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Compte rendu 2008/022

**Proceedings of the Central and Arctic
Regional Science Advisory Process
on the Recovery Potential Assessment
of Eastern Pongmussel (*Ligumia
nasuta*)**

**March 20, 2008
Canada Centre for Inland Waters
Burlington, ON**

**T. Morris
Meeting Chairperson**

**Compte rendu du processus
consultatif régional du Centre et de
l'Arctique sur l'évaluation du potentiel
de rétablissement de la ligumie
pointue (*Ligumia nasuta*)**

**Le 20 mars 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**

October 2008

octobre 2008

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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200, rue Kent Street
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K1A 0E6

<http://www.dfo-mpo.gc.ca/csas/>

CSAS@DFO-MPO.GC.CA



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SUMMARY

A regional science peer review meeting was held on March 20, 2008 in Burlington Ontario. The purpose of the review was to provide science advice on the Recovery Potential of the Eastern Pondmussel including a science-based peer review of the 17 steps in Fisheries and Ocean's Recovery Potential Assessment (RPA) framework. The advice was intended to feed the recovery process, under Canada's *Species at Risk Act* (SARA), for Eastern Pondmussel which had been designated as Endangered by COSEWIC. The advice will be provided to the DFO Minister for his consideration in any listing decision under the SARA for this species and for any socio-economic analyses, consultations and recovery planning related to this species. Participants included representatives of DFO Science and Fish Habitat Management, Central and Arctic Region, as well as Environment Canada, University of Guelph, University of Toronto, Trent University and the Bishops Mills Natural History Centre. 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 may be a CSAS Research Document(s) produced in relation to the working paper(s) presented at the workshop. The advice from the meeting will be published as a Science Advisory Report.

SOMMAIRE

Une réunion régionale d'examen par des pairs des Sciences a été tenue le 20 mars 2008 à Burlington, en Ontario. Le but de l'examen était de formuler un avis scientifique sur le potentiel de rétablissement de la ligumie pointue, y compris un examen scientifique par des pairs des 17 étapes du cadre de l'évaluation du potentiel de rétablissement (EPR) de Pêches et Océans Canada (MPO). En vertu de la *Loi sur les espèces en péril* (LEP) canadienne, l'avis devait alimenter le processus de rétablissement de la ligumie pointue, laquelle a été désignée en tant qu'espèce en voie de disparition par le COSEPAC. L'avis sera remis au ministre des Pêches et des Océans, qui en tiendra compte pour prendre toute décision concernant l'inscription de cette espèce à la liste de la LEP, et servira à la réalisation de toute analyse socioéconomique, consultation et planification du rétablissement associées à cette espèce. Parmi les participants figuraient des représentants du MPO (Sciences, Gestion de l'habitat du poisson, Région du Centre et de l'Arctique), d'Environnement Canada, des universités de Guelph, de Toronto et Trent ainsi que du Bishops Mills Natural History Centre. Le présent compte rendu résume les discussions pertinentes et présente les principales conclusions de la réunion d'examen par des pairs.

Le présent document sera publié dans la série des comptes rendus du SCCS. Il est possible que l'on produise un ou des documents de recherche du SCCS en lien avec le document de travail présenté à l'atelier. L'avis qui émanera de la réunion sera publié au titre d'avis scientifique.

INTRODUCTION

In April 2007, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the Eastern Pondmussel (*Ligumia nasuta*) as Endangered. Assuming that an extended listing process needs to be undertaken for this taxon, the Minister will be required to decide whether or not to list it under the *Species at Risk Act* (SARA) by fall 2008. To inform this decision and provide the basis for other SARA related functions, a Recovery Potential Analysis (RPA) meeting was held in Burlington on March 20, 2007. The (RPA) process was developed by DFO Science to provide the information and scientific advice required to meet the various requirements of the SARA, such as the authorization to carry out activities that would otherwise violate the SARA as well as the development of Recovery Strategies. The information is also used when analyzing the socio-economic impacts of adding the species to the list as well as during subsequent consultations, where applicable.

