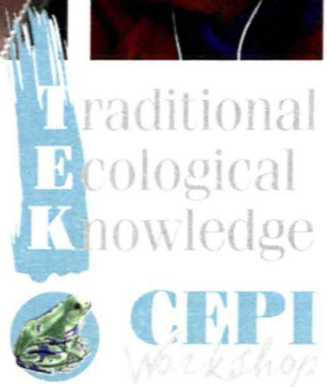
APPENDIX A: BRAS D'OR LAKES TRADITIONAL ECOLOGICAL KNOWLEDGE WORKSHOP PROCEEDINGS



Bras d'Or Lakes Traditional Ecological Knowledge Workshop Proceedings

May 3-4, 2006
Sarah Denny Cultural Centre, Eskasoni, Nova Scotia

Summarized by **Penny Doherty** and **Jason Naug**
On behalf of the Bras d'Or Collaborative Environmental Planning Initiative (CEPI)

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Prepared for the Collaborative Environmental Planning Initiative by Penny Doherty and Jason Naug.

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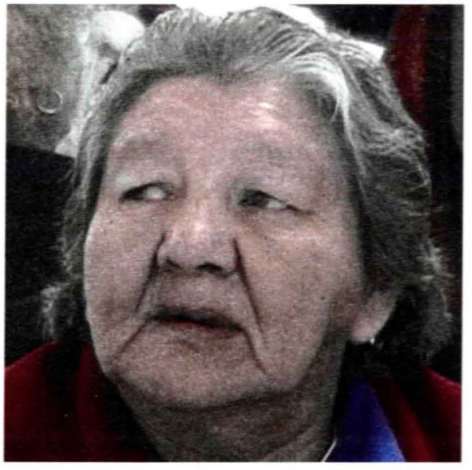

Thanks go to the workshop organizing committee: Charlie Dennis, Albert Marshall, Murdena Marshall, Jason Naug, Clifford Paul and the workshop coordinator, Shelley Porter. Special thanks to Clifford Paul who was the Master of Ceremonies.

We would also like to thank the workshop facilitators: Jackie Drinnan, Fabian Francis, Annie Johnson, Ethel Johnson, Christine Metallic, Jason Naug, Clifford Paul, Laurie Suitor and Shelley Porter. We are grateful to Murdena Marshall for providing guidance and support throughout the workshop. Thanks are also due to Weldon Bona and Rhonda Denny for their help. Stan Johnston and Tracy Horsman are thanked for preparing the figures for these proceedings.

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We are grateful to Katie MacEwan and Pauline Bernard for performing the sweetgrass ceremony and to Albert Marshall for leading the opening prayer. We thank Mike Parker (East Coast Aquatics) for presenting a summary of the Ecosystem Overview and Assessment Report for the Bras d'Or Lakes, and for providing comments on an earlier draft of these proceedings. Murdena Marshall and Albert Marshall are also thanked for reviewing an earlier draft of these proceedings. Thanks also go to Lisa Patterson (Cape Breton University), Andrew Sark (CBU), Ron Gillis (CBU), and Madeline Yakimchuk (UINR) for videotaping the workshop. We would also like to thank the CBC's Steve Sutherland who covered the workshop. Most of all, we thank the workshop participants who shared their knowledge with us.

Note about content of proceedings

These proceedings are based primarily on flip chart notes received from facilitators at the workshop. Each comment represents the opinion of one or more participants. All opinions expressed at the workshop are represented in these proceedings, regardless of whether there was general agreement or differences in opinion. Some of the comments are related to areas outside of the Bras d'Or Lakes watershed but are included here for completeness. With the exception of the Workshop Synthesis, these proceedings represent a summary of the workshop and are presented as such – they are not an interpretation of workshop results. The content of the proceedings is limited by the answers contributed and recorded at the workshop from those in attendance. It is possible that certain comments made are site-specific, and are not meant to be extrapolated to the entire watershed area. However, without sufficient detail provided by the flip chart notes, it may not be possible to differentiate between site-specific and general comments. Thus the reader is cautioned to take this into consideration.

Executive summary

On May 3-4 2006, a two day Traditional Ecological Knowledge (TEK) workshop sponsored by the Bras d'Or Collaborative Environmental Planning Initiative (CEPI) was held at the Sarah Denny Cultural Centre in Eskasoni, Nova Scotia. Twenty-five First Nation Elders from five Mi'kmaq communities (Eskasoni, Membertou, Potlotek, Wagmatcook and We'koqmaq) and twenty-five non-First Nation Elders were invited. The purpose of the workshop was to gather information about the environment of the Bras d'Or Lakes and watershed lands based on TEK to include in a report being prepared by Fisheries and Oceans Canada entitled, Ecosystem Overview and Assessment Report (EOAR) for the Bras d'Or Lakes, Nova Scotia. The purpose of the EOAR was to summarize the known biophysical information about the Bras d'Or Lakes area. The first phase of the EOAR summarized the published scientific literature on both the Bras d'Or Lakes and its surrounding watershed, while this workshop was intended to contribute to a second phase by including TEK. Together, the information in the EOAR will provide a strong foundation for management planning in this area.

A small group format was used at the workshop and each group of participants responded to a series of open ended questions, led by a facilitator. Questions focussed on topics associated with terrestrial and aquatic (marine and freshwater) plants and animals, climate change and significant areas, where the published scientific information was deemed to be incomplete or the topic was of particular importance.

Of particular interest was the contribution of information about the status and distribution of eelgrass in the Bras d'Or Lakes. TEK indicates that, in general, eelgrass has declined around the Bras d'Or Lakes since the 1940s and 1950s, and identifies the potential for shifts in location of eelgrass. Despite an overall decline, healthy eelgrass beds have been observed in certain locations such as around islands (e.g., Chapel Island) and near Wagmatcook and We'koqmaq. Eelgrass was noted to have increased over the last 5 years in St. Peters and West Bay where it had not been abundant for decades. Eelgrass also occurs in River Denys and South Basin. Unhealthy looking eelgrass was noted to occur in several places, and is heavily fouled with black tunicates in Georges River. Near Baddeck and Little Narrows, eelgrass is known to die off for a few years and then return.

Declines in several plant and tree populations were identified by TEK. Gooseberries, raspberries, wild strawberries and blackberries were once abundant but have declined. Mint leaves and hazelnuts have disappeared. Alder trees are not healthy in traditional harvesting areas. Black ash has declined significantly within the watershed

Deer were reported to have declined around the Bras d'Or Lakes. They have been declining near Eskasoni since the 1960s. Moose are much more common than 30 years ago and are thriving. The coyote population is increasing.

Several fish and invertebrate species have declined, including oysters, herring, gaspeareau, smelt and cod. There used to be 32 spawning grounds for herring in the Bras d'Or Lakes but now there are few. Some good spawning areas for gaspereau and smelt still exist.

Over the years salmon have declined in numbers and size, although some rivers (e.g., North River) still have healthy populations. Speckled and rainbow trout have also declined, however, the speckled trout population has come back in the Whycocomagh area in recent years. Eels have declined in abundance and size. TEK identifies the bridge at Barra Straight and the Canso Causeway as contributors to their decline.

In terms of physical change, the nearshore was identified as the area where the biggest change has occurred in the Bras d'Or Lakes, with the most significant changes attributed to erosion. At least two small islands have disappeared in recent years and barrier beaches have had large breaches in some areas. It is believed that the lack of ice in recent years has allowed winter storms to accelerate erosion. Shoreline development, fewer trees and erosion have caused increased siltation in the watershed. As a result, water column visibility in the Lakes has decreased significantly in the last 15 years.

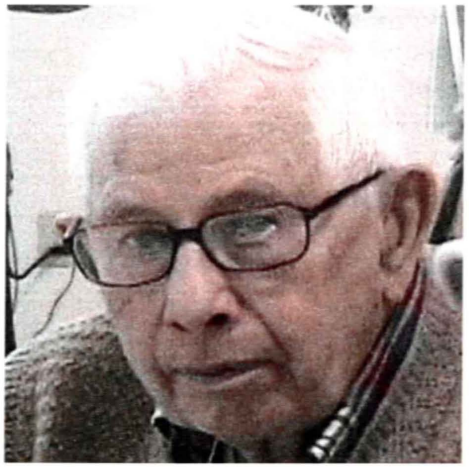
TEK indicates that there has been noticeable climate change in the Bras d'Or Lakes area over the last few decades. The winters are warmer with more rain and the summers are hotter. Snow used to be much more abundant. Forty to fifty years ago there was 4-6 ft of ice on the Bras d'Or Lakes. The ice was thick enough to support a vehicle or a house that was being moved across the Lake. Now the Lakes don't freeze and this has been particularly noticeable in the last 10 years.

TEK identifies biological changes in the Bras d'Or Lakes area as a result of climate change. A direct link exists between climate change and the decline of berries and black ash trees. Warmer weather has led to less jellyfish, and more insects and seals. The warmer winters bring less water in the spring because the water level is receiving less runoff from melting ice and snow. This results in less flushing and an increase of bacteria in the water. The smaller brooks dry up and there are less fish in the brooks.

TEK indicates a noticeable decline in the water level around the Bras d'Or Lakes. There have been more low tides in recent times, and in general the water level is lower around the Lakes now than in the past. Lower water levels have also been observed in freshwater streams compared to 50 years ago.

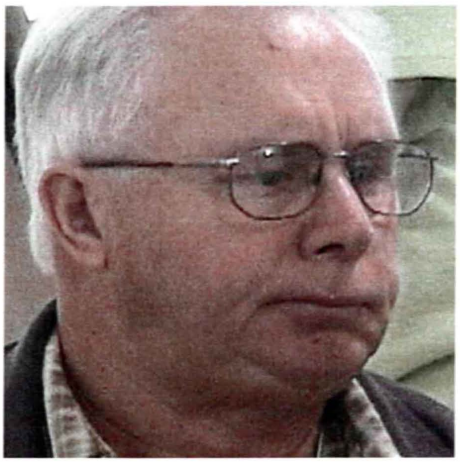
Identifying specific significant areas for plants and animals, and for cultural, recreational and social activities is a challenge for many Elders. Every species has a spirit or qualities that are important. Similarly every brook or stream has its own significance. The watersheds of three main rivers (Baddeck, Skye and Middle Rivers) were identified as significant, primarily because they are salmon habitat. The entire watershed of the Bras d'Or Lakes is significant as eagle habitat. Edges of streams and marshes throughout the watershed are important areas because they have many significant plants used for medicines. Other important areas for plants include Malagawatch (sweetgrass), Little Narrows (sweetgrass), Whycocomagh (sweet flag medicinal plant) and Irish Cove (native orchids). Significant areas for herring, gaspereau, smelts, salmon and black ash were also identified.

In terms of cultural, social or recreational significance, all areas of the Bras d'Or are considered significant because of day to day activities that are part of everyday life. The entire Bras d'Or Lake is considered significant for waterway transportation. The two areas identified the most for cultural and social significance are Chapel Island and Malagawatch. Chapel Island (Potlotek) has been used since the 1700s as a spiritual place. Malagawatch is a sacred burial ground, a traditional gathering site and a former trading place. In total, Elders identified 40 areas of cultural, social or recreational significance.



The workshop was considered successful in gathering TEK of the Bras d'Or Lakes and watershed lands to support the scientific literature or to fill in gaps identified in the EOAR. The exit questionnaire completed by the fifty-two participants at the end of the workshop, scored the workshop as a 4.5 out of 5 as an effective opportunity to learn and share information on the environment of the Bras d'Or Lakes. The historic perspective of events and trends that TEK identified that were gaps in knowledge in the scientific literature will serve an important purpose for management planning in this area.

Introduction



On May 3-4 2006, a two day Traditional Ecological Knowledge (TEK) workshop was held at the Sarah Denny Cultural Centre sponsored by the Bras d'Or Collaborative Environmental Planning Initiative (CEPI) (See Appendix 1 for Agenda, Appendix 2 for CEPI background information). The CEPI represents a cross-section of government departments (federal, provincial, municipal, First Nations), as well as local industry, academics, NGOs and community members with a role or interest in the environmental management of the Bras d'Or Lakes. The purpose of the workshop was to gather information about the environment of the Bras d'Or Lakes and watershed lands (Figure 1) to include in a report being prepared by Fisheries and Oceans Canada entitled, Ecosystem Overview and Assessment Report (EOAR) for the Bras d'Or Lakes, Nova Scotia. The first phase of the EOAR summarized the published scientific literature on both the Bras d'Or Lakes and its surrounding watershed, while this workshop was intended to contribute to a second phase by including TEK. Together, the information in the EOAR will provide a strong foundation for management planning in this area.

TEK was considered the knowledge held about the environment of the Bras d'Or by local people who are familiar with it from their experiences living and working in the area over a number of years. It was also anticipated that knowledge passed down from previous generations to the participants could be captured. Participants included hunters, fishers, divers, medicinal plant collectors, and others identified as knowledgeable by the workshop organizing committee. In total twenty-five First Nation Elders from five Mi'kmaq bands (Eskasoni, Membertou, Potlotek, Wagmatcook and We'koqmaq) and twenty-five non-First Nation Elders were invited (See Appendix 3 for a list of participants).

The workshop began with an Opening Prayer and Sweetgrass Ceremony as well as introductory instructions in Mi'kmaq by Murdena Marshall, an Elder from Eskasoni. A presentation on the scientific information from the EOAR for the Bras d'Or Lakes was made by Michael Parker of East Coast Aquatics Inc. and helped set the context for the remainder of the workshop.

The workshop included a number of open-ended questions (See Appendix 4) on various topics associated with the land (plants and animals), water (marine and freshwater), climate change and significant areas, where the published scientific information was deemed to be incomplete or the topic was of particular importance. Participants formed small groups, each with a facilitator and note taker to capture the discussion that took place.

The last session, an open discussion, recognized the challenge of collecting TEK on the entire Bras d'Or ecosystem within the limited time available during the workshop. The purpose of this session was to allow participants to add or share any other relevant information that had not been covered during the workshop. Subjects for further consideration could also be identified at this time as well as suggestions on future methods for collecting TEK.

