COSEWIC
Status Appraisal Summary

on the

River Redhorse
Moxostoma carinatum

in Canada

SPECIAL CONCERN
2015

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status appraisal summaries are working documents used in assigning the status of wildlife species suspected of being at risk in Canada. This document may be cited as follows:

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COSEWIC
Assessment Summary

Assessment Summary – November 2015

Common name
River Redhorse

Scientific name
Moxostoma carinatum

Status
Special Concern

Reason for designation
This freshwater fish species occurs in rivers in densely populated regions of Ontario and Quebec. Although collected at new locations in both Ontario and Quebec, the species has likely been extirpated from several rivers within its range. It comes close to meeting Threatened criteria due to a small area of occupancy and relatively few locations. Its persistence is limited by barriers to movement, altered flow regimes, turbidity, eutrophication and habitat deterioration from agriculture and industrial activities. The species may become Threatened if these threats are neither reversed nor managed with demonstrable effectiveness.

Occurrence
Ontario, Quebec

Status history
Designated Special Concern in April 1983. Status re-examined and confirmed in April 1987, April 2006, and November 2015.

COSEWIC
Status Appraisal Summary

River Redhorse — Chevalier de rivière

Moxostoma carinatum

Range of occurrence in Canada: Ontario and Quebec

Status History

COSEWIC: Designated Special Concern in April 1983. Status re-examined and confirmed in April 1987, April 2006, and November 2015.

Evidence (indicate as applicable):

Wildlife species:

Change in eligibility, taxonomy or designatable units: yes ☐ no ☒

Explanation:

No new data to support a change.

Range:

Change in Extent of Occurrence (EO): yes ☒ no ☐ unk ☐

Change in Index of Area of Occupancy (IAO) : yes ☒ no ☐ unk ☐

Change in number of known or inferred current locations*: yes ☒ no ☐ unk ☐

Significant new survey information yes ☒ no ☐

Explanation: There have been several new occurrences documented since the previous report but they are likely the result of enhanced sampling, not range expansion (Figure 1). In Quebec, new occurrences of River Redhorse were documented for Lac-Saint-Pierre, and rivières Saint-François, Outaouais, and Coulonge (MFFPQ unpublished data). They have also been in the Trent, Ottawa, and Richelieu rivers since 2005. The last records from the Mississippi, Madawaska, and St. Lawrence rivers were from 2002. River Redhorse are probably extirpated from the Ausable, Châteauguay, and Yamaska rivers.

* Use the IUCN definition of “location”

Population Information:

Change in number of mature individuals: yes ☐ no ☐ unk ☒

Change in population trend: yes ☐ no ☐ unk ☒

Change in severity of population fragmentation: yes ☐ no ☐ unk ☒

Change in trend in area and/or quality of habitat: yes ☐ no ☐ unk ☒

Significant new survey information yes ☐ no ☒

Explanation:

The survey information collected since what was outlined in the 2006 assessment does not warrant a change in conditions.

In Quebec, populations in the Richelieu River appear stable, with catches of YOY every year (between 1997 and 2012) at the Vianney-Legendre Fishway (bypassing the Saint-Ours Dam) and downstream of the dam (DFO 2014). River Redhorse have been recently found in the following locations: Lac-Saint-Pierre, and rivières Saint-François, Outaouais, and Coulonge (MFFPQ unpubl. data).

There is no new information available for populations in the Ausable, Châteauguay, and Yamaska rivers (QC) and these are likely extirpated.

In Ontario, populations appear stable in the Trent River and the Bay of Quinte, with OMNRF fish surveys occasionally finding individuals (DFO 2014). The River Redhorse remain extirpated from the Ausable River, as a 2008 Survey by the Ausable Bayfield Conservation Authority again failed to capture any individuals (DFO 2014).

A 1998 survey revealed River Redhorse in the Grand River, but more surveys in the river in 2007, 2010, and 2011 failed to find any River Redhorse (DFO 2014).

