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Proceedings from the Pre-COSEWIC Assessment of Wavyrayed Lampmussel (*Lampsilis fasciola*)

November 14, 2008
Canada Centre for Inland Waters
Burlington, ON

T. Morris
Meeting Chairperson

Compte rendu de l'évaluation pré-COSEPAC de la lampsile fasciolée (*Lampsilis fasciola*)

Le 14 novembre 2008
Centre canadien des eaux intérieures
Burlington (Ont.)

T. Morris
Président de réunion

Fisheries and Oceans Canada/Pêches et Océans Canada
Great Lakes Laboratory for Fisheries and Aquatic Sciences/
Laboratoire des Grands Lacs pour les Pêches et les Sciences Aquatiques
867 Lakeshore Rd./867, Chemin Lakeshore
Burlington ON L7R 4A6 Canada

March 2009 | **mars 2009**

Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings include research recommendations, uncertainties, and the rationale for decisions made by the meeting. Proceedings also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

Avant-propos

Le présent compte rendu a pour but de documenter les principales activités et discussions qui ont eu lieu au cours de la réunion. Il contient des recommandations sur les recherches à effectuer, traite des incertitudes et expose les motifs ayant mené à la prise de décisions pendant la réunion. En outre, il fait état de données, d'analyses ou d'interprétations passées en revue et rejetées pour des raisons scientifiques, en donnant la raison du rejet. Bien que les interprétations et les opinions contenus dans le présent rapport puissent être inexacts ou propres à induire en erreur, ils sont quand même reproduits aussi fidèlement que possible afin de refléter les échanges tenus au cours de la réunion. Ainsi, aucune partie de ce rapport ne doit être considéré en tant que reflet des conclusions de la réunion, à moins d'indication précise en ce sens. De plus, un examen ultérieur de la question pourrait entraîner des changements aux conclusions, notamment si l'information supplémentaire pertinente, non disponible au moment de la réunion, est fournie par la suite. Finalement, dans les rares cas où des opinions divergentes sont exprimées officiellement, celles-ci sont également consignées dans les annexes du compte rendu.

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CSAS@DFO-MPO.GC.CA

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SUMMARY

A regional science peer review meeting was held on November 14, 2008 in Burlington Ontario. The purpose of the meeting was to peer-review information relevant to the 10-year update for the original COSEWIC status assessment for the Wavyrayed Lampmussel (*Lampsilis fasciola*) in Canadian waters. The Wavyrayed Lampmussel was designated as Endangered by COSEWIC in 1999. It was listed as Endangered under the *Species at Risk Act* (SARA) in 2002 when the SARA came into force. This meeting considered new data related to the status and trends of, and threats to this species inside and outside of Canadian waters, as well as the strengths and limitations of the information. This included a review in terms of the COSEWIC Quantitative Criteria and Guidelines for the Status Assessment of Wildlife Species. The information will be made available to COSEWIC, the authors of the status report, and the Chairs of the COSEWIC Species Specialist Subcommittee. The meeting included participants from DFO Science as well as Environment Canada, University of Guelph, Central Michigan University and Ausable-Bayfield Conservation Authority. This proceedings report summarizes the relevant discussions and presents the key conclusions reached at the peer review meeting.

This will be published in the CSAS Proceedings Series. There will be a CSAS Research Document produced in relation to the working paper presented at the workshop.

SOMMAIRE

Une réunion régionale d'examen scientifique par des pairs a eu lieu le 14 novembre 2008 à Burlington, en Ontario. Le but de cette réunion était de permettre à des pairs d'examiner l'information concernant la mise à jour (de dix ans) de l'évaluation originale du COSEPAC sur la situation de la lampsile fasciolée (*Lampsilis fasciola*) dans les eaux canadiennes. En 1999, la lampsile fasciolée a été désignée en tant qu'espèce en voie de disparition par le COSEPAC. L'espèce a par la suite été inscrite comme étant en voie de disparition à la liste de la *Loi sur les espèces en péril* (LEP) en 2002, année où la Loi est entrée en vigueur. Au cours de la présente réunion, on a examiné des données nouvelles sur la situation de l'espèce ainsi que sur les tendances démographiques, les menaces à l'intérieur et à l'extérieur des eaux canadiennes et les points forts et faibles de l'information disponible. On a notamment passé en revue les critères quantitatifs du COSEPAC et les lignes directrices pour l'évaluation de la situation des espèces sauvages. L'information sera transmise au COSEPAC, aux auteurs du rapport de situation et aux présidents du sous-comité des spécialistes des espèces du COSEPAC. La réunion a regroupé des représentants du secteur des Sciences du MPO ainsi que d'Environnement Canada, de l'Université de Guelph, de la Central Michigan University et l'Office de protection de la nature d'Ausable-Bayfield. Le présent compte rendu résume les discussions et présente les conclusions principales formulées au cours de la réunion d'examen par des pairs.

Le compte rendu sera publié dans la série des comptes rendus du SCCS. Un document de recherche du SCCS sera aussi produit à partir du document de travail présenté à l'atelier.

INTRODUCTION

In 1999, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the Wavyrayed Lampmussel (*Lampsilis fasciola*) as Endangered. Every 10 years COSEWIC reassesses species that have been previously designated in a category of risk (endangered, threatened, special concern) with an updated status report. The purpose of the meeting, therefore, was to peer-review information that was new and/or relevant to the 10-year COSEWIC status assessment for Wavyrayed Lampmussel in Canadian waters. Specifically, data related to the status, trends, and threats were considered as well as the strengths and limitations of the information. Department of Fisheries and Oceans information relevant to the following were reviewed: (1) Life history characteristics; (2) Designatable units; (3) the COSEWIC criteria; (4) Characteristics or elements of the species habitat to the extent possible and threats to that habitat; (5) Whether the species has a residence as defined by SARA; and (6) Other. A draft document was sent out prior to the meeting so that meeting participants could review the information.

