Bras d'Or Lake Biosphere Reserve

Periodic Review – Initial Submission

Part I & Part II

(excluding Annexes)

February 2021



United Nations
Educational, Scientific and
Cultural Organization

Bras d'Or Lake
biosphere

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Acknowledgements

These individuals formed the BLBRA Periodic Review Committee and contributed text:

Maureen Cameron-MacMillian, Vice-Chair BLBRA
Eileen Crosby, Chair BLBRA
Dr. Bruce Hatcher, Immediate Past Chair BLBRA
Stan Johnson, Board member and CEPI
Gordon Kerr, Chair, Periodic Review Committee. Board member BLBRA
Pierre LaRochelle, Secretary / Communication Chair BLBRA
Elizabeth MacCormick, Board member BLBRA
Jim MacDonald, past Board member
Allison MacIsaac, Board member BLBRA
Dave Williams, NS Dept. of Environment

These groups and individuals contributed time, knowledge and facilities during research and map update for this document:

Port Hawkesbury Paper Ltd.—(Andrea Doucette)
NSE (Dave Williams
NSDLF (Nick Deagle)

These individuals assisted in a variety of ways to help the authors access materials needed for this submission:

Dr. Rod Beresford, Board member, BLBRA and Verschuren Centre for Sustainability in Energy and the Environment
Senator Daniel Christmas, Co-chair CEPI
Andrea Doucette, Port Hawkesbury Paper
Jim Foulds, Past Chair—BLBRA
Carla Arsenault, Cape Breton Partnership
Kristine Mills, Destination Cape Breton Association
Dr. Annamarie Hatcher, past Board member BLBRA
Shauna Barrington, Editor
Robin Stuart, Consultant
Brian MacDougall, Treasurer, BLBRA
Dr. Teresa MacNeil, Past Chair - BLBRA,
Norm Hubbert, Capstone Project Team, Shannon School of Business, CBU

Laura Syms, Business and Data Services, CBU
Jonathan Buffett, Cape Breton Weather Mesonet
Mike R. Hunter, Independent editor
Mike MacSween, Celtic Colours International Festival
Rodney MacDonald, CEO KitchenFest
Tracy Marshall, CEPI Youth
Chris Boudreau, Director of Public Works /Municipal Engineer, Richmond County
Wayne H. MacDonald, P.Eng., Director of Engineering & Public Works, CBRM
Tom Johnson, Executive Director, Eskasoni Fish and Wildlife Commission, EFWC

Financial support (2020): Funded entirely by the BLBRA

In-kind donations:

The numerous letters of support, with many containing updates for the past 10 years.

The updated zone map was produced and printed by the NSDLF

This document was greatly improved by the editing of Mike R. Hunter (some remuneration) and a comprehensive review by Shauna Barrington.

Acronyms, Abbreviations and Initialisms

ACAP-CB	Atlantic Coastal Action Program (Cape Breton)
ACCDC	Atlantic Canada Conservation Data Centre
ACOA	Atlantic Canada Opportunities Agency
AGBNHS	Alexander Graham Bell National Historic Site
AGM	Annual General Meeting
AIP	Atlantic Immigration Pilot
AZMP	Atlantic Zone Monitoring Program
BdOI	Bras d'Or Institute, CBU
BLBR	Bras d'Or Lake Biosphere Reserve
BLBRA	Bras d'Or Lake Biosphere Reserve Association
BOD	Board of Directors
BR	Biosphere Reserve
BSS	Bras d'Or Stewardship Society
C2	Crown Land category 2
CABIN	Canadian Biomonitoring Network Program
CAMP	Community Aquatic Monitoring Program
CBCCD	Cape Breton Centre for Craft and Design
CBLIP	Cape Breton Local Immigration Partnership
CBRA	Canadian Biosphere Reserves Association
CBRM	Cape Breton Regional Municipality
CBP	Cape Breton Partnership
CBU	Cape Breton University (formerly UCCB)
CCA	Climate Change Adaptation
CCUNESCO	Canadian Commission for United Nations Educational Scientific and Cultural Organization
CDC	Conservation Data Centre
CEPI	Collaborative Environmental Planning Initiative
CESD	Coastal Ecosystem Science Division (DFO Science Branch)
CM	Member of the Order of Canada
CNPP	Canada's Community-Nominated Priority Places
COMFIT	Community Feed-In Tariff
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Department of Fisheries and Oceans
DCBA	Destination Cape Breton Association
DCS	Department of Community Services
EBM	Ecosystems-Based Management
ECCC	Environment and Climate Change Canada (formerly EC)
EFWC	Eskasoni Fish and Wildlife Commission
EHS	Emergency Health Services (Nova Scotia)
EMAN	Ecological Monitoring and Assessment Network
ENS	Employment Nova Scotia
ESDC	Employment and Social Development Canada
ESSIM	Eastern Scotian Shelf Integrated Management Program
FNSWO	Federation of Nova Scotia Woodland Owners
FSC	Forest Stewardship Council
FULA	Forest Utilization License Agreement
FVCOM	Finite Volume Community Ocean Model
GIS	Geographic Information System
HCVF	High conservation value forest

ICES	International Council for the Exploration of the Sea
IFN	Island Food Network
IRM	Integrated Resource Management
IRCC	Immigration, Refugees, and Citizenship Canada
ITAC	Indigenous Tourism Association of Canada
IWMP	Integrated Watershed Management Plan
LGBTQ	Lesbian, Gay, Bisexual, and Transgender
Lgt	Transitional Low Boreal Ecoclimatic Region
MAB	UNESCO's Man and the Biosphere Program
MBA CED	Master of Business Administration in Community Economic Development
MOU	Memorandum of Understanding
MROP	Maritimes Regional Oceans Plan
MSX	Multinucleated Spherical X (disease of oysters)
NA	Not Applicable
NAICS	North American Industry Classification System
NGO	Non-Governmental Organization
NSCC	Nova Scotia Community College
NSDA	Nova Scotia Department of Agriculture
NSDLF	Nova Scotia Department of Lands and Forestry (formerly NSDNR)
NSDNR	Nova Scotia Department of Natural Resources
NSE	Nova Scotia Environment
NSESA	Nova Scotia Endangered Species Act
NSFA	Nova Scotia Fisheries and Aquaculture
NSLFFPA	Nova Scotia Landowners and Forest Fibre Producers Association
NSNT	Nova Scotia Nature Trust
NSWOOA	Nova Scotia Woodlot Owners and Operators Association
OECM	Other Environmental Conservation Measures
OESD	Ocean and Ecosystem Sciences Division (DFO Science Branch)
OFI	Ocean Frontier Institute (Dalhousie University)
ORB	Organizations Related to the Bras d'Or
PED	Population Ecology Division (DFO Science Branch)
PHP	Port Hawkesbury Paper (Formerly NewPage Port Hawkesbury Ltd. & formerly Stora Enso)
PR	Periodic Review
REN	Regional Enterprise Network
SARA	Species at Risk Act
SC	Species of Special Concern
SDG	Sustainable Development Goal
SFI	Sustainable Forestry Initiative
SRDWA	Stewards of the River Denys Watershed Association
TEEB	The Economics of Ecosystems and Biodiversity
TEK	Traditional Ecological Knowledge
TGI	Targeted Geoscience Initiative
TIANS	Tourism Industry of Nova Scotia
TNS	Tourism Nova Scotia
TISEC	Tidal in-Stream Energy Conversion
ToR	Terms of Reference
UINR	Unama'ki Institute of Natural Resources
UNESCO	United Nations Educational Scientific and Cultural Organization
WNBR	World Network of Biosphere Reserves
WNICBR	World Network of Island and Coastal Biosphere Reserves
WTI	World Tourism Institute

PART I: SUMMARY

a) Name of the biosphere reserve: Bras d'Or Lake Biosphere Reserve

b) Country: Canada

c) Year of designation: 2011

d)Year(s) of periodic review(s): Not Applicable

e) Previous recommendation(s) made by the International Coordinating Council (MAB-ICC), if applicable: Not Applicable

f) What follow-up actions are completed and if not completed/initiated, please provide justifications. Not Applicable

g) Update on the implementation of measures to achieve the objectives of the biosphere reserve.

We took actions towards addressing our goals as laid out in the 2013-2015 Strategic Plan as outlined in section 7. We are updating to a 5-year plan for 2021-2026.

h) Briefly describe the process by which the current periodic review has been conducted:

The association formed a review committee in January 2020 and the Chair proceeded to contact CCUNESCO. The document "2020-2021 Periodic Review Process_CC-UNESCO" was used for guidance and the "UNESCO-MABP Periodic Review form_2013 was used to conduct our self-assessment.

Due to the global pandemic, there have been few in-person workshops/meetings to collate information. Our committee meets using online meeting software and group collaboration is facilitated by using Google docs.

The reviewers' report and recommendations, and the BLBRA responses to that report are included immediately following this summary as (l).

i) Area and spatial configuration:		
	Previous report (nomination form or periodic review) and date	**Proposed changes (if any)**
Area of terrestrial core area(s)	7,712 ha (2010)	19,762 ha
Area of terrestrial buffer zone(s)	61,460 ha (2010)	48,397 ha
Area of terrestrial transition area(s)	178,262 ha (2010) 1 810 km2	179,261 ha (1 820 km2)
Area of marine core area(s)	0.0	0.0
Area of marine buffer zone(s)	0.0	0.0
Size of marine transition area(s)	109,154 ha (2010) 1 098 km2	no change

j) Human population of the biosphere reserve:

Biosphere Population Trends 2011 - 2020				
Biosphere Area	**Pop. 2011**	**Pop. 2016**	**Pop. 2020**	**Change vs 2011**
Core area(s) (permanent and seasonal)	None	None	None	NA
Buffer zone(s) (permanent and seasonal)	None	None	None	NA
Transition area(s) (permanent and seasonal)	18,951 **P** Unknown **S** 196,560 **T**	19,380**P** Unknown **S** 221,760 **T**	**P*** 7,436 **S** 231,840 **T****	+2 % +/- % +18 %
First Nations	5,108	5,290	5,670	+11 %
Non First Nations	13,843	14,090	**P***	+ 2 %
Permanent Residents (**P**), Seasonal Residents (**S**) and Seasonal Tourists **T**				
T is based on the fact that 21 % of non-resident NS visitors travel to Cape Breton and 48 % of those go to Baddeck (Tourism NS). Note: Attendance at Alexander Graham Bell National Historic Site rose from 67,485 to 87,000, and travellers on the Cabot Trail rose from 179,982 to 300,906 in the same period. T could be higher.				
P*Available mid 2021; T**2019 used for 2020 as visits dropped significantly with COVID-19 pandemic.				
Data attribution: Statistics Canada. GeoSuite 2016, Statistics Canada. 2016 Census of Canada, 2020 estimates: Profile data for DBs in the four counties within Bras d'Or Biosphere Ottawa, Canada. Statistics Canada [producer]; Tetrad Computer Applications, Vancouver, BC [distributor]. Available from SiteWise, CBRM data, Tourism NS.				

k) Budget (main sources of funds, special capital funds) and international, regional or national relevant projects/initiatives carried out or planned.

Budget in the previous report (nomination form or periodic review) and date	Current Budget
$125,000 - $200,000 CAN annually	As of October 2020 the allocated budget for 2021 is $47,405

Our main sources of funds have been from the TD Bank Friends of the Environment fund and from the Atlantic Canada Opportunities Agency (ACOA). We have not carried out or planned any international projects/initiatives although one of our Board members, Tom Johnson, joined CCUNESCO to work toward our greater involvement. Our major national initiative was to host a Climate Change Adaptation Forum in 2019 with an outcome of a Climate Change Adaptation Guide for Canadian Biosphere Reserves. One of our Board members makes regular connections with CBRA. Our major regional initiatives have been

to develop the middle school education curriculum, the Bras d'Or Watch, trails around the lake and the AGB Museum display.

We are considering expanding the Bras d'Or Watch into local elementary schools to coordinate with one of the current four booklets about the biosphere which are already approved by the Department of Education and in use (Adapting Watery Habitat). A Citizen Science Initiative will develop a report card for the biosphere while an updated Museum display will soon be available to the public. Finally, the executive committee is now taking steps to update our strategic plan. An update of the cooperation plan for the Biosphere Reserve in partnership with the interested parties will be considered as well.

International, regional, multilateral or bilateral framework of cooperation. Describe, where applicable, the contribution of the biosphere reserve to achieve objectives and developing mechanisms that contribute to the implementation of international or regional bilateral or multilateral agreements, conventions, etc.

Significantly, in 2018, the Board of Directors of the Bras d'Or Lake Biosphere adopted the Pessamit Call for Reconciliation regarding the Rights of Indigenous peoples. We acknowledge that all sites designated by UNESCO in Canada as Biosphere Reserves are located on Indigenous lands. The Bras d'Or Lake Biosphere Reserve is located on the traditional, unceded territory of the Mi'kmaw nation in the district of Unama'ki (Cape Breton) and we make this statement upon opening all meetings. That is the first of five statements in the Pessamit document. In order to succeed in carrying out the tenants of the Pessamit Agreement, the BLBRA focuses on thoroughly exercising the other four statements of that document in order to achieve reconciliation through 'reconcili*action*'.

l) The reviewers' report and recommendations, and the BLBRA responses to that report follow.

Bras d'Or Lake Biosphere Reserve

Reviewers Report













Gerald Singh
Geneviève Poirier-Ghys
July 25, 2021

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Introduction

The World Network of UNESCO designated Biosphere Reserves (BR) covers 714 regions in 129 countries, including 21 transboundary sites. 250 million people live in Biosphere Reserves and the overall area that the network covers is larger than China. Biosphere Reserves promote solutions reconciling the conservation of biodiversity with its sustainable use. They are learning areas for sustainable development under diverse ecological, social, and economic contexts.[1] The World Network connects communities and regions around the globe who are pioneering a positive future for people and nature. The collective impact is unparalleled[2].

In Canada, the 18 Biosphere Regions are situated within the traditional territories of over 50 Indigenous Nations and cover an area of 235 000 km^2. Represented by the Canadian Biosphere Reserves Association (CBRA) and the Canadian Commission for UNESCO, these Biosphere Regions work collectively to achieve the four common objectives from the UNESCO's Man and the Biosphere program (MAB):

A Biosphere Reserve is intended to fulfill these essential functions:

- Conserve biodiversity, restore and enhance ecosystem services and foster sustainable use of natural resources.
- Contribute to building sustainable, healthy, and equitable societies, economies, and thriving human settlements.
- Facilitate sustainability science and education for sustainable development, and.
- Support mitigation and adaptation to climate change and other aspects of global environmental change.

Concretely, Biosphere Reserves have three interrelated zones that aim to fulfil three complementary and mutually reinforcing functions:

- The core area(s) comprises a strictly protected ecosystem that contributes to the conservation of landscapes, ecosystems, species, and genetic variation.
- The buffer zone surrounds or adjoins the core areas and is used for activities compatible with sound ecological practices that can reinforce scientific research, monitoring, training, and education.
- The transition area is the part of the reserve where the greatest activity is allowed, fostering economic and human development that is socio-culturally and ecologically sustainable.[3]

Every ten years, regions designated as BRs undertake a periodic review to provide an overview of their contributions and assess their compliance with UNESCO's MAB programme. This report assesses the strengths and weaknesses of the Bras d'Or Biosphere Reserve and provides recommendations on ensuring the successful long-term development of the BR.

[1] Text from: https://en.unesco.org/biosphere

[2] Text from: https://www.biospherecanada.ca/vision

[3] Text from : http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/

1. Brief Description of Bras d'Or Lake Biosphere Reserve

The Bras d'Or Lake Biosphere Reserve was created in 2011. Bras d'Or Lake Biosphere (BLBR) is located on Cape Breton Island – Unama'ki, in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq people, in Nova Scotia.

The Bras d'Or Biosphere Reserve is a unique environment. The estuary, commonly referred to as the lake, and watershed cover over 3500 Km^2 forest and watery ecosystems in the centre of Cape Breton Island. The estuary occupies 31% of the Biosphere and the rest is a watershed.

In 2011, core areas comprised 7,712 hectares of land or 3.1% of the terrestrial portion of the BLBR.
The amount of land currently qualifying as a core area has risen to 19,762 hectares or 8.0 % of the BLBR. This is due largely to the implementation of Nova Scotia's Parks and Protected Areas Plan, an initiative to identify potential lands for legal protection as wilderness areas, nature reserves or provincial parks across the province.

The Bras d'Or Lake watershed is a special place where communities are joined together in thoughtful promotion of environmental assets and responsible economic development. The Bras d'Or Lake Biosphere Reserve Association (BLBRA) has the mission to engage all peoples in the balanced and sustainable development of the exceptional cultural, social, environmental and economic assets within the Bras d'Or Lake watershed.

The management of the Biosphere Reserve remains under the responsibility of the Bras d'Or Lake Biosphere Reserve Association since its inception in 2011. The association is governed by a board of directors, while various government and non-governmental organizations have jurisdiction over the lands and waters within the Biosphere Reserve boundary. The operations of the Biosphere Reserve therefore depend on multistakeholder partnerships.

2. Overview of the Periodic Review Process

Every ten years, regions designated as Biosphere Reserves undertake a periodic review to provide an overview of their contributions and assess their compliance with UNESCO's MAB programme. They are designed to ensure that the high standards characterizing the UNESCO designation are met and that programme objectives are achieved. In this sense, reviews validate the continuing dynamism and contributions of BRs to the three functions as outlined in the Statutory Framework: conservation, development, and logistic support[4].

[4] Extract from the Guidelines and Process for Biosphere Reserve Periodic Reviews – Canada, May 2020.

In Canada, periodic reviews are also opportunities to reflect on progress achieved over the past ten-year period, learn, and renew engagement of local government and municipalities, regional and federal government, non-governmental organizations, the private sector, Indigenous peoples, etc.

2.1 Presentation of the Reviewers

Gerald Singh and Geneviève Poirier-Ghys are both external reviewers for the Bras d'Or Lake Biosphere Reserve's periodic review and authors of this evaluation report.

Gerald Singh is an Assistant Professor in the Department of Geography at Memorial University of Newfoundland and Labrador and the Chair of the Sciences Sectoral Commission for the Canadian Commission for UNESCO. His work focuses on human impacts on ecosystems and people's relationships with the environment, particularly in regarding development and sustainability policy.

Geneviève Poirier-Ghys is the coordinator of the Mont-Saint-Hilaire Biosphere Reserve and is responsible for conservation and communication programs for Mont-Saint-Hilaire Nature Centre. She works with local stakeholders to promote the conservation of natural areas through stewardship programs, land-use planning and citizen engagement.