Perhaps due to lack of sampling, the last records from the Mississippi, Madawaska, and St. Lawrence rivers were from 2002.

Threats:

Change in nature and/or severity of threats: yes ☐ no☒ unk ☐

Explanation:

Threats remain the same as reported in 2006, with habitat degradation, siltation, and pollution (including nutrient loading) and habitat fragmentation from dams (including changes to the flow regime) being the primary concerns. Reid (2008) suggests that fragments of river habitats of less than 2 km are unable to support viable populations. Theim *et al.* (2013) found that River Redhorse struggled to pass through the fishway on the Richelieu River in QC, with a 30.8 % passage efficiency, which is considerably lower than most other species studied.

Pollution (contaminants) are also an ongoing concern, particularly in the Yamaska River watershed where industrial-scale livestock production is prevalent. However, recent increases in the use of endocrine-disrupting agricultural pesticides is of concern to all aquatic life (DFO 2014).

Protection:

Change in effective protection: yes ☒ no ☐

Explanation:

Changes to the *Fisheries Act* in 2012 have changed the protection afforded to fish habitat in Canada. The *Act* now states “No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational, or Aboriginal fishery, or to fish that support such a fishery”. Although River Redhorse does not fall into any of these fisheries categories, the distribution of this species overlaps with areas of commercial, recreational, or Aboriginal fisheries and the River Redhorse may be offered some protection under the amended *Fisheries Act*.

Rescue Effect:

Change in evidence of rescue effect: yes ☐ no ☒

Explanation:

No data to support this.

Quantitative Analysis:

Change in estimated probability of extirpation: yes ☐ no☒ unk ☐

Details:

Little new survey information since what was outlined in the 2006 assessment to determine change.

Summary and Additional Considerations: [e.g., recovery efforts]

There are currently no ongoing River Redhorse-specific recovery efforts but general ecosystem recovery efforts in the Thames River, the Ausable River, and elsewhere overlap with the needs of the River Redhorse (DFO 2014). However, the DFO (under the *Species at Risk Act*) is preparing a draft management plan for River Redhorse. The plan proposes to better understand the abundance and extent of populations, the ecology, and trends threats to River Redhorse. The plan also targets public awareness and efficient management. Recommendations of the plan include 1) standardized sampling protocol, 2) collaborative efforts amongst organizations and a shared, georeferenced database of Canadian populations, and 3) stewardship and public awareness campaigns (DFO 2014).

Acknowledgements and authorities contacted:

Lynn Bouvier – DFO, Species at Risk

Shawn Staton – DFO, Species at Risk

Neil Jones – Environment Canada (re: ATK)

Scott Reid – OMNRF Species at Risk

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Nick Mandrak – University of Toronto

Claude Renaud – Canadian Museum of Nature

Information sources:

COSEWIC 2006. COSEWIC assessment and update status report on the river redhorse *Moxostoma carinatum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 37 pp. (http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_river_redhorse_e.pdf). Last accessed October 20 2014.

DFO. (2014). Management plan for the River Redhorse (*Moxostoma carinatum*) in Canada [Proposed]. *Species at Risk Act* Management Plan Series. Fisheries and Oceans Canada, Ottawa.

Harquail, J. 2013. ATK Source Report on River Redhorse in Canada. Aboriginal Traditional Knowledge Sub-Committee on the Status of Endangered Wildlife in Canada.

NatureServe (2014). NatureServe Conservation Status, River Redhorse. www.natureserve.org. Last accessed October 19, 2014.

Reid, S.M. (2008). The effect of river fragmentation on the distribution, demographics and genetic characteristics of redhorse (*Moxostoma* spp.) populations. Ph.D. Thesis. Trent University, Peterborough, Ontario.