The purpose of the meeting was to assess and provide advice on the Recovery Potential of the Eastern Pondmussel. It is a science-based peer review of the 17 steps in the RPA framework outlined in Appendix 1. This included assessing the current status of the species, the scope for human-induced mortality and scenarios for mitigation and alternatives to activities which negatively impact the species.

Terms of reference (Appendix 2) for the meeting were made available prior to the meeting. Participants (Appendix 3) included representatives of DFO Science and Fish Habitat Management, Central and Arctic Region as well as freshwater mussel specialists from Environment Canada, University of Guelph, Trent University and Bishops Mills Natural History Centre. The meeting generally followed the agenda as outlined in Appendix 4.

This proceedings report summarizes the relevant discussions and presents the key conclusions reached at the peer review meeting. There will be a CSAS Research Document(s) produced from the working paper(s) presented at the workshop and which provided the basis for the discussions. The Science Advisory Report is the synopsis of the advice from the meeting.

DISCUSSION

Background on the *Species at Risk Act* and the Recovery Potential Analyses Processes

Presented by Todd Morris

The purposes of the *Species at Risk Act* (SARA) are to protect wild species at risk and their habitats in Canada, and to promote their recovery. The Act stipulates that it is forbidden to kill, harm, harass, capture or take individuals of a species listed under the Act as Threatened, Endangered or Extirpated. The SARA also prohibits damaging or destroying their Residence or any part of their Critical Habitat. The SARA indicates that a Recovery Strategy and Recovery Action Plan must be developed for each species listed on Schedule 1 of the SARA.

Some activities that kill, harm, harass or capture individuals of species may be allowed if those activities are specified in the Recovery Plan (Section 83(4) of the SARA).

Between legal listing and adoption of the Recovery Plan, a permit may be issued under Section 73 of the SARA. This permit exempts prosecution for violating prohibitions on the listed species, as long as the mortality is incidental to pursuit of some other activity for which the permit was issued.

The Minister of Fisheries and Oceans can only issue permits under Section 73 of the SARA if the Minister is satisfied that specific preconditions have been met and these are:

- 73(3)(a) all reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted;
- 73(3)(b) all feasible measures will be taken to minimize the impact of the activity on the species...; and,
- 73(3)(c) the activity will not jeopardize the survival or recovery of the species.

Q: How are the socio-economic analyses done? Are the landowners contacted?

A: No, I don't believe it's that specific, it is a more abstract process.

Q: What happens when we get new data on a species? Do we re-do the RPA?

A: Currently there is no mechanism to feed back to the RPA, but that will probably be developed.

Q: If the species is re-assessed under COSEWIC, would you redo the RPA?

A: If the status changes, for example from Special Concern to Threatened or Endangered, then you could revisit the RPA. However if the status remains unchanged then it is likely the RPA would remain unchanged.

Q: What happens with respect to the recovery strategies?

A: If new science is available because of recovery actions identified in the recovery strategy, then the new science can trump what the RPA says.

Comment: DFO Fish Habitat Management (FHM) won't base decisions on old RPA information. If there is new science in the recovery strategy, than that would be used.

Population Status in Lake St. Clair

Presented by Daryl McGoldrick

- Population of Eastern Pondmussel still present in the Lake St. Clair delta
- In 1999-2001, Eastern Pondmussel accounted for 3% of the live unionids collected in both Canadian and American waters (2356 specimens) of the Lake St. Clair delta
- In 2003 and 2005 the species represented 2% of the live unionids collected (367 specimens)
- Data suggests the Canadian side of the delta supports a larger population Eastern Pondmussel compared the American side
- Number of Eastern Pondmussel estimated in Pocket Bay is 20-82; number in Bass Bay is estimated at 6290 – 8510; number estimated in the rest of the delta area is 15 300 – 35 700

- Overall population size of Eastern Pond Mussel in Lake St. Clair is estimated at 22 000 – 44 292 specimens
- Shell lengths of Lake St. Clair delta population had a good representation in several size classes, suggesting a healthy, reproducing population

Population Status in Lynn Creek

Presented by Fred Schueler

- Population of Eastern Pondmussel discovered in Lyn Creek in 2006. This population is beyond the previously known limits of its Canadian distribution.
- The Eastern Pondmussel represents about 4% of the individuals collected during the survey of this watershed with a maximum of 9% at the most abundant site.