2.2 Presentation of the Process

On April 12, 2021, the reviewers remotely met with members of the Board of Bras d'Or Lake Biosphere Reserve. This meeting was set to establish the process of review and set up interviews with distinct groups who are or have in the past contributed to decisions and operations within the Biosphere Reserve. Specifically, meetings were set up between previous board chairs, current board members, members of CEPI (the Collaborative Environmental Planning Initiative) and municipalities. The reviewers also read the periodic review self-study submitted to Canadian Commission for UNESCO to frame questions for the interviews.

2.3 Virtual Visit

Because of travel restrictions due to the COVID-19 pandemic, the site visit from the periodic review committee to Bras d'Or was conducted virtually, taking the form of a series of interviews with current and past members who have had a role in decisions regarding Bras d'Or Lake Biosphere Reserve during the past 10 years. Through May 12-14, the periodic review committee met with the members and asked a series of questions regarding the i) past 10 years of challenges and opportunities, ii) perceived future challenges and opportunities, iii) partnerships, iv) follow-up questions stimulated by the periodic review and previous interviews.

3. Highlights and Achievements over the past 10 years

3.1 Territory

The Bras d'Or Lake Biosphere Reserve is not set up according to the theoretical zonation planning for biosphere reserves, which, in theory, included a core area of conservation surrounded by a buffer zone which contains low-impact activities, and an outer transition zone which will contain most of the human settlements and higher impact activities. Instead of this concentric model, the Bras d'Or Lake Biosphere system is a mosaic of core, buffer, and transition areas around the lake. Despite the non-traditional distribution of core and buffer areas, the zonation of the Bras d'Or Lake Biosphere Reserve satisfies Article 4 of the statutory framework of biosphere reserves.

The pattern of zonation is a consequence of working with existing communities meaning that, historically, planning was piecemeal and harder to align with the theoretical biosphere reserve zonation structure. It also meant that the approach is more likely to have buy-in from the community. Buffer areas have been strategically chosen to pre-emptively address one of the chief physical risks for the area: erosion. While the lake itself does not have any protected areas within it, it functions as a buffer for some of the terrestrial core areas. Over the past ten years, the size of the core area has grown.

3.2 Relation with Indigenous Communities

Bottom up

The Bras d'Or Lake Biosphere Reserve was set up with Indigenous communities from the outset. The board has indicated a strong working relationship with Indigenous communities as core partners. The CEPI partners which have been instrumental in the establishment and running of the biosphere reserve was established by five Mi'kmaq chiefs of Unama'ki and includes all levels of government.

Indigenous engagement from the start

Planning with the Indigenous Mi'kmaq was core for the Bras d'Or Lake Biosphere Reserve since its inception. Involvement with Mi'kmaq was central before the inclusion of municipalities. The CEPI itself was formed out of discussions between Indigenous groups and governments (who historically have not had productive relationships) to address challenges the lake has faced. The biosphere reserve is one of several successful case studies of the bottom-up approach taken across diverse groups at environmental management and development.

Two Eyed Seeing

Central to the governance of Bras d'Or Lake Biosphere Reserve is the concept of "two-eyed seeing", which is a concept for acknowledging, integrating, and (where needed) respecting

differences between Indigenous and western knowledge systems. While environmental management has for years tried to address and incorporate Indigenous knowledge systems, rarely has this been done where Indigenous groups have an equal footing or fundamental role in an initiative. In practice, this meant that Indigenous knowledge was vetted against western knowledge and legitimized when in agreement with western knowledge. Instead, the two-eyed seeing model has focused more on common vision and understanding, respecting differences, and finding common values. The focus is on broad consultation prior to development (rather than technocratic and expert-driven development).

In the case of Bras d'Or Lake Biosphere, this has led to strong partnerships that reaffirm many Indigenous perspectives, contributing to national efforts at reconciliation. In our interviews, we were told that the creation of the biosphere reserve was an affirmation of the Indigenous perspective that "the lakes have always been a part of us". The model of "people in nature" that is emerging from the UNESCO biosphere model is also seen as an affirmation of Indigenous perspectives, which have always seen people as part of their environment (in contrast to historic conservation lenses which have treated them as distinct). As another Indigenous interviewer stressed, "the biosphere system is just catching up to us".

Proof of Concept

The Indigenous perspective and two-eyed seeing governance system have been central to the Bras d'Or Lake Biosphere Reserve, which seems to have had substantial outcomes. First, the creation of a Biosphere Reserve through community-led efforts, and now through the establishment of a sport fishery in the surrounding area, forestry research, community-wide celebrations (Explore the Bras d'Or), and the creation of a climate-impact conference, largely through volunteer efforts.

3.3 Strong Engagement of Volunteers

Having no paid staff, Bras d´Or Lake Biosphere Reserve has always relied on competent and motivated volunteers. It is with enthusiasm and hard work that these volunteers have succeeded in making the Biosphere Reserve what it is today.

From the steering committee to the creation of the association, everyone who got involved have been volunteers. Thus, for more than ten years, they worked on the designation of the Biosphere Reserve, set up committees, created partnerships and set up several activities throughout the territory.

The democratic structure is completely open and based on the commitment of volunteers. The Board of Directors has 14 elected members and 6 appointed members. Regular meetings allow committees to present the progress of their work. To promote the feeling of belonging to the Biosphere Reserve, meetings are held each time in different communities.

The diligent work of the volunteer board members over the past 10 years has resulted in successfully seeking funding for their various initiatives on a project-by-project basis. The key obstacle encountered in the management/coordination of the biosphere is lack of funding.

3.4 Signage and Tourism

Cape Breton is an attractive area and the Biosphere benefits directly from promotion and tourism of Cape Breton Island. The Biosphere has enjoyed an 18% increase in visitors over the last 10 years. Since the designation, there have been real efforts to educate the tourism industry, regional entities, operators, and the public about the Biosphere and to promote sustainable tourism.

A website, a permanent exhibition, an online atlas, and some trails were projects created to promote tourism. One of the most significant projects of the last ten years has been raising public awareness to the Biosphere Reserve through the erection of highway signage. It took more than six years for the committee to raise the money, get the permission from the landowners and convince partners to put up signs on highways and smaller roads. Municipalities, regional, provincial, and federal agencies contributed to this project.

Signage now allows local businesses to emphasize and advertise the fact that they are operating in a UNESCO designated biosphere. It also makes the BLBRA and its work more recognizable to both its cooperating partners as well as the public.

4. Opportunities and recommendations

4.1 Strategic Planning

Bras d'Or Lake Biosphere Reserve Association (BLBRA) has played a facilitating role for the Biosphere. Indeed, the Association has always considered that Biosphere Reserve designation must add value and that it must not duplicate, substitute or in any way conflict with existing efforts.

Thus, for its tenth year of existence, it is important to review the strategic planning as well as the cooperation plan to develop a vision for the Biosphere and harmonize activities with other organizations of similar interest and concerns of the Lake and its watershed. While ensuring aligning BLBRA's objectives with those of the other key stakeholders in terms of the three functions of a biosphere: conservation, sustainable development, and logistic support.

In its function as a biosphere reserve as well as through the diversity of partners and stakeholders in the territory, it is suggested that the Biosphere use collaborative approaches for the development of these plans. Collaborative strategy planning seeks to include as many

stakeholders as possible to meaningfully involve the individuals from the stakeholder organizations in providing insights and inputs that shape the BLB's strategy.

Partnership

The Bras d'Or Lake Biosphere Reserve has an impressive number of partners. For the nomination as well as for the self-study, 72 organizations were asked to give their support to the Biosphere. However, CEPI and the four municipal governments remain the key stakeholders. They are represented on the BLBRA Board.

Multistakeholder governance is a practice of governance that employs bringing multiple stakeholders together to participate in dialogue, decision-making, and implementation of responses to jointly perceived problems. This practice has been in place in the Biosphere.

Both for the future of the board and sustaining the lakes as a UNESCO biosphere reserve. It is important to work to strengthen and maintain the participation and engagement of municipalities, CEPI and CEPI Youth while developing new and meaningful partnerships. The collaborative strategic planning exercise is a good time to renew, enrich and develop

RECOMMENDATION 1:
Increase partnership with municipalities and communities through shared strategic partnerships.

4.2 Funding and Sustainability

All work by the BLBRA is conducted by volunteers, mostly board members. The diligent work of the volunteer board members over the past 10 years has resulted in successfully seeking funding for their various initiatives on a project-by-project basis.

Furthermore, the success of the BLBR and its association is based on supportive partnerships among many different groups that are focused on creating, implementing, or participating in activities that contribute to any or all three goals common to all UNESCO BRs. For this reason, it is important to enhance the BLBRAs role as a facilitator. The Association needs to enhance the relationship with their current cooperating organization over the next several years and continue to connect with other similar minded organizations or community groups as they evolve.

Nevertheless, funding will be one of the challenges for next year. Increasing the financial capacity through development activities or partnerships would benefit the Biosphere.

RECOMMENDATION 2:
Focus on securing sustainable and diverse funding that could be done through regional partnerships or other means.

4.3 Demographics

One chief challenge faced by Bras d'Or Lake Biosphere is something facing Atlantic Canada broadly: demographics. Most of the communities are aging, and many people from younger age cohorts are moving away. Local Indigenous communities have younger age structures which can supply the next generations, and the biosphere reserve can build on and provide new opportunities for local Mi'kmaq to connect with their ancestral lands and culture, but population growth in this community is unlikely to offset population reductions elsewhere.

Youth Engagement

Most engagement in the Bras d'Or Lake Biosphere Board is taken up by retirees, and multiple interview participants pointed to a lack of youth engagement as a challenge, both for the future of the board and sustaining the lakes as a UNESCO biosphere reserve. We heard that youth representation is lacking in planning. Many youths also leave for opportunities outside of Cape Breton because they are interested in careers outside of primary industry and tourism.

Immigration

In contrast to the challenges raised by aging demographics and out-migration, there are some opportunities presented by immigration. Cape Breton University is an institution that attracts youth from outside Cape Breton, who will have opportunities to connect with the Bras d'Or region. Similarly, there have been some instances of people immigrating to the area (such as from the USA) to work remotely. There may be opportunities to partner with Cape Breton University and some organizations that allow for remote work (such as tech firms). Such partnerships may provide some opportunities beyond primary industry and tourism and youth engagement.

RECOMMENDATION 3:
Develop a volunteer program focused on youth engagement.

RECOMMENDATION 4:
Develop and secure partnerships with organizations that attracts immigrants to the region.

4.4 Climate Adaptation

Climate impacts are felt throughout the world, and Bras d'Or Lake Biosphere is no exception. Both reviewers were very impressed that the board has had the foresight and organization to establish a climate change symposium to explore likely climate impacts in the Bras d'Or region, and will be focusing on implementing its eight recommendations over the coming years.

Erosion

Erosion was cited as a major environmental challenge and will only increase as a concern through climate change. Raising seawater levels, and increased volatility in precipitation and flooding poses concerns for the freshwater ecosystems, associated biodiversity and cultural values through sedimentation and saltwater intrusion. The board may consider creating buffer zones and adaptation measures more in coastal areas to address some of these challenges. While buffer zones were set up to address erosion sensitive areas in terrestrial contexts, there are currently no marine buffer zones that may help mitigate these impacts as well.

RECOMMENDATION 5:
Create a climate adaptation plan and make it a key aspect of the strategic planning for the next ten years.

RECOMMENDATION 6:
Work with provincial and federal governments to create marine protected areas within the lake.

5. Conclusion

Overall, we find that the Bras d'Or Lake Biosphere Reserve satisfies Article 4 of the statutory framework of biosphere reserves. The zoning in the Bras d'Or Lake Biosphere is unorthodox, but this is a product of the bottom-up history of the creation of the biosphere reserve as well as the geography and planning around risks. This unorthodox zoning is a symptom of the strengths of Bras d'Or Lake Biosphere rather than weaknesses. The core areas within the Biosphere Reserve have grown over the past ten years, and it may grow further over the next ten.

Sustainable development of the area is poised to continue through the unique partnerships in Bras d'Or Lake Biosphere as much as through the zoning structure. Partners committed to operating under Two-Eyed seeing, Indigenous principles of stewardship, and people as part of the environment, in the Bras d'Or Lake Biosphere, are proof of the concept of sustainable regional development. The existing partnerships fundamental to Bras d'Or Lake Biosphere Reserve, such as with the CEPI, offer continued opportunities to address current and foreseen challenges. The partnership with the CEPI may, for example, offer opportunities for the Biosphere Reserve to secure unique funding not available to other Biosphere Reserves.

Many of the other main challenges faced by Bras d'Or Lake Biosphere Reserve may also be addressed through new partnerships with regional communities and institutions and developing strategic planning that works with these other entities may offer unique solutions. Biosphere

Reserves are model regions of the world to emulate, and Bras d'Or Lake Biosphere has displayed leadership in some aspirational areas that the Biosphere Reserve program has set out, but there is more to build on. Below, we highlight the set of recommendations we have for the next ten years. We feel that the self-study is complete and no additional information is required before submission to UNESCO.

RECOMMENDATION 1:
Increase partnership with municipalities and communities through shared strategic

RECOMMENDATION 2:
Focus on securing sustainable and diverse funding that could be done through regional partnerships or other means.

RECOMMENDATION 3:
Develop a volunteer program focused on youth engagement.

RECOMMENDATION 4:
Develop and secure partnerships with organizations that attracts immigrants to the region.

RECOMMENDATION 5:
Create a climate adaptation plan and make it a key aspect of the strategic planning for the next ten years.

RECOMMENDATION 6:
Work with provincial and federal governments to create marine protected areas within the lake.

BLBRA response to "Rapport_BrasOrBR_PeriodicReview_FINAL v2" August 2021

We were very pleased to hear the positive endorsement of the progress of our association and our partners over the past ten years in meeting the goals of a UNESCO biosphere. We were also pleased to see recommendations from the independent reviewers which will be valuable input to our strategic planning sessions this coming fall.

We made some minor changes to section 8.5 to indicate where to easily find, throughout the self-assessment report, 1/ maps of the zonation in 2010 and 2020 and 2/ notes on changes to the core areas in the past 10 years. We also updated Section 7.5.5 to include recommended action items for Biosphere Reserves in Canada which were developed from the 2019 Climate Change Adaptation Forum conducted in our Biosphere in conjunction with the Canadian Biosphere Reserve summer meeting. Below you will find our response to the six recommendations in the review report.

HOW THE BLBRA PROPOSES TO ADDRESS THE REVIEWERS RECOMMENDATIONS

These recommendations are to be brought forward to our strategic planning sessions in the fall of 2021 along with the 8 recommended action items of the climate change adaptation forum.

RECOMMENDATION 1:

Increase partnership with municipalities and communities through shared strategic planning.

We already have representatives from the Municipalities on our Board of Directors but we need to engage them more directly in our projects. We are inviting municipalities and communities to participate in our upcoming strategic planning session in the fall of 2021 in an effort to begin more direct engagement.

Current examples of engagement are the CBU Capstone Project initiated by our communications committee to promote marketing tourism in the Biosphere and a joint project conducted with CEPI in the summer of 2021 called Explore the Bras d'Or where we had engagement and met with communities around the lake.

RECOMMENDATION 2:

Focus on securing sustainable and diverse funding that could be done through regional partnerships or other means.

The BLBRA will look to develop funding streams that align with the strategic goals of the Biosphere. Specifically, fundraising with targeted projects that align with the interests of various

levels of government, other NGOs will be a priority. Establishment of a capital campaign post the formation of the BLBRA's next strategic plan should ensure a sustainable and secure funding base. Individual donations and memberships will also remain as important funding streams as it links the work of the BLBRA to community members.

RECOMMENDATION 3:

Develop a volunteer program focused on youth engagement.

We are currently looking at the Canadian initiative as documented in our monthly directors meeting minutes of June 17, 2021. To summarize:

> The Clayoquot Biosphere is looking at establishing a Canadian Biosphere Regions Youth Group. See some background https://clayoquotbiosphere.org/initiatives/empowering-youth and the Youth Engagement in Canadian Biosphere Regions video. https://www.youtube.com/watch?v=6VYmaCc0M6Q. For more information, please contact: mailto:colin@clayoquotbiosphere.org

We also have a CEPI Youth position on our board of directors which is tied to the development of the CEPI Youth group.

RECOMMENDATION 4:

Develop and secure partnerships with organizations that attracts immigrants to the region.

We already have a partnership with CBU and will be adding a CBU staff member to the board in Sept.2021. We have also developed a relationship with the Cape Breton partnership and have added a board member from their organization as an appointed position. The partnership contributes quarterly to the Biosphere Highlights. See examples of contributions provided by Cape Breton Partnership in our PR Review, sections 5.6 to 5.9.

We will look to develop and secure a partnership with the Cape Breton Local Immigration Partnership (CBLIP) Council,

RECOMMENDATION 5:

Create a climate adaptation plan and make it a key aspect of the strategic planning for the next ten years.

We will form a climate adaptation plan and base it on the eight concrete actions recommended by the 2019 Climate Change Adaptation Forum which has been discussed extensively in section 6.6.1.

A consultant's report "Davies, M., et al. (March 2016), Impacts of Climate Change and Sea Level Rise on the Mi'kmaq Communities of the Bras d'Or Lakes Phase Two Project Report AANDC Climate Change Adaptation Program", commissioned by EFWC and referenced in section 6.2, can provide valuable baseline information.

The four municipalities that govern areas of the biosphere all have climate change adaptation plans in place and the intention of gas tax transfers from the federal government are meant to fund these plans. Their plans cover the entire Island of Cape Breton, not just the BLBR. We will discuss how the BLBRA might provide support for the existing plans during our strategic planning. We must be cognizant of the fact that the logical group to coordinate adaptation plans would be the Collaborative Environmental Planning Initiative (CEPI) and all work together to avoid duplication of efforts.

RECOMMENDATION 6:

Work with provincial and federal governments to create marine protected areas within the lake.

The BLBRA will continue to work with all the partners involved in watershed management to explore OECM designation. The background rationale follows:

The Lake itself is actually an estuary connected to the Gulf of St. Lawrence and the NW Atlantic Ocean. As such, the waters beyond the shoreline of the Lake and the seabed below them up to the high water line are deemed to be marine environment and habitat, thereby falling within the jurisdiction of the Federal Department of Fisheries and Oceans (Fisheries and Oceans Canada, or "DFO").