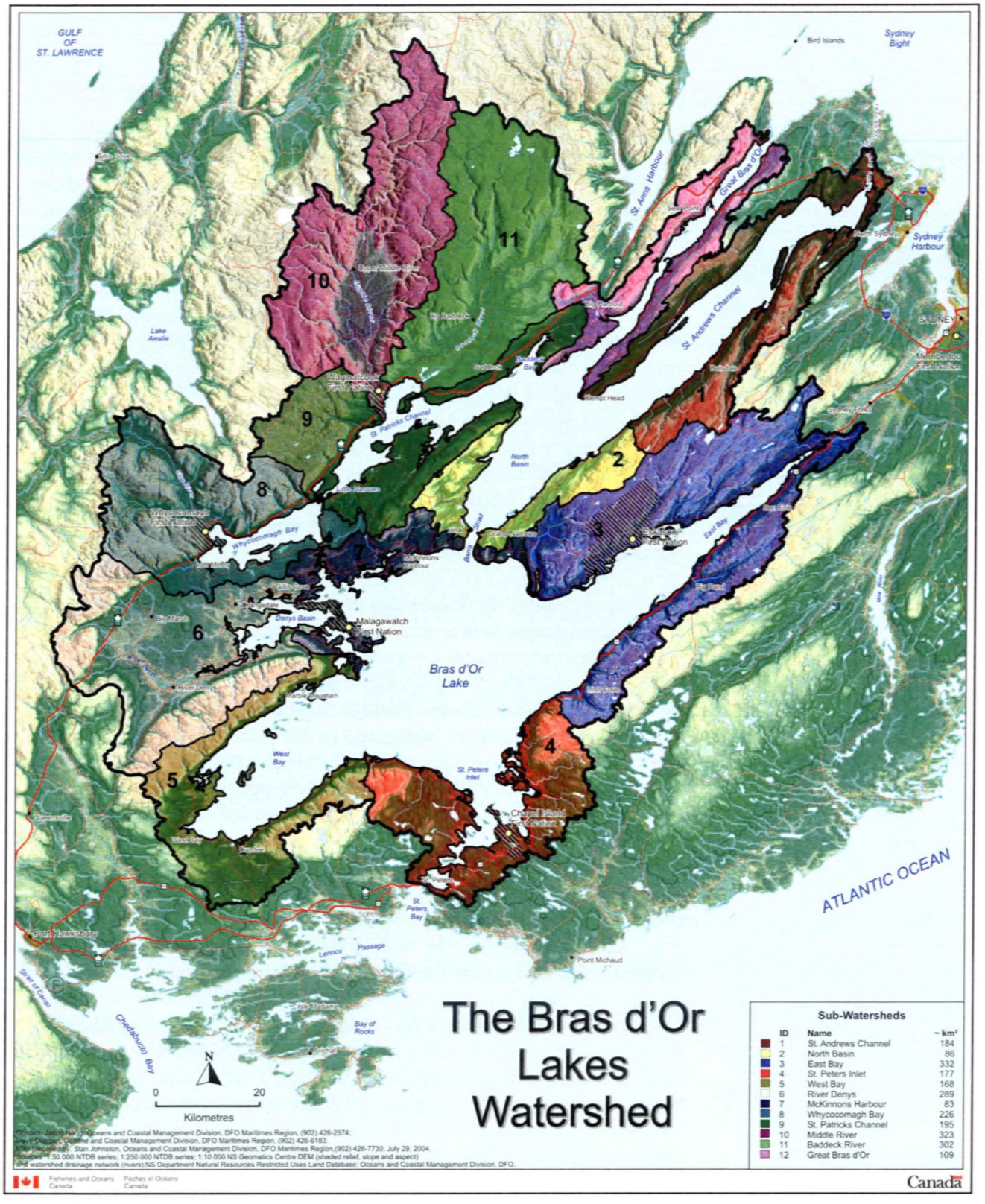


Figure 1. The Bras d'Or Lakes watershed

A questionnaire was given to each of the participants at the conclusion of the workshop, asking their general opinion about the effectiveness of the workshop for gathering TEK, and seeking any additional information or suggestions that they might have (See Appendix 5 for questionnaire and responses). Participants were generally quite pleased with the workshop as a means to gather TEK about the Bras d'Or environment, although they made several recommendations for improvement.

These proceedings have been prepared as a stand-alone document but will also be incorporated in part into the larger EOAR for the Bras d'Or Lakes. Comments from the workshop not related to the environment are provided in Appendix 6.

Summary of the Ecosystem Overview and Assessment Report for the Bras d'Or Lakes

Mike Parker, East Coast Aquatics Inc., presented an overview of the Bras d'Or Lakes Ecosystem Overview and Assessment Report (EOAR) to the workshop participants. His presentation considered the first three of four components of the EOAR: physical systems (geology and oceanography), biological systems (terrestrial and aquatic), ecosystem relationships, and human activities.

In particular, Mr. Parker highlighted some of the information gaps identified in the EOAR:

- Broad biological inventories, particularly in the eastern watershed, remain a gap in terrestrial knowledge.
- Mechanisms that support energy flows of nutrients and production exist as an information gap in the physical systems of the Bras d'Or.
- Current and detailed biological knowledge of the nearshore area exists as an information gap for aquatic biota.
- Ecosystem relationships and biological interactions within the Bras d'Or Lakes exist as an information gap. Key examples include a lack of understanding of:
  - -the role of eelgrass within the Bras d'Or Lakes because of the numerous apparent ecosystem linkages with this species,
  - -the complex interactions between the invasive species of green crab, tunicates, SSO, and MSX and the ecosystem, and
  - -food web impacts due to or related to the decline in American plaice and herring.

Mr. Parker told participants that the key objectives of the workshop were to gather Traditional Ecological Knowledge (TEK) to help verify or contradict the scientific literature on which the EOAR is based, and to fill in information gaps where research does not yet exist or is dated. He also emphasized the importance of gathering TEK to document historic and spatial changes within the Bras d'Or Lakes watershed because scientific research is often spatially and time constrained.

Terrestrial plants and animals

Plants and trees

If the Elders before us were asked these questions about 50 years ago, they would have had all the answers. When they died, their knowledge died with them. We used to take home remedies from our Elders that worked for our ailments, but we didn't know what it was that we were taking and we still don't know but it worked. –TEK Workshop Participant

There have been many changes noted in plants around the Bras d'Or Lakes (Table 1). Gooseberries, raspberries, wild strawberries and blackberries were once abundant but have declined. A "Berry Trail" always existed from Eskasoni up the mountain to the north where blueberries and a few other kinds of berries would be harvested. Potential reasons for the decline in berries were discussed including climate change, acid rain and development of houses. Mint leaves and hazelnuts were also noted to have disappeared.

The loss of plants around the Bras d'Or Lakes has had an impact on the Aboriginal community. Participants noted that plants are very important for ceremonial purposes. For example, sweetgrass is used for opening prayers. Plants are often used to make medicines and salves but now it is difficult to find the plants to make medicine. Elders expressed concern not only about the loss of plants in the area but also about the loss of traditional knowledge about plants.

Several participants discussed their concern about the health of trees. Many trees have fallen to disease. Beech trees are full of disease and cankers. The fungus on beech trees has affected the beech population but it is getting better. Dutch elm disease is present and the trees along some of the rivers are diseased. One participant thought that ships with wooden pallets had brought disease to the trees of the Bras d'Or. This caused habitat fragmentation. TEK suggests that when trees fall the waterbed changes, and silt and sediment go into the gravel bed. Fish can't lay eggs in the gravel beds so this affects fish habitat.

The concern for alder trees was evident. Alder trees are used for sweat lodges, medicine and dyes. They are not healthy in traditional harvesting areas such as Membertou where they are dry. Pollution and new bugs have attacked the trees. People now have to go toward Marion Bridge [Mira River] to find suitable alders to use.

Old photographs of communities around St. Ann's Bay show that all the trees were cut down, probably for firewood. Now spruce trees grow there. The decline of black ash and maple around the Bras d'Or has had an impact on First Nations communities who now have to import black ash from other nations. Maple is used to make baskets and is more difficult to find. The burl (mquoqt) used to make waltes bowls is harder to find. The importance of trees for cleaning air was discussed.

Table 1. Plants in the Bras d'Or Lakes watershed					
Mi'kmaq name	**Common name**	**Description**	**Use**	**Location**	**Trend**
Wjinsiku'l	Sweetgrass		Ceremonial purposes, opening prayers	Canal and lighthouse near St. Peters, Malagawatch near graveyard, Little Island outside of canal	
Plamuipkl	Peppermint leaves	Dark green and not very shiny	Cold medicine, tea, food, stomach medicine	Around streams and beaches	Increasing
Najoqjemin	Blackberries and root		Stomach medicine		Have declined
Wisawtaqjijkewe'l	Golden theath		Cold medicine, high blood pressure, tea, salve cures anything	Found all year round	
	Tea berries	Shiny red leaves (about 5)			
	Pepsin plants	Have little red cherry like berries			
Kaqauejuman	Crow berries	Have long and short stems			
K'lu'n	Cranberries			Malagawatch Point, Michud Beach	Not around much this year
Apaqtejkl	Gooseberries			Grow in sandy areas or sand bars	Have disappeared
	Foxberries	Smaller than cranberries and grow on higher ground			
Ki'kwesuskl	Flagroot				
Pakosi	Wild turnip	It is a water lily.	Good for flu	In the water and near the shore, Wagmatcook - everywhere	
Jikmueyey Pakosi				Grows on the land	
Melkamu'kowey		Has a white flower			
Jipaqteskewe'l	Buttercups		Used as tea and can be crushed and wrapped around knees		

Table 1. Plants in the Bras d'Or Lakes watershed continued					
Mi'kmaq name	**Common name**	**Description**	**Use**	**Location**	**Trend**
Pqajkkjij	Caraway seeds				
Mimkom	Oak tree		Diarrhea		
Mujiwimanaqsi	Wild cherry tree			Take off bark, boil, add sugar and use as a cough syrup	
Pituiskijijik	Service berry or Saskatoon berry		Used to make pies		
	Dandelions		Jam and wine		
Mkwiman	Blueberries				
Knijijk	Sugar berries			Found under moss with white berries that are edible	
Plamuipkl	Mint leaves		Tea		They are gone.
Maliqumjil	Hazelnuts				They are gone
Npiktuniej	Fern (eggs)				
Kikwasusk	Flagroot				
Wisapeklow	Spruce Gum		Used as a gum and the bark (Jikmuutp) was used as medicine for a sore throat		
Kaqawejmin	Punchberries				
Mteskmwaqsil	Fiddleheads				
Eptekewe'l	Hot parsnips				
Kesipalka'luajijik	Wild rosebush		Diarrhea		
Amaltaqiaqewe'l	Mayflower				Harder to find
	Black Eye Susies				Harder to find
Temkuetotimkewel	Violet		Medicine		
	Yellow flower				Harder to find
Tuklijuimis			Salve cures anything		
	Poison ivy			Malagawatch, Whycocomagh	Increase at Malagawatch & Whycocomagh; gone from some places such as Eskasoni
Tamaqn	Indian Pipe				No longer found

Rare Species

Workshop participants specifically discussed three species that have been listed by the Committee on the Status of Endangered Wildlife in Canada as species at risk in Nova Scotia.

Lynx (Apuksikn) is very rare and not seen often because it is considered cunning and good at hiding. It lives mostly in the woods. There are less lynx today but the population fluctuates with the snowshoe hare population. Lynx have been seen at Malagawatch, Margaree, Nyanza, Caribou Marsh and on the golf course in Cape Breton Highlands National Park. It is thought that the American marten (Apistanewj) lives up in the Highlands.

There were differences of opinion about the status of **Wood turtles** around the Bras d'Or Lakes. Wood turtles have been sighted in Whycocomagh and River Inhabitants where they are thought to be abundant. However in other areas they are thought to be rare. Other turtles (Mikjikj) have been seen behind Membertou and in the Mira River, although it is not known whether they were Wood turtles. Turtles have not been seen in Middle River. One participant noted that turtles are plentiful around brooks while another remarked that turtles are difficult to see which may account for why some people think turtles are rare.

Barrows Goldeneye have been found near Whycocomagh Bay shore at dusk with an increase on the west side of the island.

Animals

Deer were reported to have declined around the Bras d'Or Lakes. They have been declining near Eskasoni since the 1960s. The reasons for the decline are not known, however coyotes and overhunting are considered potential causes. One participant remarked that in the spring, deer are getting hit by cars because they are looking for food. Despite the decline, it was thought that deer counts would be higher this year because of the mild winter.

Moose (Tiam) are much more common than 30 years ago and are thriving. They are now seen closer to the Whycocomagh Reserve, on the south side. One participant noted that the native moose of Cape Breton died off so 18 moose were shipped in from Alberta in the 1940s. He commented that when native species die off there is something very wrong with the environment.

Concern was raised about how moose used to be an important food source that was shared and now it is being sold for fun. One participant remarked that during the moose hunt, greed is out of control. One Elder noted that habitat destruction has had an impact on the moose population. Another participant thought that moose were destroying the highlands by eating trees. There is a belief that on the mainland, acid rain neutralizes natural salt areas that moose depend on and that this creates a weaker animal, and facilitates the negative effects of the deer parasite.

When you see a fox, people don't like it. I don't like when people say things against fox. They are a native species. It's our fault for taking away their habitat. We forget how we interact with nature. We are imposing on this animal's habitat.
–TEK Workshop Participant

Some participants thought that **fox** had increased whereas others noted that the population had declined. Both red and silver fox have been seen. Fox have been seen in Wentworth Park, Membertou hunting for ducks. More fox are seen around farming areas. Fox get tame and play with dogs. This is not good because someone could kill them. One participant commented on negative attitudes about fox (See sidebar on left.)

The coyote population is increasing despite a bad winter for coyotes a couple of years ago. Numbers of coyotes are increasing on Chapel Island and more have been sighted around Whycocomagh and Membertou. There was some discussion about whether coyotes had actually been introduced to Cape Breton as a result of the Canso Causeway. One participant remarked that coyotes could cross the ice and that, in fact, he had seen them running across the ice in past years.

There were differences of opinion about the status of **rabbits** around the Bras d'Or Lakes. Some participants noted that the rabbit (Aplikmuj) population was down whereas others thought that it was increasing. One participant noted that there hadn't been rabbits for 10 years but now they are everywhere.

Comments on several other terrestrial species were made:

- **Skunk** (Apikjilu) is a recently introduced species to Cape Breton. Although they are rare on the Island, the population appears to have increased but not by much.
- **Caribou** have been either hunted out or eliminated by the coyote.
- **Wolves** were introduced a few years ago by Natural Resources. Timber wolves used to be seen on Cape Breton.
- Occasionally there are **bear** around. They are seen more often closer to homes.
- **Cougars** had been seen on Kelly's Mountain, and around Orangedale, Margaree and Nyanza.
- **Porcupines** were recently introduced to Cape Breton as a result of the causeway. They appear to be increasing.
- Some Elders thought **squirrels** had increased whereas others remarked that they were in decline. The absence of squirrels was attributed to overhunting or due to coyotes.
- Some Elders thought **weasels** were increasing whereas others remarked that they were in decline.
- **Rats** (Pitalu) and **mice** (Apukji'j) are increasing. Rats are on the rise due to the constant food source, milder winters and faster reproduction. Rats are increasing in Eskasoni.
- **Bobcats** (Wtkoqwej) are rare and declining. Two kinds of bobcats have been seen (long and short tail). Bobcats have been hunting dogs and cats. One participant lost his geese to a bobcat a few years ago.

