranche réniforme (Ptychobranchus fasciolaris)

Le ptychobranche réniforme est une grosse moule qui vit dans les réseaux hydrographiques des rivières Ohio, Tennessee et Cumberland et dans le bassin sud des Grands Lacs. En Ontario, le ptychobranche réniforme se trouvait auparavant dans le lac Érié, le lac Ste-Claire, le sud du lac Huron et leurs chenaux correspondants et leurs bassins hydrographiques. L'espèce a connu deux périodes de déclin : 1) à la fin des années 1800 quand elle a disparu des rivières Grand, Welland et Thames en raison d'envasement et 2) dans les années 1990 à 2000, lorsqu'elle a disparu du lac Érié, du lac Ste-Claire et des chenaux correspondants en raison de la concurrence des moules zébrées et quagga. Ceci a provoqué un déclin de 70 % de l'espèce dans l'ensemble de son aire de répartition en Ontario. La répartition actuelle du ptychobranche réniforme se limite à la rivière Ausable et à la rivière East Sydenham, avec des nombres très faibles dans le delta du lac Ste-Claire et le ruisseau Medway. Bien que plusieurs mesures de la qualité de l'eau indiquent que les rivières Sydenham et Ausable sont stables ou qu'elles s'améliorent, le ptychobranche réniforme est menacé à ces endroits par la propagation continue des moules envahissantes et du gobie à taches noires. Le ptychobranche réniforme est désigné comme espèce **en voie de disparition** en Ontario parce qu'on ne le trouve qu'à quatre endroits et qu'il a connu un déclin considérable au cours des dernières 30 années en raison de sa disparition de toutes ses occurrences dans le lac Érié. Seulement deux des endroits actuels semblent avoir des populations saines et celles-ci sont menacées par la propagation d'espèces aquatiques envahissantes.

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PART 1

CURRENT STATUS AND DISTRIBUTION

Current Designations:
GRANK – **G4G5** (Assessed 14 May 2009) (NatureServe, accessed 25 April 2013); IUCN – Least Concern (Assessed 1996[1]) (Bogan 1996, IUCN Red List, accessed 26 April 2013)

NRANK Canada – **N1** (Assessed 10 Sep 2011) (NatureServe, accessed 25 April 2013)

COSEWIC – **Endangered** (COSEWIC 2013)

SARA – **Schedule 1** (Environment Canada 2012, accessed 25 April 2013)

ESA 2007 – **Endangered** (Ontario Ministry of Natural Resources 2013, accessed 25 April 2013)

SRANK – **S1** (NHIC/NatureServe, accessed 25 April 2013)

Distribution in Ontario:
The Ontario distribution of Kidneyshell has always been restricted to the waters and tributaries of Lake Erie, Lake St. Clair and southern Lake Huron. It currently occurs in the Ausable River and East Sydenham River, and may still occur, but with very low numbers, in the Lake St. Clair delta and Medway Creek (a tributary of the Thames River in London). Kidenyshell is extirpated from Lake Erie, Grand River, Detroit River, Niagara River and Thames River (COSEWIC 2013; COSEWIC 2003)

Distribution and Status Outside Ontario:
Kidenyshell occurs throughout the Ohio, Tennessee and Cumberland river systems, and in the southern Great Lakes basin. Its Great Lakes distribution includes Lake Erie and Lake St. Clair and tributaries, Detroit and St. Clair rivers and at least two tributaries in lower Lake Huron in Michigan and Ontario (NatureServe 2013).

[1] Noted in report that updating is required.

PART 2

ELIGIBILITY FOR ONTARIO STATUS ASSESSMENT

Taxonomic Distinctness
Yes
Kidneyshell is universally recognized as a full and separate species.

Designatable Units
There is only one Designatable Unit and no distinctions that warrant assessment below the species level.

Native Status
Yes
There are a number of early accounts of Kidneyshell in Ontario, including records from the Grand River in 1888 and Thames River in 1894 (COSEWIC 2013).