Significant jurisdictional challenges to any attempt to provide effective protection to the Lake ecosystem of the Bras d'Or Biosphere are the inherent and close connections with the terrestrial ecosystem within large watershed (approx. twice the area of the Lake). While DFO jurisdiction does extend into the watershed up rivers that provide habitat for anadromous and catadromous fish species, a plethora of other agencies have jurisdiction over land use activities in the watershed that can negatively affect the Lake ecosystem. The problem is compounded by the fact that more than 80% of the coastal lands above the high-tide waterline of the Lake (a tidal estuary) are privately owned, and therefore governed by highly variable and weakly enforced Municipal land use by-laws.

Canada's framework and mechanism for the creation of marine protected areas specifically, and multiple-use zoning of marine space generally, are a confusing patchwork of overlapping mandates, jurisdictions and legislation. At least 18 Federal, Provincial and Municipal agencies have the mandate and legislation to control human activities on, under and around the Lake and its watershed (i.e. the Biosphere). So, while DFO is the lead agency on any decisions about marine protected areas, and has several options and levels of designated protection (e.g. Fish

Habitat areas, Ecologically and Biologically Significant Areas, Fisheries Closure Zones), other agencies, such as Environment Canada, Parks Canada and Transport Canada (as well as several provincial agencies) have the authority to provide particular types of protection to specific areas of marine space in the Biosphere (e.g. migratory bird sanctuaries, Species-at-Risk Recovery habitats, National and Provincial Parks, Heritage Sites and Wilderness areas, No-discharge zones, etc. The fact is that other than the un-enforced designation of the entire Lake as a No-Discharge Zone for ship & boat waste, none of these types of protection are currently offered to any areas of the estuary (and to relatively few of the riverine fish habitats beyond a riparian buffer from forest clearing).

To these established mechanisms of protection that might be applicable to the Bras d'Or Lake may be added so-called "other effective conservation measures" (OECM) that the Federal Government is promoting to increase its national total of protected area. These could include areas of the Lake offered degrees of protection by un-legislated standards of care and prohibitions of prescribed activities, promoted and monitored by government and private landowners, non-governmental agencies and indigenous communities. There are some initiatives of this sort underway, the most significant being the designation of the entire Lake and its Watershed as a UNESCO Biosphere Reserve in the context of the Man and the Biosphere Programme. But on the 10th anniversary of that designation, there are no other OECM for the Lake besides the sparse human population, lack of heavy industry, moderate and highly seasonal tourism and good will of the residents and visitors to the Biosphere Reserve (all of which serve to limit activities and impacts that negatively affect the health of the estuary).

PART II: PERIODIC REVIEW REPORT

1. BIOSPHERE RESERVE:

1.1 Year designated: 2011

1.2 Year of first periodic review and of any following periodic review(s) (when appropriate):

Not Applicable

1.3 Follow-up actions taken in response to each recommendation from the previous periodic review(s) (if applicable), and if not completed/initiated, please provide justifications.

Not Applicable

1.4 Other observations or comments on the above.

This first Periodic Review Report draws on the extensive work conducted by a number of the same authors involved in preparing the original Designation Application document (BLBRA 2010). Except where required for context, we do not repeat information provided in that earlier document. Our focus is on what has happened in the Biosphere Reserve since it's designation, how that has contributed or not, to the goals of the UNESCO MaBP, what has been learned from the experience, and how that knowledge informs our strategic planning for the next decade.

1.5 Describe in detail the process by which the current periodic review has been conducted:

See description in section 1

1.5.1 Which stakeholders were involved?

All the major stakeholders including the 19 signatories of the CEPI charter, the Cape Breton Partnership, Destination Cape Breton Association and resources identified in section 6.1

1.5.2 What methodology was used to involve stakeholders in the process (e.g., workshops, meetings, consultation with experts).

We asked for letters of support from an initial group of 72 organizations. We selected specific organizations from which we requested information about their accomplishments in the past ten years and their future plans. We followed up with phone calls and reminder letters as appropriate. We used their information in their supporting letters as contributions

to the report. We included 33 letters of support in ANNEX IV [Note to reviewers: we plan to follow up to obtain more by April 2021.] The Covid-19 pandemic created a considerable barrier to meetings, consultations, etc. Consequently, we relied primarily on website research, conference calls and Google team meetings. Members of our BLBRA periodic review committee represented many of the cooperating institutions and as such we feel confident that we have been able to obtain a good overview of the changes over the past ten years (see note* at the end of Table 1.1 in section 1.5.4.

1.5.3 How many meetings, workshops, etc. occurred throughout the process of conducting this review?

There were eleven meetings conducted while conducting the review (See Table in Section 1.5.4).

1.5.4 Were they well attended, with full and balanced representation?

(Describe participation and stakeholders)

Table 1.1 Summary of Stakeholder Meetings Conducted During Review*				
Date	**Stakeholder**	**Methodology**	**Participants**	**Outcome**
June 2010	See Note 1	Online (GoTo Meeting)	Periodic review comm	Planning for self-assessment doc
Oct 13, 2020	See Note 1	Online (Zoom)	Periodic review comm	No minutes, comments listed in Google Docs.
Oct 29, 2020	See note 1	(Google meet)	Periodic review comm	Strategy for self-assessment sect 3,4,5,6 and update on 7
Nov 26, 2020	CEPI	In person	Senator Dan Christmas, CEPI Co-Chair Stan Johnson, CEPI Coordinator Eileen Crosby, BLBRA Chair Gordon Kerr, BLBRA PR comm	Discussed CEPI support letter; Mi'kmaw community support letters; Cooperation, Governance; CCUNESCO meeting in the spring; moderate livelihood supreme court decision; history of CEPI; engaging the youth and much more See minutes of meeting with Sen. Dan Christmas-Draft.pdf
Dec 2, 2020	See note 1	(Google meet)	Periodic review comm	Progress review
Dec 7, 2020	Richmond County	In council committee of the whole	Eileen Crosby, Gordon Kerr, R.C. Council	Provide the new council with Biosphere primer and officially request support. Https://youtu.be/teh-BR5emSgQ
Jan 4, 2021	See note 1	(Google meet)	PR comm	Progress review
Jan 11, 2021	See note 1	(Google meet)	PR comm	Progress review
Jan 18, 2021	See note 1	(Google meet)	PR comm	Progress review
Jan 25, 2021	See note 1	(Google meet)	PR comm	Progress review
Jan 21, 2021	Inverness County	Presentation to Council	Eileen Crosby, Gordon Kerr, I. C. Council	Provide the new council with BR primer and request updates on actions taken for the Integrated Community Sustainability Plan and Climate Change Adaptation Plan.
* Note 1 – Periodic review committee members represent: BLBRA, NS Dept. of the Environment; NS Dept. of Natural Resources; CEPI; Cape Breton University Bras d'Or Institute of Ecosystem Research; Nova Scotia Community College.				

2. SIGNIFICANT CHANGES IN THE BIOSPHERE RESERVE DURING THE PAST TEN YEARS:

2.1 Brief summary overview: Narrative account of important changes in the local economy, landscapes or habitat use, and other related issues. Note important changes in the institutional arrangements for governance of the biosphere reserve area, and changes (if any) in the coordinating arrangements (including the biosphere reserve organization/coordinator/manager) that provide direction for the biosphere reserve. Identify the role of biosphere reserve organization/coordinator/manager in initiating or responding to these changes.

This is the first Periodic Review of the BLBR and the updates that follow reflect efforts by a) the association (BLBRA) that prepared the successful application for the UNESCO designation and b) many other people and organizations who are engaged in activities pertinent to the goals of the MaB Programme. In describing the significant changes that have occurred between 2011 and 2020, the authors of this document acknowledge that we have not captured all changes, and do not claim or accept responsibility for said changes, unless specifically stated. Note as well that some of the changes reported here are neither products of, or even influenced by, the BLBRA.

The Bras d'Or Lake and its watershed communities have not changed markedly during the reporting period. The local economy has shown little growth or decline overall (reflecting a stable population size), although real estate values have increased rapidly of late, after several years of stasis or slow growth at best. Over the past ten years, some important businesses have thrived (e.g. breweries and distilleries), while others have withered (the two gypsum mines have closed, and with their cessation there remains no heavy industry of any sort within the BLBR). The four Mi'kmaw communities within the BLBR have emerged as growth centres during the reporting period, both in populations (about 28 % of the BR total) and economies. Fishing, aquaculture, tourism, education and reconciliation justice were important drivers, although an unknown, but large portion of their income is derived from activities outside of the BR (e.g. commercial fisheries). Despite these advances, poverty-related health outcomes continue to disadvantage Indigenous peoples (and indeed, many of the larger population) within the BLBR.

We saw a universal downturn in 2020 due to the COVID-19 pandemic. It is too early to know the magnitude of this loss, but it certainly exceeds a 20 % drop overall. In the case of the tourism and culture industries, the change is close to 60 %.

The land and seascapes of the BLBR remained largely intact during the reporting period, with little obvious change in some metrics of terrestrial, aquatic and marine biodiversity. We have seen our knowledge grow regarding the species list and the species at risk as we

review in section 4. But most of the pre-existing challenges to the conservation of biodiversity and maintenance of ecosystem functions (species-at-risk, reduced fishery yields, forest clear cutting) have shown no significant improvement or further decline. Most notably, the historically most valuable fishery in the biosphere, that for the American Oyster, has shown no significant recovery since its destruction by the MSX parasite in 2002 (see also discussion in Section 5.1.2). None of the resource extraction industries have grown significantly. The human population is also aging, and has not experienced significant economic growth during this period, although Indigenous communities in the BLBR are experiencing a demographic shift toward a younger population.

Population rejuvenation, heightened attention to the UN-SDGs and the COVID-19 pandemic have increased small-scale agriculture within the watershed. Provincial government commitment to UN-Sustainable Development Goals (SDG) and national conservation targets have resulted in a 156 % increase in the extent of terrestrial protected (i.e. core) area within the BLBR.

Some changes have accelerated over the past decade, with apparent effects, both positive and negative, on conservation and development in the BLBR. Some are clearly related to anthropogenic climate change. Increased erosion and inundation of low-lying coastal land as a result of declining sea ice-cover and sea-level rise alter intertidal habitat and destroy valuable land. This has resulted in a marked (>100 %) increase in shoreline hardening and associated habitat alteration (e.g. barrachois ponds). Rising temperatures and inputs of organic matter to the estuary from altered patterns of precipitation in the watershed are driving an expansion and intensification of hypoxia and anoxia in the lake, with as yet unknown effects on local marine biodiversity and productivity.

Besides the marked increase in the terrestrial core areas within the BLBR, there is some new background information to add to the knowledge conveyed in the original Designation Application. While the size of the human population remains essentially the same, the age structure has become more bi-modal, due to aging out, births and immigration of young people. Government structures and governance processes in the BLBR and in the Association have shifted only slightly over the decade. While societal norms have largely been retained, there has been significant progress of reconciliation with Indigenous people in terms of justice (e.g. Indigenous court in Wagmatcook established in 2018), governance, education (e.g. CBU/Unama'ki College Course MIKM 2701, *Learning from Knowledge Keepers of Mi'kma'ki*) and engagement in opportunity.

Finally, there have been no significant changes in the institutional participants or the coordinating arrangements among them for governance of the BLBR. Specific to the BLBRA, there have been executive and board of director changes that have affected the association's activity focus.

2.2 Updated background information about the biosphere reserve.

2.2.1 Updated coordinates (if applicable).

There has been no change in the geographic boundaries of Bras d'Or Lake Biosphere Reserve.

2.2.2 If necessary, provide an updated map on a topographic layer of the precise location and delimitation of the three zones of the biosphere reserve Map(s) shall be provided in both paper and electronic copies. Shape files (also in WGS 84 projection system) used to produce the map must also be attached to the electronic copy of the form.

If applicable, also provide a link to access this map on the internet (e.g. Google map, website).

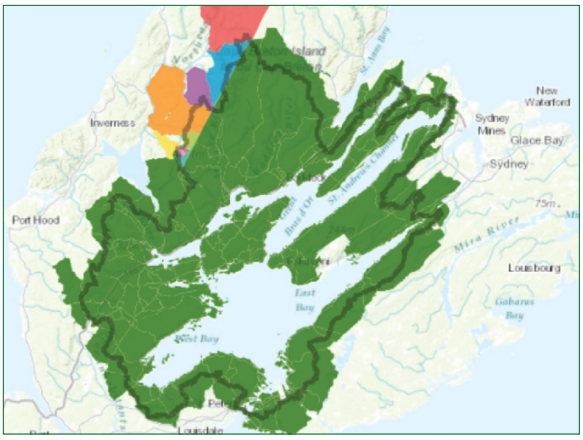
The required data files and zone map are located as follows::

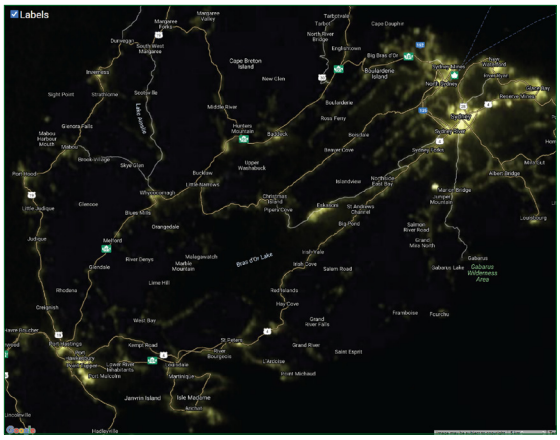
- the updated zone map PDF
- https://blbra.ca/wp-content/uploads/Brasdor_BioRes_Land_Cover_E_2021017713.pdf
- the zip file of core areas (ANNEX V)
- the zip file of buffer areas (ANNEX V)
- the zip file of the watershed boundary (ANNEX V)
- Note that all GIS data is in the UTM NAD83 (Zone 20) projection system. This is very close to the WGS84 projection, and it is the data standard used by the vast majority of agencies in Nova Scotia.

2.2.3 Changes in the human population of the biosphere reserve.

Table 2.1 Biosphere Population Trends 2011-2020

Biosphere Area	**Pop. 2011**	**Pop. 2016**	**Pop. 2020**	**Change vs 2011**
Core Area(s) (Permanent and Seasonal)	None	None	None	N/A
Buffer Zone(s) (Permanent and Seasonal)	None	None	None	N/A
Transition Area(s) (Permanent and Seasonal)	18,951 **P** Unknown **S** 196,560 **T**	19,380 **P** Unknown **S** 221,760 **T**	**P*** 7,436 **S** 231,840 **T****	+2 % +/- % +18 %
First Nations	5,108	5,290	5,670	+11 %
Non First Nations	13,843	14,090	**P***	+ 2 %
P - Permanent Residents **S** - Seasonal Residents **T** - Seasonal Tourists				
P*Available mid 2021; **T****2019 used for 2020 as visits dropped significantly with COVID.				
(T is based on the fact that 21 % of non-resident NS visitors travel to Cape Breton and 48 % of those go to Baddeck, in the heart of the BLBR. (Tourism NS)				





Figs 2.1a, b Data attribution:Statistics Canada. GeoSuite 2016, Statistics Canada. 2016 Census of Canada, 2020 estimates: Profile data for dissemination blocks (DB) in the four counties within Bras d'Or Biosphere Ottawa, Canada. Statistics Canada [producer]; Tetrad Computer Applications, Vancouver, BC [distributor]. Available from SiteWise, CBRM data, Tourism NS. Map: CBU Photo: Blue Marble Night Sky (https://blue-marble.de/nightlights/2019)

Table 2.2 Biosphere Demographic Profile

	Biosphere Portion of Cape Breton County	Biosphere Portion of Inverness County	Biosphere Portion of Richmond County	Biosphere Portion of Victoria County	Total
Population 2011	9,372	2,655	2,950	3,974	18,951
Population 2016	9,534	2,719	2,904	4,223	19,380
% Increase	+2 %	+2 %	-2 %	+6 %	+2 %
Median Age 2020	43.3	49.8	53.4	54.2	48.1
Lone-parent families	28.0 %	17.1 %	16.6 %	16.1 %	21 %
Bachelor degree	15.8 %	17.3 %	12.0 %	20.7 %	17 %
Avg Household Income	$75,227	$75,724	$70,032	$82,304	$76,060
Top 3 Visible Minorities	Black, South Asian Chinese	Black, Chinese, Multiple	Black, Multiple, Korean	Multiple, Black, Chinese	

Table 2.3 First Nations Biosphere Demographic Profiles (included in Table 2 figs.)					
	We'koqma'q	Potlotek	Eskasoni	Wagmatcook	Total
Pop. 2011, Census	800	481	3,309	518	5,108
Pop. 2016 Census	825	505	3,425	535	5,290
Pop. 2020, Est.	891	543	3,691	545	5,670
Pop. 2025, Projected	898	544	3,601	535	5,578
% Pop. Change (2011-2020)	11.3 %	12.9 %	11.5 %	5.2 %	+11 %
2011 Median Age	22	22.9	21.9	23.6	22.2*
2020 Median Age	23.3	24.5	24.3	26.0	24.3*
2020, Avg Household Income	$45,272	$46,984	$40,955	$39,803	$42,100.04
* Average weighted Median.					
Data attribution: Statistics Canada. 2016 Census of Canada, 2020 estimates: Profile data for IRI census subdivisions in the four counties within Bras d'Or Biosphere. Ottawa, Canada. Statistics Canada [producer]; Tetrad Computer Applications, Vancouver, BC [distributor]. Available from SiteWise. Statistics Canada. 2011 Census of Canada Community Profiles. Ottawa: Statistics Canada.					

Year	Births	Deaths	Net International Migration	Net Interprovincial Migration	Net Intraprovincial Migration	Net Non-permanent Residents	Residual Deviation
2010 / 2011	268	399	16	-105	-219	11	-5
2011 / 2012	245	359	53	-229	-230	-23	140
2012 / 2013	268	364	2	-236	-192	18	143
2013 / 2014	247	395	20	-84	-213	16	150
2014 / 2015	248	409	8	-49	-188	27	157
2015 / 2016	243	389	56	105	-249	106	158
2016 / 2017	274	403	38	152	-147	87	-
2017 / 2018	278	410	35	147	-124	43	-

Source: Staistics Canada, Annual Population Estimates

Fig. 2.2 Components of Regional Population Change for Rural Cape Breton
These figures exclude urban CBRM and are assumed to be reflective of the BLBR. Source: CBP (2020) A Profile of Strait-Western Cape Breton Region.

2.2.4 Update on conservation function, including main changes since last report. (Note briefly here and refer to 4 below).

In 2010, core areas comprised 7,712 hectares of land or 3.1 percent of the terrestrial portion of the BLBR. The amount of land currently qualifying as core area has risen to 19,762 hectares or 8.0 % of the BLBR. This is due largely to the implementation of Nova Scotia's 'Parks and Protected Areas Plan (2013)', an initiative to identify potential lands for legal protection as wilderness areas, nature reserves or provincial parks across the province.