Hunting in the highlands areas west of St. Patrick's Channel is a relatively new thing. Game used to be readily available next to the reserves, so there were no traditional camps or trails to the highlands. –TEK Workshop Participant

Before white man, the native people would migrate depending on where the food was. They would migrate to match the migration patterns of eels, salmon and certain species. The Grand Council would organize who went where so they wouldn't overhunt or overfish any area. During the winter they moved inland. They would eat dried stuff and hunt moose and beaver... They would keep eels and fish in pools so they would stay fresh until they would eat them. –TEK Workshop Participant

- **Muskrat** (Ki'kwesu) and **mink** populations were thought to be declining, possibly due to the loss of marshes. However some participants noted that mink and muskrat were more abundant than previously.
- Some participants thought that **racoons** (Amaljikwej) were increasing whereas others remarked that they were on the decline.

Declines in populations of various terrestrial species were attributed to:

- overhunting
- loss of habitat
- clearcutting
- pollution
- dumping
- no traditional teachings
- loss of respect for the natural world

Changes in hunting patterns due to the decline in game were noted. (See sidebar on left.)

Birds

Cormorants (Shaq) appear to be increasing and have been noticed more in the last 50 years. They first came to Cape Breton around 70 years ago and have been very destructive toward fish, especially perch.

Herons have been declining since the 1930s-40s. Smaller ducks are gone. **Kingfisher** and **sandpiper** (Jijuikatej and Jijuikatejij) are declining. **Grayjay** birds and **sparrows** are not as numerous. **Barn swallows** are rare.

When the inlets are frozen you can stick your head around the corner and it's like a helicopter with all the geese taking off. –TEK Workshop Participant

Several bird populations were noted to be stable:

- **Black Bird** (Pu'tliskie'j)
- **Robin** (Jipjawej)
- **Swallow** (Pukwales)
- **Crane** (Tmkwaliknej)

The following species are increasing: **grouse**, **crows**, **wild ducks**, **Merganser** (Apjijkmuj) and **partridge**. Partridge has increased in Irish Cove.

Geese are increasing near Wagmatcook. They are tamer and not scared of people. In Little Narrows, there are quite a few Canada Geese. These geese were put there. They are supposed to fly south in winter but there is so much food there, they don't fly south.

Some people thought **owls** (Goodoosek), and in particular, barred owls are rare. Others thought they had increased. Some people believe an owl is a death omen and it brings bad luck. It's like an urban myth.

A lot of our people think owls are bad luck. You can listen in between the hoots and there is a voice with a message from an ancestor. But it's not bad luck. Listen to him and try to understand the message. –TEK Workshop Participant

The **eagle** (Kitpu) population is thought to be either stable or increasing. There are more eagles than in the 1960s because there is no DDT spraying anymore. Eagles are protected so they are left alone. However, they are being fed by people more often and therefore they don't hunt and they stay around more in the winter. Eagles have been seen nesting in Whycocomagh. Occasionally Sea Eagles from Greenland, Iceland or Northeastern Europe turn up in Cape Breton. In the Cape Breton Highlands during the moose hunt, at least 300 eagles are there because there is a feast for them. But when the hunt is over they go away.

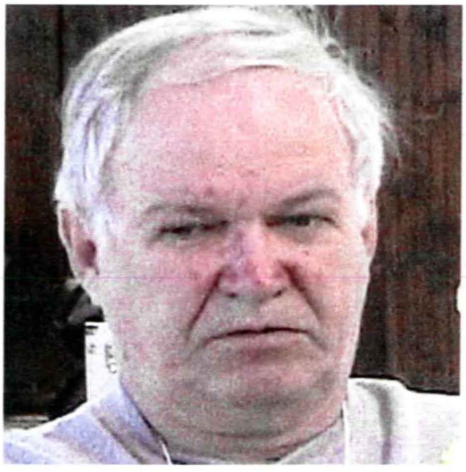
Freshwater species

Fish

There was a difference of opinion about the status of freshwater fish. Some people thought that most freshwater fish populations were the same. They remarked that there have been no notable changes in spawning locations as far as they know because there are no studies they are aware of that have been done. Others believed that freshwater fish populations in general have declined in the Bras d'Or Lakes, that the Lakes need more stocks, and that catch and release is not working. As one man stated, There are more anglers than fish.

Over the years salmon have declined in numbers and size. As late as 1925, locals were still catching more salmon than locally was demanded, and they would have to fillet and salt it to prevent it from spoiling. The largest salmon caught in a net was 44lb. In Sampsonville (St. Peters) during the 1920s-1930s there was a mill that would put sawdust in a brook that would wash into the lake, and in the winter they would dump sawdust on the ice. Large piles of sawdust formed on the floor of the inlet that would be visible as "yellow" through the water. There were many small worms associated with the sawdust that fish of all kinds would come to feed on and it was a great place to catch trout, smelt, salmon and eels. The sawdust dumping no longer occurs, and none of these fish are prevalent there now.

There are more anglers than fish.
–TEK Workshop Participant



Similarly, in the 1920s and 1930s, there were lots of salmon in the Washabuck area. Salmon spawning appears to have declined since then. Salmon were fished commercially. In 1974, a 30lb wild salmon was caught in Benacadie Pond. There are few wild salmon, even in Margaree River. St. Peters Inlet area was once a big spawning area. Salmon and rainbow trout are reproducing in Irish Cove. In the North River the population of salmon is very good. The decline in salmon is attributed to their often having been caught in herring nets, and the clearcutting of trees that has destroyed their habitat.

Speckled and **rainbow trout** have declined. However, the speckled trout population has come back in the Whycocomagh area in recent years, possibly because they stopped fishing the eels there. Aquaculture introduced in the 1970s (brown trout, rainbow trout, Arctic char) may have contributed to the speckled trout decline due to competition and larger fish preying on the speckled trout. Brown trout are only found at St. Peters. They feed on small salmon smolts.

As a kid I caught lots of big brook trout. Now the big ones are few and far between. –TEK Workshop Participant

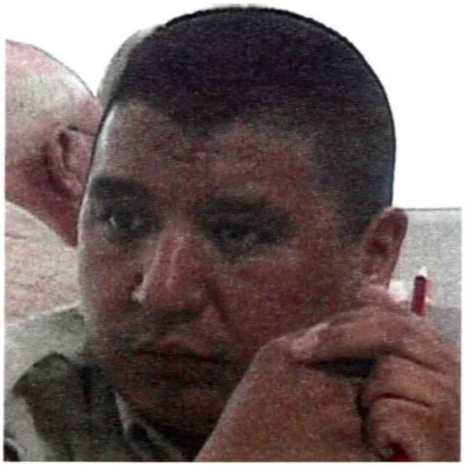
Striped bass at the mouth of the Baddeck River come to spawn in the middle of summer on the marshy grounds in shallow water.

Spawning locations identified for freshwater fish include:

- Skye River
- Margaree River
- Benacadie River
- Grand River
- Black River
- Most brooks

Other species

Beavers are still common. They move up headlands and go higher up streams. Beavers don't like wild waters so they move upstream.



Nearshore area

Physical changes

Several participants remarked that the nearshore is the area where the biggest change has occurred in the Bras d'Or Lakes. The most significant changes over the last 60 years were attributed to erosion, in part due to Nor'easters and warm water. At least two small islands have disappeared in recent years. One in St. Peters off Burkes Point and the other in West Bay west of the Cranberry Islands. Similarly barrier beaches have had large breaches at Cape St. George and MacKinnon's Harbour. The graveyard in the Little Narrows is close to shore, and has been eroded by wind and rain. It is believed that the lack of ice in recent years has allowed winter storms to accelerate erosion.

There was concern over how low the water is on shorelines around the Bras d'Or. Several participants remarked that there have been more low tides in recent times.

Consequences of shoreline development are evident. There is increased siltation in the lakes. As a result, visibility in the Lakes has decreased significantly and has changed from clear to cloudy in the last 15 years. Water is much dirtier than before. Little Narrows Gypsum has contributed to siltation in Whycocomagh Bay over many years. Today, after a rainfall the water level in some rivers rises quickly because there are fewer trees around so the water is no longer absorbed by roots. In 1973, the rivers would rise only a few centimetres after a rainfall.

Loss of habitat is evident. In particular, wetlands and marshes with cattails are declining and/or disappearing. The decline in salt water marshes coincided with a large influx of ducks. Many marshes are "sinking" or being covered over. They used to be firm but are now turning into mud flats. Tractors used to collect salt hay but the marshes will no longer support the vehicles. Cattails were used as torches, and harvest may have had an impact either in helping renewal or depletion. Potential reasons for the decline in wetland habitat include pollution, sewage, siltation, bad land use practices, over use of chemicals, farming, mining and strip mining.

Eelgrass

Many Elders noted the decline of eelgrass (qata'skul) around the Bras d'Or, however some believe that the plant is not declining but shifting location, at least around Whycocomagh. There is a decrease at Eskasoni and Manis (West Bay). There are still a lot of healthy eelgrass beds where there are islands such as around Chapel Island. There are deeper spots in River Denys, about 3-4 m, and in South Basin that have eelgrass, possibly because the water is clearer. Eelgrass appears healthy near Wagmatcook and Waycobah. An increase of eelgrass in St. Peters and West Bay has been observed over the last 5 years but prior to that had been quite low for decades. Near Baddeck and Little Narrows, eelgrass can die off for a couple of years but usually returns, however it is not observed in muddy or deep water. Eelgrass has been observed growing on sand and hard bottom areas.

When I was a kid I walked through eelgrass. They are great nurseries. You would see a lot of minnows, pinfish and eels and watch them swim away. I want to talk to youth to let them know that eelgrass beds are important nurseries. Eelgrass has decreased a lot. It is different today.
–TEK Workshop Participant

There is a lot less eelgrass around the Bras d'Or. I'm amazed by the infestation of green crab. I think the one most important single cause for the decline in eelgrass is the green crab.
–TEK Workshop Participant

I did a lot of diving in the 1970s on eelgrass beds. There is such a difference now. Now you only get a fraction of eelgrass beds that there once was. Eelgrass looks like there is a film of something on the leaves and fronds. It doesn't look healthy. This occurs in many places. In Georges River, eelgrass and wharves are covered in black tunicates, blanketing the eelgrass. It's [black tunicate] in more coves than ever before. Shallow species have died.
–TEK Workshop Participant

Eelgrass (and rockweed) used to be used as insulation around houses in the fall and winter as late as the 1940s and 1950s, washing ashore in large volumes where it could be collected. The material no longer washes ashore in such quantities. The grass was used as banking around houses in the fall and during potato planting to help keep potatoes dry. Off French Cove, eelgrass was used to make hay over 35 years ago.

Most notably eelgrass was identified as a place to find and fish eels and other fish. Eelgrass, as well as other water plants, act as nurseries for fish. The abundance of eelgrass in an area indicates the presence of many fish.

After an earthquake in 1929, there was no seaweed accumulating on the shores according to one man's parents. It has only recently been making a comeback to where it accumulates on the shores in fall in certain areas. Eelgrass has been declining since the 1940s and 1950s due to siltation, raw sewage, watershed runoff, chemicals in fish food from fish farms, pollution and green crabs. Following storms, there is less eelgrass.

Green crabs destabilize the bottom, dig out eelgrass and damage the habitat. Some people thought green crabs were on the rise whereas others thought they were declining. Green crabs have cleaned out razor clams in St. Ann's Bay. One man who frequently dives in the Bras d'Or Lakes attributed the decline of eelgrass to green crabs,

The unhealthiness of eelgrass in some areas has also been observed.

Fish and invertebrates

Herring

Years ago when herring was spawning, the whole nearshore area was all white. You don't see that anymore.
–TEK Workshop Participant

Herring traps were mismanaged. There were hundreds of nets and traps tied together. You could see 40 to 60 seiners at one time. They'd come in and bury them. They only took the roe. Hundreds of tons of herring were taken to the landfill.
–TEK Workshop Participant

There used to be a lot of herring coming in to the John Paul area in Eskasoni. They would spawn and when they were done the water would look all milky. The last time they did that was about 20 years ago - they haven't returned. It's also the same story in St. Anne's Bay and Harbour. There used to be enough herring in St. Anne's Bay to collect 16 barrels. There is herring but they're not spawning.
–TEK Workshop Participant

A significant decline in herring has been noticed over the last 25 years. In the 1970s, 1980s and 1990s seiners could be seen fishing. Nets were set whenever the herring were spawning in coves and inlet areas. In the late 1990s the herring declined. They were used for the bait fishery. There used to be 32 spawning grounds for herring in the Bras d'Or Lakes but now there are few (e.g., Malagawatch). You can still see a few herring spawning in Johnson's Harbour and on sand bars along the shore in East Bay.

The loss of herring is attributed primarily to overexploitation but also to polluted water and seals, although some participants believe that it is a misconception that seals are responsible for the decline. Herring spawn in shallow water in the eelgrass and it is thought that the loss of eelgrass has also played a role in the decline of herring.

Eels

Legend had it that a large serpent existed in the Lakes, and people would stay away in the fall. It was later found to be an "eel ball". This ball of eels congregated in late February in a river mouth and rolled back and forth along the channel for up to two weeks. Fishermen would make a string of holes in the ice heading upstream and each would have an opportunity to fish as the ball rolled past their hole and on to the next. These "rolling eels" are disappearing.
–TEK Workshop Participant

Eels have declined. The bridge at Barra Straight was first built in 1900, and Elders then thought it had disrupted the flow and altered channels in the area, impacting nutrient flow to East Bay. This resulted in the slow decline of the eel, until by the 1950s you could no longer harvest a significant amount. The Canso Causeway also contributed to the decline of the eel. The decline of eels has been observed at Judique and Mabou.

Eels are smaller than before. They go into seaweeds, winter in the grass or bury themselves in the mud and when frogs appear in the spring so do the eels. People used to use eel traps but now eels can be speared in the winter.

From a habitat perspective a local diver reports a shallow lava rock shoal off the end of Long Island in St. Andrew's Channel where high densities of eel can still be observed. Eels are still seen in Crinkle Lake near West Bay. There was a big kill of eels of all sizes near the fire hall where Middle River meets Nianza Bay (Wagmatcook). Elders believe the kill might have been caused by the water being too low or the ice too thick.