Terms of reference (Appendix 1), COSEWIC Quantitative Criteria and Guidelines for the Status Assessment of Wildlife Species (Appendix 2), and COSEWIC 2008 Guidelines for Designatable Units (Appendix 3) were made available prior to the meeting. Participants (Appendix 4) from DFO Science, Environment Canada, University of Guelph, Central Michigan University and Ausable-Bayfield Conservation Authority were included. The meeting generally followed the agenda as outlined in Appendix 5.

DISCUSSION

Pre-COSEWIC Regional Peer Review for Wavyrayed Lampmussel (*Lampsilis fasciola*)

Led by Todd Morris
Open Discussion

The word document was written using the terms of reference and the COSEWIC criteria. The goal of this meeting was to confirm that the Pre-COSEWIC assessment document included all of the newly available and relevant information on the Wavyrayed Lampmussel. In addition, to determine if the data were correctly interpreted with respect to the status, trends, threats, and strengths and limitations of the information.

Comment: The recovery strategy must be streamlined so that it is relevant to the assessment as COSEWIC has commented that they are often too long.

It was confirmed the 2006 data from the Ausable River was obtained.

(1) Life history characteristics

The distribution data needs to be updated to include new records from the Speed River and Medway Creek.

If and where possible the Bridgeport data should be incorporate into the strategy,

Check to see if density data was used.

Sex ratios we not used because some of the individuals were not sexed. Pariticipants discussed using the information (sex ratios) from specific blocks rather then the entire site and agreed that this was a good idea for Table 8.

Growth parameters: age/length at maturity, maximum age and/or length:

Generation Time:

- There are differences between the Thames and Grand River growth (length)
- Growth rates are faster in the Grand River, so these mussel mature faster but do not get as big
- It was suggested that this could be due to food availability, or a potential bottleneck that may have occurred in the Thames River however, that signature was not evident through the genetic studies
- Males and females are not distinguishable for ages 0-2
- The Thames is more eutrophic than the Grand River
- Glochidia numbers in females should be checked in 2008)

Early Life History:

- The juveniles are growing faster than what was originally expected
- Juveniles are found in quadrat sampling with adults
- If the juveniles are using different habitat it has to be within the adult habitat (microhabitat), however on a coarse scale there may not be much of a difference between the adult and the juvenile mussel habitat
- Comment: The juveniles are most likely found in well-aerated sediment
- Ensure that Figure 13 is not a snapshot in time, it is over a 10 year period. It's heavily weighted by Grand River and Thames River data.
    - Make sure all the Thames River data are included.
    - Dave will send his numbers as well.

Total and natural mortality rates and recruitment rates (if data are available):

- No natural mortality rates are available

Fecundity:
Glochidia to juvenile success rate should be calculated as this will aid in model creation

Participants discussed whether Figures 12 and 13 should be ONLY 2007/2008 data to represent a current snapshot of size and age rather than including all data from 1997-2008. They agreed however they indicated, that it must be clear in the captions as well as whether the data are from quantitative or qualitative data collection.

There was discussion as to whether the Grand River should only include excavation data. It was suggested that the quadrat data should be used. It will include ~ 200 individuals. This will also take the juveniles into account. There might be some resource partitioning or microhabitats. Timed searches should also be used for the Thames River data as well but this should be clear in the captions.

- Check for timed searches in Grand River data
- There are ~ 20 individuals for the Maitland River,

- There is no growth curve for Wavyrayed Lampmussels in the Maitland River and there has to be a length distribution
- Maitland River data will be provided for Table 6
- Change shell size to LENGTH (in Table 6; otherwise there may be confusion)

- Data for the Ausable River for 2006 will be provided but the 2008 data are not yet available.
- Text should be modified to reflect the incoming data

(2) Review of Designatable Units

- Microsatellite differences:
  - They meet the criteria for management units but not designatable units
  - Suggests keeping them separate
  - There is mixing within watersheds and upstream and downstream of sites
  - Between watersheds keep the populations separate
- Data added includes: population abundances (Table 4)
  - Ausable River value will change because of increased numbers, however densities will probably stay the same
  - Lake St. Clair is a gross over estimation
  - Add brackets with standard error to show how wide the confidence intervals are (Table 4)
  - Grand River Area of Extent might change because of the addition of the Speed River information

(3) Review the COSEWIC criteria

- Trends in abundance (Table 5)

There was discussion about Catch-per-unit-effort data for the Grand River. 18 individuals were found in 6 person-hours of searching.
It was suggested that it would be interesting to look at the data in reference to the peaks from the 2008 data.

- What month did Janice collected her data? This may be affected by these peaks?
- 1998 data will be sent including when the data were collected
- Put both the year and the month (in brackets) to show when the data were collected for Table 5.

- Under category A when considering decline:
  - As a group the trends appear to go up not down
  - Originally we didn't know what was happening
  - Now it appears to be either stable or increasing

→ These are not gloom and doom data, however if COSEWIC wants to delist Wavyrayed Lampmussel then the data must be collected

Area of Occupancy (length/width of river and # of actual river kms)
IAO blocks around the area of occupancy were not included as it's not calculated.

- COSEWIC data should be sent to the group

Extent of Occurrence: For all populations this will not have changed much because the range has been extended but no additional points have been added

These populations are severely fragmented

- The different watershed populations do not mix with each other
- The historical sizes of the Great Lakes populations and how much they were connected is unknown

→ Therefore this species will likely still qualify for Endangered status

→ We are almost at a point where the zebra mussel invasion and devastating declines in Great Lakes populations is outside the three generation window considered by COSEWIC during assessment.