Presence/Absence
Present
Regularly occurs in Ontario.

1.3 ELIGIBILITY CRITERIA MET

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

GRANK – **G4G5** (Assessed 14 May 2009) (NatureServe, accessed 25 April 2013); IUCN – Least Concern (Assessed 1996[2]) (IUCN Red List, accessed 26 April 2013)

2. Global Decline

Not in any category

NatureServe (2013) reports a range-wide decline of 10-30%, noting that although Kidenyshell has declined in some locations, including in Ontario, many sites have large populations and the U.S. occurrences have been more stable. This global decline does not meet the criterion threshold for threatened (>30%).

3. Northeastern North America Ranks

Special Concern

44% (4/9) of northeastern North American jurisdictions in which the species is ranked have ranks of S1, S2, SH or SX (see Appendix 1). The species appears to be of greatest conservation concern at the periphery of its core range (i.e. outside of Kentucky and Tennessee).

4. Northeastern North America Decline

Threatened

Northeastern North America decline appear to be more acute than global population trends (decline of 10-30%), particularly in the Great Lakes basin. While the species remains common in the core area of its range, there are reported declines from Ontario, Michigan and Illinois, and it is rare in most Great Lakes states (see Appendix 1). Although unquantified, this information does constitute a generally recognized serious regional decline in population.

5. Ontario Occurrences

Endangered

Kidneyshell is extant at four sites in Ontario: Sydenham River, Ausable River, St. Clair Delta and Medway Creek. Populations in the St. Clair Delta and Medway Creek are extremely small (COSEWIC 2013). Element occurrence information is available for this species, but this information has not been updated since 2006 and does not reflect recent search information.

[2] Noted in report that updating is required.

6. Ontario Decline

Endangered

Kidneyshell appears to be absent from >75% of historic sites including occurrences from Lake Erie, Detroit River, Niagara River, Welland River, Grand River and Thames River (COSEWIC 2013). The recent loss of Kidneyshell from Lake Erie, and most of Lake St. Clair due to non-native Zebra and Quagga Mussels (*Dreissena polymorpha, D. bugensis*) has likely resulted in a loss of 50% of the population within the last three generations (approximately 30 years for this species), given the amount of habitat that was available. Both the loss of historic sites (>75%) and recent decline from Lake Erie and most of Lake St. Clair (50% sites) warrant an assessment of endangered for this criterion.

7. Ontario's Conservation Responsibility

Not in any category

Less than 5% of the global range of this species is in Ontario (COSEWIC 2013). It may be less than 1% of the global range (based on area of occupancy) and population (estimated at >1 M) based on NatureServe (2013). This does not meet the criterion threshold of ≥10% for threatened status.

3.2 APPLICATION OF SECONDARY CRITERIA (Threats and Vulnerability)

1. Population Sustainability

Insufficient Information

Information on population recruitment and sustainability are unknown for this species.

2. Lack of Regulatory Protection for Exploited Wild Populations

Not in any category

This criterion applies to exploited populations. There is no evidence that Kidneyshell is exploited in Ontario and it is protected under the provincial *Endangered Species Act* and federal *Species at Risk Act*.

3. Direct Threats

Threatened

Kidneyshell is at risk of disappearing from >50% of current sites – Medway Creek and Lake St. Clair delta. The population at the Medway Creek and Lake St. Clair are presently very small, and it may already be absent from those sites.

Current populations in the Ausable and Sydenham Rivers appear healthy, but there is a risk that zebra or quagga mussels could spread to these sites. Round Goby (*Neogobius melanostomu*) invasions could reduce populations of host species, although it could also serve as a host for Kidneyshell (McNichols et al. 2010). Dressinid mussels and

Round Goby occur at mouth of the Ausable River, but have not been documented further upstream (Kari Jean, Ausable Bayfield Conservation Authority, pers. comm.).