Gaspereau (Kaspalaq)

In the 1970s, I saw gaspereau coming through like a big black cloud. Now they just come in little schools.
–TEK Workshop Participant

In St. Ann's Bay I saw one massive school of gaspereau a few years ago but that is rare. –TEK Workshop Participant

Gaspereau is declining. It is not available anymore in May-June when it was once abundant. Gaspereau still spawn relatively strongly at Red Point and South Side Road near Whycocomagh, Jamisville barachois and Grass Cove near Iona. They used to be abundant in the barachois at Eskasoni but there are very few now. Some are still observed in Barney's River. Eagles will be affected by their decline because gaspereau is their main food source.

Smelt (Kaqpesaw)

The smelt population has declined. Smelts only come into the streams to spawn. They still spawn up North River. In Brack's Brook, the smelt population was higher than ever last year. Declines have been observed in smelts this year at Benacadie. When Barn Swallows start flying around, it indicates that the smelts are running.

Cod

Cod have declined. In the 1980s and early 1990s they allowed longline gear in West Bay. Now there are hardly any cod left. Cod in the Bras d'Or Lakes are smaller and don't even look the same anymore. One participant thought that cod were increasing around Whycocomagh. Another remarked that the Bras d'Or is probably the only place in the world where you can see codfish coming to the surface to feed on little fish in 6-8 inches of water.

Oyster (Mntmu)

In River Denys, there is a big oyster growing area. It was once the most productive oyster growing area in all the Bras d'Or. This area is now under silt. This is related to the cutting of trees.
–TEK Workshop Participant

Oysters used to be a big revenue thing in Malagawatch but now you can hardly find any anywhere.
–TEK Workshop Participant

There has been a decline in oysters. Silt is being deposited on an oyster lease (not fished) off Eskasoni and is believed to be responsible for the decline in this area. In the last 5 years, 2-3 inches of deposition has occurred at this site. Oysters caught in We'kaqma'q were no good – they closed the fishery because there was so much pollution and the oysters were full of bacteria. The single biggest cultch (natural oyster bed) for oysters is eelgrass. The decline of eelgrass may have contributed to the loss of oysters because spawn have less eelgrass to collect on. Declines in Gillis Cove, Crane Cove, River Denys and Malagawatch have also been observed. A few participants had not noticed oyster declines in Eskasoni or Malagawatch.

Weeds have turned up in more abundance in shallows along the shore. Oysters get tangled up in it and get smothered by it. Weeds are associated with oyster beds in Europe, and have been seen in MacKinnon's Harbour and Denas Pond. There is a brown weed that blankets the bottom of part of Aspy Bay. All the oysters are smothered by it.

In addition to silt, pollution, sewage and MSX are believed to be responsible for the oyster decline. It is thought that MSX first showed up with the green crab and that crab may be the transport mechanism for the parasite. There are areas where oysters within a mile of heavy mortality areas are unaffected, so some protective and transport mechanisms probably exist. Ballast water release from foreign vessels is also believed to be a transport mechanism for the parasite. Good oyster areas have been lost in part because culverts were put up and herbicides that affect larval counts were used on the sides of roads.

Mussels

The mussel population is stable or perhaps increasing due to the large amount of debris and waste going into the watershed.

Other species

Other species that have declined in the Bras d'Or Lakes include clams, quahogs, urchins, flounder, skate, minnows and lobster. Elders observed that, in general, there is a lot less plant life in the water. Clams were abundant going down Island view (7 islands) in the past but the present population is very small. It is believed that flounder have been affected by the decline of herring because they were dependent on herring spawning for food. Flounder appears to be plentiful in Whycocomagh. There are not enough small lobster but they are on the way back.

Thirty years ago at Chapel Island I was diving and getting little hermit crabs. There aren't many there anymore.
–TEK Workshop Participant

No one recalls shad in any numbers, although it was mentioned that they could be speared on occasion. You would need to spear them as they went away from you, as their big scales would deflect the spear from the side or front of the fish.

Causes of nearshore damage

Changes to the nearshore area were attributed to:

- overfishing
- loss of habitat
- clearcutting
- cottage/trailer raw sewage
- erosion
- ballast water releases in lakes
- dumping
- pollution
- acid rain

Anywhere where they allow dragging in the Lakes, it destroys everything. Dragging turns an underwater forest into a desert with one pass. –TEK Workshop Participant

Dragging was thought to have contributed to the decline of many species through habitat damage.

Dragging in the late 1980s was thought to be a potential leading cause of the decline in several species. A decline of scallops in St. Patricks Channel was attributed to dragging.

St. Ann's Bay was given as an excellent example of what can happen if you put a stop to dragging. Scallops and other fish species returned there after 2 years. There has been much improvement since dragging has been banned.

Marine mammals

The **seal** population has increased sharply and seals are moving into the Bras d'Or Lakes, possibly because of increased fish abundance. There is less competition because no one is fishing for cod or herring. This winter 250 seals were seen at the mouth of Washabuck and 40 seals were sighted in the St. Peter's area. There were 32 seals at Ben Eion Beach. They like to sit on the edge of the ice to hunt. Now there is more ice edge because there is less ice cover.

Halfway between Port Hawkesbury and Whycocomagh you would see seals crossing the road in late fall/early winter, perhaps following fish up the brook. It was common to see seals on the road but they are not seen as often anymore.

Some thought **otters** had declined whereas others remarked they were plentiful.

Climate change

Participants noted that there used to be more snow and ice in the Bras d'Or area. Several stories were told about snow banks as high as houses and telephone poles, particularly in the early 1900s. In recent years, the snow hasn't been as deep. About 40-50 years ago, there used to be 4-6 ft of ice on the Bras d'Or Lakes but now the Lakes don't freeze. This is particularly true of the last 10 years. A lack of ice on roads and land near Whycocomagh has also been observed. Ice hasn't formed on Baddou Island in recent years. Forty years ago, it was colder and the ice would stay until June. There is a story of Sydney Harbour being frozen all year in the late 1890s. About 3-5 years ago in Nyanza, the winter was very cold and the ice froze to the bottom and killed the eels. The formation of ice is important because it cleans the shoreline by pressing against it and then receding.

There is less ice formation now in and around the Bras d'Or Lakes. In 2006, ice only formed in half of St. Anne's Harbour, and this only occurred one other time in the 1950s in one man's 87 years. Residents used to drive from Crane Cove to East Bay on the ice 50 years ago and this can no longer be done. Residents would drive from Malagawatch across Bras d'Or Lake to Kelly's Shoal to go ice fishing in the winter. Cars could be on the ice by Christmas in the past. Horse races used to be held on the ice. Contrary to the greater ice in the past, it was also noted that in 1933 one resident's father rowed across St. Peter's inlet for all but two weeks, so it was also warm at some points in the past.

The lack of ice has resulted in a change of activity on the Lake. People used to skate on the ice and travel from reserve to reserve or to attend church or visit Chapel Island. Messengers would travel by ice to inform people of a death in the community. People skate less now and get less physical activity. Fifty years ago, cars would travel on the ice. You could drive from Eskasoni to Potlotek on the ice in half an hour. Trucks used to travel to Kelly's Cove in the middle of the lake. Horses and skidoos crossed the ice and there would be horse races and hockey games. The Elders used to move houses on the ice but can't do that anymore. Ice fishing for smelt, eel and cod used to be common but now it can't be done.

In general it is much warmer. The winters are warmer with more rain. Summers are hotter than before. There are a lot more storms that are more severe. January and February are milder now so you don't notice the slight warming in January before it gets colder again.

Effects of warmer winters and less snow and ice are evident. There are less jellyfish because of the warmer water. The warmer winters mean less water in the spring because the water level is receiving less runoff. This results in less flushing. More bacteria are present in the water. Animals and people get sick more. The smaller brooks are dry and there are less fish in the brooks. The warmer weather brings more illness to potatoes, and makes gardens harder to

grow. Insulation of snow during winter is important for berries and the warmer winters affect berry picking. There is an increase in insect populations, such as the moth, due to the earlier spring and later fall. Floating algae appears earlier in the spring and more in inlets.

Climate change was also thought to have played a role in the changes in forests. A lesson has been learned from black ash whose seeds will not germinate unless climate conditions are right. Black ash has died away although some residual black ash seems to be in hardwood forests in the mountains, however only 4 in one woodlot was seen. White ash is still around and is found more in lowland areas. There was concern that the original forest will become a completely different forest.

Significant Areas

Important areas for plants and animals

For many Elders, it is difficult to choose specific significant areas for plants and animals because every species has a spirit or qualities that are important. Similarly every brook or stream has its own significance. Elders discussed the need to teach children not to destroy the spirit of plants and animals.

Table 2. Significant areas for plants and animals within and around the Bras d'Or Lakes watershed

Plant/animal	Significant area
Sweetgrass	Malagawatch, Little Narrows
Sweet flag medicinal plant	Whycocomagh
Native orchids	Irish Cove
Berries	Chapel Island First Nation Reserve, southwest of New Campbellton, Malagawatch First Nation Reserve
Black ash	East of Cains Mountain, east of Rear Christmas Island
Rare birds, cormorants	Red Islands
Wild ducks, Mergansers	Sydney Harbour, Northwest Arm, South Arm

The watersheds of three rivers are significant, primarily because they are salmon habitat: Baddeck, Skye and Middle Rivers (Table 2, Figure 2). Middle River was noted to be important for speckled trout, rainbow trout, salmon, striped bass and shad, although shad have disappeared from the River. In addition, medicines at the estuary give the area significance. Benacadie Pond is also important for salmon. Islandview Brook, Indian Brook and MacIntosh Brook are significant areas for salmon, although salmon no longer run in them, probably due to forestry practices.

The entire watershed of the Bras d'Or Lakes is significant as eagle (Kitpu) habitat for nesting and breeding. Edges of streams throughout the watershed are important for pag'osi (cow parsnip) medicine. Marshes are important areas because they have many significant plants used for medicines such as sweetgrass. Other important areas for plants include Malagawatch (sweetgrass), Little Narrows (sweetgrass), Whycocomagh (sweet flag medicinal plant) and Irish Cove (native orchids).

Red Island is significant for rare birds and cormorants. Sydney Harbour, Northwest Arm and South Arm are important areas for wild ducks such as the Merganser. There are still some around in the area but they are rare. They were last seen in abundance approximately 25-30 years ago. The Cape Breton Highlands are significant for American marten habitat.

Significant areas for plants and animals within and around the Bras d'Or Lakes watershed are given in Table 2 and shown in Figure 2.

Table 2. Significant areas for plants and animals within and around the Bras d'Or Lakes watershed continued	
Salmon	Baddeck River, Skye River, Middle River, Benacadie Pond, Islandview Brook (H*), Indian Brook (H), MacIntosh Brook (H)
Herring	North of Indian Islands (off Islandview), eastern Denys Basin
Gaspereau	MacKinnons Harbour, east of Christmas Island, Neilban Cove, northern Pipers Cove, Amaguadees Pond, Grass Cove, Plaster Cove area, west of Indian Islands (off Islandview), Benacadie Pond, Indian Cove, Gillis Beach area
Smelts	Plaster Cove area, north of Grass Cove, southwest of Castle Bay (west of Amaguadees Pond), MacNabs Cove, Maskells Harbour, Indian Cove, Pipers Cove/western Boisdale Hills area (H)
Quahogs	Pipers Cove, Gillis Beach area, Neilban Cove
Lynx	Malagawatch First Nation Reserve, north and northeast of the Eskasoni First Nation Reserve, northern Bouladerie Island
American marten	Cape Breton Highlands (not shown in Figure 2)
*H denotes a historically significant area	

All areas of the Bras d'Or are significant so it is difficult to say one is more important than another. All places are significant because of day to day activities; there is no area that is not part of everyday life. Every part of Unama'ki is sacred because it contains the spirit. Every Unama'ki reserve has an annual pow wow therefore each reserve is significant for cultural and social reasons. Some areas are for spiritual reflection and some for species. The entire Bras d'Or Lake is significant for waterway transportation.

Areas of cultural, social and recreational significance

The two areas identified most often as significant are Chapel Island and Malagawatch (Figure 3). Chapel Island (Potlotek) is an important area. It has been used since the 1700s as a spiritual place. It became a meeting place after Malagawatch due to association with the French. St. Ann's Mission Retreat occurs annually on the Island for about one week and thousands of people representing the Mi'kmaq nation attend.

After the retreat in the summer, the lake is heavily polluted. There are no bathrooms and not enough outhouses. Recreational Vehicles on the other side of the Island do not use the dump station. Recreational boating is expected to increase and affect the water in the future. However, a new law (2006) requires that recreational boats have to have holding tanks.

Malagawatch is a sacred burial ground, a meeting site and a former trading place. No one owns it but there are five bands living there. It is a traditional gathering place and annual ceremonial mass site in August. It has both social and cultural significance as it is used for prayer, feast and celebration. Malagawatch is also significant for medicinal plants, and special practices for harvesting sweetgrass are used to ensure it grows there again.

Malagawatch is also important as a place to get away from modern culture. Many First Nations people have cabins in Malagawatch. With the resources to sustain themselves and no telephones, it is a place to get back in touch with nature. There is concern that the Malagawatch cemetery is eroding.

Areas of cultural, social and recreational significance are listed in Table 3 and shown in Figure 3.