(4) Habitat

It was pointed out that these are lab numbers and the data from the lab needs to be linked to the field. In addition, other people involved in Grand River research (GRCA), should be included (e.g. Waterloo water chemistry in the Grand River – pharmaceuticals)

- Get eutrophication numbers for these places
- Come up with a better heading for page 4
-

Whether the data could be strengthen to be relevant for Wavyrayed Lampmussels was discussed.

- table 9 should be taken out
- temporal data are needed to compare the last report to this one . For example, nitrates have increased.
    - Get water quality data, ambient levels of water quality parameters over time for the Grand River, especially sites that overlap
    - Kari will get similar data for Ausable River (ABCA)
- Use data from 2002. The previous assessment was from 1999 – 2008, then it could be done for 1988-1999
    - Using generation times of 6-10 years
- Use contaminants in Table 2. Contaminants include copper, total phosphorus, nitrate/nitrite, turbidity, and potassium.

→ Ask for TEK and ATK

(5) Residence

- Fish may not be considered residences (these must be constructed by the animal) under SARA according to the latest advice from Ottawa.
- Action item: Todd will circulate the document from the Ottawa meeting
- Hosts are included under critical habitat as of now.
- Smallmouth bass data (Action item: Daelyn will send)

(6) Other

→ Toxicity data is all new and helps to identify threats even though they are lab numbers
→ For COSEWIC criteria A and B will still likely be triggered.

APPENDIX 1. TERMS OF REFERENCE

Terms of Reference
Pre-COSEWIC Regional Peer Review for

Wavyrayed Lampmussel (Lampsilis fasciola)

November 14, 2008
Canada Centre for Inland waters, Burlington, ON

Chairperson: Todd Morris

Context

The implementation of the federal Species at Risk Act (SARA), proclaimed in June 2003, begins with an assessment of a species' risk of extinction by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC is a non-government scientific advisory body that has been established under Section 14(1) of SARA to perform species assessments which provide the scientific foundation for listing species under SARA. Therefore, an assessment initiates the regulatory process whereby the competent Minister must decide whether or not to accept COSEWIC's assessment and add a species to Schedule 1 of SARA, which would result in legal protection for the species under the Act. If the species is already on Schedule 1 of SARA, the Minister may decide to keep the species on the list, reclassify it as per the COSEWIC assessment, or to remove it from the list (Section 27 of SARA).

DFO, as the primary generator and archivist of information on marine aquatic species and some freshwater aquatic species, is to provide COSEWIC with the best information available to ensure that an accurate assessment of the status of a species can be undertaken.

The ***Wavyrayed Lampmussel (Lampsilis fasciola)*** was first assessed by COSEWIC in 1999. This species was listed on COSEWIC's winter 2007 Call for Bids to produce an updated status report.

Meeting Objectives

The overall objective of this meeting is to peer-review information relevant to the COSEWIC status assessment for Wavyrayed Lampmussel in Canadian waters, considering data related to the status and trends of, and threats to this species inside and outside of Canadian waters, and the strengths and limitations of the information. This information will be available to COSEWIC, the authors of the status report, and the Chairs of the COSEWIC Species Specialist Subcommittee. Output from the peer-review (see below) will be posted on the Canadian Science Advisory Secretariat (CSAS) website.

Specifically, DFO information relevant to the following will be reviewed to the extent possible:

1) Life history characteristics

- Growth parameters: age and/or length at maturity, maximum age and/or length
- Total and natural mortality rates and recruitment rates (if data is available)
- Fecundity
- Generation time

- Early life history patterns
- Specialised niche or habitat requirements (see also critical habitat and residence)

2) Review of designatable units – See COSEWIC 2008 "Guidelines for Recognizing Designatable Units below the Species Level". Discussion on the species will consider available information on population differentiation, which could support a COSEWIC decision of which populations below the species' level would be suitable for assessment and designation.

3) Review the COSEWIC criteria for the species in Canada as a whole, and for designatable units identified (if any):

COSEWIC Criterion – Declining Total Population

a. Summarize overall trends in population size (both number of mature individuals and total numbers in the population) over as long a period as possible and in particular for the past three generations (taken as mean age of parents). Additionally, present data on a scale appropriate to the data to clarify the rate of decline.

b. Identify threats to abundance— where declines have occurred over the past three generations, summarize the degree to which the causes of the declines are understood, and the evidence that the declines are a result of natural variability, habitat loss, fishing, or other human activity.

c. Where declines have occurred over the past three generations, summarize the evidence that the declines have ceased, are reversible, and the likely time scales for reversibility.

COSEWIC Criterion – Small Distribution and Decline or Fluctuation: for the species in Canada as a whole, and for designatable units identified, using information in the most recent assessments:

a. Summarise the current extent of occurrence (in km^2) in Canadian waters.

b. Summarise the current area of occupancy (in km^2) in Canadian waters.

c. Summarise changes in extent of occurrence and area of occupancy over as long a time as possible, and in particular, over the past three generations.

d. Summarise any evidence that there have been changes in the degree of fragmentation of the overall population, or a reduction in the number of meta-population units.

e. Summarise the proportion of the population that resides in Canadian waters, migration patterns (if any), and known breeding areas.

COSEWIC Criterion – Small Total Population Size and Decline and Very Small and Restricted: for the species in Canada as a whole, and for designatable units identified, using information in the most recent assessments:

a. Tabulate the best scientific estimates of the number of mature individuals.

b. If there are likely to be fewer than 10,000 mature individuals, summarize trends in numbers of mature individuals over the past 10 years or three generations, and, to the extent possible, causes for the trends.