While the provincial Parks and Protected Areas Plan involves legal protection of public lands, there has been a corresponding increase in efforts to protect ecologically significant areas on privately-owned lands as well. The number of private conservation easements and land trust acquisitions has increased from four (252 hectares) in 2010 to 12 (780 hectares). Given that most of the highly productive lands along the Bras d'Or Lake and its associated rivers is privately owned, an increase in private land conservation is considered essential to the maintenance and restoration of native biodiversity. One key focus area of private land conservation efforts has been lands where underlying gypsum deposits (karst) create more alkaline soil conditions which support unique and rare plant communities.

In 2019, the Province secured $14.3 million in federal funding under the Canada Nature Fund to help advance collaborative conservation initiatives across Nova Scotia. With an emphasis on private land conservation and Indigenous Protected and Conserved Areas, it is expected that this fund will lead to further land conservation actions within the Bras d'Or Lake watershed.

At the request of the Nova Scotia government, an independent review of forest practices in the province was conducted by William Lahey, President and Vice-Chancellor, University of King's College. In August of 2018, Mr. Lahey submitted his final report summary and recommendations, *An Independent Review of Forest Practices in Nova Scotia* (Lahey, 2018). In December of 2018, the Government of Nova Scotia issued its response to the Lahey report and recommendations, in which it accepted (Nova Scotia (2018), *Response to Lahey Report*). Among other commitments, the response states:

> Nova Scotia will protect and enhance ecosystems and biodiversity as the overarching policy priority, as they are the foundation for other values. Nova Scotia's forest policies and operational decision making will be guided by the practice of ecological forestry through a triad model. This will represent a significant change in the way Nova Scotia's forest will be managed and will require modelling for habitat and wood supply. Using this approach, Crown land will be managed with a greater emphasis on ecological considerations which will result in changes on the ground, including less clearcutting.

Please refer to Section 4 for details on the conservation function.

2.2.5 Update on the development function, including main changes since last report. (Note briefly here and refer to 5 below).

The *One Nova Scotia Report*, a.k.a. the *Ivany Report* (2014) showed that Nova Scotia is a service-based economy and that 84.3 % of Cape Breton's economy was service-based. Of that, 38.2 % is in the public sector services and the remaining 46.1 % is in the private sector. Other regions in the province had a service-based economy ranging from 70.3 % in Southern Nova Scotia to 86.9 % in Halifax, the provincial capital.

In 2016, the Collaborative Environmental Planning Initiative (CEPI) held a three day Sustainability Practices Conference at the Wagmatcook First Nation Cultural Centre and at the Inverary Inn, Baddeck. The conference has come to be known as The Peoples of the Lakes Speak. The final conference report was issued in February 2017 (CEPI, 2017). It discusses 5 major sectors and 3 others that are added for the purpose of this Periodic Review.

Table 2.4 See Section 5.1.1 for more details.

Sector	Main Changes over the Decade
Agriculture	Food security is becoming an issue and food hubs and community gardens are growing. Capacity growing for markets can be strategically developed to allow farmers to research new markets, diversified markets and partnerships.
Fisheries and Aquaculture	The Bras d'Or is a system that is constantly under change. Currently its capacity for fish production is rather low. However, Trout aquaculture is underway in We'kogma'q and research is underway on Oyster aquaculture
Renewable Energy	There are economically scaled opportunities in solar wind and tidal power developments for communities and businesses and these are being implemented on a gradual basis. The privately held provincial power supplier currently uses 40 % renewable resources as it moves to a target of 60 % in 2021.
Forestry	The contribution of forestry activities to the economy of the biosphere is largely unchanged in the past 10 years, with PHP (Port Hawkesbury Paper; formerly Stora Enso) remaining the largest operator in the industry locally. Within the province, there has been a recent shift toward adopting ecological forestry principles to ensure sustainability and protection of biodiversity and ecosystem services.
Mining	The gypsum mines have closed, so currently there is no mining being carried out in the watershed.
Tourism	Tourism steadily increased in Cape Breton from 380,000 room nights in 2011 to 472,954 room nights in 2019, an increase of 24 %. A 59 % drop was experienced in 2020 due to COVID-19. (Tourism NS 2020)
Manufacturing and Construction	The manufacturing and construction sector has not changed significantly in the last decade; however, we have seen growth in craft beer & wine startups and other artisan efforts.
Service Industries	According to Scott's Directories, there are currently 208 businesses located in the BLBR working among 24 of the 26 sectors tracked under the North American Industry Classification System (see also Section 5.3). We do not have a 2011 baseline for the same geography but will implement a repeatable process going forward.

2.2.6 Update on logistic support function, including main changes since last report.

(Note briefly here and refer to 6 below).

The main organizations conducting research and monitoring are provided in Table 6.1. Descriptions of these organizations are provided in our 2010 submission for designation, Section 4 in this review, and some new organizations are described in Section 6.1. The main themes of research and monitoring are provided in Section 6.2

There are extensive formal and informal educational programs within and nearby our BLBR which we detail in Tables 6.4a and 6.5b respectively. The BLBRA-designed programs that embrace Traditional Ecological Knowledge (TEK) and Environmental/sustainability education combined are; 1/ the inquiry based grade school curriculum designed by the BLBRA education committee, 2/ the Bras d'Or Watch program and 3/ the Forest Watch program.

The BLBRA currently has no formal methodology to assess the effectiveness of its logistical support actions or strategies. We do, however, see interaction through hits on Facebook pages and through renewed requests for letters of support from our cooperating organizations.

The BLBRA has an extensive internal and external communications network. It allows us to communicate with those providing or seeking logistical support, passively or actively. which we outline in Table 6.4. We use mainly our Board of Directors meetings, website and Facebook pages as well as newsletters, newspaper articles and e-mail. We started using Google Docs in 2020 to facilitate development of our periodic review self-assessment document. We have found the platform useful and are considering using it into the future.

We have had limited collaboration with other Biosphere Reserves until, in 2019, the Canadian Biosphere Reserves Association (CBRA) held their summer session here in conjunction with the three-day Climate Change Adaptation Forum which is discussed extensively in section 6.6.1. At the provincial level, there is one other BR—Southwest Nova— with which BLBRA has had some collaboration but nothing significant.

At the national level, we have one Board member who represents the BLBR on a regular basis and communicates any information from CBRA back to the Board, while another Board Member has represented the BLBRA at the Indigenous Circle for the past two years.

Other than to post a number of items under the "Proud to Share"—including this video, https://youtu.be/wJQ1VskBHs0— the BLBR has not had any international collaboration with other biospheres in the World Network of Biosphere Reserves (WNBR). One reason would be our limited ability to contribute since we are completely a volunteer association. The BLBRA intends to share items of interest in a digital format between the WNBR website and our newsletters or website dependent upon our volunteers' capacity to do so.

In conclusion, the main factors that influenced the success (both positive and negative) of logistic support initiatives were education (both for and about the BLBR and its functions), as well as networking with our partner organizations which we describe in section 6.7 and which will be reviewed as part of our upcoming strategic planning sessions.

See section 6 for further details on updates to Logistic Support.

2.2.7 Update on governance management and coordination, including changes since the last report (if any) in hierarchy of administrative divisions, coordination structure. (Note briefly here and refer to 7 below).

Significant developments for CEPI have been their updated Terms of Reference in 2018 and the formation of the CEPI Youth group. The BLBRA has updated their bylaws over the past ten years but with no significant changes to governance. As previously outlined, the NS Dept. of Lands and Forestry issued the Parks and Protected Areas Plan in 2013 which resulted in an expanded core area in the biosphere (156 %). See section 7.5 for more details.

2.3 The authority/authorities in charge of coordinating/managing the biosphere reserve:

(Comment on the following topics as much as is relevant).

2.3.1 Updates to cooperation/management policy/plan, including vision statement, goals and objectives, either current or for the next 5-10 years

It is critically important that the objectives of the BLBR are compatible with the ongoing programs and activities of the area's respective agencies and organizations. The Biosphere reserve designation must add value. It must not duplicate, substitute or in any way conflict with existing efforts. (UNESCO, 2010) A draft cooperation plan was included in the BLBRA 2011 submission document that would harmonize plans and activities with other organizations that had similar interest and concerns of the Lake and its watershed. Essentially, this cooperation plan means aligning BLBRA's objectives with those of the other key stakeholders in terms of the three functions of a biosphere: conservation, sustainable development and logistic support. We attempted to follow the cooperation plan idea but it has become somewhat less focused than originally conceived. We attribute this to not following through with strategic planning sessions after 2015.

Small shifts have been happening in our cooperation plan in terms of the original stakeholders; some dissolved while others have evolved over the past 10 years. The CEPI and the four municipal governments remain the key stakeholders which are all represented on the BLBRA Board.

As the focus of BLBR economic activity shifted away from heavy industry, the focus is now on sustainable tourism. In that regard, the BLBRA now has a representative from the Board of Destination Cape Breton Association on our own Board and another of our directors on DCBA's External Marketing Committee. It is hoped that with a well-developed sustainable tourism plan involving tourism operators and promoters, the BLBRA can help to advance success in this segment of the economy.

Another stakeholder organization which has come on the scene in recent years is the Cape Breton Partnership (CBP). In their words:

> The Cape Breton Partnership is Cape Breton-Unama'ki's private-sector-led economic development organization that supports companies and entrepreneurs by promoting our island as a great place to live and invest; growing a culture that values and celebrates creativity, innovation and entrepreneurship; and connecting entrepreneurs and companies to the resources they need to succeed. (capebretonpartnership.com/about/)

The BLBRA has invited a representative from this organization to sit on our Board. Hopefully, this collaboration will assist us in enhancing our aim of promoting sustainable development for the Biosphere.

There have been no updates to our vision or mission statements since the original application for Biosphere Reserve status. These statements were reaffirmed in the BLBRA Strategic Plan (2013-2015) and again at the Nov. 2020 board meeting.

Going forward, in 2021 it is hoped that the BLBRA can extend its cooperation plan to include the local schools, which are in the watershed, in a more meaningful way. To that end, the Association will approach these schools to foster education about the BLBR involving inquiry based learning units which have already been written and approved. This partnership should bode well for present and future youth engagement with the Biosphere.

In the past, the BLBRA partnered with Cape Breton University (CBU) on a number of projects, primarily through the Bras d'Or Institute. Recently, there are two additional areas where the cooperation plan is starting to make connections; that is, with the World Institute of Tourism and the Shannon School of Business for demographic and firmographic data analysis.

In August of 2020, we conducted a poll of the 20 Directors and 7 Observers of the BLBRA to identify and rank priority themes and activities. (This does not supplant the strategic planning exercise that will follow in 2021). The results of this survey provided insights to themes that may leverage funding because they are consistent with government policies and priorities. The themes and their alignment with sustainable development goals (SDG) are:

Climate Change Adaptation (SDG #13)
Environmental Conservation and Sustainability (SDG #14,15)
Reconciliation with Indigenous peoples (SDG #10, 17)
Youth inclusion and engagement (SDG #10, 17)
Sustainable tourism (SDG #8, 14, 15, 17)
Renewable energy (SDG #7)

See Section 7.5 and BLBRA (2020), *BLBR Priorities 2021-2031* for details.



Fig. 2.3 Sustainable Development Goals – Source: Sustainable Developments Solutions Network Canada

2.3.2 Budget and staff support, including approximate average annual amounts (or range from year-to-year); main sources of funds (including financial partnerships established (private/public), innovative financial schemes); special capital funds (if applicable); number of full and/or part-time staff; in-kind contribution of staff; volunteer contributions of time or other support.

All work by the BLBRA is conducted by volunteers, mostly board members. We do not track our hours but they are considerable. Funding has been provided by the TD Bank Friends of the Environment Trust, Atlantic Canada Opportunities Agency, the four Municipalities, the Bras d'Or Lake Preservation Nature Trust, memberships and donations and a number of other organizations on a project by project basis. Our 2019 Climate Change Adaptation Forum had many sponsors which are listed in Section 6. Presently, we have no staff or office manager which is a considerable barrier to our progress as an organization. Lack of funding is the main issue.

Table 2.5 lists our income and expenses for the past ten years.

The current year budget for the BLBRA allocated $50,325 to support its activities.

Table 2.5 BLBRA annual revenue and expenditures (CAN$) 2011 through March 31, 2020.

Fiscal Year	Annual Revenues	Annual Expenditures	Gain/ (Loss)
2011	2,074	5,527	(3,453)
2012	67,640	50,065	17,575
2013	4,080	10,812	(6,732)
2014	21,556	13,625	7,931
2015	1,801	20,394	(18,593)
2016	13,910	14,287	(377)
2017	29,016	103	28,913
2018	20,278	1,782	18,496
2019	37,222	15,940	21,282
2020	162,709	145,028	17,681
Total	$ 360,286	$ 277,563	$ 82,723

The allocations by activity are shown in Table 2.6 below.

The BLBRA is a registered Canadian charity and as such issues tax receipts for all donations, including membership dues received.

Over the next ten years, the BLBRA will look to increase its financial capacity through development activities that will likely include the establishment of endowments to provide sustainable resources to support its strategic plan.

Table 2.6 Current Budget BLBRA

Project / Committee	2021 Allocation
Operations	$2100
Communications Committee	$3000
Baechler Memorial	$2000
Bras d'Or Watch Committee	$5500
Climate Change	$9000
Museum Committee	$10000
Report Card Committee	$1700
Trail Committee	$1925
Periodic Review Committee	$8500
Strategic Planning	$6600
TOTAL	$50,325

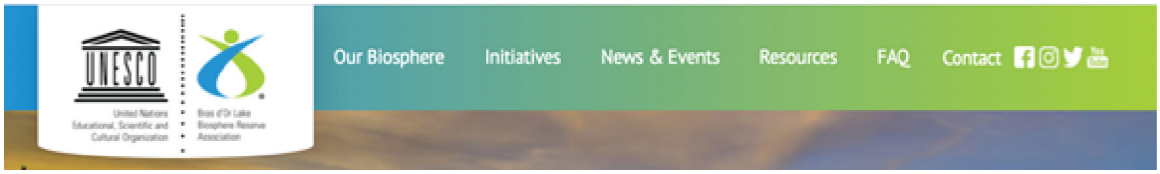
2.3.3 Communications strategy for the biosphere reserve including different approaches and tools geared towards the community and/or towards soliciting outside support.

The BLBRA understands that communication and engagement among many external stakeholders is an important aspect of making the BLBR successful in meeting its objectives. That audience includes community groups, industry, government, academia and indigenous peoples. These stakeholders are reached using various channels including face-to-face and online meetings, events, presentations to groups, social media, websites, newsletters, church bulletins, brochures, newspapers, banners, radio, posters, sandwich boards, signage as well as a permanent display at the Alexander Graham Bell National Historic Site. The content is developed using any combination of text, graphics, video, audio and live interaction as budget and timeframes allow. See also Section 6.5.1.

The most significant means of raising public awareness to this international designation, despite the many other efforts utilized over the past 10 years, has been the erection of highway signage. It now allows local businesses to emphasize and advertise the fact that they are operating in a UNESCO designated biosphere. It also makes the BLBRA and its work more recognizable to both its cooperating partners as well as the general public.

The communications committee has worked comprehensively on understanding the various target audiences. It is constantly developing a shared understanding of the brand, lexicon and components of our Biosphere which is manifested mainly in our social media. A living communications plan has been created to support the effort as is shown in Section 6.5.1

Figs. 2.4 Channel and Media Thumbnails



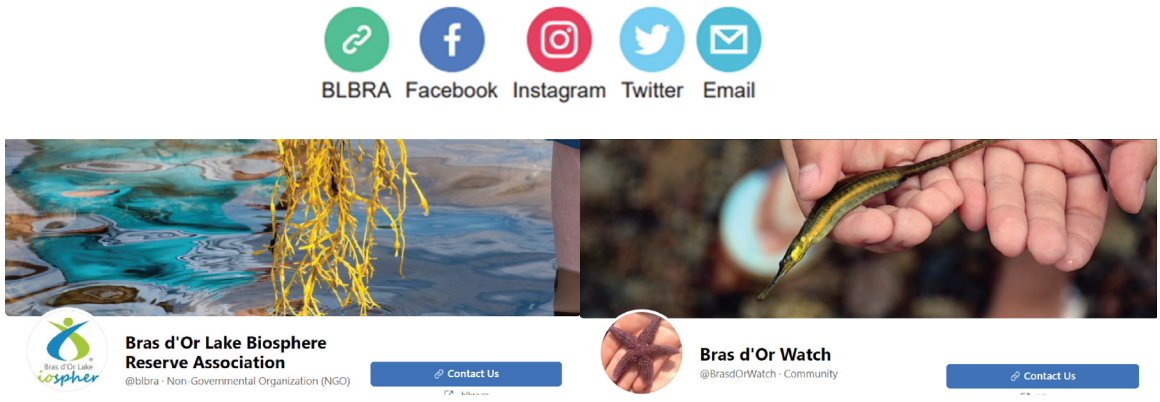
Website



Digital Newsletter Newspaper Article Recognition



Permanent Exhibit, AGBNHS; Local Events and Highway Signage



Social Media

2.3.4 Strategies for fostering networks of cooperation in the biosphere reserve that serve as connections ("bridging") among diverse groups in different sectors of the community (e.g. groups devoted to agricultural issues, local economic development, tourism, conservation of ecosystems, research and monitoring).

The BLBRA primarily fosters networking of cooperation through meetings, consultations and team work with key persons who represent the organizations mentioned in our original cooperation plan. In reflection on this aspect of the BLBRA over the past 10 years, this review process has been very helpful in reminding us of the importance of executing a solid communication strategy.

The success of the BLBR and its Association is based on supportive partnerships among many different groups that are focused on creating, implementing or participating in activities that contribute to any or all of the three goals common to all UNESCO BRs. For this reason it is important to enhance the BLBRAs role as a facilitator. The Association needs to enhance the relationship with our current cooperating organization over the next several years and continue to connect with other similar minded organizations or community groups as they evolve. See detailed response in 7.7.

2.3.5 Particular vision and approaches adopted for addressing the socio-cultural context and role of the biosphere reserve (e.g. promotion of local heritage resources, history, cultural and cross-cultural learning opportunities; cooperation with local population; reaching out to recent immigrant groups, indigenous people etc.).

In January of 2018, the Board of Directors of the BLBRA adopted the Pessamit Call for Reconciliation regarding the rights of Indigenous peoples. Of the five key statements in the document, the BLBRA recognizes the first statement at the start of this every Board of Directors meeting with, '*We acknowledge that this meeting is being held on the traditional, unceded territory of the Mi'kmaq nation in the district of Unama'ki.*' However, enacting the other four statements is key to ensuring that reconciliation becomes '*reconciliaction*' as we engage with our residents in all biosphere activities.