The community used to go to Chapel Island from July 1 to the end of July. It is a place of prayer. The oldest Elder would open with prayers. On the Island Elders would be fed first. People shared their food and resources. We did creative cooking with potatoes and flour. We cooked luskigan bread in the sand. We would dig a hole in the sand, put the bread in the hole, cover it with sand and wood and cook it half an hour. We cleaned eels. We used white sand to clean the church floor. No one under the influence of alcohol or with bad behaviour was allowed on the Island. There were strict rules about this. Now it is still a place of prayer. People still go there but not for as long a time. –TEK Workshop Participant

Table 3. Areas of cultural, social and recreational significance in and around the Bras d'Or Lakes watershed		
#	**Significant area**	**Comments**
1	Chapel Island	Spiritual place, annual retreat
2	Malagawatch First Nation Reserve	Sacred burial ground, meeting site and former trading place
3	Chapel Island First Nation Reserve	Annual pow wow
4	Eskasoni First Nation Reserve	Annual pow wow
5	Membertou First Nation Reserve	Annual pow wow Veterans Monument Used to live and travel on Kings Road (Stoney) from Membertou to Sydney Harbour (Ku'ntewiktuk) Gambling
6	Wagmatcook First Nation Reserve	Annual pow wow
7	Whycocomagh First Nation Reserve	Annual pow wow
8	Grand Narrows Bridge (and wreck under train bridge)	Diving. Very diverse ecology, lots of fish
9	St. Patricks Channel	Diving
10	East Bay sand bar	Swimming
11	Grand Narrows Marina	Swimming
12	Dundee Marina	
13	St. Peters Marina	
14	Baddeck	Baddeck Marina, Trailsman Hotel - Newly discovered First Nations burial ground
15	Sampsonville	Boats
16	Irish Cove	Swimming
17	Red Islands	Swimming; egg gathering
18	Ben Eion	Hiking, swimming
19	Big Pond	Concerts
20	Whycocomagh	Artifacts found around 1980, rabbit hunting near juniper trees, pulp boats, hiking, Veterans Monument
21	Cape George village	4H camp

Table 3. Areas of cultural, social and recreational significance in and around the Bras d'Or Lakes watershed continued		
#	Significant area	Comments
22	Marble Mountain (Clarks Harbour)	
23	Pipers Cove	Recreation area/beach
24	Head of West Bay Cove	Craft work
25	Barra Strait near Derby Point	Recreation area
26	Eastern shore Whycocomagh Bay	Recreation area
27	Western Nyanza Bay	Salmon netting area
28	Denas Pond	Ice fishing area
29	Kellys Shoal	Ice fishing in the past
30	West Eskasoni Harbour	Clam digging area
31	Off Neilban Cove	Indian chief burial ground
32	North Sydney	An old reserve First Nations "Holy cross" graveyard (Johnston Road) – not well marked
33	Eskasoni	Veterans Monument First pow wow 1980 Anthony's Trail Pulp boats Stations of the cross-shrine up hill near river
34	Kluscap Caves (Fairy Hole)	Home of the great warrior Chief Kluscap
35	Iona	Pulp boats loaded with pulp Cemetery Highland Village
36	Grand Narrows	Pulp boats loaded with pulp
37	St. Peters Canal	Used to be a Mi'kmaq site where teepees were made of tar paper. On the park side of the canal, there used to be a Mi'kmaq camp and it is believed that there is a Mi'kmaq burial ground there.
38	New Campbellton Point (Campbellton to the caves)	
39	Bucklaw (Epatuekwityy)	Overnight stop in Bucklaw Bear Mountain above Bucklaw
40	Hunters Mountain	

Open discussion

The last session of the workshop was intended to provide workshop participants with an opportunity to add additional information or identify gaps that had not been previously discussed in the previous working sessions. No additional comments were made at this time with regard to the subject of the workshop.

Albert Marshall invited participants to express other concerns and opened the floor by stating how activities on the Lake are not meeting the needs of communities. For example, strip mining and the Crowdis Mountain sewage issue were mentioned.

Mr. Marshall remarked that it is time to put all resources together to come up with one voice while emphasising that a common objective of putting energy into solutions was needed. He remarked that he is not anti-development but that every precaution must be taken to make sure development doesn't have a negative impact for tomorrow.

There was general agreement that Albert Marshall be the voice to represent the Elders in matters relating to the environment.

A few other issues were highlighted:

- the need to look into the issue of air population from flight paths over the Lakes and its impact on the health of the Bras d'Or
- the need to consider Malagawatch cemetery and other environmental issues across the entire island
- the issue of some reserves preventing others from accessing resources (i.e., eels)
- the need to have these types of sessions more frequently, perhaps every 3-6 months or to go with the seasons (spring, summer, fall, winter).

Elders were thanked for their participation at the workshop. At this point they filled out the exit questionnaire.

Workshop synthesis

The Traditional Ecological Knowledge Workshop for the Bras d'Or Lakes was an initial attempt to gather TEK to verify or contradict the scientific literature on which the draft Ecosystem Overview and Assessment Report (EOAR) for the Bras d'Or Lakes is based, and to fill in information gaps where research does not yet exist. In most cases, the TEK gathered at the workshop corroborated the scientific literature and, in some cases, filled in information gaps. Although the TEK from the workshop was never intended to be a comprehensive account of TEK within the Bras d'Or Lakes watershed, it has provided much valuable information about the biological biota and related changes over many decades that only residents of the area would know. Thus the information collected will no doubt be valuable in future planning efforts within the watershed.

Whereas the previous sections of these proceedings are summaries of information gathered at the workshop, this section is an attempt to draw out some key issues and ecosystem linkages that TEK identified in relation to the EOAR. It is important to note that the following synthesis is an interpretation of TEK information collected at the workshop, which in some cases came from one comment made by one individual with little detail. Thus the reader is cautioned to take this into consideration.

Eelgrass

One of the gaps identified in the EOAR was the current status of eelgrass and potential changes in its distribution within the Bras d'Or Lakes. Based on TEK, eelgrass has declined around the Bras d'Or Lakes since the 1940s and 1950s. Decades ago eelgrass would wash up on shore in large volumes, however this rarely occurs now. The potential for shifts in location of eelgrass was identified and has been observed around Whycocomagh. Whereas an overall decline has occurred, healthy eelgrass beds have been observed in certain locations such as around islands (e.g., Chapel Island) and near Wagmatcook and Waycobah, and eelgrass has increased over the last 5 years in St. Peters and West Bay where it had not been abundant for decades. Eelgrass still occurs in River Denys and South Basin. Unhealthy looking eelgrass was noted to occur in several places.

Eelgrass is heavily fouled with black tunicates in Georges River, and both green crab and black tunicates have been identified as potential causes of decline in eelgrass in recent years. But given that eelgrass has been declining since the 1940s and 1950s, there must be some other factors involved in addition to these invasive species which are relatively new to the Bras d'Or Lakes. TEK identifies raw sewage, siltation, watershed runoff and chemicals in fish food from fish farms as causes of the decline of eelgrass, most if not all of which have increased over the last few decades.

Of particular interest is the contrast between healthy and unhealthy (other than those affected by invasive species) eelgrass at different locations within the Lakes, perhaps suggesting some site-specific mechanisms for protecting eelgrass. Near Baddeck and Little Narrows, eelgrass is known to die off for a few years and then return, suggesting that some suitable sites for eelgrass may become periodically unsuitable.

Also of note are events that have led to declines or loss of eelgrass and other seaweeds. After an earthquake in 1929, seaweed seemed to disappear in the Bras d'Or. There is less eelgrass after storms, indicating a vulnerability of eelgrass to storm surges and perhaps suggesting a relationship between its decline and climate change. Less ice cover recently and the associated heavy shoreline erosion during winter storms that has been observed could impact the shallow areas where eelgrass beds occur.

Climate change

Winter conditions are a significant gap within the scientific literature published on the Bras d'Or Lakes. An additional gap in winter knowledge is associated with ice cover trends. Knowledge of these issues could add significant insight into seasonal and biological changes in the Bras d'Or.

TEK indicates that there has been noticeable climate change in the Bras d'Or over the last few decades. The winters are warmer with more rain and the summers are hotter. Snow used to be more abundant, as high as houses and telephone poles back in the early 1900s. In recent years there has been less snow. Forty to fifty years ago there was 4-6 ft of ice on the Bras d'Or Lakes. The ice was thick enough to support a vehicle or a house that was being moved across the Lake. Now the Lakes don't freeze and this has been particularly noticeable in the last 10 years.

TEK identifies biological changes in the Bras d'Or as a result of climate change. A direct link was suggested between reduced snow in the winter associated with climate change and the decline of berries in the area. Climate change has also been identified as a cause of the decline of black ash whose seeds will not germinate unless climate conditions are appropriate. The warmer water results in less jellyfish. An increase in insect populations occurs due to the earlier spring and later fall. Floating algae appears earlier in the spring and more in inlets. Less ice cover results in more ice edges which has been associated with the increase of seals in the area.

TEK suggests that lack of ice in recent years has allowed winter storms to accelerate shoreline erosion. TEK indicates that storms have increased in number and severity, and there is a link between storms and decline of eelgrass.

The warmer winters bring less water in the spring because the water level is receiving less runoff from melting snow and ice. This results in less flushing and an increase of bacteria in the water. The smaller brooks dry up and there are less fish in the brooks.

Sea level change

The topic of sea level change was not included in the draft EOAR because there is little direct study of sea level change within the Bras d'Or. TEK indicates a noticeable decline in the water level around the Bras d'Or. There have been more low tides in recent times, and in general the water level is lower around the Bras d'Or now than in the past. Lower water levels have also been observed in freshwater streams compared to 50 years ago, and some brooks have simply dried up.

Although the water level is lower in the Bras d'Or, it quickly rises much more than the few centimetres it would have risen 30 years ago after a rainfall. This is attributed to the fewer trees in the area compared to years ago, which cannot absorb as much rainfall.

Physical changes to the nearshore area

The nearshore area of the Bras d'Or in general remains a biological information gap for the EOAR. Historical trends in the nearshore are of particular importance, as much can be learned by the magnitude of change that has occurred from past disturbance, and because scientific research is often time specific.

TEK indicates that the nearshore area has undergone the most dramatic change in the Bras d'Or over the last few decades. The most significant changes over the last 60 years are attributed to erosion. At least two small islands have disappeared in recent years. Similarly barrier beaches at Cape St. George and MacKinnon's Harbour have had large breaches. The graveyard in the Little Narrows is close to shore, and has been eroded by wind and rain. It is believed that the lack of ice in recent years has allowed winter storms to accelerate erosion.

Shoreline development, fewer trees and subsequent erosion have resulted in increased siltation in the lakes. As a result, the water is much dirtier and visibility in the Lakes has decreased significantly from clear to cloudy in the last 15 years. Changes to the waterbed have occurred. Increased silt and sediment have settled on gravel beds where fish and oyster spawn, damaging fish habitat and making it unsuitable for egg laying. Increased silt has also had a negative impact on oyster growing areas such as River Denys.

Loss of habitat has occurred. Wetlands and marshes with cattails have declined and in some areas have disappeared. Many marshes are "sinking" or being covered over. They used to be firm but are now turning into mud flats.

Appendix I: Workshop Agenda

Traditional Ecological Knowledge

CEPI Workshop

Sarah Denny Cultural Centre, Eskasoni, NS
May 3 & 4, 2006

1 Day One

9:30 am	Registration and Welcome
10:00 am	Opening Prayer *(Albert Marshall)*
	Sweetgrass Ceremony *(Katy MacEwan & Pauline Bernard)*
10:30 am	Introduction to the Workshop *(Shelley Porter & Clifford Paul)*
10:40 am	Overview/Explanation of Purpose *(Mike Parker)*
11:00 am	Introductory Instructions *(Murdena Marshall)*
11:10am–12:30 pm	First Session: Land (Animals and Plants)

LUNCH BREAK & ENTERTAINMENT
Keltic Chorus Quartette – Gospel Traditions

1:30 pm	Summary of First Session (*Clifford Paul)*
1:40 pm	Second Session: Water (Salt and Fresh Water)
3:10 pm	Summary: Report out
	Intro. To 2nd Day (*Clifford Paul)*
3:45 pm	Closing Prayer (*Albert Marshall*) and Adjourn for the Day

2 Day Two

9:30 am	Convene, Tea, Social
10:00 am	Opening Prayer (*Albert Marshall)*
10:10 am	Opening & Summary (*Clifford Paul)*
10:15 am–11:45 am	First Session: Climate and Significant Areas

LUNCH BREAK & ENTERTAINMENT
Sons of Membertou – Mi'kmaq Drumming

12:45 pm	Summary all the Sessions (*Clifford Paul)*
1:00–2:30 pm	Talking Circle
3:00 pm	Closing Prayer (*Albert Marshall)* and Adjourn for the Day

Appendix 2: Backgrounder

Bras d'Or Lakes CEPI Collaborative Environmental Planning Initiative

Background on Bras d'Or Collaborative Environmental Planning Initiative (CEPI)

The Bras d'Or Collaborative Environmental Planning Initiative (CEPI) represents a cross-section of government departments (First Nation, federal, provincial and municipal), as well as local industry, academics, NGOs, and community members with a role or interest in the management of the Bras d'Or Lakes. CEPI strives to lead this unique collaboration of partners and incorporate both traditional and western perspectives. It was formed in 2003 with the intent to develop an overall management plan for the Bras d'Or Lakes and watershed lands and to facilitate its implementation by government departments and other relevant stakeholders. A balance of environmental, social, cultural, and institutional objectives will be pursued through the development of a management plan that will ensure the health and sustainable use of the Bras d'Or Lakes watershed ecosystem. The Unama'ki Institute of Natural Resources (UINR) is playing a lead role in facilitating this process, with support from various partners.

For more information on CEPI, please contact:
Shelley Porter, CEPI Coordinator, Unama'ki Institute of Natural Resources (902) 379-2163
shelley.porter@uinr.ca

Background on the Bras d'Or Ecosystem Overview and Assessment Report (EOAR)

In 2005 the Department of Fisheries and Oceans undertook the development of an Ecosystem Overview and Assessment Report (EOAR) for the Bras d'Or Lakes. The purpose of the report was to summarize the known biophysical information about the Bras d'Or Lakes, based on published scientific information, and to assess the ecologically and biologically significant areas within the Lakes to assist with management planning. The biophysical component summarized the known information in terms of the geological system, oceanographic system, biological system, and the human activities and stressors. The assessment component tried to identify areas of particular significance from an ecological perspective. The first draft of this report was completed in October 2005 and a formal technical review was undertaken in November during a two day workshop in Wagmatcook. As the original draft of the report did not include Traditional Ecological Knowledge, it was acknowledged that special effort would be required to capture it. This and other suggestions made during the review period will be incorporated into the final version of the report.