Summarise the options for combining indicators to provide an assessment of status, and the caveats and uncertainties associated with each option.

For transboundary stocks, summarise the status of the population(s) outside of Canadian waters. State whether rescue from outside populations is likely.

4) Describe the characteristics or elements of the species habitat to the extent possible, and threats to that habitat

It is necessary to scope out the characteristics of a species' critical habitat prior to the COSEWIC assessment, with full identification and quantification occurring at the stage that a recovery strategy is developed.

Critical habitat is defined in SARA as "the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species". Habitat is defined as "in respect of aquatic species, spawning grounds and nursery, rearing, food supply, migration and any other areas on which aquatic species depend directly or indirectly in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced".

The following guidelines are from the DFO Science Advisory Report "Documenting Habitat Use of Species at Risk and Quantifying Habitat Quality" (DFO, 2007. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2007/038). The phrasing of the following guidelines would be adapted to each specific species and some could be dropped on a case-by-case basis if considered *biologically* irrelevant. However, these questions should be posed even in cases when relatively little information is expected to be available, to ensure that every effort is made to consolidate whatever knowledge and information does exist on an aquatic species' habitat requirements, and made available to COSEWIC.

a) Describe the "functional properties" that a species' aquatic habitat must have to allow successful completion of all life history stages.

In the best cases, a functional property will include both features of the habitat occupied by the species and the mechanisms by which those habitat features play a role in the survivorship or reproduction of the species. However, in many cases the functional properties cannot be described beyond reporting patterns of distribution observed (or expected) in data sources, and general types of habitat feature known to be present in the area(s) of occurrence and suspected to have functional properties. Information will rarely be equally available for all life history stages of an aquatic species, and even distributional information may be missing for some stages. Science advice needs to be carefully worded in this regard to communicate uncertainties and knowledge gaps clearly.

b) Provide information on the spatial extent of the areas that are likely to have functional properties.

Where geo-referenced data on habitat features identified are readily available, these data could be used to map and roughly quantify the locations and extent of the species' habitat. Generally however, it should be sufficient to provide narrative information on what is known of the extent of occurrence of the types of habitats identified. Many information sources, including Traditional Ecological Knowledge (TEK) and experiential knowledge, may contribute to these efforts.

c) Identify the activities most likely to threaten the functional properties, and provide information on the extent and consequences of those activities.

COSEWIC's operational guidelines require consideration of both the imminence of each identified threat, and the strength of evidence that the threat actually does cause harm to the species or its habitat. The information from the Pre-COSEWIC assessment should provide whatever

information is available on both of those points. In addition the information should include at least narrative discussion of the magnitude of impact caused by the threat when it does occur.

d) Recommend research or analysis activities that are necessary to satisfy the requirements for advice on habitat issues, if needed for the species

Usually knowledge gaps are identified and any recommendations made and enacted at this stage in the overall process could result in much more information being available should a Recovery Potential Assessment (RPA) or recovery planning be required for the species.

5) Describe to the extent possible whether the species has a residence as defined by SARA

SARA s. 2(1) defines Residence as "a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating."

6) Other

Finally, as time allows, review status and trends in other indicators that would be relevant to evaluating the risk of extinction of the species. This includes the likelihood of imminent or continuing decline in the abundance or distribution of the species, or that would otherwise be of value in preparation of COSEWIC Status Reports.

Working Paper(s)

Any working paper(s) related to the status of the Wavyrayed Lampmussel being reviewed at the meeting will be made available to all participants by1November 2008.

Output of the meeting

The key conclusions/recommendations will address the basis for assessing status of the Canadian Wavyrayed Lampmussel population(s) to be considered by COSEWIC. The final version of the minutes of the meeting will be part of the CSAS Proceedings series. CSAS Research document(s) is also expected from the working paper(s) submitted for review.

Participation

Participation is expected from:

- Relevant DFO Sectors
- COSEWIC status report author
- Members of COSEWIC (Co-Chairs and or SSC experts)
- Relevant provinces
- Industry
- Aboriginal groups
- ENGO's
- Academia
- Other invited external experts as deemed necessary

28 October 2008
T. Morris

APPENDIX 2. COSEWIC QUANTITATIVE CRITERIA AND GUIDELINES FOR THE STATUS ASSESSMENT OF WILDLIFE SPECIES

COSEWIC's revised criteria to guide the status assessment of wildlife species. These were in use by COSEWIC by November 2001, and are based on the revised IUCN Red List categories (IUCN 2001[1]). An earlier version of the quantitative criteria was used by COSEWIC from October 1999 to May 2001. For definitions of terms marked in bold italics, see COSEWIC's Glossary of Definitions and Abbreviations (Appendix C).

Indicator	Endangered	Threatened
A. Decline in Total Number of Mature Individuals		
A1. An observed, estimated, inferred or suspected reduction in total number of mature individuals over the last 10 years or 3 generations, whichever is the longer, where the causes of the reduction are: clearly reversible **and** understood **and** ceased, based on (and specifying) any of the following: (a) direct observation (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.	Reduction of ≥ 70%	Reduction of ≥ 50%
A2. An observed, estimated, inferred or suspected reduction in total number of mature individuals over the last 10 years or 3 generations, whichever is the longer, where the reduction or its causes may not have ceased **or** may not be understood **or** may not be reversible, based on (and specifying) any of (a) to (e) under A1.	Reduction of ≥ 50%	Reduction of ≥ 30%
A3. A reduction in total number of mature individuals, projected or suspected to be met within the next 10 years or 3 generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.	Reduction of ≥ 50%	Reduction of ≥ 30%
A4. An observed, estimated, inferred, projected or suspected reduction in total number of mature individuals over any 10 year or 3 generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased **or** may not be understood **or** may not be reversible, based on (and specifying) any of (a) to (e) under A1.	Reduction of ≥ 50%	Reduction of ≥ 30%

