COSSARO Candidate Species at Risk Evaluation for Silver Lamprey (*Ichthyomyzon unicuspis*)

Great Lakes – Upper St. Lawrence River Population and Northwestern Ontario Population

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

November 2011

Final

La **Lamproie argentée** (*Ichthyomyzon unicuspis*) adulte est un parasite d'autres poisons, qui remonte les ruisseaux à la fin de sa vie pour frayer. Elle peut vivre jusqu'à six ans à l'état d'ammocète dans les sédiments mous des ruisseaux. Les ammocètes des différentes espèces *d'inchtyomyzon* sont pratiquement impossibles à distinguer les uns des autres. La Lamproie argentée vit principalement dans le nord-est de l'Amérique du Nord, du Québec au Manitoba et jusqu'au Tennessee vers le sud. La **population des Grands Lacs et du haut Saint-Laurent** est présente au Québec, en Ontario et dans les États des Grands Lacs. En Ontario, les populations sont présentes dans plusieurs ruisseaux qui se déversent dans les Grands Lacs, le fleuve Saint-Laurent et la rivière des Outaouais. L'espèce n'affiche aucun déclin récent et pourrait même être à la hausse dans le lac St. Clair. Les relevés réalisés dans les dernières années indiquent la présence de l'espèce dans la plupart des sites historiques; par conséquent, l'aire d'occurrence n'a diminué que légèrement depuis les années 1930. Les menaces pour cette espèce comprennent le traitement des cours d'eau occupés avec des lampricides pour le contrôle de la Lamproie marine, la construction de barrages qui réduisent sa capacité de migrer des lacs vers les aires de frai et la pollution chimique, notamment par l'Atrazine. Cette population comprend environ 20 p. 100 de l'aire de répartition mondiale et est classée **préoccupante**.

La population du nord-ouest de l'Ontario de la **Lamproie argentée** (*Ichthyomyzon unicuspis*) se trouve dans la région du lac des Bois de l'Ontario. La population de Lamproie argentée du nord-ouest de l'Ontario est mal connue et les données de population sont insuffisantes pour établir le statut de l'espèce. Aucune menace spécifique n'a été répertoriée, mais elles pourraient inclure la construction de barrages qui réduisent la capacité de la lamproie de migrer des lacs vers les aires de frai. La Lamproie argentée fait partie des espèces dont les **données sont insuffisantes**.

Cette publication hautement spécialisée, COSSARO Evaluation for Silver Lamprey (Great Lakes – Upper St. Lawrence River population) n'est disponible qu'en anglais en vertu du Règlement 671/92 qui en exempte l'application de la Loi sur les services en français. Pour obtenir de l'aide en français, veuillez contacter le secrétariat de COSSARO par courrier électronique à l'adresse COSSAROsecretariat@ontario.ca.

PART 1: Current status and distribution

Great Lakes – Upper St. Lawrence River Population
Northwestern Ontario Population

Current designations:

GRANK – G5 (NatureServe 2011)

NRANK Canada – N4 (NatureServe 2011)

COSEWIC – Great Lakes – Upper St. Lawrence River Populations: Special Concern (COSEWIC, 2011)

Saskatchewan - Nelson River Populations: Data Deficient (COSEWIC, 2011)

SARA – Special Concern (No Schedule) (Environment Canada, 2011)

ESA 2007 – Not Ranked (Ministry of Natural Resources, 2011)

SRANK – S3 (NHIC/NatureServe, accessed 20/11/2011) Great Lakes - St. Lawrence DU is S3. Northwestern Ontario DU has not been assessed but probably would be S2S3 or S3 (D. Sutherland, NHIC pers. comm. (2011)

Distribution in Ontario:

Silver Lamprey occurs in creeks and rivers that feed into all of the Ontario Great Lakes as well as the Ottawa River. It also occurs in two locations in the Lake of the Woods region in northwestern Ontario.