Summary of Species Current/Recent Status and Species Trajectory

(Steps 1 and 2 from RPA Guidelines)

(Population status table [Table 1] found in draft RPA filled out by participants)

Lake St. Clair delta

- Status – the species is not going to disappear in a year; therefore, it shouldn't be called critical

Q: How safe are the bays in the delta from zebra mussels? Could a storm event change the situation?

A: It is possible, but Eastern Pondmussel has lasted 20 years in the bays, co-existing with low levels of zebra mussels

- Certainty of status – based on population size; based on the # of zebra mussels in the bay
- Trajectory – there is not a lot of quantitative data; its either stable or declining (in the last 10 years)
- Certainty of the trajectory – based on catch-per-unit-effort data or semi-quantitative data
- Importance – high importance as there are only two remaining populations

Lyn Creek

- Status – it is fairly pristine habitat and there is no reason to believe that there is something wrong with this population
- Certainty of status – based on best guess/expert opinion
- Trajectory – unknown as we've only known about the population for 2 years; they're not the dominant species in the creek
- Certainty of trajectory – based on best guess/expert opinion

- Importance – high, as it is only one of two known remaining populations

Great Lakes and Connecting Channels

- Status – likely extirpated, although some historic areas have not been sampled recently (more sampling is required at river mouths shorelines, Long Point, wetlands, eastern Lake Erie and eastern Lake Ontario)
- Certainty of status – based on semi-quantitative data; a lot of sampling has been done in these areas
- Trajectory – declined dramatically from historic levels (were, at one point, one of the most abundant mussels in the Great Lakes, numbering in the billions)
- Certainty of trajectory – based on a lot of sampling; very evident that they have declined
- Importance – high; 93% of the species’ range has been lost and if we’re going to recover the species than this habitat is very important

Table 1. Population status and trajectory of Eastern Pondmussel in Canada.

Population	Status	Certainty	Trajectory	Certainty	Importance	Certainty	AHA
Lake St. Clair delta	Cautious	2	Stable to slight decline	2	High		
Lyn Creek	Cautious	1	Unknown	1	High		
Great Lakes and connecting channels	Extirpated	2	Declined	3	High		

Life – History Parameters

(Step 3)
Open discussion

- Very limited information available for the Eastern Pondmussel and the use of a surrogate species may be necessary
- The host fish for Eastern Pondmussel has not been determined either in the U.S. or Canada.

Habitat Requirements

(Step 4)
Open discussion

- We are trying to quantify areas where the species is found now, with the qualification that historic habitat may have been different
- Species inhabits slack-water areas of rivers or sheltered areas of lakes, with soft sand or mud substrates
- Juvenile habitat requirements are not known

- Lake St. Clair – we haven't looked at areas where the species is found compared to areas where they are not found; we don't know if they are found in areas with dense aquatic vegetation because of the difficulty in sampling these locations
- Lyn Creek – habitat has not been quantified
- Lyn Creek drainage is fairly pristine - current habitat of Lyn Creek: clear, slow water; well-buffered; muddy substrates; deep; intact riparian vegetation; surrounded by wetlands
- Beaver dams may be creating optimal habitat for Eastern Pondmussel in Lyn Creek
- The temperature differences between the Lake St. Clair delta and Lyn Creek are likely to be very big, suggesting that the Eastern Pondmussel has a wide temperature tolerance

Expected Population and Distribution Targets

(Step 5)

Open discussion

- It is not possible to develop population or distribution targets as we don't even know what the current population size is
- This requires modelling that has not been completed yet
- The current goal is to maintain or increase current area of occupancy of the species

Expected Population Trajectories

(Step 6)

Open discussion

- Expected population trajectories can't be developed as we don't know how long the species lives and we can't confirm that reproduction is occurring

Residence Requirements

(Step 7)