[1] IUCN 2001. *IUCN* Red List Categories and Criteria: Version 3.1. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

Indicator	Endangered	Threatened
<u>B. Small Distribution Range and Decline or Fluctuation</u>		
B1. Extent of occurrence estimated to be	< 5,000 km²	< 20,000 km²
or		
B2. Area of occupancy estimated to be	< 500 km²	< 2,000 km²
and (for either B1 or B2) estimates indicating at least two of a–c:		
a. Severely fragmented **or** known to exist at:	≤ 5 locations	≤ 10 locations
b. Continuing decline, observed, inferred or projected, in any of (i) extent of occurrence, (ii) area of occupancy, (iii) area, extent and/or quality of habitat, (iv) number of locations or populations, (v) number of mature individuals.		
c. Extreme fluctuations in any of (i) extent of occurrence, (ii) area of occupancy, (iii) number of locations or populations, (iv) number of mature individuals.		
C. Small and Declining Number of Mature Individuals		
C. Total number of mature individuals estimated to be:	<2,500	< 10,000
and one of either C1 or C2:		
C1. An estimated continuing decline in total number of mature individuals at least:	20% within 5 years or two generations (1)	10% within 10 years or three generations (1)
(1) whichever is longer, up to a maximum of 100 years in the future		
or		
C2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals		
and		
a.(i) No population estimated to contain	> 250 mature individuals	> 1000 mature individuals
or		
a.(ii) one population has	≥ 95% of all mature individuals	100% of all mature individuals
or		
b. There are extreme fluctuations in number of mature individuals.		

Indicator	Endangered	Threatened
D. Very Small or Restricted Total Population		
D. Total number of mature individuals very small or restricted in the form of either of the following:		
D1. Population estimated to have	< 250 mature individuals	< 1000 mature individuals
or		
D2. **For threatened only**: Population with a very restricted area of occupancy (typically < 20 km²) or number of locations (typically ≤ 5) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming endangered or extinct in a very short time period.	Does not apply	Area of occupancy < 20 km² **or** ≤ 5 locations
Quantitative Analysis		
E. Quantitative analysis (population projections) showing the probability of extinction in the wild is at least	20% within 20 years or 5 generations (1)	10% within 100 years
(1) whichever is longer, up to a maximum of 100 years		

Special Concern:
those wildlife species that are particularly sensitive to human activities or natural events but are not endangered or threatened wildlife species.

Wildlife species may be classified as being of Special Concern if:

(a) the wildlife species has declined to a level of abundance at which its persistence is increasingly threatened by genetic, demographic or environmental stochasticity, but the decline is not sufficient to qualify the wildlife species as Threatened; or
(b) the wildlife species may become Threatened if factors suspected of negatively influencing the persistence of the wildlife species are neither reversed nor managed with demonstrable effectiveness; or
(c) the wildlife species is near to qualifying, under any criterion, for Threatened status; or
(d) the wildlife species qualifies for Threatened status but there is clear indication of rescue effect from extra-limital populations.

Examples of reasons why a wildlife species may qualify for "Special Concern":

- a wildlife species that is particularly susceptible to a catastrophic event (e.g., a seabird population near an oil tanker route); or
- a wildlife species with very restricted habitat or food requirements for which a threat to that habitat or food supply has been identified (e.g., a bird that forages primarily in old-growth forest, a plant that grows primarily on undisturbed sand dunes, a fish that spawns primarily in estuaries, a snake that feeds primarily on a crayfish whose habitat is threatened by siltation; or
- a recovering wildlife species no longer considered to be Threatened or Endangered but not yet clearly secure.

Examples of reasons why a wildlife species may not qualify for "Special Concern":

- a wildlife species existing at low density in the absence of recognized threat (e.g., a large predatory animal defending a large home range or territory); or
- a wildlife species existing at low density that does not qualify for Threatened status for which there is a clear indication of rescue effect.

Guidelines for use of Extinct or Extirpated

A wildlife species may be assessed as extinct or extirpated from Canada if:

- there exists no remaining habitat for the wildlife species and there have been no records of the wildlife species despite recent surveys; or
- 50 years have passed since the last credible record of the wildlife species, despite surveys in the interim; or
- there is sufficient information to document that no individuals of the wildlife species remain alive.

Guidelines for use of Data Deficient

Data Deficient should be used for cases where the status report has fully investigated all best available information yet that information is insufficient to: a) satisfy any criteria or assign any status, or b) resolve the wildlife species' eligibility for assessment.

Examples:

- Records of occurrence are too infrequent or too widespread to make any conclusions about extent of occurrence, population size, threats, or trends.
- Surveys to verify occurrences, when undertaken, have not been sufficiently intensive or extensive or have not been conducted at the appropriate time of the year or under suitable conditions to ensure the reliability of the conclusions drawn from the data gathered.
- The wildlife species' occurrence in Canada cannot be confirmed or denied with assurance.

Data Deficient should **not** be used if: a) the choice between two status designations is difficult to resolve by COSEWIC, or b) the status report is inadequate and has not fully investigated all best available information (in which case the report should be rejected), or c) the information available is minimally sufficient to assign status but inadequate for recovery planning or other such use.