Watershed report cards indicate that habitat quality of existing sites in the Sydenham and Ausable Rivers is generally stable or improving (see Table below), but high cash crop prices have been resulting in conversion of pasture and natural habitats into cropland that could reduce water quality in these watersheds. The glochidium of some mussels is very sensitive to sodium chloride (i.e. road salt) (Gillis 2011), and these populations occur in regions of high road density..

A recovery strategy has recently been prepared for this species (Morris 2010), and several actions have been implemented (DFO 2012).

Summary of Key Watershed Report Card Indicators from Watersheds with Extant Populations of Kidneyshell

Watershed	***Total P (trend)***	***Benthic Invertebrates (trend)***	***Forest Cover (trend)***
Middle East Sydenham (2008)	0.08 mg/l B (unknown)	6.4 FBI C (unknown)	14.5% C (unknown)
Upper East Sydenham (2008)	0.13 mg/l C (unknown)	5.5 FBI B (unknown)	5.9% D (unknown)
Middle Ausable River (2013)	0.094 mg/l D (stable)	4.47 FBI B (improving)	13.6% D (improving)
Upper Ausable River (2013)	0.266 mg/l F (declining)	5.46 FBI C (unknown)	10.6% D (improving)
Medway Creek (2012)	0.120 D (improving)	5.87 FBI D (stable)	9.6 D (declining)

4. Specialized Life History or Habitat-use Characteristics

Special Concern

Like other freshwater unionid mussels, Kidneyshell has a complex reproductive cycle involving a period of obligate parasitism on fishes. The female mussel releases conglutinates (i.e. packages containing many individual glochidia) which grow in the fishes gills and are subsequently dispersed. The host fishes for the Kidneyshell in Ontario include: Blackside Darter (*Percina maculata*), Fantail Darter (*Etheostoma flabellare*), and Johnny Darter (*E. nigrum*), Iowa Darter (*E. exile*) and Brook Stickleback (*Culaea inconstans*) (McNichols 2007).

Kidneyshell is a habitat generalist and occurs in a variety of habitat types including lakes, deltas, streams and large rivers. It does however require clear waters (COSEWIC 2013, NatureServe 2013) and seems to prefer gravel substrates in riparian habitats (Grabarkiewicz 2012).

The life history of Kidneyshell, like all freshwater unionid mussels, is highly specialized

which could put it at risk of environmental change or disturbance. This meets the description for special concern in this category.

3.3 COSSARO EVALUATION RESULTS

1. Criteria satisfied in each status category

Number of primary and secondary criteria met in each status category:

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

Number of Ontario-specific criteria met in each status category:

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

2. Data Deficiency

No

The number of criteria assessed as “insufficient information” is 1.

3. Recommended Status

The application of COSSARO evaluation criteria suggests that **Kidneyshell** remains designated as **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
Threatened Likely meets criterion for A2, with a 50% population decrease in the last three generations, and the cause (invasive mussels) is a continued threat.

Criterion B – Small Distribution Range and Decline or Fluctuation
Endangered Both the EO and IAO meet the threshold for endangered, there are fewer than five populations and there is continuing decline is number of populations and mature individuals (COSEWIC 2013).

Criterion C – Small and Declining Number of Mature Individuals
Insufficient Information While the number of individuals is not known, it likely exceeds the threshold for threatened (10,000). Current rates of decline are uncertain. The Sydenham River population appears to be stable.

Criterion D – Very Small or Restricted Total Population
Threatened Fewer than five populations. IAO exceeds threshold. Extant populations are prone to the effects of human activities or stochastic events within a very short time period (1-2 generations) in an uncertain future, and are thus capable of becoming endangered or extinct in a very short time period.

Criterion E – Quantitative Analysis
Not in any category Information not available.