- The host should be considered residence because for a mussel population to survive they need a connection between populations to provide gene flow etc.; host fish acts as an ecological connection.
- A residence is protected even when not occupied
- Host fish is also critical habitat
- If the host is deemed to be a residence than it receives automatic protection, whereas if you called it critical habitat it would not receive automatic protection

Consensus: the host fish should be residence

Probability of Achieving Recovery Targets;
Likelihood that the Current Quantity and Quality of Habitat is Sufficient; and,
Magnitude by Which Current Threats Have Reduced Habitat Quality and Quantity
 (Steps 8, 10 and 11)

- Currently there is not enough information at this time to answer these questions

Magnitude of Each Potential Source of Mortality

(Step 9)

Open discussion (Threats and threats by population tables [Tables 2 and 3] found in draft RPA filled out by participants)

Table 2. *Known and suspected threats for the Eastern Pondmussel in Canada.*

Magnitude	Probability	Threat
High	High	Zebra Mussels
Unknown*	Unknown	AIS impacting host species
Low (macrophytes)	Low	Other AIS impacting Eastern Pondmussel
Low (Asian carp)	Medium	
High	Medium	Climate Change: Water Levels and Flow
High**	Unknown	Climate Change: Fish Community Shifts
High	Low	Water Quality – Acute (event/spill/leak etc)
High***	Low	Water Quality – Chronic (urban/agriculture run-off)
High	Low	Land Use Changes: Urbanization
High	Low	Land Use Changes: Agriculture

*impact of AIS on host fishes could be a positive or negative impact, depending on the species

**if there are fish community shifts, the impact will be high, but the probability of this occurring is not known because we don't know what the host fish is

***the area around Lyn Creek uses less road salt than other areas, and there aren't as many bridges and road crossings, so the probability of urban run-off would be lower; there is little if any agriculture in the area so probability is low too (future threat could be strip development at downstream end of the creek)

Table 3. *Known and suspected threats by population to the Eastern Pondmussel in Canada.*

Threat	Lake St. Clair Delta	Lyn Creek
	Magnitude/Probability	Magnitude/Probability
Zebra Mussel	High/High	High/Low
AIS on Host Fish	unknown	unknown
Other AIS on Eastern Pondmussel	Low/High (macrophytes)	Low/High
	Low/High (Asian carp)	Low/Low
Climate Change:		
Water levels	High/Medium	High/Medium
Fish Community Shifts	High/Unknown	High/Unknown
Water Quality – Chronic	High/Low	High/Medium
Water Quality – Acute	High/Low	High/Low
Land Use Changes:		
Urbanization	High/Low	High/Low
Agriculture	High/Low	High/Medium

Inventory of All Feasible Measures to Minimize/Mitigate; and, Alternatives to the Activities

(Steps 12 and 13)

Aquatic Invasive Species:

Alternatives to Activities

- no live bait use (Lyn Creek)
- limit potential boat traffic (Lyn Creek)
- AIS signage/awareness (Lyn Creek)
- No water connection between Centre Lake and Lees Pond (Lyn Creek)

Feasible Mitigation Measures

- establish sanctuary area/experimental populations (Lyn Creek/Lake St. Clair)

Climate Change (Fish Community Changes):

Alternatives to Activities

- none

Feasible Mitigation Measures

- move mussels to areas where host fish is present (assuming the host has been identified)

Reasonable and Feasible Activities That Could Increase the Productivity or Survivorship Parameters;

Reduction in Mortality Rate Expected and the Increase in Productivity or Survivorship;

Expected Population Trajectory; and,

Parameter Values for Population Productivity and Starting Mortality Rates

(Steps 14, 15, 16 and 17)

- Currently there is not enough information at this time to answer these questions

Sources of Uncertainty

- Host fish is unknown
- Other possible extant populations of Eastern Pondmussel?
- Can we re-establish populations from outside the area?
- How do we effectively sample Lyn Creek? (dredge, ponar, scuba?)