Distribution and status outside Ontario:

The Silver Lamprey occurs from St. Lawrence drainage in Quebec and New York west through the Great Lakes to Manitoba through the Nelson River drainage. It also occurs south through the upper Mississippi River drainage to northwestern Tennessee. It may be more widespread than this since there is difficulty in finding and identifying ammocoetes (COSEWIC 2011), therefore its status is not well understood but it appears to be fairly common in the jurisdictions in the central part of its range.

PART 2: Eligibility for Ontario status assessment

2.1 Application of eligibility criteria

Taxonomic distinctness
Yes. Although almost identical genetically to the Northern Brook Lamprey, Silver Lamprey is parasitic whereas Northern Brook Lamprey is not and is considerably smaller in size. The two species therefore are morphologically and behaviorally distinct.

Designatable units
COSEWIC (2009) recognizes two DUs: the Upper Great Lakes – St. Lawrence River (DU1) and the Saskatchewan River - Nelson River (DU2). The DUs are separated by major watershed divides. The northwestern Ontario records belong to DU2, consequently both DUs are present and extant in Ontario.

It should be noted that COSSARO's 'Northwestern Ontario' DU, is the same DU identified by COSEWIC as the 'Saskatchewan and Nelson River' DU; however, the DU name was changed to better reflect Ontario populations (i.e., the Saskatchewan and Nelson Rivers are not located within Ontario).

Native status
Yes (both DUs). It is known to have occurred in Ontario since at least the 1930s. The species is considered native to northeastern North America including the Great Lakes watershed of Ontario.

Presence/absence
Present (both DUs). Surveys detected the species at many locations in the Great-Lakes – Upper St. Lawrence River DU, and two locations in the NorthwesternOntario DU between 1989 and 2007 so it is extant in both.

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. **Yes**.

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. G5

2. Global decline
Insufficient Information. There is no available trend in populations for this species anywhere in its range.

3. Northeastern North America ranks
Not in any Category – Great Lakes –Upper St. Lawrence River DU. If Great Lakes – Upper St. Lawrence River DU is considered separately it is ranked as S1, S2, SH or SX in 2 of 10 jurisdictions (20%) and would be Not in any Category (Appendix 1)

Special concern – Northwestern Ontario DU. It would be ranked as S1, S2, SH or SX in 1 of 3 jurisdictions (33%) and therefore would qualify as special concern under this category.

However, if both DUs were combined it would be ranked as S1, S2, SH or SX in 4 of 14 jurisdictions (28%) and be considered Special Concern.

4. Northeastern North America decline
Not Applicable. The global range is essentially the same as the northeastern North American range, and therefore not applicable.

5. Ontario occurrences
Not in any category. Great Lakes – Upper St. Lawrence River DU. COSEWIC (2011) states that Silver Lamprey is known from 29 streams in the Great Lakes Watershed. Donald Sutherland of NHIC (pers. comm. 2011) has indicated that there are about 60 recent element occurrences in the NHIC database and about 24 historical element occurrences. Only one element occurrence is listed in the NHIC website, but this species has not been tracked until recently and therefore the records have yet to be updated.

Endangered - Northwestern Ontario DU. Silver Lamprey is only known from only two locations near Lake of the Woods.

6. Ontario decline
Insufficient Information. Great Lakes – Upper St. Lawrence River DU. Sampling is challenging due to variable effort, the difficulty of identifying ammocoetes, and because available records have been mostly incidental to Sea Lamprey surveys. When all surveyed populations in the Great Lakes are combined, there is no detectable decline

trend. Surveys indicate a significant decline in Lake Superior from mid 1950s to mid 1960s, and in Lake Huron from mid 1960s to early 1980s but not in the last three generations. (COSEWIC 2011). No trends were apparent in lakes Ontario or Erie and the species has shown evidence of increasing in Lake St. Clair. However, these trends are inconclusive and based on inconsistent search effort. Surveys since 1989 found Silver Lampreys to be present in the majority of sites where they were recorded before 1989, and enhanced search effort has yielded some new localities as well (COSEWIC 2011).

Insufficient Information. Northwestern Ontario DU. No information on population trends is available.