Theim, J.D., Binder, T.R., Dumont, P., Hatin, D., Hatry, C., Katopodis, C., Stamplecoskie, K.M., Cooke, S.J. (2013). Multispecies fish passage behaviour in a vertical slot fishway on the Richelieu River, Québec, Canada. River Research and Applications 29, 582-592.

TECHNICAL SUMMARY

Moxostoma carinatum

River Redhorse Chevalier de rivière

Range of occurrence in Canada: Ontario and Quebec

Demographic Information

Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines(2011) is being used)	> 10-15 yrs
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	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] period, 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?	Unknown if there is a decline.
Are there extreme fluctuations in number of mature individuals?	unknown

Extent and Occupancy Information

Estimated extent of occurrence based on minimum convex polygon around all records within Canada's extent of jurisdiction	156,392 km²
Index of area of occupancy (IAO) (Always report 2x2 grid value). Discrete index of area of occupancy: 184 grids = 736 km² based on one grid over each observation record Continuous index of area of occupancy: 1,985 grids = 7,940 km² based on continuous stretch of river between all observed records. Field sampling suggests that the actual IAO is likely much closer to the discrete rather than continuous estimates *Note: the location in the upper Gatineau River is questionable	736 km^2

Is the population "severely fragmented" i.e. is >50% of its total area of occupancy 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? *Note that the previous status report suggested that River Redhorse were severely fragmented, but by current use of the term, severe fragmentation is not met.	a. unknown b. dispersal possible but unlikely due to large distances between watersheds where they are known to occur.
Number of "locations"∗ (use plausible range to reflect uncertainty if appropriate)	≥13 locations
Is there an [observed, inferred, or projected] decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] decline in index of area of occupancy?	No
Is there an [observed, inferred, or projected] decline in number of subpopulations?	No
Is there an [observed, inferred, or projected] decline in number of "locations"*?	No
Is there an [observed, inferred, or projected] decline in [area, extent and/or quality] of habitat?	Projected decline in quality of habitat, as a result of increased human population growth and development.
Are there extreme fluctuations in number of subpopulations?	unknown
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 subpopulation)

Subpopulations (give plausible ranges)	**N Mature Individuals**
	Unknown
Total	

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	unknown

∗ See Definitions and Abbreviations on COSEWIC website and IUCN (Feb 2014) for more information on this term

Threats (actual or imminent, to populations or habitats, from highest impact to least)

Current and potential threats were assessed by DFO (2014) with input from experts from Ontario and Quebec, and the following threats were identified as “high overall concern”:

i. Habitat degradation
ii. Pollution
iii. Siltation
iv. Habitat fragmentation by dams

Habitat fragmentation is of particular concern on the Grand, Gatineau, Trent, Ottawa, Mississippi, Madawaska, and Richelieu rivers, as these systems have experienced considerable flow regulation and hydroelectric dam development (S. Reid OMNRF pers. comm. 2014). The Richelieu River has the Vianney-Legendre Fishway (bypassing the Saint-Ours Dam) but River Redhorse have difficulty passing it (Theim *et al*. 2013).

Pollution from industrial agriculture practices has severely degraded River Redhorse habitat in the Eastern Townships of Quebec.

Was a threats calculator completed for this species and if so, by whom?

No

Rescue Effect (immigration from outside Canada)

Status of outside population(s) most likely to provide immigrants to Canada.	River Redhorse have a national conservation status of N4 in USA (apparently secure) compared to N2N3 in Canada (imperiled or vulnerable), with a rank of S1 in Michigan (critically imperiled), S2 in New York (imperiled), and S3S4 in Pennsylvania (vulnerable to apparently secure) (NatureServe 2014).
Is immigration known or possible?	Immigration is possible from US population but not likely due to the conservation status of this species in adjacent states.
Would immigrants be adapted to survive in Canada?	Yes.
Is there sufficient habitat for immigrants in Canada?	Unknown
Are conditions deteriorating in Canada?+	Projected decline in quality of habitat, as a result of increased human population growth and development.
Are conditions for the source population deteriorating?+	Unknown. No new information since 2006.