APPENDIX 1. RECOVERY POTENTIAL ASSESSMENT TOPICS

The topics (from the national framework) for which an assessment should be done for any species/designatable unit are as follows:

Phase I: Assess current/recent species status

To the extent possible with the information available and taking account of uncertainties:

1. Evaluate **present species status** for abundance, range and number of populations.
2. Evaluate **recent species trajectory** for abundance, range, and number of populations.
3. Estimate, to the extent that information allows, the current or recent **life history parameters** for the species (total mortality [Z], natural mortality[m], fecundity, maturity, recruitment, etc.) or reasonable surrogates, and associated uncertainties for all parameters.
4. Address the separate terms of reference for describing and quantifying (to the extent possible) the **habitat requirements and habitat use patterns** of the species.
5. Estimate expected **population and distribution targets** for recovery, according to DFO guidelines.
6. Project **expected population trajectories** over three generations (or other biologically reasonable time), and trajectories over **time to the recovery target** (if possible to achieve), given current population dynamics parameters and associated uncertainties using DFO guidelines on long-term projections.
7. Evaluate **residence requirements** for the species, if any.

Phase II: Scope for management to facilitate recovery

To the extent possible with the information available and taking account of uncertainties:

8. Assess the **probability that the recovery targets can be achieved** under current rates of population dynamics parameters, and **how that probability would vary with different mortality** (especially lower) **and productivity** (especially higher) **parameters**.
9. Quantify to the extent possible the **magnitude of each major potential source of mortality** identified in the pre-COSEWIC RAP and considering information in COSEWIC Status Report, from DFO sectors, and other sources.
10. Quantify to the extent possible the **likelihood that the current quantity and quality of habitat is sufficient** to allow population increase, and would be sufficient to support a population that has reached its recovery targets (using the same methods as in step 4)
11. Assess to the extent possible the magnitude by which current **threats to habitats have reduced habitat quantity and quality**.

Phase III: Scenarios for mitigation and alternative to activities

To the extent possible with the information available and taking account of uncertainties:

12. Using input from all DFO sectors and other sources, as appropriate, develop an **inventory of all feasible measures to minimize/mitigate** the impacts of activities that are threats to the species and its habitat (steps 9 and 11).
13. Using input from all DFO sectors and other sources as appropriate, develop an inventory of all reasonable **alternatives to the activities** that are threats to the species and its habitat (steps 9 and 11), but with potential for less impact. (e.g., changing gear in fisheries causing by-catch mortality, relocation of activities harming habitat)
14. Using input from all DFO sectors and other sources, as appropriate, develop an inventory of all **reasonable and feasible activities that could increase the productivity or survivorship parameters** (steps 3 and 8).
15. Estimate, to the extent possible, the **reduction in mortality rate expected** by each of the mitigation measures in step 12 or alternatives in step 13 and **the increase in productivity or survivorship** associated with each measure in step 14.
16. Project **expected population trajectory** (and uncertainties) over three generations (or other biologically reasonable time), and to the time of reaching recovery targets when recovery is feasible; given mortality rates and productivities from step 15 that are **associated with specific scenarios** identified for exploration. Include scenarios which provide as high a probability of survivorship and recovery as possible for biologically realistic parameter values.
17. Recommend **parameter values for population productivity and starting mortality rates**, and where necessary, specialized features of population models that would be required to allow exploration of additional scenarios as part of the assessment of economic, social, and cultural impacts of listing the species.

APPENDIX 2. TERMS OF REFERENCE

Recovery Potential Assessment of the Eastern Pondmussel

Regional Peer Review Meeting – Central and Arctic Region
Canada Centre for Inland Waters
Burlington, ON
March 20, 2008
Chairperson: Todd Morris

TERMS OF REFERENCE

A. Background

In April 2007, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the Eastern Pondmussel (*Ligumia nasuta*) as Endangered. Assuming that an extended listing process needs to be undertaken for this taxon, the Minister will be required to decide whether or not to list it under the *Species at Risk Act* (SARA) by fall 2008. In the interim, a Recovery Potential Assessment (RPA) and subsequent socio-economic analysis and listing consultations need to be conducted.