The BLBRA has worked diligently to partner with and educate industry, regional entities, operators and the public within the BLBR and Cape Breton Island on growing and leveraging the strong socio-cultural aspects of the island including the Acadian, Gaelic, Indigenous, musical and craft and design contexts among the regions and communities found here.

To get the message out, the BLBRA and our partners have used online channels and social media, held workshops and created various events exploring, researching, educating and celebrating the diversity and inclusiveness of the BLBR for its citizens and visitors. Much effort has been on promotion for development of new or existing cultural experiences to grow the tourism sector, inward migration and sustainable development. See Section 5.2 for an extensive discussion on the subject.

Outreach

The Nova Scotia government and Cape Breton Partnership recognize that immigration is key to maintaining and growing the local economy on Cape Breton Island and within the BLBR. There are active programs to encourage immigration and provide support resources, as well as welcoming Committees in place to make transition to residency a truly positive experience. See more details in Section 5.6 to 5.9.

2.3.6 Use of traditional and local knowledge in the management of the biosphere reserve.

The Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI) is a unique organization with representatives of the federal, provincial and municipal governments with the Chiefs of the five First Nations communities located along the shoreline of the Bras d'Or Lake. This co-management agreement committed to Two Eyed Seeing requires all agencies and peoples to work together, bringing their statutes, expertise, and interests to share with the group. This remains the arrangement today.

Working in coordination with the CEPI are the Eskasoni Fish and Wildlife and the Unama'ki Institute of Natural Resources, two First Nations' organizations, discussed in more detail in the combined response to questions 6.3 and 6.4 in section 6..

2.3.7 Community cultural development initiatives. Programmes and actions to promote community language, and, both tangible and intangible cultural heritage. Are spiritual and cultural values and customary practices promoted and transmitted?

English is the predominant language in most of the BLBR, with Mi'kmaw the primary language spoken in the First Nation communities as per Table 2.7 - Primary Spoken Languages, below**.** Mi'kmaw, English, Acadian/French and Gaelic can be considered community languages in the Bras d'Or Lake Biosphere Reserve. As described, some are more prominent than others depending on historical settlement locations and size of the community but all enrich our biosphere communities culturally. The Mi'kmaw, Acadian and Gaelic terms are often used on signs and distributed material created by the BLBRA. For example, our recent Christmas card contained the following phrase:

> *As the winter solstice approaches The Board of the Bras d'Or Lake Biosphere Reserve Association wishes you all a very Merry Christmas, Wli nipi alasutmamk, Joyeux Noël and Nollaig Chridheil.*

Primarily, it is these four cultures and their unique languages, music and dance that are taught, performed and celebrated all over the island in community halls and other venues.

The importance of sharing these initiatives is manifested in Destination Cape Breton Association's website pages promoting all of Cape Breton but of which the Biosphere provides a significant portion. The 'Things To Do' page groups **Culture & Heritage** by 'Mi'kmaq Culture, Acadian Culture, Gaelic Culture, National Historic Sites and Museums & Heritage Site.



Figs. 2.5 Eskasoni Pow Wow, photo by E. Crosby; Baile nan Gàidheal | Highland Village, Iona, courtesy of Destination Cape Breton.



The following are some other examples of BLBRA initiatives that pay attention to the overall cultural community of the Biosphere, in particular the First Nations community.

Tom and Carol Anne Johnson (Fig. 2.6) from Eskasoni, N.S., along with some of their relatives, overdubbed the 2000 movie Chicken Run in Mi'kmaw about a decade ago. Since then, it's become a cult classic, and they still get requests from people who want to watch it (CBC 2020).

First Nations families, men, women and children from the communities in and around the BLBR also go to the Cape Breton Highlands to learn traditional moose hunting practices.

Powwows are held among Cape Breton's five First Nations: Membertou, Eskasoni, Potlotek, Whycocomagh and Wagmatcook. (See 5.2.5 for a list of Cultural and Heritage Events.)

Cape Breton University and Unama'ki College developed a 10 week course in 2016 called *Learning from Knowledge Keepers of Mi'kma'ki (MIKM 2701).* This course

was a combination of classroom and on-line learning and had a huge following. It provided students with a history of the Mi'kmaw communities, residential schools and the recommendations of the Truth and Reconciliation Commission.

BLBRA Education Committee - Elementary resource material approved for use in NS schools incorporated the habitat balance and medicine wheel as well as Indigenous terms.

Bras d'Or Watch and its inclusion of First Nations' locations, and its 2020 on-line presentation featuring historic languages of the area (French, English, Mi'kmaq, Gaelic, English)

BLBR Highway Signage – Wayfinding and display signage typical includes English, French, Mi'kmaq and Gaelic.

Trail Committee - brochure distributed to approximately 10,000 households features attention to Mi'kmaw influence, including the concept of Two-Eyed Seeing and a glyph that continues to be the masthead for work relating to the objective of having a walking trail connecting communities around the Bras d'Or.



Two Eyed Seeing - credit for articulating the concept is due to Elders Dr. Murdena and Dr. Albert Marshall, both of whom have been closely associated with aspects of the BLBRA program through the years.

Hike the Hill - led in part by a Mi'kmaq Guardian who also serves as a member of the Trail Committee with attention to plants and geographic points of interest. Also a local historian provided information about the early Gaelic-speaking settlers to the East Bay area of Bras d'Or Lake.

Forum Committee - The Climate Change Adaptation Forum was filled with examples of the way the BLBR's varied cultural backgrounds merge into a common community language. The forum presentations featured First Nation leaders, their projects, and inclusion of the Medicine Wheel in the Forum's Report. Not only was day 2 of the forum held in a First Nation community, but the closing of the forum on day 3 occurred on National Indigenous Peoples Day with performances by Mi'kmaw singers, dancers, drummers and native craft demonstrations.

BLBRA Communications Committee - Monthly newspaper and quarterly newsletter articles included Mi'kmaw words and articles based on the Mi'kmaw calendar, referring to plants and animals found within the BLBR. Tom Johnson from Eskasoni was enlisted to correct spelling of terms and ensure accurate interpretation of their importance.

2.3.8 Specify the number of spoken and written languages (including ethnic, minority and endangered languages) in the biosphere reserve. Has there been a change in the number of spoken and written languages? Has there been a revitalization programme for endangered languages?

The Census data shows that English, French and Mi'kmaq are the primary spoken languages with German and Dutch also reported.

Table 2.7 - Primary Spoken Languages

Biosphere Portion of Cape Breton County	Biosphere Portion of Inverness County	Biosphere Portion of Richmond County	Biosphere Portion of Victoria County
English, French, non-official languages	English, French, non-official languages	English, French, non-official languages	English, French, non-official languages
We'koqma'q	**Potlotek**	**Eskasoni**	**Wagmatcook**
Mi'kmaq, English	Mi'kmaq, English	Mi'kmaq, English	Mi'kmaq, English

There are courses offered in Gaelic as well as Mi'kmaw in the area, both online and at cultural centres such as the Baile nan Gàidheal | Highland Village museum. Courses are also offered in nearby colleges and universities. The mandate of Comunn Féis an Eilein in Christmas Island, in the Biosphere Reserve, is to promote and preserve Gaelic language and culture through means that are commensurate with the values of the community.

Recently, a large contingent of 3,500 international university students at CBU, many from Asia and the Middle East, are adding to the spoken and written languages encountered in the Biosphere as they obtain seasonal employment or start new businesses serving that region.

2.3.9 Management effectiveness. Obstacles encountered in the management/coordination of the biosphere reserve or challenges to its effective functioning.

On a positive note, the diligent work of the volunteer board members over the past 10 years has resulted in successfully seeking funding for our various initiatives on a project-by-project basis.

The key obstacle encountered in the management/coordination of the biosphere is lack of funding. The following points make this clear.

> The BLBRA did not receive fifty thousand dollars ($50,000) in annual funding as expected from the federal government. Prior to the BLBR designation in June of 2011, the federal government was providing an operational grant of $50,000 every year for four years to all (15) designated Canadian UNESCO Biospheres. Due to a change in government coincident with the completion of our designation, the grant was stopped. Consequently, the available funds for that first year was the $2,074 collected through memberships and donations and much of the $125,000 of

budgeted activities were eliminated. Work continued as best we could for projects where a major portion of time and program expenses planned were to be in-kind from volunteers and partner organizations.

The BLBRA does not have a centre or office from which to work. Many UNESCO biospheres contain a sizable urban center which can offer an office and even a staff person through a cost sharing arrangement with the local municipal government. Such is not the case with the BLBRA.

The BLBRA does not have a paid coordinator/manager position. With changes in the executive positions on the BLBRA Board, there is the possibility of loss of continuity in the focus and direction which the organization has taken over the ten year period.

There is such a diverse group of institutions that manage separate portions of the Biosphere Reserve (e.g. land based and water based systems, economic systems and social/cultural systems) that the challenge becomes seeing the big picture. This also leads to difficulties accessing research documents as they are stored in various locations.

The Board completed several projects that were/are very successful—this is a measure of effectiveness. The board has also been effective at creating partnerships/relationships and recruiting volunteers when needed.

2.4 Comment on the following matters of special interest in regard to this biosphere reserve: (Refer to other sections below where appropriate).

2.4.1 Is the biosphere reserve addressed specifically in any local, regional or/and national development plan? If so, what plan(s)? Briefly describe such plans that have been completed or revised in the past 10 years.

The biosphere reserve is specifically addressed in:

The Climate Change Action Plans of the four Municipalities were developed with input from the BLBRA. These plans are discussed in Section 2.4.2.

CEPI has a BLBRA board member as a member of their management council and the BLBRA is addressed extensively in their terms of reference.

CBRA addresses all Canadian Biosphere Reserves in their strategic plan. These plans have all been completed in the past ten years and are discussed in Section 2.4.2.

2.4.2 Outcomes of management/cooperation plans of government agencies and other organizations in the biosphere reserve.

The outcomes of these cooperating organizations' plans are detailed in sections three through seven. The organizations, plans and the relevant sections with details of outcomes are identified in Table 2.8.

Table 2.8 - Outcomes of Cooperating Organizations

ORGANIZATION	PLAN	OUTCOMES
BLBRA	Strategic Plan 2013-2015	See details of progress in section 7.7.5
Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI)	CEPI (2011) Spirit-of-the-Lake-Speaks	Plan updated to CEPI (2018) ToR -Final version. See details in Section 6.1-6.2 and the preamble to Section 7.
Destination Cape Breton Association	Strategy 2020-2021	2019 Key performance indicators
Environment and Climate Change Canada	Ecological Monitoring and Assessment Network (EMAN)	EMAN Site at Irish Cove is closed but a local hydrologist is currently setting up a stream monitoring baseline study at the site.
Environment and Climate Change Canada	Federal Sustainable Development Strategy for Canada 2019 to 2022	1/ The report states 'Consider contacting the Canadian Biosphere Reserves Association to explore the potential of partnering with one of Canada's 18 UNESCO biosphere reserves on collaborative, community-based initiatives to protect our coasts and oceans', which is a partnership our Biosphere may wish to pursue (See 7.7.7). 2/ Our BLBRA provided input comments in 2018 for the E&CC strategy update.
Fisheries and Oceans Canada	Eastern Scotian Shelf Integrated Management Program (ESSIM)	This initiative of Fisheries and Oceans Canada was concluded in 2012. The Maritimes Regional Oceans Plan (MROP) evolved from this and other regional plans. The MROP produced a progress report 2014-2016 and implementation priorities document 2014-2017. See details in DFO Letter of Support.
Cape Breton Regional Municipality	Climate Change Action Plan Issued in 04/15/2014	Municipal Climate Change Action Plan Update – Workshop January 2020: 1/ Agenda (7MB) 2/ Appendix A (150KB) 3/ Energy and Mines Minister Derek Mombourquette - PowerPoint (537MB) 4/ Biosphere Presentation (2.21 MB) See details in section 7.7.7.
Municipality of Inverness County	Inverness and Victoria Climate Change Action Plan 2013	No update has been received from Inverness County to date.

Municipality of the County of Richmond	Municipal Climate Change Action Plan 2013. BLBRA listed on page 36	An extension to the St. Peter's water treatment system to French Cove was completed in 2019. A markup of action taken on the plan is provided in Section 9. A draft Municipal Land Use bylaw is currently being reviewed by the province. See details in section 7.7.7
Municipality of the County of Victoria	Inverness and Victoria Climate Change Action Plan 2013	No update has been received from Victoria County to date.
Nature Conservancy of Canada	Work in Cape Breton	2020 added 241 ha of protected area to the Cain's Mountain Wilderness Area See details in section 6, Table 6.1.
Nova Scotia Nature Trust	Land Conservation Program	LANDS ADDED: MacKenzie Cove Conservation Lands – 81 ha in 2012 Marble Mountain Conservation Lands – 27 ha in 2013 MacRae's Island Conservation Lands – 32 ha in 2017 Lime Hill Conservation Lands – 40 in 2017
Nova Scotia Department of Economic and Rural Development		The department was dissolved in April 2015, when it was superseded by the new and 'leaner' Department of Business.
NS Dept. of Lands and Forestry	Parks and Protected Areas Plan	Issued in 2013. Added more Core areas. See details in section 4.2.
Parks Canada – Bell Museum	Plan for Bell Museum 2014	Ongoing MOU for the BLBRA display at the Bell Museum. See details in section 5.2.2.
Port Hawkesbury Paper – Forestry Practices	2015 Sustainable Long-term Forest Management Plan for FULA Lands	PHP (2019) 2019 Annual Monitoring Report for SFM Indicators and High Conservation Values See details in section 4.2 and 6.1.
Stewards of the River Denys Watershed Association (SRDWA)	3-yr plan listed in our 2010 submission	This society is no longer active.
Trans Canada Trail	Strategic Plan 2013-2017	2017 - Installed BLBRA signage at approximately 18 launch sites on their Great Trail water route around the Bras d'Or Lake. See details in section 5.2.2; Item 3.
Unama'ki Institute of Natural Resources (UINR)	See About UINR	For outcomes see Netukulimk

2.4.3 Continued involvement of local people in the work of the biosphere reserve. Which communities, groups, etc. How are they involved?

Local people are involved in the work of the Biosphere in the following areas and related activities:

Community Capacity Building - The Trail Committee of the BLBRA has had consistent contact over the years with the Middle River Watershed Society, the East Bay Area Community Council, The Johnstown Community Development Council, and they are developing inroads with local residents from the New Harris area, as well as some preliminary support and advice from the Marconi Trail Blazers ATV Club. Currently, the committee is putting together a Toolkit for Communities (trail building) for use by community groups in the Biosphere Reserve.

Personnel at Atlantic Coastal Action Program (ACAP) have been involved with the Biosphere each summer for the past 4 out of 5 years through our Bras d'Or Watch Program. Thanks to some local volunteers and equipment and resources from CBU's Bras d'Or Institute, the success of this "Explore the Bras d'Or" family day was guaranteed.

In a joint venture with Ski Ben Eoin and Celtic Colours, individuals from local communities volunteered as trail interpreters or assistants for the past three years at the Hike The Hill event. Our volunteers consisted of a Mi'kmaw artist and knowledge holder, a retired Natural Resources employee, an ACAP biologist, local historian and others. Given the fact that our Biosphere has no staff, we rely on the "go and ask" method of finding help for our project.

Various groups around the Biosphere have created new events. These include annual science, cultural and heritage events. Please refer to sec. 5.2.2. item 8.

2.4.4 Women's roles. Do women participate in community organizations and decision-making processes? Are their interests and needs given equal consideration within the biosphere reserve? What incentives or programmes are in place to encourage their representation and participation? (e.g. was a "gender impact assessment" carried out?) Are there any studies that examine a) whether men and women have different access to and control over sources of income and b) which sources of income do women control? If so, provide reference of these studies and/or a paper copy in an annex.

Women's participation in leadership roles has increased significantly in the past year evidenced by their participation in recent municipal elections. Given that the BLBR watershed partially encompasses the four counties of Cape Breton Island, the Richmond Municipal Council is composed of 2 women, one of whom serves as the Warden and 3 men. Cape Breton Regional Municipality has a female mayor for the first time in its history, while Inverness Municipal Council has a female warden.

The BLBRA Board of Directors currently has six women on a 20 member Board. There are 3 vacancies and two municipal councilors yet to be appointed. Both the Chair and the Vice Chair are women.

Inroads are being made and although, on the surface, women in general may appear to be in a more equalized position economically, the two recent studies cited below give a more nuanced perspective.

The first study was conducted by Cape Breton Partnerships which looked at Barriers to Success for Indigenous Female Entrepreneurs, while the second study by Vibe Creative Group looked at Enhancing Entrepreneurial Support for Women Living and Working in Cape Breton. For more detail on these two studies, see section 7.5.1

2.4.5 Are there any changes in the main protection regime of the core area(s) and of the buffer zone(s)?

Although the amount of core areas has increased between 2010 and 2020, the legislative framework and management regime for these lands remains the same.

2.4.6 What research and monitoring activities have been undertaken in the biosphere reserve by local universities, government agencies, stakeholders and/or linked with national and international programs?

Research in the BR spans a range of scientific disciplines from environmental physics to molecular biology, a range of arts and social sciences from indigenous languages to social enterprise, and a range of development applications from aquaculture to musical folklore. Activities may be broadly grouped into environmental health monitoring, resource assessment and management, human health and culture, economic development and regional planning classifications (although, there is almost always interplay among them during any given research activity).

There has been a modest increase in the level of research activity in the BR during the reporting period, both in terms of the number and diversity of projects undertaken. These are in addition to the continuation of ongoing programmes. Some, such as renewable energy technologies (AECOM, 2012; McMiillan et al., 2012) underwent a burst of activity, only to collapse to virtually nothing. Other research endeavours, such as the conservation of endangered species (Crossin et al., 2016, Bordeleau et al., 2018), environmental education (Hatcher, 2012), climate change adaptation (Hatcher, 2016, Hatcher et al., 2020), and artisanal history (Hatcher, 2018; Hatcher and Landry, 2020) have maintained a high level of research activity. In particular, the specific arrangements for governance in the BLBR have attracted interest from national research programs (Castleton et al., 2014). Of course, there are far more gaps in research & monitoring than there are programmes in this lightly populated BR.