Rescue Effect
No. Very unlikely that the two extant populations in Ausable and Sydenham Rivers could be repopulated. Lake Erie populations could be repopulated if any nearshore refugia exist or from Ohio streams.

Special Concern Status
NA

4.2 COSEWIC EVALUATION RESULTS

1. Criteria satisfied in each status category

Indicate whether or not a criterion is satisfied in each of the status categories.

ENDANGERED – [yes]
THREATENED – [yes]
SPECIAL CONCERN – [NA]

2. Data Deficiency

No

3. Status Based on COSEWIC Evaluation Criteria

The application of COSEWIC evaluation criteria suggests that **Kidneyshell** 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

Kidneyshell is classified as **Endangered** in Ontario.

Kidneyshell is a large mussel that occurs throughout the Ohio, Tennessee and Cumberland river systems, and in the southern Great Lakes basin. In Ontario, Kidneyshell once occurred in Lake Erie, Lake St. Clair, southern Lake Huron and their connecting channels and watersheds. It experienced two periods of decline: 1) in the late 1800s when it was extirpated from the Grand, Welland and Thames Rivers due to siltation, and 2) in the 1990s-2000s when it was lost from Lake Erie, Lake St. Clair and connecting channels due to competition from Zebra and Quagga Mussels. This resulted in an overall range decline of 70% in Ontario. The current distribution of the Kidneyshell is restricted to the Ausable River and East Sydenham River, with very low numbers in the Lake St. Clair delta and Medway Creek. Although many measures of water quality in the Sydenham and Ausable rivers are stable or improving, Kidneyshell is threatened at these sites by the continued spread of invasive mussels and Round Goby.

Kidneyshell is Endangered in Ontario because it only occurs at four sites, and there has been a significant decline in the last 30 years through the loss of all Lake Erie occurrences. Only two of the existing sites appear to be have healthy populations, and these are threatened by the spread of aquatic invasive species.

Information Sources

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2. Community and Aboriginal Traditional Knowledge Sources
None. No known source of ATK.

3. Acknowledgements
Scott Gibson (MNR) provided comments on the draft evaluation.

Kari Jean (Ausable Bayfield Conservation Authority) provided information on the extent of dressindid mussels and round goby in the Ausable River.

APPENDIX 1

NORTHEASTERN NORTH AMERICA STATUS RANK AND DECLINE

	Subnational Rank	Sources	Decline/Other Status	Sources
CT	-*	1	-	
DE	-	1	-	
IL	S1	1	Fairly widespread but only locally abundant. Disappearing from parts of its range. Endangered in Illinois.	2
IN	S2	1	Special Concern	3
IA	-	1	-	
LB	-	1	-	
KY	S4S5	1	No information	
MA	-	1	-	
MB	-	1	-	
MD	-	1	-	
ME	-	1	-	
MI	SNR	1	Special Concern	4
MN	-	1	-	
NB	-	1	-	
NF	-	1	-	
NH	-	1	-	
NJ	-	1	-	
NS	-	1	-	
NY	S2	1	No information	
OH	S3	1	Species of concern	1
ON	S1	1	Endangered	1
PA	S4	1	No information	
PE	-	1	-	
QC	-	1	-	
RI	-	1	-	
VA	S4	1	No information	
VT	-	1	-	
WI	-	1	-	
WV	S3	1	No information	

*-: does not occur in this state/province
1: NatureServe 2013
2: Illinois Natural History Survey
http://wwx.inhs.illinois.edu/collections/mollusk/publications/guide/index/98
3: Indiana DNR
http://www.in.gov/dnr/fishwild/files/fw-Freshwater_Mussels_Of_Indiana.pdf
4: Michigan Natural Features Inventory
http://mnfi.anr.msu.edu/data/specialanimals.cfm

Occurs as a native species in **10 of 29 northeastern jurisdictions**
SRANK or equivalent information available for 9 of 10 jurisdictions = (90%)
S1, S2, SH, or SX in 4 of 9 = (44%)