The purposes of the SARA are to protect wild species at risk and their habitats in Canada, and to promote their recovery. The SARA prohibits killing, harming, harassing capturing or taking individuals of a species listed under the Act as Threatened, Endangered or Extirpated. The SARA also prohibits damaging or destroying their residence or any part of their critical habitat. Furthermore, the SARA provides for the preparation of a recovery strategy for species listed as Threatened, Endangered or Extirpated. The provisions of these recovery strategies must ensure that any possible threat to a given species and its habitat does not jeopardize its survival and recovery.

Section 73(2) of the SARA provides the competent minister with the authority to permit normally prohibited activities affecting a listed species, its critical habitat, or its residence, even though they are not part of a previously approved recovery plan. Such activities can only be approved if: 1) they are scientific research relating to the conservation of the species and conducted by qualified persons; 2) they will benefit the species and are required to enhance its chance of survival in the wild; or, 3) affecting the species is incidental to the carrying out of these activities.

The decision to permit allowable harm and the development of a recovery strategy must take into consideration the species' current situation and its recovery potential. The recovery potential considers the impacts of human activities on the species and on its ability to recover, as well as the alternatives and measures to reduce these impacts to a level which will not jeopardize the survival and recovery of the species.

Therefore, a species RPA process was developed by DFO Science to provide the information and scientific advice required to meet the various requirements of the SARA, such as the authorization to carry out activities that would otherwise violate the SARA as well as the development of recovery strategies. In the case of a species that has not yet been added to Appendix 1 of the SARA, the scientific information also serves as advice to the DFO Minister regarding the listing of the species under the SARA. Consequently,

the information is used when analyzing the socio-economic impacts of listing the species and during subsequent consultations.

B. Objectives

The intent of this meeting is to assess the recovery potential of the Eastern Pondmussel. It is a science-based peer review of the species unit assigned by COSEWIC and the 17 steps in the RPA framework outlined in Appendix 1. The advice will be provided to the DFO Minister for his consideration in any listing decision under the SARA for this species.

C. Products

The meeting will generate a proceedings report summarizing the deliberations of the participants. This will be published in the Canadian Science Advisory Secretariat (CSAS) Proceedings Series. There may be CSAS Research Document(s) produced in relation to the working paper(s) presented at the workshop. The advice from the meeting will be published in the form of a Science Advisory Report.

D. Participants

Participants from DFO (Science, Habitat Management and Policy sectors), Environment Canada, academic institutions and the private sector will be included. Participants will not exceed a maximum of 20 people.

APPENDIX 3. LIST OF PARTICIPANTS

Name	Affiliation	e-mail address
Todd Morris*	DFO Science	todd.morris@dfo-mpo.gc.ca
Amy Edwards	DFO Science	amy.edwards@dfo-mpo.gc.ca
Daryl McGoldrick	Environment Canada	daryl.mcgoldrick@ec.gc.ca
Frederick Schueler	Bishops Mills Natural History Centre	bckcdb@istar.ca
Gerry Mackie	University of Guelph	gerry.mackie@sympatico.ca
Daelyn Woolnough	Trent University	daelynwoolnough@trentu.ca
Dave Zanatta	University of Toronto	dave.zanatta@utoronto.ca
Andrea Doherty	DFO FHM	andrea.doherty@dfo-mpo.gc.ca
Matt Keevil	Bishops Mills Natural History Centre	keevilm@hotmail.com
Aleta Karstad	Bishops Mills Natural History Centre	karstad@pinicola.ca

* meeting chair

APPENDIX 4. AGENDA

Agenda
Eastern Pondmussel RPA Meeting
CCIW Burlington
Library Guest Lounge
March 20, 2008
9:00-17:00

Chair: Todd Morris

9:00 – 9:05	Introductions
9:05 – 9:10	Purpose of meeting
9:10 – 10:30	Phase 1 – Assess species current/recent status
10:30 – 10:45	Break
10:45 – 12:00	Phase 2 – Scope for management to facilitate recovery
12:00 – 12:45	Lunch
12:45 – 13:30	Phase 2 continued
13:30 – 14:30	Phase 3 - Scenarios for mitigation and alternatives to activities
14:30 – 14:45	Break
14:45 – 15:30	Phase 3 continued
15:30 – 16:30	Phase 4 – Critical habitat
16:30 – 17:00	Summary and concluding remarks