Three publicly-funded universities and two community colleges contribute on a regular or sporadic basis to research and monitoring within the BR. Tertiary education institutions incorporate BLBR studies into the curricula of their biology, business, chemistry, community studies, education, environmental studies and technologies, language, oceanography,

public health and recreation programmes. Professors, instructors and students regularly undertake *in situ* training, exploration and environmental monitoring as part of coursework or graduate studies, and in collaboration with other agencies and institutions (including the BLBRA and the CEPI). There has been little significant increase, or decrease, in the number of tertiary institutions, or the capacities within them to undertake research in the BR during the reporting period (although in this last year, the global COVID-19 pandemic has stalled many research activities in the BR). One small, but significant decrease in monitoring activity has been the abandonment of the Ecological Monitoring and Assessment Network (EMAN) site in Irish Vale, where lowlands forest biodiversity and productivity had been monitored for more than 25 years.

The main government agencies undertaking research in the BLBR include the federal departments of Parks and of Fisheries and Oceans and the provincial departments of Environment, Fisheries and Aquaculture, and Lands and Forestry. In many cases, these government agencies play the role of research funders and regulators with few staff researchers operating within the BR. As described in Section 4.2, the main areas of research activities by government agencies are biodiversity (e.g. ECCC's Canada Nature Fund's Community-Nominated Priority Places for Species at Risk program and DFO's salmon population assessment monitoring) and biophysical monitoring (e.g. DFO's finite Volume Community Ocean Model development and benthic survey coring initiatives).

Other key examples of ongoing monitoring include the Atlantic Zonal Monitoring Program, the Bras d'Or Watch citizen science program, and the UINR CABIN and CAMP monitoring program. An unsuccessful attempt was made to establish a new forest monitoring program, and a new CEPI Forest and Barrachois Pond project was recently initiated with a focus on identifying habitat for species at risk. Other research projects initiated during the period under review include A SHARED Future program (Canadian Institutes of Health Research) focused on Indigenous approaches to renewable energy generation, an oyster restoration project aimed at rejuvenating the industry (see section 4.2). All these research activities are embedded within, or linked to various agencies operating at provincial, national or international levels, including the CBRA, ECCC and DFO.

UINR and EFWC have brought the Indigenous perspective to research and monitoring and details are provided in section 6.2.

2.4.7 How have collective capacities for the overall governance of the biosphere reserve (e.g. organization of new networks of cooperation, partnerships) been strengthened?

Collective capacity for overall governance has been strengthened in the following ways:

> Ensuring that we have key community, industry and stakeholder representation on our Board of Directors so that the synergy of implementing complementary or supportive initiatives can be leveraged for more impactful outcomes.
>
> Opportunities for sustaining the BLBRA financially is due in part to the tremendous effort of our Board committees who seek funding from various governmental

departments, NGOs, financial institutions and the private business sector to source out the funding on various collaborative projects.

In partnering with the CEPI on the Climate Change Adaptation Forum, both organizations were able to meet the costs of the forum as well as make some money to continue publishing and promoting the adaptation guidelines which were published after the forum's conclusion.

The CEPI continues to address environmental management issues around the Bras d'Or Lake, as commissioned at the 2003 and 2004 Bras d'Or Lakes CEPI workshops. After more than 10 years of intense and varied activity, CEPI's management committee hosted a sustainable development conference on the Bras d'Or Lake in 2016. The conference brought together individuals and organizations from around the lake who have an interest in sustainable development in the Bras d'Or watershed. The conference was focused on 6 pillars of development: renewable energy, agriculture, tourism, mining, forestry, recreational fishery and aquaculture.

CEPI Youth presented at the 2016 Sustainable Development Conference and at the end of their presentation indicated that they wanted to have their own conference. The youth conference "Changing Climates/Changing Economies" was made possible by the collaboration of the CEPI and Port Hawkesbury Strait Area NSCC campus in 2018.

2.4.8. Please provide some additional information about the interaction between the three zones.

The zoning model for many biosphere reserves includes a central core area(s) surrounded by a buffer zone, which in turn is surrounded by the transition area. In contrast, the Bras d'Or Lake BR involves core areas comprised of 45 protected natural areas ranging in size from several thousand hectares to less than 10 hectares dispersed across the watershed. The goal of this "system" of protected areas is to represent the variety of natural landscapes occurring within the watershed, and to capture ecologically intact examples of the rich diversity of plant and animal communities. Core areas are uninhabited, and are managed for the conservation, maintenance and restoration of native biodiversity and associated ecological processes. Core areas contribute to the health of ecosystems outside their boundaries, as well as to critically important ecosystem services such as clean water, carbon storage and good air quality.

Buffer areas include public lands which are managed under an integrated resource management policy framework that seeks to maintain the ecological integrity and cultural values of the lands while allowing for sustainable resource development. Where buffers are adjacent to core areas, management practices seek to feather the effects of disturbance on core areas while recognizing and facilitating the contribution of core areas to the ecological health of surrounding lands. Buffer areas are also uninhabited, but along with core areas, provide residents and visitors with opportunity to engage in the natural environment while benefiting from sustainable resource development. Some ecologically significant lands currently included in the buffer zone have been identified in the 2013 Provincial Parks and Protected

Areas plan for legal protection, and when designated, will contribute directly to the system of core areas within the watershed.

The transition zone is comprised of the remaining lands in the watershed as well as the Bras d'Or Lake itself. The transitional lands are largely privately owned; this is where the people live and where most human activity occurs. Due to low population levels and the lack of industrial and agricultural development, the transition area is predominantly forested, providing more effective connectivity to buffer and core areas, and unobstructed flow of ecological services across zones. Efforts to legally protect ecologically intact private lands are ongoing and will continue to build upon the core areas within the watershed. Private landowners adjacent to existing core areas are encouraged to voluntarily adopt compatible land use practices as a means to protect the integrity of the protected areas but also to facilitate the flow of benefits from protected areas to their own lands and to the broader landscape.

2.4.9 Participation of young people. How were young people involved in the organizations and community decision-making processes? How were their interests and needs considered within the biosphere reserve? What are the incentives or programs in place to encourage their participation?

The CEPI Youth Coordinator was brought in to help bring more youth to the CCA Forum in 2016 and was made an active board member of the BLBRA in order to bring a youthful perspective to the board.

There were concerns that the youth were only taken into consideration at the end of planning, thus bringing to light the fact that youth should be brought into the conversation earlier on. Youth are encouraged to participate in CEPI Youth events around the Bras d'Or, that includes Biosphere events that CEPI Youth are invited to attend.

3. ECOSYSTEM SERVICES:

3.1 If possible, provide an update in the ecosystem services provided by each ecosystem of the biosphere reserve and the beneficiaries of these services.

(As per previous report and with reference to the Millennium Ecosystem Assessment Framework and The Economics of Ecosystems and Biodiversity (TEEB) Framework (http://millenniumassessment.org/en/Framework.html and http://www.teebweb.org/publications/teeb-study-reports/foundations/)). (http://millenniumassessment.org/en/Framework.htmland3)(http://www.teebweb.org/publications/teeb-study-reports/foundations/)).

Ecosystem services were not discussed in our 2010 submission or in our Strategic Plan 2013-2015. We were provided the paper about assessing ecosystem services in biosphere reserves from CCUNESCO which was published in March, 2019. We will be able to provide a baseline but not an update.

There has not been a rigorous assessment of the ecosystem services provided by the Bras d'Or Lake Biosphere to its residents and users. The most comprehensive (and recent) documentation of the ecosystem (Parker *et.al*. 2006) does not provide quantitative data relevant to the current reporting period. It is used here, in conjunction with more recent sources from the grey and primary literature, to provide qualitative description of ecosystem services according to the TEEB (2010) framework, (as per Vasseur & Siron, 2019), without ascribing quantitative or economic values.

All of the supporting services one could anticipate from such a large, cold-temperate watershed basin are provided to some extent by the BLBR. The young (<10,000y since deglaciation) landscape and seascape of the Biosphere means that the soil layer is often thin or absent, water courses are sharp and dynamic, and groundwater resources are large and recharged. Based on land cover alone, forest primary production is recognized as the main source of labile organic carbon in the terrestrial ecosystem, and the BLBR. Much of the untreed land within the watershed supports vegetation, ranging from alder scrub, to marshland, to manicured lawn. Excepting bedrock outcrop, only a small fraction of the land area has been covered by impermeable surfaces. The voluminous ($33km^3$) estuarine lake in the centre of the Biosphere (Bras d'Or Lake) gathers all of the surface runoff, as well as submarine groundwater discharges, mixing them with ocean water and connecting to the NW Atlantic Ocean. It's a large marine ecosystem supporting a remarkable level of aquatic biodiversity for this latitude. The complex geology, meteorology and oceanography of the extensive forest, riparian and estuarine ecosystems in the BLBR provide the full gamut of ecosystem structures and functions: habitat variety and complexity, alpha and beta species

diversity, foundation and keystone species, functional redundancy in food webs, primary and secondary production, nutrient and mineral supply, cycling and sequestration, aerobic and anaerobic decomposition, fresh water reservoirs and supplies, soil formation and enrichment, sediment deposition and erosion, dynamic stability and resilience in the face of natural and anthropogenic pressures and disturbances.

In the parlance of the economics of ecosystems and biodiversity (TEEB, 2010), these ecological attributes of the BLBR may be viewed as providing a classified set of services to its communities (i.e. provisioning, supporting, regulating, including cultural services). In the context of UNESCO's Man and the Biosphere Programme, we focus on those services provided to humans by the Bras d'Or ecosystem: referred to as "nature's contributions to people" (Pascual et al., 2017, Diaz et al., 2018). A summary assessment of these types of services, with ranked examples, a classification of benefit types, a crude assessment of value, and an indication of the magnitudes and directions of their change over the past decade is provided in Table 3.1 (below).

Provisioning services of high significance in the BLBR include: biodiversity (the evolutionary history of the BLBR results in a diversity of habitats and species drawn from more than 20 degrees of latitude that has sustained humans since the end of the last glaciation), fresh water (for drinking, cooking, washing and agri/aquaculture), fibre (from plants and animals for paper and cardboard products, clothing, arts and crafts), energy (in the form of wind and currents that drive aero- and hydro-dynamic energy converters to produce electricity), food (obtained by hunting, trapping and agriculture, fishing and aquaculture), fuel (firewood for heating, cooking, drying and entertainment), minerals (rocks and metals from quarries and mines for construction materials, road building, landscaping, coastal infilling and armouring, smelting, arts and crafts), biochemicals (including medicinals and nutraceuticals from plants, animals and soils for preserving, dying, tanning, curing and health care).

Table 3.1 : Summary of Bras d'Or Lake Biosphere Ecosystem Services, their Benefits, Values and Change over 2011-2021.						
CATEGORY	**SERVICE**	**PRIMARY**	**SECONDARY**	**BENEFIT TYPES**	**VALUE**	**10Y CHANGE**
Provisioning						
1	Water	Potable	Irrigation	Ecol/Econ/Soc-Cul	Very High	Decreased supply
2	Genetic Resources	Redundancy	Adaptability	Ecol/Soc-Cul/Econ	Very High	Little net change
3	Raw Materials	Wood Fibre	Rock, Minerals	Econ/Soc-Cul/Ecol	High	Decreased value
4	Energy	Fuel wood	Wind	Econ/Soc-Cul.	Moderate	Increased value
5	Food	Ag. Produce	Fish	Soc-Cul/Econ/Ecol	Moderate	Little net change
6	Medicinal	Plants	Animals	Soc-Cul	Low	Increased value
7	Ornamental	Quill & Feather	Wood	Soc-Cul/Econ	Low	Increased value
Regulating						
8	Biological control	Nutrient cycling	Pest predation	Ecol/Econ	Very High	Little net change
9	Air Quality maint	Cleaned Air	Renewed Air	Ecol/Soc-Cul/Econ	Very High	Little net change
10	Waste treatment	Sewage treatment	Land fill	Soc-Cul/Econ/Ecol	High	Little net change
11	Pollination	Bees	Moths	Ecol/Econ	High	Decreased value

12	Climate regulation	C-sequestration	Temperation	Ecol/Soc-Cul/Econ	High	Little net change
13	Water Flow control	Gnd-Water	Flood mitigation	Econ/Ecol/Soc-Cul	High	Decreased value
14	Soil fertility maint	Veg cover	Karst landscape	Soc-Cul/Ecol/Econ	High	Little net change
15	Extreme Event mit	Storm protec	Flood prevention	Econ/Soc-Cul/Ecol	Moderate	Decreased value
16	Erosion mitigation	Soil retention	Shoreline protec	SocCul/Ecol/Econ	Moderate	Decreased value
Habitat						
17	Life cycle maint	Nurseries	Refuges	Ecol/Soc-Cul/Econ	Very High	Little net change
18	Biodiversity maint	Habitat Diversity	Predictability	Ecol/Soc-Cul/Econ	Very High	Little net change
Cultural						
19	Recreation-Tourism	Authenticity	Accessibility	Soc-Cul/Econ	Very High	Increased value
20	Inspiration for Art	Beauty	Changeability	SocCul/Econ	High	Increased value
21	Cognitive develop	History	Geography	Soc-Cul/Econ	Moderate	Increased value
22	Aesthetic info	Landscapes	Diversity	Soc-Cul	Moderate	Little net change
23	Spiritual experience	Naturalness	Heritage	Soc-Cul	Moderate	Little net change

Regulating services of high significance in the BLBR include: water purification (for recharge of potable water supplies and maintenance of aquatic and marine habitat quality), air conditioning and weather/climate moderation (by geography, topography, heat storage masses, marine carbon sinks and vegetation cover), pest and disease control (by healthy predator populations, extremes of temperature and salinity), pollination (by healthy populations of pollinators supported by abundant plant cover and diversity), water flow and erosion regulation (e.g. flood control by channels and vegetated landscapes, shoreline protection by barrier beaches).

Supporting (habitat) services of high significance in the BLBR include: terrestrial, aquatic, estuarine and marine ecosystems (e.g. large karst fields, extensive areas of forest at stages of succession from primary to climax, extensive volumes of marine habitat from shallow, seagrass meadows to deep oxic and anoxic basins), that are partially protected from many predatory and invasive species; nursery habitats (e.g. numerous barrachois ponds, permanent lakes, old growth forest stands) suitable for early life history stages of many species of ecological, cultural and economic importance.

Cultural Services of high significance in the BLBR include: an authentic 'sense of place' for diverse cultures; aesthetic information in the form landscapes and seascapes of beauty and diversity through place and time that attracts settlers, visitors and tourists; assistance in cognitive and spiritual development through education and recreation; inspiration for art, music and culture; and the preservation of heritage, religion and spirituality in human populations of the present and the future.

3.2 Specify if there are any changes regarding the indicators of ecosystem services that are being used to evaluate the three functions (conservation, development and logistic) of the biosphere reserve. If yes, which ones and give details and update.

The lack of a well developed and documented indicator set for the BLBR hinders our ability to detect change in ecosystem services provided by the BLBR. Indicators for which there are at least some data include aquatic water quality (CABIN); estuarine water quality (Secchi depth), nutrient loading (CSSP), and primary productivity (AZMP); forest cover and forestry yields (DLF, PHP); fishery yields (DFO, NS-DFA); agri- and aquaculture yields (NS-DA and DFA); abundance of a few indicator species, including aquatic insects (CABIN), bees and butterflies (CBU), bats (ACAP and NSDLF), birds (BSC), salmon and seals (DFO), and moose (UINR); shoreline retreat (GSC), mining yields (NS-DMM), tourist numbers and tourism revenues (NS-DT), real estate values (RAC), human population, demography and per capita income (StatsCan), business development (CBP), sales of music, literature, arts and crafts (SOCAN, CB-CAD). There are many more indicators for which we need data, especially in the contexts of cultural services and development functions (educational outcomes, information levels, organizational capacities, climate change adaptation).

Change analysis can be easy for some indicators (e.g. demographics, harvest rates and economic metrics); difficult for others (e.g. water quality, species abundance and diversity, metrics of social enterprise). Some of the known indicators have changed significantly during the decade (e.g. mining yields, tourism, salmon abundance); most have not (e.g. human population, fishery yields, real estate values). Some of those that have changed are continuations of trends started before the the designation of the BLBR (e.g. the decline of Atlantic salmon abundance, the rise of tourism), while others that have not changed are continuations of previously flat-lined indicators at low or high levels (e.g. fishery and forest yields). The analyses are complicated by the fact that different elements of the same indicator may have changed in opposite directions, leaving no net change in the whole despite significant changes in the parts (e.g. shellfish aquaculture collapsed while caged fish aquaculture exploded; recreational fishery catches grew while commercial catches dwindled, quarry rock mining increased while gypsum rock mining declined). Overall, there has been relatively little change in the effect of changes in BLBR ecosystem services on the three MaB functions over the past 10 years. Those most worthy of note are:

a. An approx. 150 % increase in the proportion of the 1,300 km shoreline of the Bras d'Or Lake that has been armoured against shoreline erosion. This response to the erosion of valuable coastal land appears to be driven by an increase in the wave energy impinging on shores previously protected from winter storm waves by sea ice, which has declined markedly in both the duration and coverage of the lake during the past two decades as the winter weather moderates (presumably due to anthropogenic climate change). Another factor driving this change in shoreline armouring may be the transition of summer cottages to permanent residences by retirees. The effect of shoreline armouring on ecosystem services has yet to be measured in the BLBR, but elsewhere it has been shown to damage seagrass meadows and decrease species diversity and productivity (Prosser et al., 2017). If this becomes a widespread practice due to uncontrolled waterfront alteration in the BLBR, the conservation function will be compromised, with little positive effect on the development function.

b. The closure of the two industrial gypsum mines in the BLBR due to the collapse of the market in the USA represents the loss of direct and indirect employment in the BLBR, along with the economic spin-offs that accrue from such industry. Whether benefits from reduced fossil fuel combustion and environmental restoration expressed in the conservation function will offset the cost to the development function depends in part on what is done with the land and mine sites. A concomitant growth in the several rock quarries in the BLBR may completely replace both these negative and positive effects on functions. The data are not yet available.

c. Caged fish aquaculture production has grown ten-fold in the Lake during the past decade, all at a single, intensely used site. The employment and direct and indirect economic benefits accrue largely to one of the Indigenous communities in the BLBR, representing a significant enhancement of the Development function. As shellfish aquaculture and commercial fisheries have been flat-lined near zero in the BLBR since 2005, this caged-fish initiative is currently one of only two industries based directly on aquatic ecosystem services provided by the BLBR (the other being the recreational fishery, which provides indirect

contributions to the local economy associated with the expenditures on travel, accommodation and equipment.) The effects of these fish-harvest activities on the conservation function of the BLBR have yet to be determined. One area of concern is the apparent increase in the extent and intensity of hypoxic and anoxic zones within the water column. For example: concentrations of H_2S and CH_4 have increased markedly during the past decade in the locale where the fish farm is located, but it was anoxic long before the farm was installed.

d. Among the three major categories of ecosystem services, the increase in culture services is perhaps the most notable. Recreation, cultural experiences, education and spirituality can be enjoyed by locals and tourists alike and we have entrepreneurs and local businesses offering more of those experiences each year. These are detailed in Section 5.2.2.