APPENDIX 3. COSEWIC 2008 GUIDELINES FOR RECOGNIZING DESIGNATABLE UNITS BELOW THE SPECIES LEVEL

Preamble:

It is widely recognised that status assessments and the conservation of biological diversity require that units below the species level (using "species" in the accepted sense of the taxonomic hierarchy) be considered when appropriate. The Species at Risk Act includes "subspecies, varieties or geographically or genetically distinct population" in its definition of wildlife species. This recognizes that conservation of biological diversity requires protection for taxonomic entities below the species level (i.e. Designatable Units or DUs), and gives COSEWIC a mandate to assess those entities when warranted.

Approach to the status assessment of DUs below the species level:

COSEWIC may assess DUs below the species level when a single status designation is thought not to reflect the probability of extinction of the wildlife species.

Designatable Units should be discrete and evolutionarily significant units of the taxonomic species, where "significant" means that the unit is important to the evolutionary legacy of the wildlife species as a whole and if lost would likely not be replaced through natural dispersion.

Following is a set of guidelines to assist in the identification of Designatable Units for the purpose of status assessment by COSEWIC. The guidelines should be seen as aids for identifying DUs and not as rigid criteria.

Guidelines for the identification of DUs:

1) Subspecies or varieties:

A unit may be recognized as a DU if it represents a named subspecies or variety identified in accordance with COSEWIC's guidelines for naming subspecies and varieties. COSEWIC may choose not to recognize a named subspecies or variety as a DU if current scientific data do not support its validity.

2) Discrete and evolutionarily significant populations:

A population or group of populations may be recognized as a DU if it has attributes that make it "discrete" and evolutionarily "significant" relative to other populations.

The first step in identifying DUs is to ask whether the population or group of populations is discrete from other populations.

Discreteness

A population or group of populations may be considered discrete based on one or more of the following criteria:

1. Evidence of genetic distinctiveness including, but not limited to, inherited traits (e.g. morphology, life history, behaviour) and/or neutral genetic markers (e.g. allozymes, DNA microsatellites, DNA restriction fragment length polymorphisms (RFLPs), DNA sequences).

2. Natural disjunction between substantial portions of the wildlife species' geographic range, such that movement of individuals between separated regions has been severely limited for an extended period of time and is not likely in the foreseeable future and where the disjunction is likely to favour the evolution of local adaptations.

3. Occupation of differing eco-geographic regions that are relevant to the wildlife species and reflect historical or genetic distinction, as may be depicted on an appropriate ecozone or biogeographic zone map (Figs. 1 - 3). Some dispersal may occur between regions, but it is insufficient to prevent local adaptation.

Significance

If a population or group of populations is considered discrete, based on one or more of the above criteria, then its significance may next be considered. A population may be considered significant based on, but not limited to, one or more of the following criteria, each of which can be considered a measure of evolutionary significance:

1. Evidence that the discrete population or group of populations differs markedly from others in genetic characteristics thought to reflect relatively deep intraspecific phylogenetic divergence. Such differences would typically be manifested as qualitative genetic differences at relatively slow-evolving markers (e.g. fixed differences in mitochondrial or nuclear DNA sequences or fixed differences in alleles at multiple nuclear loci). Quantitative (frequency) differences of shared alleles, especially for rapidly-evolving markers such as microsatellites, generally would not be sufficient to meet this criterion.

2. Persistence of the discrete population or group of populations in an ecological setting unusual or unique to the wildlife species, such that it is likely or known to have given rise to local adaptations.

3. Evidence that the discrete population or group of populations represents the only surviving natural occurrence of a wildlife species that is more abundant elsewhere as an introduced population outside of its historical range.

4. Evidence that the loss of the discrete population or group of populations would result in an extensive gap in the range of the wildlife species in Canada.

It is important to recognize that some criteria provide more compelling evidence of "discreteness" and "significance" than others; hence, when identifying a DU, it is important to present the best available evidence for all criteria that are met.