+ See Table 3 (Guidelines for modifying status assessment based on rescue effect)

Is the Canadian population considered to be a sink?+	Unknown.
Is rescue from outside populations likely?	Rescue would be possible, but difficult due to distances separating sites.

Data Sensitive Species

Is this a data sensitive species? No

Status History

COSEWIC: Designated Special Concern in April 1983. Status re-examined and confirmed in April 1987, April 2006, and November 2015.
Additional Sources of Information: Comtois, A., Chapleau, F., Renaud, C.B., Fournier, H., Campbell, B., Pariseau, R. (2004). Inventaire printanier d'une frayère multispécifique : l'ichtyofaune des rapides de la rivière Gatineau, Québec. Canadian Field-Naturalist 118(4): 521-529. COSEWIC (2006). COSEWIC assessment and update status report on the river redhorse *Moxostoma carinatum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 37 pp.(http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/ sr_river_redhorse_e.pdf). Last accessed October 20 2014. DFO. (2014). Management plan for the River Redhorse (*Moxostoma carinatum*) in Canada [Proposed]. *Species at Risk Act* Management Plan Series. Fisheries and Oceans Canada, Ottawa. Harquail, J. 2013. ATK Source Report on River Redhorse in Canada. Aboriginal Traditional Knowledge Sub-Committee on the Status of Endangered Wildlife in Canada. Lowles, A.G. (2013). Effects of environmental factors, physical barriers and season on the fish community, composition of the lower Ottawa and Mississippi river systems as determined from quantitative electrofishing. M.Sc. Thesis. Queens University, Kingston, Ontario. NatureServe (2014). NatureServe Conservation Status, River Redhorse. www.natureserve.org. Last accessed October 19, 2014. Reid, S.M. (2008). The effect of river fragmentation on the distribution, demographics and genetic characteristics of redhorse (*Moxostoma* spp.) populations. Ph.D. Thesis. Trent University, Peterborough, Ontario. Theim, J.D., Binder, T.R., Dumont, P., Hatin, D., Hatry, C., Katopodis, C., Stamplecoskie, K.M., Cooke, S.J. (2013). Multispecies fish passage behaviour in a vertical slot fishway on the Richelieu River, Québec, Canada. River Research and Applications 29, 582-592.

+ See Table 3 (Guidelines for modifying status assessment based on rescue effect)

Status and Reasons for Designation:

Status:	**Alpha-numeric codes:**
Special Concern	Not Applicable

Reasons for designation:
This freshwater fish species occurs in rivers in densely populated regions of Ontario and Quebec. Although collected at new locations in both Ontario and Quebec, the species has likely been extirpated from several rivers within its range. It comes close to meeting Threatened criteria due to a small area of occupancy and relatively few locations. Its persistence is limited by barriers to movement, altered flow regimes, turbidity, eutrophication and habitat deterioration from agriculture and industrial activities. The species may become Threatened if these threats are neither reversed nor managed with demonstrable effectiveness.

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Not applicable. No information is available on the number of mature individuals.
Criterion B (Small Distribution Range and Decline or Fluctuation): Does not meet criteria. Comes close to meeting Threatened with small IAO and projected decline in quality of habitat as a result of increased human population growth and development but no other sub-criteria are met since it is not severely fragmented, no extreme fluctuations and number of locations is close to but exceeds the threshold (> 13).
Criterion C (Small and Declining Number of Mature Individuals): Not applicable. No information is available on the number of mature individuals.
Criterion D (Very Small or Restricted Population): Not applicable. No information is available on the number of mature individuals.
Criterion E (Quantitative Analysis): Not done.