For more information on the EOAR report, please contact:
Jason Naug, Department of Fisheries and Oceans, (902) 426-2574

Traditional Ecological Knowledge CEPI Workshop

Appendix 3: List of Participants

George Ball	Sydney
Rod Bereford	CBU staff
Blair Bernard	UINR staff
Charles Bernard	Waycobah
Julena Bernard	Whycocomagh
Pauline Bernard	Membertou
Charlie Cash	Irish Cove
Susie D. Denny	Eskasoni
Penny Doherty	Halifax
Abraham Doucette	Eskasoni
Jackie Drinnan	UINR staff
Donnie Flood	Albert Bridge
Fabian Francis	EFWC staff
Frankie Francis	Eskasoni
Frank Googoo	Baddeck
Irene Googoo	Whycocomagh
Jean Googoo	Baddeck
Joe Googoo	Whycocomagh
Judy Googoo	Whycocomagh
Pearl Googoo	Whycocomagh
Mary Rose Gould	Membertou
Noel Joe Gould	Whycocomagh
Annie Gould Paul	Eskasoni
Elizabeth Graham	Whycocomagh
Ann Marie Hatcher	Sydney
Annie Clair Isaac	Chapel Island
Bruno John Isaac	Chapel Island
Bridget A Isadore	Baddcek
Freddy John Isadore	Wagmatcook
Martha Isadore	Baddeck
Annie Johnson	UINR Staff
Ethel Johnson	Eskasoni
Howard Johnson	Eskasoni
Dr. Margaret Johnson	Eskasoni
Stanley Johnson	Eskasoni
Douglas Landry	St. Peters
Duncan MacDonald	Baddeck
Lloyd MacDonald	St. Peters
Mike MacDonald	Red Islands
Jack MacKillop	Baddeck

Vince MacLean	Washabuck
Albert Marshall	Eskasoni
Anthony Marshall	Membertou
Lillian Marshall	Chapel Island
Mary V. Marshal	Chapel Island
Murdena Marshall	Eskasoni
Susie Marshall	Eskasoni
Katie McEwan	Membertou
Eleanor Mitchell	Chapel Island
Christine Metallic	Eskasoni
Jason Naug	Halifax
Clifford Paul	UINR staff
Mike Parker	Bridgetown
Shelley Porter	UINR staff
Bessie Prosper	Eskasoni
James Redden	Benacadie
Ronald J Stevens	Wagmatcook
Robin Stuart	Englishtown
Laurie Suitor	UINR Staff
Rita Toney	Eskasoni
Shirley Tuplin	Membertou
Robert Urquhart	West Bay
Lawrence Wells	Membertou
Florence Young	Eskasoni

Appendix 4: Workshop Questions

Traditional Ecological Knowledge

CEPI Workshop

TEK Workshop Questions

Sarah Denny Cultural Centre, Eskasoni, NS • May 3-4, 2006

Day 1: May 3, 2006

Session 1: Land (Plants and Animals) *(80 minutes)*

Introduction: (5 minutes)

1 **Question 1** *(25 minutes)*
Are there any plants that you feel are at risk in the Bras d'Or? Have their numbers or locations where they are found changed? MAP OPTIONAL

2 **Question 2** *(25 minutes)*
Several rare species have been noted to occur in the Bras d'Or (Canada Lynx, American Martin, Wood Turtle, Harlequin Duck, Barrows Goldeneye). Are there more or less of these species today and where and when are they observed? MAP REQUIRED

3 **Question 3** *(25 minutes)*
Are there any other terrestrial animals that are of significance in the Bras d'Or that you feel are changing in numbers or distribution? MAP OPTIONAL

Session 2: Water (Marine and Freshwater) (80 minutes)

Introduction: (5 minutes):

1 **Question 1** *(25 minutes)*
Have you noticed any changes in the nearshore area around the lakes (shoreline out to approximately 10 m depth) the species located there (oysters, herring, etc.), and over what time period? Which areas are most changed? What do you think are the causes? MAP REQUIRED.

2 **Question 2** *(25 minutes)*
Have there been any changes in the eelgrass beds over time? In what locations and when did most of the change occur? Do they appear to be unchanging in area/ increasing/ decreasing? MAP REQUIRED.

3 **Question 3** *(25 minutes)*
How have the freshwater fish changed in the streams within the Bras d'Or watershed? What species, sizes, numbers do you recall? Were there any notable spawning locations? MAP OPTIONAL.

Traditional Ecological Knowledge

CEPI Workshop

Day 2: May 4, 2006

Session 3: Climate/Significant Areas *(80 minutes)*

Introduction: (5 minutes)

1 **Question 1** *(25 minutes)*
Has the climate changed around the Bras d'Or? Is it warmer, colder, wetter, dryer or some combination? Were there any unusual climatic events that you recall?

2 **Question 2** *(25 minutes)*
Are there any areas within the Bras d'Or lake or watershed lands that you would consider significant based on the plants and animals found there? What is significant? Can you mark these on the maps at your table? MAP REQUIRED.

3 **Question 3** *(25 minutes)*
Are there any areas within the Bras d'Or Lake or watershed lands that you would consider significant for cultural/social/recreational reasons? Can you mark these on the maps at your table? MAP REQUIRED.

Session 4: Talking Circle *(80 minutes)*

Introduction: *(5 minutes)*

This last session recognizes the challenge of collecting TEK on the entire Bras d'Or ecosystem within the limited time available during a workshop such as this. The purpose of this session will be to allow participants to add or share any other relevant information that has not been covered during the workshop. Subjects for further consideration may also be identified at this time as well as suggestions on future methods for collecting this information.

Session is open ended.

Appendix 5:
Exit Questionnaire and Summary

Traditional Ecological Knowledge

CEPI Workshop

CEPI TEK Workshop Survey

May 3-4, 2006

Please take a few minutes to answer the following questions.

1 How would you score this workshop as an opportunity to learn and share information on the environment of the Bras d'Or Lakes and watershed? (please circle: 1 = poor; 3 = good; 5 = excellent)

1 2 3 4 5

2 How could this TEK workshop have been improved?

3 Was this workshop an effective way to gather TEK? Other suggestions are welcome.

4 Were there any subjects that you feel are important but were not covered?

5 Were there people who you thought were missing that would be a good source of TEK? If so, who?

6 Is there any other information you would like to contribute?
Please include it here and on the reverse, or provide your personal information and we will be happy to contact you.

The following information was summarized from the 52 completed surveys collected at the end of the workshop.

1. How would you score this workshop as an opportunity to learn and share information on the environment of the Bras d'Or Lakes and watershed? (1 = poor; 3 = good; 5 = excellent)

- Average score from 52 respondents was 4.5 out of 5

2. How could this workshop be improved?

Although the participants were generally quite pleased with the workshop, a number of specific recommendations for improvement were made, including:
Follow up with key Elders on a one to one basis to get more detail

- Include more fishermen and hunters
- Include more government representatives (Natural Resources)
- Include more handouts and slides
- Include more people from different communities around the lakes
- Include more young people to hear information shared
- Include more time for each topic and for personal stories
- Smaller groups of people at each table
- Provide pictures/samples of some of the species covered such as eelgrass
- Provide more history on First Nations
- Provide participants with the questions to be discussed prior to the workshop
- Change groups more frequently
- Hold meetings like this every six months
- Use Talking Circle
- Include a survey or questionnaire for Elders that could not attend

3. Was this workshop an effective way to gather TEK? Any other suggestions?

- This workshop was generally considered a good way to gather TEK
- See question #2 for potential improvements.

4. Were there any topics you feel are important but were not covered?

- Rats
- Breeding areas for animals
- Water quality and sewage
- Medicines to prevent illnesses

5. Were there people who you thought were missing that would be a good source of TEK? If so, who?

- Commercial fishermen, hunters, fur trappers and farmers
- Ben Silliboy, Howard Poulette
- Charlie Dennis
- Dennis Isadore (Wagmatcook)
- Government Employees
- Leaders from First Nation communities
- Prime Minister
- John MacInnis (naturalist who writes a column for Cape Breton Post)
- Dan Banks (retired biologist from NSDNR)
- Dave Harris (biologist NSDNR)
- Levi M. Denny, Bernie Peck, Gordon Lewis
- Caroline Gould

6. Is there any other information you would like to contribute? Please include it **here and on the reverse, or provide your personal information and we would be happy to contact you.**

- Commercial salmon stories of 50-80 years ago.
- Historical data on hydrography will soon be available

Appendix 6: Additional Comments from Workshop

The following comments were made at the workshop and are included here for completeness.

- The Bras d'Or is a unique and sensitive system that requires protection.
- There has been a loss of balance in the Lakes, and change appears to be happening rapidly in recent years.
- A holistic view to managing activities on the Lakes is necessary.
- Post signs telling people to 'keep the area clean' and 'no dead fish or animals'.
- Address disconnect with youth of today. Go into schools and deliver message to youth (native and non-native). Connect students to nature by getting them out of classroom on field trips. Teach them to respect their catch (proper care, preparing, usage) and to take care of the water. Reinforce stewardship principles.
- Replicate mother nature – understand conditions in which species flourish.
- Understand what changes have occurred to prevent species from flourishing.
- Assess how many tons of carbon dioxide are being taken from the air by trees and therefore how we are impacting air when we cut them.
- Create a whole community of stewards to monitor data and document changes. Five days per year should be dedicated to monitoring and observation of various brooks (species, health of water, etc.).
- Machine harvesting has increased destruction.
- Large pulp companies harvest too large of an area.
- Need to know the significant plants so we know where they are.
- Need to share how to collect significant plants.
- Must be diligent in changing mindset – step out of prison of man-made environment & wealth, need change of mind/heart to work with nature – preserve her – she has wealth of her own.
- Need doers – people to take action.
- Develop mentorship of some kind. Integrate this into each system.
- Derive our lessons from nature.

- All fish have worms which they get from Seal droppings.

- Bras d'Or Lakes were once fresh water so a lot of species there now wouldn't have been there before. It was a big river system. The ice age caused the salt water that the Bras d'Or has now. It's not as salty as the ocean but everything in the Atlantic can live in the Bras d'Or.

- Haddock - starting to come back

- Some trees here now are genetically introduced – not native species anymore.

- Must identify primary reasons for problems with the ecosystem – it is humans.

- Spraying for budworm in the 1970's may have had effects on watershed health.

- Animals here understand Mi'kmaq, they understand what you are saying. When you talk to the dog, the dog understands. When a kid says he doesn't understand Mi'kmaq use the dog as an example. If the dog listens to its owner the kid can understand.

- *A lot of Elders say you resemble the animals you eat. We used to eat moose but now we eat cows and chickens. Ancestors used to burn a lot of calories. They lived to be 130-140 years old. Now we hardly burn any calories. They used their bodies to catch fish and animals. Ancestors had no diabetes, etc. Now we get sick because we still have the hunter/gatherer metabolism but we're eating western foods like steak, hamburgers. It's not the right kind of food. The health of our ecology determines the health of humans.* –TEK Workshop Participant

- Human waste affects the water which in turn affects the fish and food.

- Young people don't like traditional foods, they like fast food.

- Need recipes and benefits of traditional foods.

- Recipes need to be shared.

- There are stone tools that are 8000 years old that have old blood from caribou on them. In Wreck Cove, an arrowhead was found. It was 4000 years old.

- Many old coastal artifacts are now underwater.

- They think there are some geothermal pools or heat sources coming into the Bras d'Or. For example, Boisdale/Barachois Ponds. They suspect there are some thermal springs.

- Diving in the Bras d'Or and Mira River you notice warm spots.
- There was a study done on the Bras d'Or Lake of water temperature–hard copy & digitized copy will be available in the near future.
- Expo 67/Eskasoni people (1967) canoed to Montreal.
- In the last few years, there is more canoeing in the Bras d'Or Lakes.
- March 17th every year, race on horse from Chapel to Eskasoni
- Chapel Island – canoe run 1929 from Newfoundland
- Oyster shells were once used to build roads
- Frost Fish (Punamu'k) are no longer available for midwinter gathering, they come out later.
- Kelp (qata'skwul) was used as a medicine or tonic and as food.
- There is an unbelievable amount of shiners spawning in the East Bay area. Maybe there are smelt. They look like a minnow that you can see through. You see them all over the Bras d'Or, near Eskasoni, etc.
- Commercial fisheries also affecting the spawning of fish.
- Robins made an early appearance this spring
- Smog, cars more or both/affecting the environment
- There were only horses & wagons years prior to centralization.
- New winter water temperature data and some ice information is being compiled by Robin Stuart from private companies and this should be available from the University College of Cape Breton and on its website in the next month or so.

Bras d'Or Lakes

CEPI

Collaborative Environmental Planning Initiative

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APPENDIX B: SUMMARY OF SPECIES AT RISK IN THE BRAS D'OR WATERSHED

Table B1. Summary of species assessed and reported through the Atlantic Canada Conservation Data Centre for the Bras d'Or Lake watershed sub-basins in 2005, and sorted first by provincial (SPROT) and national (NPROT) protected species, followed by provincial ranking (SRANK). Further explanation of ranks follows this table.

01BaddeckR	02UpMiddleR	03GBrasdOr	05StPetersI	06aStPatricks	06bStAndrews	06cRiverDenys	08Whycocomagh	10aWestBay	10bEastBay	12NorthBasin	15unnamed	GNAME	GCOMNAME	GRANK	NPROT	SRANK	SPROT
X		X		X	X			X	X			*Lynx canadensis*	Lynx	G5	NAR	S1	Endangered
								X				*Floerkea proserpinacoides*	False Mermaid-Weed	G5	NAR	S2S3	
						X					X	*Ammodramus nelsoni*	Nelson's Sharp-tailed Sparrow	G5	NAR	S2S3B	
X		X		X								*Hemidactylium scutatum*	Four-toed Salamander	G5	NAR	S3	
		X										*Accipiter gentilis*	Northern Goshawk	G5	NAR	S3B	
X	X	X	X	X	X	X	X	X	X	X	X	*Sterna hirundo*	Common Tern	G5	NAR	S3B	
		X										*Falco columbarius*	Merlin	G5	NAR	S3S4B	
				X			X					*Catharus bicknelli*	Bicknell's Thrush	G4	SC	S1S2B	Vulnerable
X	X	X		X	X	X	X					*Glyptemys insculpta*	Wood Turtle	G4	SC	S3	Vulnerable
X	X			X								*Sorex gaspensis*	GaspÄ Shrew	G3	SC	S2	
X			X	X						X	X	*Isoetes prototypus*	Prototype Quillwort	G2?	SC	S2	
X												*Martes americana*	American Marten	G5		S1	Endangered
X												*Ophiogomphus aspersus*	Brook Snaketail	G3G4		S1	
							X					*Gomphaeschna furcillata*	Harlequin Darner	G5		S1	
X		X	X	X			X	X		X		*Somatochlora septentrionalis*	Muskeg Emerald	G5		S1	
			X		X	X	X		X		X	*Somatochlora williamsoni*	Williamson's Emerald	G5		S1	
					X							*Coenagrion interrogatum*	Subarctic Bluet	G5		S1	
X												*Enallagma carunculatum*	Tule Bluet	G5		S1	
						X						*Paludella squarrosa*	a Moss	G3G5		S1	
						X		X				*Sanicula odorata*	Black Snake-Root	G5		S1	
X						X	X					*Hypericum majus*	Larger Canadian St. John's Wort	G5		S1	
							X					*Polygonum viviparum*	Viviparous Knotweed	G5		S1	
		X					X					*Rhynchospora capillacea*	Horned Beakrush	G5		S1	
	X			X								*Listera australis*	Southern Twayblade	G4		S1	
X												*Stuckenia vaginata*	Sheathed Pondweed	G5		S1	
	X											*Schoenoplectus robustus*	Saltmarsh Bulrush	G5		S1?	
				X			X					*Triglochin gaspensis*	Gaspe Peninsula Arrow-Grass	G3		S1?	
				X			X					*Cystopteris laurentiana*	Laurentian Bladder Fern	G3		S1?	
				X			X					*Asio otus*	Long-eared Owl	G5		S1S2	
						X						*Arabis hirsuta var. pycnocarpa*	Hairy Rock-Cress	G5T5		S1S2	