Fig. 1. COSEWIC National Ecological Areas

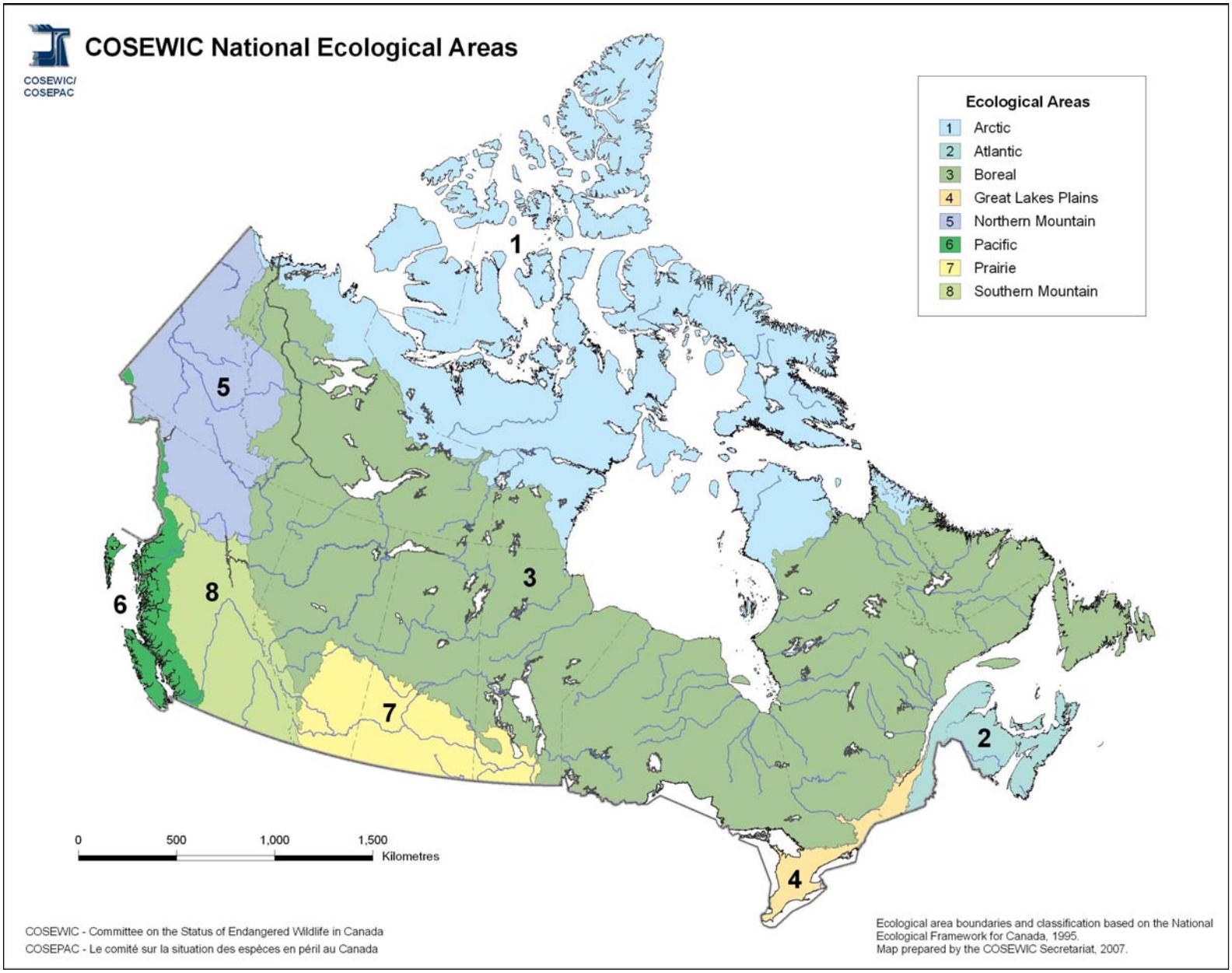


Fig. 2. COSEWIC National Freshwater Biogeographic Zones

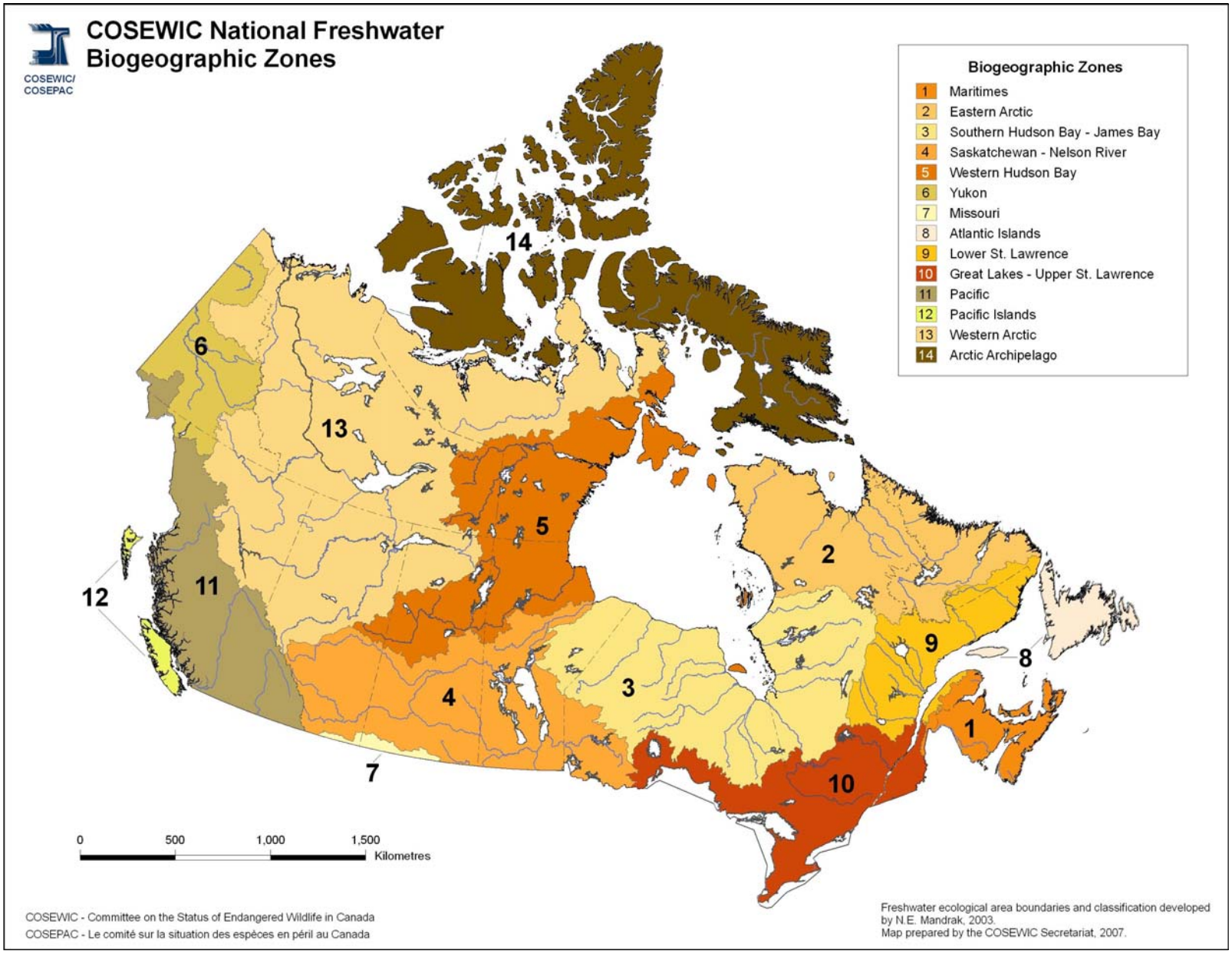
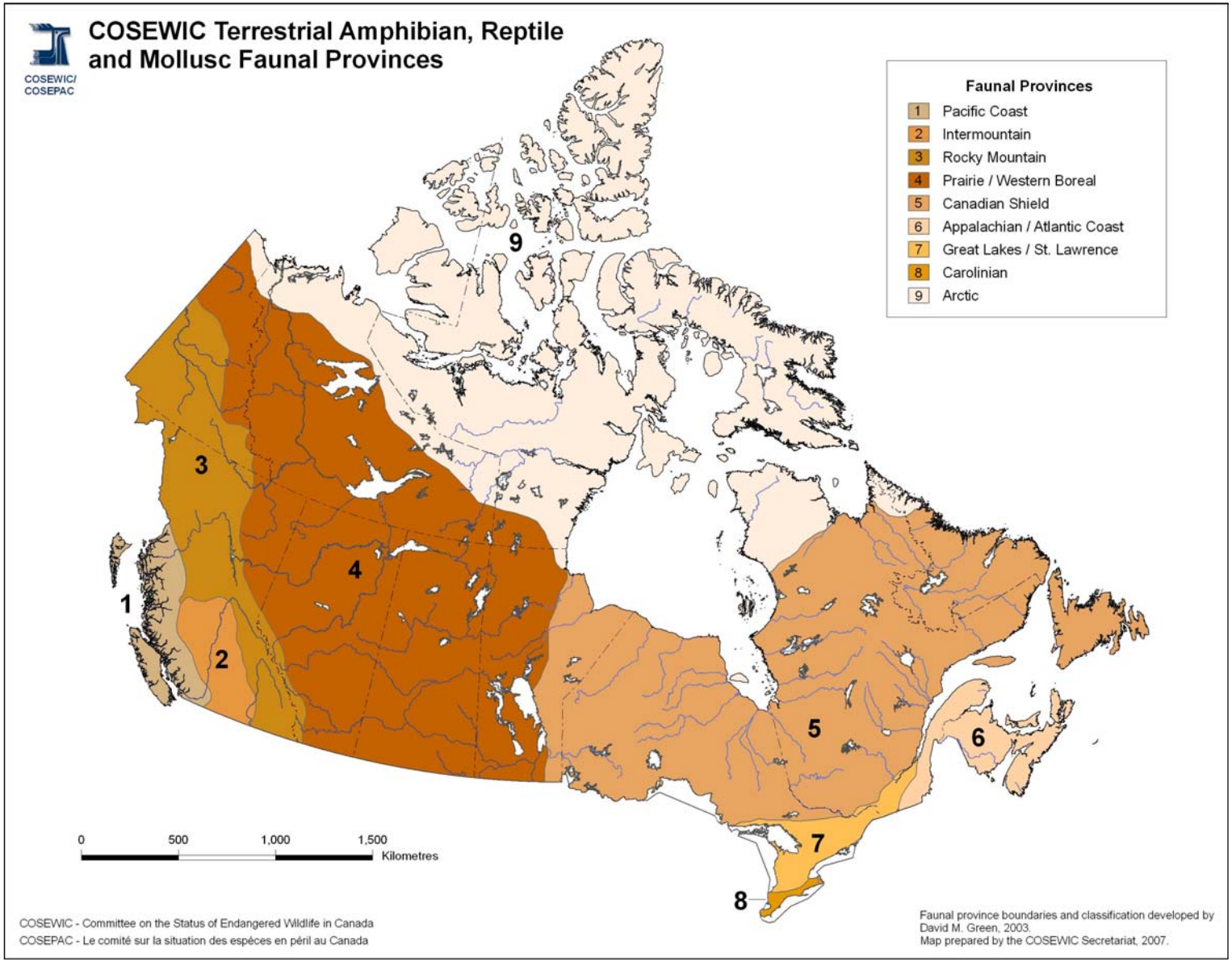


Fig. 3. COSEWIC Terrestrial Amphibians, Reptiles, and Mollusc Faunal Provinces



APPENDIX 4. List of Participants

Name	Affiliation	e-mail address
Todd Morris*	DFO Science	todd.morris@dfo-mpo.gc.ca
Dave Zanatta	University of Central Michigan	Zanat1d@cmich.edu
Daryl McGoldrick	Environment Canada	daryl.mcgoldrick@ec.gc.ca
Daelyn Woolnough	University of Central Michigan	Wooln1d@cmich.edu
Gerry Mackie	University of Guelph	gerry.mackie@sympatico.ca
Patty Gillis	Environment Canada	Patty.gillis@ec.gc.ca
Scott Craig	Environment Canada	Scott.craig@ec.gc.ca
Joe Ackerman	University of Guelph	ackerman@uoguelph.ca
Kelly McNichols	University of Guelph	kmcnicho@uoguelph.ca
Kari Killins	Ausable-Bayfield Conservation Area	kjean@abca.on.ca

* meeting chair

APPENDIX 5. Agenda

Ontario Freshwater Mussel Recovery Team Meeting
Canada Centre for Inland Waters
L601.
Friday, 14 November 2008, 12:00 PM – 17:00 PM

AGENDA

1. Welcome and Introductions
2. Purpose of meeting
3. Life history characteristics
4. Review of Designatable Units
5. Review of COSEWIC criteria
6. Habitat/Threats/Residence
7. Wrap-up
8. Adjourn.