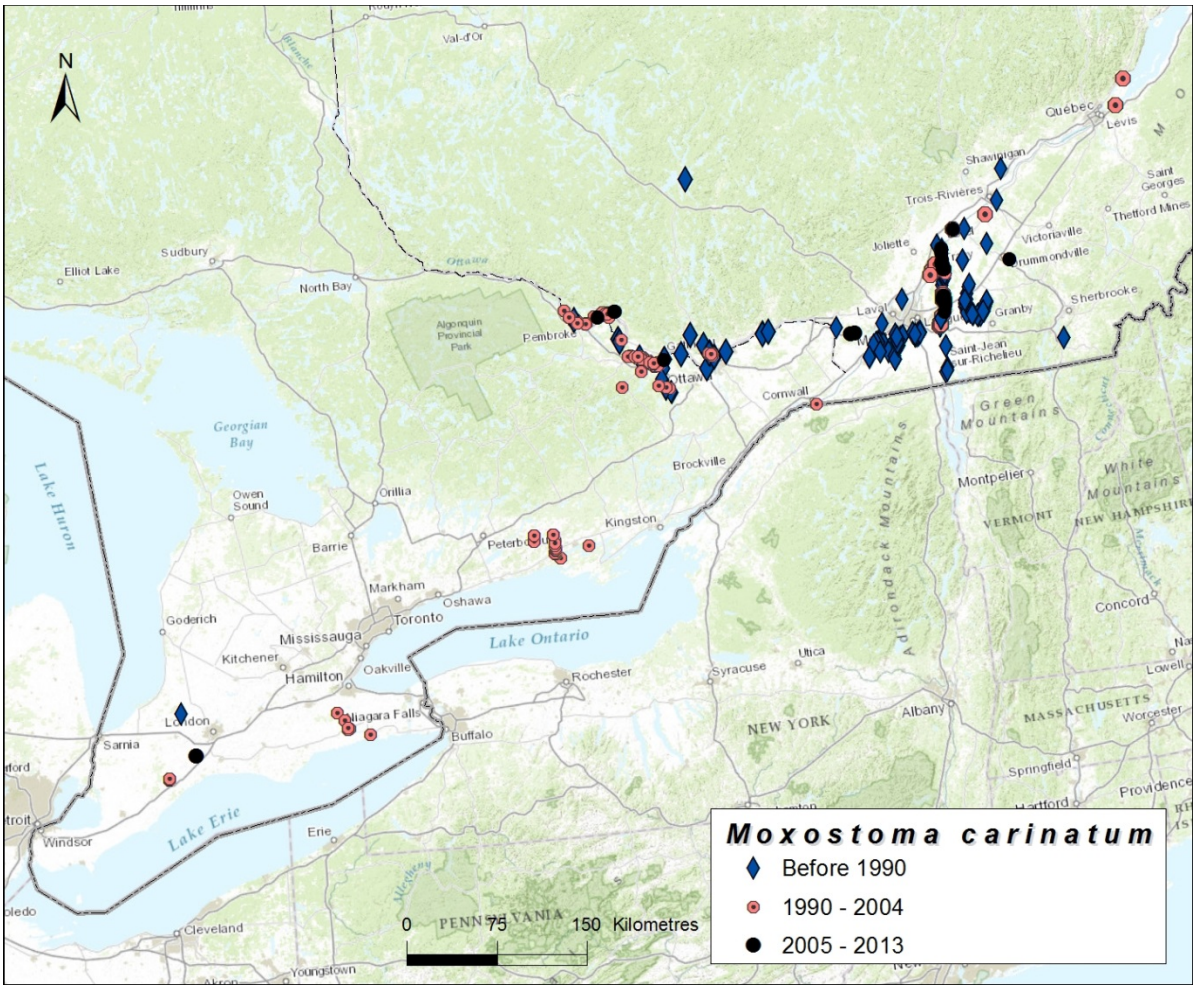

Figure 1. Canadian distribution of River Redhorse.

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS
(2015)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

Environment Canada / Environnement Canada

Canadian Wildlife Service / Service canadien de la faune

Canada

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