Table B1. Summary of species assessed and reported through the Atlantic Canada Conservation Data Centre for the Bras d'Or Lake watershed sub-basins in 2005 *continued*

01BaddeckR	02UpMiddleR	03GBrasdOr	05StPetersI	06aStPatricks	06bStAndrews	06cRiverDenys	08Whycocomagh	10aWestBay	10bEastBay	12NorthBasin	15unnamed	GNAME	GCOMNAME	GRANK	NPROT	SRANK	SPROT
						X						*Lobelia kalmii*	Kalm's Lobelia	G5		S1S2	
						X						*Anemone virginiana var. alba*	River Anemone	G5T4T5		S1S2	
						X						*Carex bebbii*	Bebb's Sedge	G5		S1S2	
						X						*Carex viridula ssp. oedocarpa*	A Sedge	G5T?		S1S2	
						X						*Juncus alpinoarticulatus*	A Rush	G5		S1S2	
						X	X					*Juncus alpinoarticulatus ssp. nodulosus*	Richardson's Rush	G5T5?		S1S2	
							X				X	*Calamagrostis stricta* ssp. stricta	Northern Reedgrass	G5T5		S1S2	
						X						*Cryptogramma stelleri*	Fragile Rockbrake	G5		S1S2	
						X						*Woodsia alpina*	Northern Woodsia	G4		S1S2	
						X						*Picoides tridactylus dorsalis*	American Three-toed Woodpecker	G5TU		S2	
X				X		X						*Salmo salar*	Atlantic Salmon	G5		S2	
X		X		X		X						*Microtus chrotorrhinus*	Rock Vole	G4		S2	
X	X			X		X				X		*Gomphus borealis*	Beaverpond Clubtail	G4		S2	
X	X			X						X		*Gomphus descriptus*	Harpoon Clubtail	G4		S2	
X	X	X		X								*Gomphus spicatus*	Dusky Clubtail	G5		S2	
X	X	X		X								*Gomphus adelphus*	Mustached Clubtail	G4		S2	
X	X			X						X		*Lanthus parvulus*	Northern Pygmy Clubtail	G4		S2	
X	X					X						*Aeshna sitchensis*	Zigzag Darner	G5		S2	
X				X								*Dorocordulia libera*	Racket-Tailed Emerald	G5		S2	
X	X											*Somatochlora cingulata*	Lake Emerald	G5		S2	
X				X						X		*Somatochlora forcipata*	Forcipate Emerald	G5		S2	
X	X					X						*Somatochlora minor*	Ocellated Emerald	G5		S2	
						X						*Somatochlora tenebrosa*	Clamp-Tipped Emerald	G5		S2	
						X						*Sympetrum danae*	Black Meadowhawk	G5		S2	
X		X		X			X			X		*Lestes forcipatus*	Sweetflag Spreadwing	G5		S2	
				X	X	X				X	X	*Lestes eurinus*	Amber-Winged Spreadwing	G4		S2	
					X							*Lestes unguiculatus*	Lyre-Tipped Spreadwing	G5		S2	
				X		X	X			X		*Enallagma vernale*	a Bluet Damselfly	G4Q		S2	
					X		X					*Enallagma aspersum*	Azure Bluet	G5		S2	
X	X	X		X			X					*Amphiagrion saucium*	Eastern Red Damsel	G5		S2	
	X											*Osmorhiza longistylis*	Smoother Sweet-Cicely	G5		S2	
		X										*Erigeron philadelphicus*	Philadelphia Fleabane	G5		S2	
		X										*Senecio pseudoarnica*	Seabeach Groundsel	G5		S2	
X							X					*Impatiens pallida*	Pale Jewel-Weed	G5		S2	

Table B1. Summary of species assessed and reported through the Atlantic Canada Conservation Data Centre for the Bras d'Or Lake watershed sub-basins in 2005 *continued*

01BaddeckR	02UpMiddleR	03GBrasdOr	05StPetersI	06aStPatricks	06bStAndrews	06cRiverDenys	08Whycocomagh	10aWestBay	10bEastBay	12NorthBasin	15unnamed	GNAME	GCOMNAME	GRANK	NPROT	SRANK	SPROT
						X	X					*Caulophyllum thalictroides*	Blue Cohosh	G4G5		S2	
							X		X			*Arabis drummondii*	Drummond Rockcress	G5		S2	
X				X	X				X	X		*Draba arabisans*	Rock Whitlow-Grass	G4		S2	
X												*Triosteum aurantiacum*	Coffee Tinker's-Weed	G5		S2	
X	X											*Shepherdia canadensis*	Canada Buffalo-Berry	G5		S2	
				X		X	X			X		*Vaccinium boreale*	Northern Blueberry	G4		S2	
X												*Vaccinium caespitosum*	Dwarf Blueberry	G5		S2	
						X	X				X	*Rumex salicifolius*	Willow Dock	G5		S2	
					X							*Pyrola minor*	Lesser Wintergreen	G5		S2	
		X			X		X					*Anemone quinquefolia*	Wood Anemone	G5		S2	
							X					*Galium labradoricum*	Bog Bedstraw	G5		S2	
X												*Comandra umbellata*	Umbellate Bastard Toad-Flax	G5		S2	
X		X										*Parnassia palustris var. parviflora*	a Marsh Grass-of-Parnassus	G4		S2	
						X	X				X	*Saxifraga paniculata ssp. neogaea*	a White Mountain Saxifrage	G5T?		S2	
						X						*Viola nephrophylla*	Northern Bog Violet	G5		S2	
X							X					*Carex atratiformis*	Black Sedge	G5		S2	
	X			X	X		X		X	X		*Eleocharis quinqueflora*	Few-Flower Spikerush	G5		S2	
							X					*Juncus trifidus*	Highland Rush	G5		S2	
X			X	X						X		*Cypripedium reginae*	Showy Lady's-Slipper	G4		S2	
					X				X			*Potamogeton obtusifolius*	Blunt-Leaf Pondweed	G5		S2	
X												*Asplenium trichomanes*	Maidenhair Spleenwort	G5		S2	
X		X		X		X	X	X			X	*Asplenium trichomanes-ramosum*	Green Spleenwort	G4		S2	
			X			X	X					*Polystichum lonchitis*	Northern Holly-Fern	G5		S2	
		X		X	X	X				X	X	*Woodsia glabella*	Smooth Woodsia	G5		S2	
					X							*Botrychium lanceolatum var. angustisegmentum*	Lance-Leaf Grape-Fern	G5T4		S2	
							X					*Hieracium umbellatum*	Umbellate Hawkweed	G5?		S2?	
							X					*Symphyotrichum boreale*	Boreal American-Aster	G5		S2?	
							X					*Amelanchier fernaldii*	Fernald Serviceberry	G2G4		S2?	
				X		X	X					*Bucephala clangula*	Common Goldeneye	G5		S2B	
				X								*Vireo gilvus*	Warbling Vireo	G5		S2B	
X												*Vireo philadelphicus*	Philadelphia Vireo	G5		S2B	
		X		X						X	X	*Tringa melanoleuca*	Greater Yellowlegs	G5		S2B,S5M	
		X			X			X				*Asclepias incarnata ssp. pulchra*	Swamp Milkweed	G5T5		S2S3	
			X									*Erigeron hyssopifolius*	Daisy Fleabane	G5		S2S3	

Table B1. Summary of species assessed and reported through the Atlantic Canada Conservation Data Centre for the Bras d'Or Lake watershed sub-basins in 2005 *continued*

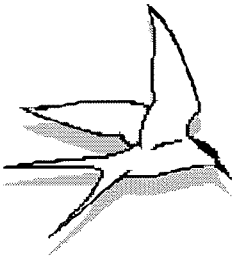
01BaddeckR	02UpMiddleR	03GBrasdOr	05StPetersI	06aStPatricks	06bStAndrews	06cRiverDenys	08Whycocomagh	10aWestBay	10bEastBay	12NorthBasin	15unnamed	GNAME	GCOMNAME	GRANK	NPROT	SRANK	SPROT
											X	*Decodon verticillatus*	Hairy Swamp Loosestrife	G5		S2S3	
		X							X			*Lilium canadense*	Canada Lily	G5		S2S3	
			X						X			*Cypripedium parviflorum*	Small Yellow Lady's-Slipper	G5		S2S3	
X				X					X	X	X	*Goodyera repens*	Dwarf Rattlesnake-Plantain	G5		S2S3	
				X		X	X					*Poa glauca*	White Bluegrass	G5		S2S3	
	X			X								*Poa glauca ssp. glauca*	White Bluegrass	G5T5?		S2S3	
X	X											*Stuckenia filiformis*	Slender Pondweed	G5		S2S3	
X				X						X		*Potamogeton zosteriformis*	Flatstem Pondweed	G5		S2S3	
X				X						X		*Ophioglossum pusillum*	Adder's Tongue	G5		S2S3	
X	X			X		X				X		*Mergus serrator*	Red-breasted Merganser	G5		S2S3B	
						X						*Sayornis phoebe*	Eastern Phoebe	G5		S2S3B	
X	X	X		X								*Polygonum raii*	Pondshore Knotweed	G2G4Q		S2S3S E	
X	X	X		X		X	X			X		*Cordulegaster diastatops*	Delta-Spotted Spiketail	G5		S3	
X		X		X		X	X			X		*Cordulegaster maculata*	Twin-Spotted Spiketail	G5		S3	
						X						*Gomphus exilis*	Lancet Clubtail	G5		S3	
X	X	X		X			X			X		*Ophiogomphus carolus*	Riffle Snaketail	G5		S3	
X	X	X	X	X		X				X	X	*Aeshna canadensis*	Canada Darner	G5		S3	
X	X	X		X		X	X	X	X	X		*Aeshna eremita*	Lake Darner	G5		S3	
						X	X					*Aeshna subarctica*	Subarctic Darner	G5		S3	
					X	X		X				*Aeshna tuberculifera*	Black-Tipped Darner	G4		S3	
X	X	X		X		X	X					*Anax junius*	Common Green Darner	G5		S3	
X	X			X						X		*Basiaeschna janata*	Springtime Darner	G5		S3	
X												*Boyeria vinosa*	Fawn Darner	G5		S3	
X	X	X		X		X		X	X	X		*Cordulia shurtleffii*	American Emerald	G5		S3	
X	X	X		X		X	X					*Epitheca canis*	Beaverpond Baskettail	G5		S3	
X	X											*Epitheca spinigera*	Spiny Baskettail	G5		S3	
X	X			X								*Helocordulia uhleri*	Uhler's Sundragon	G5		S3	
X	X			X		X				X		*Somatochlora elongata*	Ski-Tailed Emerald	G5		S3	
X	X											*Somatochlora elongata*	Ski-Tailed Emerald	G5		S3	
X	X	X		X								*Somatochlora walshii*	Brush-Tipped Emerald	G5		S3	
X				X						X		*Leucorrhinia frigida*	Frosted Whiteface	G5		S3	
X				X		X				X		*Leucorrhinia glacialis*	Crimson-Ringed Whiteface	G5		S3	
X		X		X		X						*Leucorrhinia hudsonica*	Hudsonian Whiteface	G5		S3	
X		X		X								*Leucorrhinia intacta*	Dot-Tailed Whiteface	G5		S3	
X	X	X		X	X	X		X		X	X	*Leucorrhinia proxima*	Red-Waisted Whiteface	G5		S3	
X	X			X				X				*Plathemis lydia*	Common Whitetail	G5		S3	

Table B1. Summary of species assessed and reported through the Atlantic Canada Conservation Data Centre for the Bras d'Or Lake watershed sub-basins in 2005 *continued*

01BaddeckR	02UpMiddleR	03GBrasdOr	05StPetersI	06aStPatricks	06bStAndrews	06cRiverDenys	08Whycocomagh	10aWestBay	10bEastBay	12NorthBasin	15unnamed	GNAME	GCOMNAME	GRANK	NPROT	SRANK	SPROT
X	X	X		X		X	X		X	X	X	*Ladona julia*	Chalk-Fronted Corporal	G5		S3	
X	X	X		X		X				X	X	*Sympetrum costiferum*	Saffron-Winged Meadowhawk	G5		S3	
X						X						*Sympetrum obtrusum*	White-Faced Meadowhawk	G5		S3	
						X						*Sympetrum semicinctum*	Band-Winged Meadowhawk	G5		S3	
X	X					X	X					*Sympetrum vicinum*	Yellow-Legged Meadowhawk	G5		S3	
X	X			X		X				X		*Calopteryx aequabilis*	River Jewelwing	G5		S3	
X		X		X		X				X		*Calopteryx amata*	Superb Jewelwing	G4		S3	
X	X	X		X		X				X		*Lestes dryas*	Emerald Spreadwing	G5		S3	
X				X		X				X		*Lestes congener*	Spotted Spreadwing	G5		S3	
X												*Lestes rectangularis*	Slender Spreadwing	G5		S3	
X	X			X		X			X	X		*Argia fumipennis violacea*	Variable Dancer	G5T5		S3	
						X		X				*Argia moesta*	Powdered Dancer	G5		S3	
X	X			X		X				X		*Enallagma boreale*	Boreal Bluet	G5		S3	
X	X	X		X		X		X		X		*Enallagma civile*	Familiar Bluet	G5		S3	
X	X	X		X		X		X		X		*Enallagma ebrium*	Marsh Bluet	G5		S3	
X	X	X		X		X	X	X				*Enallagma hageni*	Hagen's Bluet	G5		S3	
X	X		X	X		X	X	X			X	*Ischnura posita*	Fragile Forktail	G5		S3	
X	X	X		X		X	X					*Nehalennia irene*	Sedge Sprite	G5		S3	
X	X	X		X		X	X	X				*Chromagrion conditum*	Aurora Damsel	G5		S3	
					X		X				X	*Asclepias incarnata*	Swamp Milkweed	G5		S3	
					X							*Bartonia virginica*	Yellow Screwstem	G5		S3	
					X							*Fraxinus nigra*	Black Ash	G5		S3	
	X						X					*Epilobium strictum*	Downy Willow-Herb	G5?		S3	
									X			*Polygonum pensylvanicum*	Pennsylvania Smartweed	G5		S3	
					X							*Primula laurentiana*	Bird's-Eye Primrose	G5		S3	
				X			X	X				*Rhamnus alnifolia*	Alderleaf Buckthorn	G5		S3	
	X								X			*Galium kamtschaticum*	Boreal Bedstraw	G5		S3	
					X							*Verbena hastata*	Blue Vervain	G5		S3	
					X	X		X	X			*Carex eburnea*	Ebony Sedge	G5		S3	
							X					*Luzula parviflora*	Small-Flowered Wood-Rush	G5		S3	
X	X	X										*Corallorhiza trifida*	Early Coralroot	G5		S3	
X	X											*Listera convallarioides*	Broad-Leaved Twayblade	G5		S3	
			X					X				*Platanthera grandiflora*	Large Purple-Fringe Orchis	G5		S3	
			X					X				*Platanthera orbiculata*	Large Roundleaf Orchid	G5?		S3	
			X									*Sparganium natans*	Small Bur-Reed	G5		S3	
			X			X						*Dryopteris filix-mas*	Male Fern	G5		S3	
								X				*Botrychium dissectum*	Cutleaf Grape-Fern	G5		S3	