7. Ontario's conservation responsibility
Endangered. Great Lakes – St. Lawrence River DU. Ontario's areal extent within the Great Lakes – St. Lawrence River DU, appears to comprise about 35% of the range of the Silver Lamprey that lies within the Great Lakes – St. Lawrence watershed based on the range map shown in COSEWIC (2011).

Not in Any Category. Northwestern Ontario DU. The Ontario range in the Nelson River DU (Lakes of the Woods) occupies less than 5% of the global range or the entire Canadian Nelson River DU.

3.2 Application of secondary criteria (threats and vulnerability)

8. Population sustainability
Insufficient Information. Great Lakes – St. Lawrence River DU. When Great Lakes surveyed populations are combined there is no discernible decline trend. There is an indication that Silver Lamprey has declined in Lake Superior and Lake Huron, but surveys were incidental for this species and have had inconsistent search effort, so these declines cannot be applied province wide.

Insufficient Information. Northwestern Ontario DU. No information on population trends are available.

9. Lack of regulatory protection for exploited wild populations
Not in any category (both DUs). Fish habitat is protected in *Ontario under the Fisheries Act* which affords the Silver Lamprey some protection.

10. Direct threats
Special Concern. Great Lakes – St. Lawrence River DU. Silver Lamprey are susceptible to lampricides which are applied in many streams where this species occurs. They may also be susceptible to other water pollution. For example Renaud et al. (1995) found that atrazine may be causing ammocoete mortality. Dams have been constructed on

many streams restricting migration passage. It is reasonable to assume that the species could disappear from >25% of Ontario streams if the use of lampricides to control Sea Lampreys continues in the long term.

Insufficient Information. Northwestern Ontario DU. Sea Lampreys are not present in this DU and lampricides are not being applied. There may be some dams on rivers which could affect migration.

11. Specialized life history or habitat-use characteristics
Special Concern (both DUs). Among temperate fish, the parasitic life history is infrequent. The migration of adults downstream to lakes, then upstream to breed once in their lifetime is a specialized life history that makes them vulnerable to changes in their environment. The Silver Lamprey appears to prefer streams with stable flow regimes and clean, unpolluted water (COSEWIC 2011). COSEWIC (2011) reports observations of a high number of attachments to Lake Sturgeon (*Acipenser fulvescens*) and Muskellunge (*Esox masquinongy*).

3.3 COSSARO evaluation results

1. Criteria satisfied in each status category: Great Lakes – Upper St. Lawrence River DU

Endangered – [1/0]
Threatened – [0/0]
Special concern – [0/2]

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

Endangered – [1]
Threatened – [0]
Special concern – [0]

Criteria satisfied in each status category: Northwestern Ontario DU

Endangered – [1/0]
Threatened – [0/0]
Special concern – [1/1]

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

Endangered – [1]
Threatened – [0]
Special concern – [0]

2. Data deficiency
No. Great Lakes – St. Lawrence River DU. Although knowledge on this species in Ontario is incomplete due to lack of species-specific surveys and similarity of Silver

Lamprey to other *Ichthyomyzon* species, an assessment can be made based on the global responsibility and demonstrated threats. Three criteria were assessed as "insufficient information".

Yes. Northwestern Ontario DU. This DU, which only marginally extends into Ontario, was designated as Data Deficient by COSEWIC (2011) because of the lack of information on population trends as no species directed surveys have taken place. There are relatively few records in Ontario and no information on population trends or understanding of threats. Four criteria were assessed as "insufficient information".

3. Status based on COSSARO evaluation criteria

The application of COSSARO evaluation criteria suggests that the Great Lakes – Upper St. Lawrence River DU of Silver Lamprey is Special Concern.

The application of COSSARO evaluation criteria suggests that the Northwestern Ontario DU of Silver Lamprey is Data Deficient.

PART 4: Ontario status based on COSEWIC evaluation criteria

4.1 Application of COSEWIC criteria

Regional (Ontario) COSEWIC criteria assessment: Great Lakes – Upper St. Lawrence River DU

Criterion A – Decline in total number of mature individuals
Not in any category. No clear indication of declines over the last 3 generations.