Tourism in the Biosphere has grown 18 % in the last decade and is viewed as a major contributor of the economy of Nova Scotia and Cape Breton, including the BLBR as heavier industry has concomitantly experienced a severe downturn as discussed in Section 5.1. This increase is welcome. To our benefit, more than one-third of visitors reported some impact of environmental sustainability on how they travel. Close to two in ten visitors ensure all their travel minimizes impact on the environment and a similar proportion has researched sustainable tourism in order to make environmentally sustainable choices when they travel. (Nova Scotia Tourism, 2010).

In 2006 the Bras d'Or Lake was the first body of water in Atlantic Canada to be designated a 'no discharge zone,' making it illegal for pleasure boats and commercial vessels to dump waste directly into the water. The lake has long been enjoyed as a cruising destination, whether by sail or power, and.has increasingly been promoted each year at trade shows in North American markets and online. This brings in offshore revenues for facilitation services as well as clients to a growing number of boat owners/operators who provide tours and charters and other on-water experiences through rentals. The lake is also part of the Great Trail (Trans Canada Trail) and provides one of the few over-water segments in Canada.



Fig. 3.1 Photos courtesy of SPEDO, Destination Cape Breton photo library and CBC News

With less lake ice in the last decade, the winter use of the lake has decreased. No longer are houses towed, cars touring, deer crossing or seals sunbathing by breathing holes on the frozen waters. Ice fishing, skating and occasional snowmobiling continues however when access from shore is deemed safe. Only occasionally does the Big Pond Wall of Ice, driven by higher winds, provide the draw for hundreds to come and visit the shoreline.

On land the Reserves cultural services are plentiful, with existing and a growing number of traditional knowledge and cultural experiences being offered among the five First Nations and numerous other communities sharing Mi'kmaw, Gaelic, Scottish and Acadian language, music and heritage. Advantage is taken of the nature's splendid fall colours to draw more than 24,000 attendees to the 10-day Celtic Colours International (Music) Festival, of which 16 % occurs in BLBR communities, to listen, dance and enjoy the environment inside or out. At least 50 % of the audience is from far away. See also Section 5.2.2.

Local cuisine and locally grown ingredients from local growers can be experienced, now often through the Cape Breton Food Hub established in 2015 (see also Section 5.1.1). Chanterelle mushrooms are eagerly purchased by restaura-



Fig. 3.2 Photos courtesy of St. Peter's Economic Development Organization (SPEDO), Destination Cape Breton photo library

teurs from forest foragers.

Numerous community groups, nonprofits and various venues offer food, music and arts and crafts seasonally and throughout the year. Our low levels of light pollution and amazing places are a draw to many. We benefit from the recent years of attention by Tourism Nova Scotia (TNS) and Destination Cape Breton (DCBA) to promote UNESCO-specific attractions and experiences and educate entrepreneurs about tourist profiles, furthering their ability to create new and successful attractions and experiences. The entrepreneurs in the Biosphere know well that tourists are Authentic Experiencers and Cultural Explorers.

As stated in Section 5.4 communities in the BLBR benefit from economic activities that offer full time or part time employment based on sustainable resources as Cape Breton recovers from the loss of most of its industrial-based economy and related outmigration. The marketing and promotion of local and environmentally friendly businesses and entrepreneurial initiatives is attractive to residents, seasonal visitors and tourists alike.

Living in a place where people can also work while attaining a balanced and sustainable relationship with the natural world certainly has a positive overall effect on creating pride of place for many. With promotion, education and facilitation, our rural communities are already showing signs of growth and more sustainability as economic activities of the same ilk increase.



Fig. 3.3 Photos courtesy of Destination Cape Breton photo library. Nightsky: J. Felix 2014

3.3 Update description on biodiversity involved in the provision of ecosystems services in the biosphere reserve (e.g. species or groups of species involved).

Monitoring of biodiversity within the BLBR, including those species and species groups involved in the provision of ecosystem services, has been largely undertaken by dedicated survey efforts by the UINR and EFWC, Atlantic Canada Conservation Data Centre (ACCDC), NSDLF, volunteer survey efforts like Bras d'Or Watch, the Maritimes Breeding Bird Atlas and Maritimes Butterfly Atlas, and use of 'citizen science' apps such as eBird and iNaturalist. These efforts have led to the discovery of hundreds of previously undocumented species in the Reserve, as shown in Section 9.5.

iNaturalist.ca is a unique example of citizen and professional science sharing a common platform, where individual observations are verified by others for consensus, and accuracy to attain 'research grade' status. The BLBR is a 'Place' in the database filter tool defined by our boundary file (the watershed). A search of that Place will return records of species observed, along with the observer's username, and the date and location where the observation was made.

In the last ten years, populations of taxa that provide provisioning and regulating ecosystem services within the BLBR have largely remained stable, with some notable exceptions. There has been no documented loss of specific species or habitat/ecosystem types

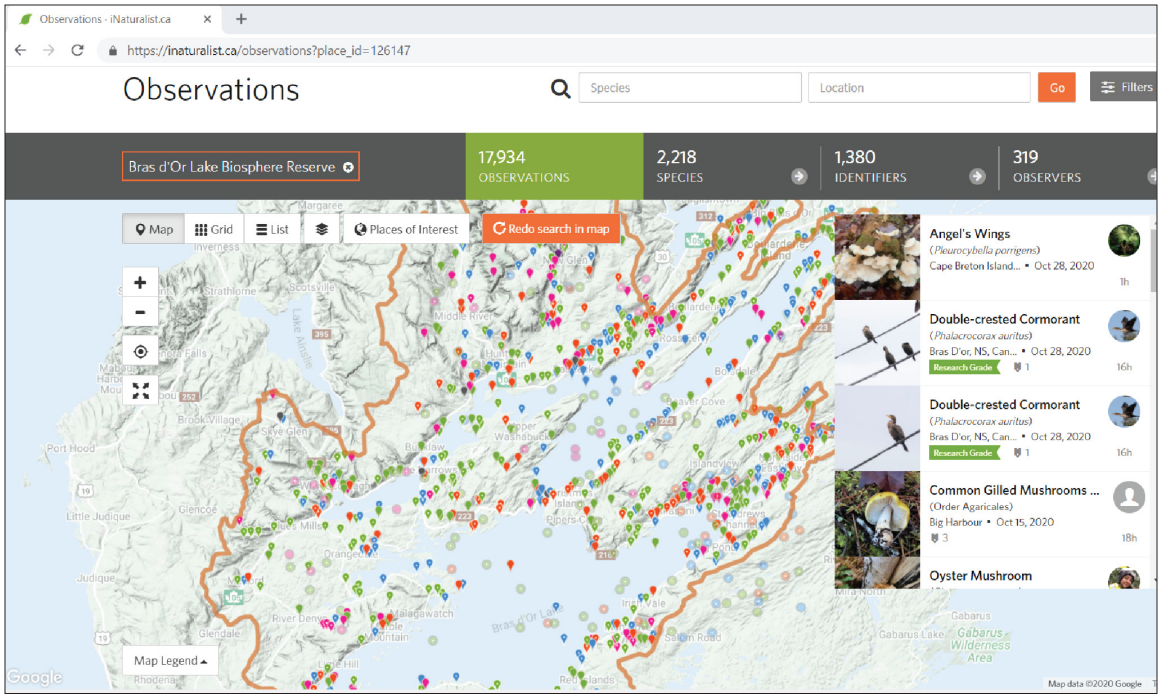


Fig. 3.4 Screen capture showing the distribution of species observations within the BLBR submitted to iNaturalist as of 28 October 2020

of traditional or economic importance within the BLBR over the past ten years. Increased levels of land protection on both public and privately owned properties are helping to secure habitats for rare and endangered species. Special management practices designed to protect significant and sensitive habitats such as nesting sites, wetlands and rare species occurrences are being implemented in all forestry activities on public lands. As outlined in Section 4.1, moose and balsam fir species have not changed appreciably over the past decade, although there is some indication that spruce budworm infestation could potentially reduce populations of the latter in coming years. Pollinator species including honeybees and other native bee and moth species have had recent worldwide population declines, and two of the biggest threats to pollinators have been detected in NS (the parasitic *Varroa* mite and the pathogen *Nosema*).

3.4 Specify whether any recent/updated ecosystem services assessment has been done for the biosphere reserve since its nomination/last report. If yes, please specify and indicate if and how this is being used in the management plan.

There have been no recent or updated ecosystem services assessments completed for the biosphere reserve, other than this one.

4. THE CONSERVATION FUNCTION:

[This refers to programmes that seek to protect biodiversity at landscape and site levels and/or ecological functions that provide ecosystem goods and services in the biosphere reserve. While actions to address this function might be focused on core area(s) and buffer zone(s), ecosystem dynamics occur across a range of spatial and temporal scales throughout the biosphere reserve and beyond.]

Conservation of biodiversity in the BLBR has been secured largely by provincial programs administered by the Nova Scotia Department of Environment (NSE), the Nova Scotia Department of Lands and Forestry (NSDLF), Fisheries and Oceans Canada (DFO), industry efforts (forestry, fishery and mining), and activities of environmental and non-government organizations. The Biosphere Reserve designation has strengthened the work of each of these entities by bringing forward national and international examples, sometimes finding resources through the World Network of Biosphere Reserves, and by fostering a sense of stewardship among local residents and other stakeholders.

4.1 Significant changes (if any) in the main habitat types, ecosystems, species or varieties of traditional or economic importance identified for the biosphere reserve, including natural processes or events, main human impacts, and/or relevant management practices (since the last report).

Ecosystems and Land Use

Current land-use patterns within the biosphere remain largely unchanged from 2010. The predominant land use remains forestry, and while ongoing silvicultural activities continue to alter the age-class distribution and individual forest stand composition, there has been little conversion of woodlands to other uses. The increase in core areas from 3.1 % in 2010 to the current 8.0 % of the terrestrial area of the biosphere reserve has helped to protect additional rare and vulnerable ecosystem types including older forest, wetlands and karst habitats. The Nova Scotia government's acceptance of William Lahey's 2018 report, 'An Independent Review of Forest Practices in Nova Scotia', will have a significant impact on how ecological values are incorporated in forest management planning and operations. The recommended paradigm shift to adopting "ecological forestry" principles and practices will have a positive impact upon biodiversity and ecosystem services across the province, including the BLBR. Refer to Section 2.2.4 for additional reference information.

There has been no major expansion in the resource development sector, in fact, two of the gypsum mining companies have ceased operations since 2010. Tourism remains a key

economic driver. Shoreline development for residential use continues to expand resulting in concerns over impacts to sensitive marine habitats. The Nova Scotia government has recently introduced the new Coastal Protection Act (not yet passed into law) which may help address environmental and ecological concerns related to residential and business development along the shores of Bras d'Or Lake. The proposed legislation can be seen at GNS (2019).

The distribution of ecodistricts within the BLBR is depicted in Section 9.2, while the five ecodistricts in the BLBR by area as defined by NSDNR (2017) are described below. The composition of land cover by percentage within each ecodistrict is summarized in Table 4.1-1.

Cape Breton Hills (ecodistrict 310)

The Cape Breton Hills is the largest ecodistrict in the Nova Scotia Uplands ecoregion. These hardwood-covered hills and slopes are 150-300 m above sea level, with higher elevations near the apex of the steep slopes leading to the Cape Breton plateau. This wide range in elevation provides the geographic basis for an impressive variety of ecosystems and associated species. This disjunct ecodistrict includes recognizable landmarks such as North Mountain, Kelly's Mountain, Skye Mountain (Whycocomagh), East Bay Hills and Boisdale Hills. Fresh, medium-to-rich soils support large intact Acadian forests of shade tolerant hardwoods (yellow birch, sugar maple and beech) with stands extending from the crests to lower slopes of hills and large hummocks. Stands of black spruce and balsam fir are common on top of the larger hill complexes with level hummocky topography underlain with imperfectly drained soils. Forests of white spruce are also very common throughout the ecodistrict, especially on abandoned fields and pastures in the uplands. Deer wintering yards are common on the sheltered south facing slopes, and numerous eagle nests are found along the ravines of major streams. The ecodistrict is influenced by the strong, cold winds of the Gulf of St. Lawrence. Temperatures are slow to warm in the spring resulting in a short growing season.



Fig. 4.1 Cape Breton Hills. Photo courtesy M. Cameron-MacMillan.

Bras d'Or Lowlands (ecodistrict 510)

Throughout this low-lying ecodistrict, white gypsum cliffs and red sandstone can be observed, especially along the shorelines of lakes. Thick deposits of gypsum, anhydrite and salt occur. The bays and channels are narrow, and parallel to ridges of gypsum-dominated bedrock. Good examples of this feature are found near the community of Iona. Where the underlying gypsum bedrock is expressed at the surface with sinkholes and/or karst topography, unique forest communities can occur—often with rare plants, such as yellow

lady's slipper (*Cypripedium parviflorum*), swamp milkweed (*Asclepias incarnata*), and shepherdia (*Sheperdia canadensis*). Fresh, nutrient-medium soils support Acadian forests of shade tolerant hardwoods on hummocky to hilly terrain or drumlins. On level to hummocky terrain with moist nutrient poor soils, black spruce, white spruce and balsam fir are prominent (with tamarack and red maple becoming more prevalent as soils gets wetter). On steeper slopes, white pine can be found, while red spruce (a rarity in the district) and hemlock will be found in the valley canyons, steep ravines, and along some watercourses coming off the uplands. The clearing of land by early settlers and later abandonment of those fields and pastures has given rise to large areas of old field forests of white spruce and tamarack. Natural disturbances include losses to blowdown in exposed areas along the lakes and coast, as well as fire and spruce budworm. The current forest has been strongly influenced by human settlement and later abandonment, followed by forest harvesting. These conditions have resulted in more softwood and hardwood stands of early successional species such as white spruce, trembling aspen, red maple, white birch and grey birch. The Bras d'Or Lowlands ecodistrict has more nesting eagles than any other ecodistrict in the province, with 216 nesting areas recorded over the years by Nova Scotia Department of Lands and Forestry staff. Because eagles feed mostly on fish during the nesting season, most eagle nests are located close to the shoreline, though some inland waterways are also used.



Fig. 4.2 Bras d'Or Lowlands. Photo courtesy M. Cameron-MacMillan.

Cape Breton Highlands (ecodistrict 210)

The extensively forested Cape Breton Highlands ecodistrict is made up of boreal and near-boreal ecosystems. The rolling topography of hummocks and hills provides the setting for an almost unbroken forest of balsam fir, spruce, heartleaf birch and white birch. A climatic transition zone occurs at the shoulder of the plateau where a blending of the boreal-like balsam fir forest and the Acadian hardwood forest of the steep slopes creates a mixedwood forest of yellow birch and balsam fir. Shrublands and wetlands are dispersed throughout, and the headwaters of the Island's major rivers start their descent down the escarpment through steep-sided ravines. Freshwater in small lakes and flowages covers 1.6 % of the ecodistrict. The ecodistrict experiences cold, late springs and snow cover lasts into May. Heavy



Fig. 4.3 Cape Breton Highlands. Photo courtesy M. Cameron-MacMillan.

snowpack exceeding 3 m is typical, and the Highlands are subjected to some of the highest winds in the province. On average, the largest treed wetlands in the province occur in the Cape Breton Highlands; these habitats are important to many avian species at risk, such as the Canada Warbler, Olive-sided Flycatcher and Rusty Blackbird.

Inverness Lowlands (ecodistrict 320)

This is one of the smallest ecodistricts in the province; within the BLBR, it includes the fault valley of Middle River as well as the Whycocomagh Bay area. The area tends to be somewhat sheltered by the surrounding uplands of the Cape Breton Hills and Cape Breton Highlands. Abundant arable land and deposits of coal and gypsum at several locations led to widespread settlement of the ecodistrict. Most of the original forest has been severely disturbed, especially on the intervale lands, which account for almost 8 % of the ecodistrict. On these rich floodplains sugar maple, white ash, and elm once formed the climax forest. Extensive areas of black spruce forest are found on the moist soils of this ecodistrict. Where sheltered growing conditions are provided by the hills and uplands, and where the soils are well drained on slopes, tolerant hardwood forests of sugar maple, yellow birch and beech will occur. Old field white spruce forests are common where agricultural land has been abandoned.



Fig. 4.4 Inverness Lowlands. Photo courtesy M. Cameron-MacMillan.

Cape Breton Coastal (ecodistrict 810)

This ecodistrict flanks the exposed Atlantic Shore of Cape Breton Island; within the BLBR it is represented by just a small area east of the St. Peter's Canal. This long, narrow ecological landscape includes a variety of coastal features and adjacent low lying inland areas. Elevations are generally low, rising to about 130 m in the interior. Strong winds, abundant fog and rain, and lower summer temperatures characterize the generally cool climate, making the Cape Breton Coastal ecodistrict usually the coldest part of Nova Scotia's entire coast. A Maritime Boreal coastal forest of white spruce, balsam fir and black spruce dominates the ecodistrict, and extends several kilometres inland. Balsam fir wave forests are strongly expressed on the exposed coastal slopes. In sheltered areas and on drumlins, white pine and



Fig. 4.5 Cape Breton Coastal Photo courtesy M. Cameron-MacMillan.

tolerant hardwood species will occasionally be found; however, red maple and white birch dominate the hardwood component of most coastal forests. Throughout the ecodistrict, small patches of jack pine and scattered red oak occur.

Table 4.1 Percentage Land Cover within the Ecodistricts Represented in the BLBR					
Cover Type	**Cape Breton Hills (310)**	**Bras d'Or Lowlands (510)**	**Cape Breton Highlands (210)**	**Inverness Lowlands (320)**	**Cape Breton Coastal (810)**
Forest/woodland	92.3	70.7	81.5	53.7	69.2
Wetland	1.9	8.8	12.6	6.4	14.6
Shrub/heathland	1.3	2.6	4.2	2.7	3.3
Water	0.3	3.7	1.4	13.7	5.4
Urban/Industrial	1.9	10.3	0.3	7.6	4.9
Agriculture	2.2	3.7	<0.1	15.4	1.4
Sparsely Vegetated	0.2	0.2	<0.1	0.5	1.3

Species of Traditional or Economic Importance

There has been no documented loss of specific species or habitat/ecosystem types of traditional or economic importance within the BLBR over the past ten years. Increased levels of land protection on both public and privately owned properties are helping to secure habitats for rare and endangered species. Special management practices designed to protect significant and sensitive habitats such as nesting sites, wetlands and rare species occurrences are being implemented in all forestry activities on public lands. Greater knowledge of species' overall population trends and distribution over the past 10 years has resulted in status changes for some species that occur in the biosphere.