Table B1. Summary of species assessed and reported through the Atlantic Canada Conservation Data Centre for the Bras d'Or Lake watershed sub-basins in 2005 *continued*

01BaddeckR	02UpMiddleR	03GBrasdOr	05StPetersI	06aStPatricks	06bStAndrews	06cRiverDenys	08Whycocomagh	10aWestBay	10bEastBay	12NorthBasin	15unnamed	GNAME	GCOMNAME	GRANK	NPROT	SRANK	SPROT
X				X						X		*Campanula aparinoides*	Marsh Bellflower	G5		S3?	
						X		X			X	*Potamogeton praelongus*	White-Stem Pondweed	G5		S3?	
			X						X			*Cystopteris tenuis*	A Bladderfern	G4G5		S3?	
	X	X		X					X			*Isoetes lacustris*	Lake Quillwort	G5		S3?	
					X				X			*Lycopodium complanatum*	Trailing Clubmoss	G5		S3?	
			X					X				*Lycopodium sabinifolium*	Ground-Fir	G4		S3?	
			X						X			*Lycopodium sitchense*	Alaskan Clubmoss	G5		S3?	
X	X			X					X	X		*Sterna paradisaea*	Arctic Tern	G5		S3B	
					X				X			*Coccyzus erythropthalmus*	Black-billed Cuckoo	G5		S3B	
		X			X							*Mimus polyglottos*	Northern Mockingbird	G5		S3B	
X		X		X	X		X		X	X	X	*Dolichonyx oryzivorus*	Bobolink	G5		S3B	
X	X	X	X	X	X	X	X	X	X		X	*Poecile hudsonica*	Boreal Chickadee	G5		S3S4	
											X	*Loxia curvirostra*	Red Crossbill	G5		S3S4	
						X		X				*Synaptomys cooperi*	Southern Bog Lemming	G5		S3S4	
			X			X		X	X		X	*Liparis loeselii*	Loesel's Twayblade	G5		S3S4	
	X			X					X			*Spiranthes romanzoffiana*	Hooded Ladies'-Tresses	G5		S3S4	
X		X										*Sphenopholis intermedia*	Slender Wedge Grass	G5		S3S4	
									X			*Cystopteris bulbifera*	Bulblet Fern	G5		S3S4	



Atlantic Canada CDC Canada Atlantique

2004 Edition

Part I. Conservation Data Centre Subnational Rarity Ranks

Biological diversity or biodiversity can be described at a number of levels, from molecules to ecosystems. Biodiversity is a combination of species diversity (the variety of species), genetic diversity (the genetic variability among individuals of that species), and ecological diversity (the variety of ecosystems/habitats in which they live). Conservation Data Centres (CDCs), as part of The NatureServe[27] international network, track biodiversity at two levels: species and ecological communities. Species and ecological communities are referred to as **elements** of biodiversity.

[27] Formerly known as The Nature Conservancy (TNC)

Elements are ranked in each jurisdiction (province or state) and at global and national levels in order to help prioritise conservation efforts.

NatureServe and all CDCs (called Heritage Programs in the US) use a standardised element ranking system that has evolved over some 30 years, with input from hundreds of scientists, managers and conservationists. The following material describes this element ranking system at the subnational (S) or provincial level and explains how ranks are assigned for species elements of biodiversity. (The community ranking process is slightly different.)

Definitions of Provincial (subnational) ranks - SRANKS

S1 Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.

S2 Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.

S3 Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in at some locations. (21 to 100 occurrences).

S4 Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).

S5 Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.

S#S# Numeric range rank: A range between two consecutive numeric ranks. Denotes range of uncertainty about the exact rarity of the Element (e.g., S1S2).

SH Historical: Element occurred historically throughout its range in the province (with expectation that it may be rediscovered), perhaps having not been verified in the past 20 - 70 years (depending on the species), and suspected to be still extant.

SU Unrankable: Possibly in peril throughout its range in the province, but status uncertain; need more information.

SX Extinct/Extirpated: Element is believed to be extirpated within the province.

S? Unranked: Element is not yet ranked.

SA Accidental: Accidental or casual in the province (i.e., infrequent and far outside usual range). Includes species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded.

SE Exotic: An exotic established in the province (e.g., Purple Loosestrife or Coltsfoot); may be native in nearby regions.

SE# Exotic numeric: An exotic established in the province that has been assigned a numeric rank.

SP Potential: Potential that Element occurs in the province, but no occurrences reported.

SR Reported: Element reported in the province but without persuasive documentation which would provide a basis for either accepting or rejecting (e.g., misidentified specimen) the report.

SRF Reported falsely: Element erroneously reported in the province and the error has persisted in the literature.

SZ Zero occurrences: Not of practical conservation concern in the province, because there are no definable occurrences, although the species is native and appears regularly. An NZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations) or transitory. In other words, the migrant regularly passes through the province, but enduring, mappable Element Occurrences cannot be defined.

Qualifiers

Breeding Status

B Breeding: Basic rank refers to the breeding population of the element in the province.

N Non-breeding: Basic rank refers to the non-breeding (usually wintering) population of the element in the province.

M Migratory: Basic rank refers to the migratory stopover population in the province.

Other Qualifiers:

? Inexact or uncertain: for numeric ranks, denotes inexactness, e.g., SE? denotes uncertainty of exotic status. (The "?" qualifies the character immediately preceding it in the SRANK)

C Captive or cultivated: Element is presently extant in the country or province only in captivity or cultivation.

RARITY STATUS

GRANK	TXT 5	Global Rank of taxon*
NRANK	TXT 5	National Rank of taxon (in Canada)*
NPROT	TXT+	National Protection Status of taxon (= COSEWIC in Canada)
SRANK.**	TXT 5	Subnational (Provincial) Rank of taxon*
SRNUM	DEC 3,1	SRANK rendered as number (S2S3 = 2.5 etc)
SPROT.**	TXT+	Provincial rank/status of taxon

APPENDIX C: STORA ENSO SPECIAL MANAGEMENT AREAS

Table C1. Stora Enso special management areas listed by subwatershed presented in hectares and percentage of Stora Enso managed lands in each subwatershed). Note that overlap occurs (e.g., significant habitat areas may also be deer wintering areas) so areas within subwatershed cannot be totaled. Descriptions for each special management treatment are described below. Data provided by Stora Enso Port Hawkesbury.

Subwatershed	Viewshed management	Significant habitat	Riparian zones	Recreation	Old forest	Connectivity management zone	Marten management zone	Lynx habitat	Boreal felt lichen	Deer wintering
Baddeck River	1443 (8)	280 (1)	1003 (5)	0	948 (5)	106 (1)	14 036 (74)	2155 (11)	2 (0)	7 (0)
East Bay	4355 (47)	4114 (44)	528 (6)	0	807 (9)	91 (1)	0	2227 (24)	28 (0)	657 (7)
Great Bras dOr Channel	1704 (86)	243 (12)	96 (5)	276 (14)	0	0	0	0	1 (0)	29 (1)
McKinnons Harbour	13 (35)	0	0	0	0	0	0	0	0	11 (28)
Middle River	1076 (6)	7 (0)	852 (5)	0	228 (1)	1162 (7)	3460 (20)	1482 (8)	0	0
North Basin	605 (56)	617 (57)	59 (5)	0	100 (9)	0	0	287 (27)	11 (1)	0
River Denys	2282 (28)	954 (12)	440 (5)	0	1709 (21)	33 (0)	0	0	0	986 (12)
St. Andrews Channel	38 (3)	62 (5)	81 (6)	0	38 (3)	0	0	193 (15)	9 (1)	87 (7)
St. Patricks Channel	387 (7)	64 (1)	381 (7)	0	1069 (19)	756 (14)	2816 (50)	0	10 (0)	142 (3)
St. Peters Inlet	6 (0)	204 (5)	262 (6)	0	332 (8)	0	0	120 (3)	1 (0)	9 (0)
West Bay	0 (0)	361 (13)	169 (6)	0	161 (6)	0	0	0	3 (0)	48 (2)
Whycocomagh Bay	1458 (40)	419 (12)	217 (6)	0	138 (4)	0	0	0	1 (0)	0

- **Viewshed Management**: Highly visible, aesthetically important areas managed to minimize impacts to viewscapes as a result of harvesting. Harvest operations carefully planned in viewshed areas to maintain aesthetic quality.
- **Significant Habitat**: Significant wildlife habitat areas defined by NSDNR. Species listed as endangered or threatened (provincial and/or national) are automatically protected by Stora Enso from harvest. Forest management activities will be modified for all other listings to minimize impacts.
- **Riparian Zones**: Riparian zone management adheres to provincial regulations on watercourses. Riparian zones will be maintained a minimum of 20 m wide on either side of all watercourses, including lakes, streams, bogs, and fens within the total forest management area. Municipal watershed areas will have buffers of at least 30 m.
- **Recreation**: Recreation areas identified in the provincial Integrated Resource Management process managed to minimize impacts to recreational opportunities in the area.
- **Old Forest**: Areas defined by Stora Enso and NSDNR as old forests. SE will strive to have 8% of its total forest management area by ecoregion identified and maintained in an old forest condition.
- **Connectivity Management**: These zones are at least 500 m wide and explicitly managed for connectivity between ecologically important areas. The overriding objective for each of these zones is to provide spatially and temporally continuous connectivity between the ecologically important areas of forest.
- **Marten, lynx, felt lichen** and **deer wintering** areas are all under special management objectives. Sufficient habitats will be maintained for each species, based on habitat levels specified by the NSDNR.

APPENDIX D: MATRIX OF HUMAN ACTIVITY AND PRESSURES

Table D1. Matrix of human activity and pressures

Subwatershed	Oyster Aquaculture	Mining	Shipping	Forestry (clear + recent)	Agriculture	Development	Parks and Trails	Population density (approx)	Road density	Shellfish Closures	TOTAL SCORE
St. Peters Inlet	0	0	0	S3R3FP(6)	S1R3F1P1(6)	S1R3F0P(4)	S2R0F2P0(4)	S1R3F3P3(10)	S3R3FP(6)	11sm2med(28)	**64**
Denys Basin	S1R1F1P1(4)	S2R3F3P1(9)	0	S3R3FP(6)	S2R3F1P2(8)	S1R3F0P(4)	0	S2R3F3P3(11)	S1R3FP(4)	cond4sm1lg(17)	**63**
East Bay	S1R1F1P1(4)	0	0	S4R3FP(7)	S1R3F1P1(6)	S3R3F0P(6)	S1R0F1P1(3)	S4R3F3P3(13)	S2R3FP(5)	2sm2med1lg(14)	**58**
St. Patricks Channel	S1R1F1P1(4)	S2R3F3P0 (8)	S0R0F2P0 (2)	S3R3FP(6)	S1R3F1P1(6)	S2R3F0P(5)	0	S1R3F3P3(10)	S1R3FP(4)	3sm1lg(10)	**55**
St. Andrews Channel	0	0	0	S2R3FP(5)	S3R3F1P2(9)	S3R3F0P(6)	S1R0F1P1(3)	S2R3F3P3(11)	S2R3FP(5)	3med(9)	**48**
Whycocomagh Bay	S0R1F1P1(3)	0	0	S3R3FP(6)	S2R3F1P2(8)	S1R3F0P(4)	S1R0F1P1(3)	S2R3F3P3(11)	S2R3FP(5)	1sm2med(8)	**48**
Baddeck River	0	0	0	S7R3FP(10)	S2R3F1P1(7)	S2R3F0P(5)	S1R0F1P1(3)	S3R3F3P3(12)	S1R3FP(4)	1lg(4)	**45**
Middle River	0	0	0	S9R3FP(12)	S3R3F1P3(10)	S2R3F0P(5)	0	S1R3F3P3(10)	S1R3FP(4)	1lg(4)	**45**
Great Bras d'Or	0	0	S0R0F2P0 (2)	S3R3FP(6)	S1R3F1P1(6)	S2R3F0P(5)	S1R0F1P1(3)	S1R3F3P3(10)	S2R3FP(5)	2sm1med(7)	**44**
McKinnons Harbour	S1R1F1P1(4)	0	0	S1R3FP(4)	S1R3F1P1(6)	S1R3F0P(4)	0	S1R3F3P3(10)	S3R3FP(6)	3med(9)	**43**
West Bay	0	0	0	S2R3FP(5)	S1R3F1P1(6)	S1R3F0P(4)	0	S1R3F3P3(10)	S2R3FP(5)	1sm2med(7)	**37**
North Basin	0	0	0	0	S1R3F1P1(6)	S3R3F0P(6)	0	S1R3F3P3(10)	S1R3FP(4)	2med(6)	**32**
Activity Total	**19**	**17**	**4**	**73**	**84**	**58**	**18**	**119**	**57**		

Ranking factors:*
S = size of disturbance. Generally ranked from 0 (smallest) to 4 (largest). For example, total area of agriculture in each subwatershed was assigned a 1 if there were 0-500 ha, a 2 for 500-1000 ha, and a 3 for 1000+ ha.
R = ability of an area to recover after a disturbance. Generally ranked from 0 (no recovery time) to 3 (years to decades). For example, hiking trail use was ranked 0 and mining was ranked 3.
F = frequency of disturbance. Generally ranked from 0 (infrequent) to 3 (daily). For example, road density was ranked 0 and mining was ranked 3.
P = patchiness of disturbance. Generally ranked from 0 (one location) to 3 (several locations). For example, oyster aquaculture was ranked 1 and population density was ranked 3.
*If there is no number beside a ranking factor, not enough information was available to reasonably assign a number.

Shellfish closures were assigned a special ranking scheme. Open areas were ranked 0, any conditional areas in a given bay were ranked 1, each small closure was given 2 points, each medium closure was given 3 points, and each large closure was given 4 points.

Note: The relative size of each subwatershed has not been considered in this ranking scheme.