Criterion B – Small distribution range and decline or fluctuation
Not in any category. Area of Occupancy is greater than required by this criterion (COSEWIC 2011).

Criterion C – Small and declining number of mature individuals
Not in any category. Population not small and there is no available decline trend information.

Criterion D – Very small or restricted total population
Not in any category. Population not very small and restricted.

Criterion E – Quantitative analysis
Insufficient information. No Population Viability Analyses have been conducted for the species in Ontario.

Rescue effect
Yes. Rescue from populations in adjacent United States is possible since adults occur in Great Lakes on both sides of the border. Larger populations are present in US streams that flow into Lakes Huron and Superior (COSEWIC 2011).

Special concern status
Yes. The species could become Threatened if factors suspected of negatively influencing the persistence of the species are not reversed nor managed. The main issue is the use of lampricides that are targeted for Sea Lampreys but which also affect Silver Lamprey.

Regional (Ontario) COSEWIC criteria assessment: Northwestern Ontario DU

Criterion A – decline in total number of mature individuals
Insufficient Information. Too few records, lack of specific surveys to determine if decline is occurring (COSEWIC 2011).

Criterion B – Small distribution range and decline or fluctuation
Insufficient Information. Area of Occupancy within Ontario portion of this DU is not known well enough to determine if it would meet this criterion.

Criterion C – Small and declining number of mature individuals
Insufficient Information. Population within Ontario portion of this DU is not known well enough to determine if it would meet this criterion.

Criterion D – Very small or restricted total population
Not in any category. Population not very small and restricted.

Criterion E – Quantitative analysis
Insufficient information. No Population Viability Analyses have been conducted for the species in Ontario.

Rescue effect
Unknown. It is possible that population on Manitoba side of Lake of the Woods could provide rescue effect but not known.

Special concern status
No. Lampricide is not being used in this watershed because Sea Lampreys are not present, but there is no other information on threats or population condition of this species.

4.2 COSEWIC evaluation results

Great Lakes –Upper St. Lawrence River DU

1. Criteria satisfied in each status category

Endangered – [no]
Threatened – [no]
Special concern – [yes]

2. Data deficiency

No. Great Lakes- Upper St. Lawrence DU. Although the knowledge of population trends on this species in the Great Lakes basin is incomplete due to lack of species specific surveys and similarity of Silver Lamprey to other *Ichthyomyzon* species, an assessment can be made based on some population trend information and known threats.

3. Status based on COSEWIC evaluation criteria
The application of COSEWIC evaluation criteria suggests that the Great Lakes – Upper St. Lawrence River DU of Silver Lamprey is Special Concern.

Northwestern Ontario DU

1. Criteria satisfied in each status category

Endangered – [no]
Threatened – [no]
Special concern – [no]

2. Data deficiency
Yes. Northwestern Ontario DU. This DU which only marginally extends into Ontario was designated as Data Deficient by COSEWIC (2011) because lack of information of population trends since no species directed surveys have taken place.

3. Status based on COSEWIC evaluation criteria
The application of COSEWIC evaluation criteria suggests that the Northwestern Ontario DU of Silver Lamprey is Data Deficient.

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

Great Lakes – Upper St. Lawrence River Population of the Silver Lamprey is classified as Special Concern.

The Silver Lamprey is a parasite on other fish in lakes as an adult, then migrates up streams to spawn at the end of its life. It lives up to 6 years as a larval ammocoete in soft sediments of streams. The ammocoetes are nearly impossible to distinguish among the various species of *Ichthyomyzon*. The Silver Lamprey occurs primarily in northeastern North America from Quebec and Manitoba south to Tennessee. The Great Lakes – Upper St. Lawrence River DU occurs in Quebec, Ontario and the Great Lakes states. In Ontario, members of this designatable unit occur in a number of streams that flow into all the Great Lakes as well as the St. Lawrence and Ottawa Rivers. The species has shown no recent declines and may have increased in Lake St. Clair. Surveys since 1989 have recorded the species at most historical locations, therefore the area of occurrence has only declined slightly since the 1930s. Threats to Silver Lamprey include treatment of occupied streams with lampricides to control Sea Lampreys, installation of dams which restrict the lamprey's ability to migrate between lakes and breeding areas, and chemical pollution particularly by Atrazine. This DU comprises about 20% of the global range of the species and is classified as Special Concern.

Northwestern Ontario Population of the Silver Lamprey is classified as Data Deficient.

The Silver Lamprey lives as a parasite on other fish in lakes as an adult, then migrates up steams to spawn at the end of its life. It lives up to 6 years as a larval ammocoete in soft sediments of streams. The ammocoetes are nearly impossible to distinguish among the various species of *Ichthyomyzon*. The Silver Lamprey occurs primarily in northeastern North America from Quebec and Manitoba south to Tennessee. The Northwestern Ontario DU occurs in Ontario and Manitoba. In Ontario, members of this designatable unit occur in the Lake of the Woods area only. The population of Silver Lamprey in northwestern Ontario is poorly known and there are insufficient population data to determine the species' status. Specific threats have not been identified but may include dams that restrict the lamprey's ability to migrate between lakes and breeding areas. This DU is classified as Data Deficient.

Information sources

1. Literature cited

COSEWIC. 2011. COSEWIC Status Report on Silver Lamprey *Ichthyomyzon unicuspis* in Canada. Committee on the Status of Endangered Wildlife in Canada.

Environment Canada, 2011. SARA Registry http://www.sararegistry.gc.ca/default_e.cfm

Natureserve 2011. http://www.natureserve.org/explorer/ accessed on November 24, 2011.

Renaud, C.B., K.L. Kaiser and M.E. Comba. 1995. Historical versus recent levels of organochloride contaminants in lamprey larvae of the St. Lawrence River Basin, Quebec. Canadian Journal of Fisheries and Aquatic Sciences 52:268-275.

2. Acknowledgements

Donald Sutherland of the Natural Heritage Information Centre provided Ontario status information and perspective.

Appendix 1: Northeastern North America status rank and decline

State/Province	Subnational Rank	Sources	Designatable Unit	Sources
CT	Not present	NatureServe 2011		
DE	Not present	NatureServe 2011		
IL	S3	NatureServe 2011	GL	
IN	S4	NatureServe 2011	GL	
IA	S3	NatureServe 2011		
LB	Not present	NatureServe 2011		
KY	S2	NatureServe 2011		
MA	Not present	NatureServe 2011		
MB	S3	NatureServe 2011	NW	
MD	Not present	NatureServe 2011		
ME	Not present	NatureServe 2011		
MI	S4	NatureServe 2011	GL	
MN	SNR	NatureServe 2011	GL, NW	
NB	Not present	NatureServe 2011		
NF	Not present	NatureServe 2011		
NH	Not present	NatureServe 2011		
NJ	Not present	NatureServe 2011		
NS	Not present	NatureServe 2011		
NY	S3	NatureServe 2011	GL	
OH	S4	NatureServe 2011	GL	
ON	S3	NatureServe 2011	GL, NW	
PA	S1	NatureServe 2011	GL	
PE	Not present	NatureServe 2011		
QC	S3	NatureServe 2011	GL	
RI	Not present	NatureServe 2011		
VA	Not present	NatureServe 2011		
VT	S2?	NatureServe 2011	GL	
WI	S4	NatureServe 2011	GL	
WV	S2S3	NatureServe 2011		

Occurs as a native species in 15 of 29 northeastern jurisdictions

Srank or equivalent information available for 14 of 15 jurisdictions = (93%)

Total Range	S1, S2, SH, or SX in 4 of 14 = (28%)
Great Lakes – Upper St. Lawrence DU	S1, S2, SH, or SX in 2 of 10 = (20%)
Northwestern Ontario DU*	S1, S2, SH, or SX in 1 of 3 = (33%)

* This assumes that Northern Ontario is S2/S3 (Sutherland pers. comm.)