Changes to species (or varieties) of traditional or economic importance identified for the BLBR over the past ten years—including natural processes or events, main human impacts, and/or relevant management practices—are as described in the following subsections.

Moose (*Alces alces*) are abundant in Cape Breton-Unama'ki, including the highland forests in the northern portions of the BLBR. The annual moose hunt attracts many from throughout the province and beyond. The responsibility for managing moose within Unama'ki is shared between the Department of Lands and Forestry, Parks Canada and the Unama'ki Institute of Natural Resources (UINR). Since the early 2000s, survey results have indicated that moose populations have ranged between 1,300 and 5,000, with the most recent survey putting the population at 2,300 individuals (NSDLF 2013; 2020). Unlike mainland Nova Scotia, where moose are considered endangered by NSDLF, moose are plentiful in Cape Breton; however, our moose are of a different subspecies, descended from a small number of moose introduced to the island from Alberta in the 1940s following overexploitation and extirpation of our native subspecies.

Annually, 345 licences are granted to non-native harvesters to hunt moose, with reported success rates of between 61 % and 80 % (Ayers, 2020). In addition, there is an Indigenous harvest that utilizes the principle of *netukulimk* (a culturally rooted concept of responsible

co-existence and interdependence with Earth's resources and each other) (UINR 2014). The Indigenous moose harvest is celebrated with an annual Feast in the Highlands event in which participants, visitors, youth and Elders are invited to share in a bountiful outdoor-cooked meal around a campfire. UINR uses this opportunity to offer harvesters and fishers an ammunition and fishing tackle exchange program where lead bullets and tackle are traded for ecofriendly alternatives. The Feast provides a venue for everyone interested in moose to come together, share a meal and speak freely over the management of the resource.

Oyster aquaculture within the Bras d'Or Lake was once a thriving industry, as described in section 5.1.2. However, in the early 2000s, high mortality was observed on natural oyster beds and on oyster aquaculture sites in the Bras d'Or Lake due to an aquatic parasite, *Haplosporidium nelsoni*, commonly known as MSX. It was first observed in dying oysters in the Delaware Bay, USA, area in the late 1950s. In June 2019, scientists at the Verschuren Centre in Cape Breton along with industry partners began a three-year research project across the Bras d'Or Lake to try and determine what conditions will support oyster growth, reduce oyster mortality, and mitigate the negative effects of the MSX parasite. Early project results appear promising, and scientists and industry research partners are hoping for continued success over the next two years. If this proves to be successful, oyster populations at aquaculture sites within the Bras d'Or Lake are expected to increase.

The most important tree species to the local forestry industry is the **balsam fir** (*Abies balsamea*). Balsam fir is abundant throughout the BLBR. Threats to this species include eastern spruce budworm (*Choristoneura fumiferana*), which have cyclical outbreaks every 30 to 40 years that may last for a decade or more (NSDLF 2016); monitoring has shown high numbers of spruce budworm between 2011 and 2016, which may indicate resurgence and a new outbreak. Management of spruce budworm may be attained partly through appropriate forestry practices, specifically, the harvesting of overmature spruce and fir stands that are the preferred hosts of the budworm.

The importance of **pollinators** in agriculture and in the ecosystem in general can hardly be overstated; reproduction of flowering plants and many food crops would be impossible without animal pollinators. The most well-known pollinators in the BLBR are honeybees, an introduced species that has become naturalized over several centuries; however, many native bee species, certain butterflies and moths, hoverflies, beetles and even hummingbirds are known to play a role in pollination. Worldwide, there is a decreasing trend in pollinator populations due to habitat loss, disease, climate change and inappropriate pesticide use (Pollinator Partnership Canada, undated). In the Maritime Provinces of Canada, many beekeepers monitor their hives for the presence of two key threats, the parasitic *Varroa* mite and the pathogen *Nosema*. Recent research has shown that, in Nova Scotia, more than 86 % of hives were infested with *Varroa* and 44 % of hives showed presence of *Nosema* (Cutler 2013). This study also found a correlation between certain pesticide compounds and rate of *Nosema* (Cutler 2013). Efforts are currently underway within the Nova Scotia Highlands ecoregion, which encompasses much of the BLBR, to increase public awareness of the role of these species, and to promote stewardship by planting beneficial native plant species and providing suitable habitat (Pollinator Partnership Canada, undated).

There is little regional data on pollinator abundance and trends in the BLBR overall over the past 10 years. However, it is notable that the yellow-banded bumblebee (*Bombus terricola*), a federally listed *Species at Risk Act* (SARA) species of special concern and provincially considered vulnerable under the NS *Endangered Species Act*, was observed at most survey sites within the BLBR in 2020.

Conservation of Biodiversity:

Since our 2010 submission, hundreds of species have been newly identified in the Reserve through the efforts of local citizens, organizations such as the Atlantic Canada Conservation Data Centre (ACCDC) and industry. An up-to-date list of species documented within the BLBR is provided in Section 9.5. This includes a number of species at risk and species of conservation concern that were newly identified in the BLBR. In addition to newly identified species, there are species that were known to occur in the biosphere in 2010 that have undergone status changes due to changes in (or increased knowledge of) the species' population trends and distribution.

It is important to note that the increased number of species of conservation concern within the BLBR is not due to threats to the species within the Reserve, but rather because of increased survey and documentation efforts as well as recent changes in species' status as assessed by provincial and federal government organizations. Dedicated volunteer survey efforts such as the Maritimes Breeding Bird Atlas and Maritimes Butterfly Atlas, ACCDC research, and the increasing popularity of 'citizen science' apps such as eBird and iNaturalist have all contributed to a greater understanding of the biodiversity within the BLBR and elsewhere.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is an independent advisory panel that assesses the conservation status of wild species or populations on a Canada-wide (or occasionally on a regional) basis. While COSEWIC does not directly designate species for protection under the federal *Species at Risk Act* (SARA), the recommendations are taken into consideration by the Minister of Environment and Climate Change Canada for addition to the Species at Risk list (SARA Schedule 1). Species listed as endangered (facing imminent extirpation or extinction) or threatened (likely to become endangered if limiting factors are not reversed) on Schedule 1 of SARA receive legal protections. Species that are in decline or are at risk of decline but do not currently meet the criteria for threatened are classified as being of Special Concern under Schedule 1. Provincially, the NS Endangered Species Working Group is responsible for determining the status of wildlife species, and species considered to be endangered (facing imminent extirpation or extinction) or threatened (likely to become endangered if limiting factors are not reversed) receiving legal protection under the NS *Endangered Species Act* (NS ESA). Species that are not currently threatened but are particularly sensitive to human activities or natural events do not receive the same protections but are considered vulnerable under the NS ESA. The conservation and recovery of species at risk is overseen by the Biodiversity Program within the Wildlife Division of NSDLF.

In addition to species listings by COSEWIC and the NS Endangered Species Working Group, the ACCDC ranks the conservation status of species within the province (S-ranks).

S-ranks range from S5 (secure) to S1 (critically imperiled), and these rankings may be accompanied by qualifiers such as "B" for breeding, "N" for nonbreeding, "M" for migrant, or "?" to denote uncertainty in rank. For example, a species listed as "S3?BS5M" would be considered rare (with some degree of uncertainty) within its breeding range in NS, but the migrating population, which includes individuals nesting outside the province, is considered secure. Species with some uncertainty in S-rank may have a range rank, e.g. S2S3.

A summary of Species of Conservation Concern (i.e. those assessed as endangered, threatened, or of special concern / vulnerable by COSEWIC and/or the NS Endangered Species Working Group, as well as those with S-ranks of 3 (vulnerable) or less) is provided below in Table 4.2; a full list of these species and their rarity rankings is found in Annex IV, Table 2. Where applicable, changes to the species' status rankings since 2010 are indicated in that table. Species that were considered to be of conservation concern in 2010 that have since been reassessed and are now considered secure have been retained in Annex IV, Table 2, but are shaded in grey.

Table 4.2 List of Species of Conservation Concern in the BLBR with Status Rankings, referenced in section 9.5.

	Current to December 2020		2010 MaB Submission	
	Species of Conservation Concern (total)	Species At Risk Receiving Legal Protections*	Species of Conservation Concern (total)	Species At Risk Receiving Legal Protections*
Birds	99	10	21	6
Fishes	6	0	1	0
Invertebrates	32	1	63**	0
Mammals	7	3	5	2
Reptiles and Amphibians	4	2	2	0
Fungi including Lichens	27	3	1	1
Plants (non-vascular)	25	0	0	0
Plants (vascular)	155	1	47	0

* Species listed as "Threatened" or "Endangered" under federal and/or provincial legislation

** Fifty-one odonate (dragonfly and damselfly) species that were considered to be of conservation concern in 2010 have since been reassessed and are now considered secure.

4.2 Describe the main conservation programmes that have been conducted in the biosphere reserve over the past ten years as well as current on-going ones. Note their main goals and the scope of activities, e.g. biotic inventories, species-at-risk, landscape analyses, conservation stewardship actions. Cross reference to other sections below where appropriate.

The main conservation programs within the BLBR over the past ten years have been administered by the provincial and federal governments, the BLBRA, UINR, EFWC, NGOs, and through voluntary initiatives by private industry, as described here.

Canada's Community-Nominated Priority Places (CNPP) for Species at Risk: Maliamuki'k msit Ko'kmanaq Priority Places Initiative

Canada Nature Fund's Community-Nominated Priority Places for Species at Risk is a $15.6 million, 4-year funding initiative administered by Environment and Climate Change Canada (ECCC) to support community-led projects that protect and conserve species at risk. The BLBR was selected as a Priority Place through a partnership that included Atlantic Canada Conservation Data Centre, Cape Breton Private Land Partnership, Cape Breton University, Bras d'Or Lake Collaborative Environmental Planning Initiative (CEPI), Mi'kmaw Kinamatnewey, Nature Conservancy of Canada, Pitu'paq, Port Hawkesbury Paper, NSDLF, and ECCC / Canadian Wildlife Service, Atlantic Region.

This project, titled *Maliamuki'k msit Ko'kmanaq*, which means 'taking care of all our relations', was initiated in 2020 and focuses on identifying key habitats and species hotspots within the BLBR using existing data, and subsequently filling information gaps through monitoring efforts and engaging traditional knowledge keepers. A public engagement campaign is underway through social media to highlight the significance of species at risk on the land; see Section 4.1 for examples. Further, the project coordinators are in the process of developing and distributing management plans to improve land management practices.

Early successes in this 4-year project include the sighting of a wood turtle (*mikjikj*) in a section of a stream that has never had a documented turtle sighting, and higher than expected numbers of yellow-banded bumble bees (*Amu*).

Unama'ki Institute of Natural Resources

The Unama'ki Institute of Natural Resources (UINR) represents each of the Mi'kmaw communities of Unama'ki, and was formed in 1999 to address concerns regarding natural resources and their sustainability. UINR's research is guided by their communities and the advice and guidance of their community's Elders. Their programs include moose management (as noted in Section 4.1), forestry and aquatic research and stewardship. Initiatives include ongoing Community Aquatic Monitoring Program (CAMP) surveys from shallow areas of the lake since 2009, and 2012 workshops to collect Mi'kmaw ecological knowledge on the presence and distribution of striped bass in the lake. The emphasis is research on species of concern to Mi'kmaq (e.g. oyster, lobster, eel, gaspereau and other food fishing species), and species at risk and invasive species are also a priority at UINR. The

institute strives to find environmentally sound ways to use natural resources while creating employment for members of their communities and further strengthening relationships between local industry and Mi'kmaw people. The three main goals of UINR are to provide resources for Mi'kmaq equal participation in natural resource management in Unama'ki and its traditional territory; to strengthen Mi'kmaw research and natural resource management while maintaining traditions and world views; and to partner with other groups sharing the same desire to protect and preserve resources for future generations (UINR 2020).

Atlantic Canada Conservation Data Centre

The Atlantic Canada Conservation Data Centre (ACCDC) contributes to the BLBR's initiatives through research and data management on the biodiversity within the Reserve. Their work is made available to land managers, government agencies and those pursuing economic development activities to aid in sustainable planning. The knowledge and data they provide enables the effects of human activities on ecologically significant species and places to be avoided or mitigated. The mission of the ACCDC is to assemble and provide objective and understandable data and expertise about species and ecological communities of conservation concern, including those at risk, and to undertake field biological inventories in support of decision-making, research and education in Atlantic Canada. The ACCDC was established in 1997. It became a member of NatureServe in 1998 and NatureServe Canada in 1999, was incorporated as a non-profit organization in 1999, and became a registered charity in 2000. Like all Conservation Data Centres, ACCDC staff gather, maintain and update spatially-accurate occurrence data for species and ecological communities of conservation concern.

ACCDC maintains a database of all wild species of vertebrates, vascular plants, bryophytes, lichens and many groups of invertebrates and fungi that occur within Nova Scotia. The conservation status of each species is scientifically assessed by the organization in cooperation with regional experts; for species considered to be of conservation concern, they maintain a geographically linked database of known sites of occurrence. Additionally, the ACCDC conducts field research to further the understanding of rare species and significant areas within the BLBR and throughout the province. Over the past decade, the ACCDC obtained records for 16 legally protected species at risk not previously documented within the BLBR, and in October 2020, they discovered a species in the Reserve that had not been known to occur in all of Nova Scotia, Goldie's wood fern (*Dryopteris goldiana*).

Canada Nature Fund Collaborative Conservation Initiatives

In 2019, the Province of Nova Scotia secured $14.3 million in federal funding under the Canada Nature Fund to help advance collaborative conservation initiatives across Nova Scotia. With an emphasis on private land conservation and Indigenous protected and conserved areas, it is expected that this fund will lead to further land conservation actions within the Bras d'Or Lake watershed. For more information on the Canada Nature Fund, refer to ECCC (2020).

ACAP Cape Breton Monitoring Activities

ACAP-CB is a non-profit charitable community organization dedicated to science and monitoring-based projects, electronics recycling, social marketing and education and awareness. Their vision is for a clean and healthy environment, a prosperous economy and a population that is educated and empowered to make responsible choices for a sustainable future. ACAP-CB has undertaken considerable survey effort within the BLBR in the past ten years. Examples follow.

The Eastern Bras d'Or Erosion Project was a one year (2012-2013) monitoring and awareness initiative implemented by ACAP-CB with financial support from Environment Canada. The focus of this project was to gather baseline information on coastal erosion in the Bras d'Or Lake (from the East Bay Sandbar to Hay Cove) and to collect data on the status of freshwater streams flowing into this unique watershed. The results of their study suggest that there is a crucial need to re-establish coastal buffer zones along this stretch of the Bras d'Or coastline. The photographic evidence of coastal erosion obtained during this study will serve as a benchmark for future erosion studies in the same area. Canadian Aquatic Biomonitoring Network (CABIN) sampling used in this study was also performed from the perspective of scientific monitoring. Both the CABIN data and erosion survey data will act as baseline knowledge for future comparison and re-assessment.

A Sediment Impact Monitoring program was undertaken in 2013-2014 to assess areas of ecological vulnerability in and around the East Bay of Bras d'Or Lake by determining the impact of sedimentation from freshwater sources and assessing the ecological integrity of freshwater habitats flowing into the lake. Since Bras d'Or Lake is a primarily closed system with numerous freshwater inputs, activities around the watershed are almost certainly having an effect on sedimentation (excessive sedimentation is associated with habitat degradation for both aquatic flora and fauna).

In the summer of 2015, a coastline in Eskasoni received a facelift, with the planting of a living shoreline. Living shorelines are a method of erosion mitigation that use natural techniques to stabilize the shoreline. These include planting grasses, shrubs and trees to stabilize soil, adding hay to increase biomass and reduce slope grades, and weaving brush mats to protect exposed areas from wind and wave action. Living shorelines techniques are beginning to gain traction in place of traditional, structural methods. Structural shoreline protection measures (also called "hard" methods) usually involve placing rock or concrete structures on or near the shore to shield the ground beneath from wave action. This can disrupt the natural hydrogeological processes on a coastline (e.g. movement of water and sand). Although they protect the ground behind them, they can actually cause accelerated erosion on adjacent properties and destroy the habitat in front of them as the wave energy is reflected back off the hard stone. Living shorelines are meant to work with natural hydrogeological processes and create and enhance habitat for birds, fish, snails and other invertebrates while stabilizing and expanding the shoreline. In areas where they are applicable, they can also be much more cost-effective to build and maintain. The Living Shorelines project was undertaken with the help of partners at Saint Mary's University, CEPI, UINR, and the Unama'ki Fishery and Land Guardians.

To monitor the population health of bats in Cape Breton following the introduction of the highly destructive White Nose Syndrome in eastern North America, ACAP-CB began a Bat Monitoring Project in 2013. This project included four major components: summer monitoring, maternity colony counts, hibernacula monitoring and public education. Prior to the summer of 2013, no signs of White Nose Syndrome had been detected in Cape Breton. To collect information about our bat populations in a healthy state, ACAP-CB deployed ultrasonic bat detectors in several locations in eastern Cape Breton, including within the BLBR. The monitors were deployed in spring or summer in locations which serve as bat habitat including forests, ponds, coasts, fields and human-made structures. Three sites were monitored in 2013 and five in 2014. Visual counts of bats emerging from maternity colonies were conducted at dusk. Data collected over these two years of monitoring has provided information about activity level, species composition and arrival/dispersal of bats in Cape Breton. Bat hibernation sites, or hibernacula, are typically caves or mines where the temperature is relatively stable throughout the winter and bats are protected from weather and temperature extremes. High levels of activity in winter and a large number of bats leaving the hibernaculum are indicators of white-nose syndrome. ACAP-CB began monitoring potential hibernacula in winter 2013-14 and 2014-15 to determine whether bats were active during the hibernation period. These data provided valuable information on bat populations before and at the beginning of the emergence of White Nose Syndrome in the BLBR. In the summer of 2020, monitoring efforts by NSDLF with support from the Canadian Wildlife Health Cooperative were initiated in order to document the status and recovery of bat populations seven years after the first cases of White Nose Syndrome were observed in the Reserve.

Fisheries and Oceans Canada (DFO) Research Activities

DFO Maritimes Region Science Branch, including the Population Ecology Division (PED), Coastal Ecosystem Science Division (CESD), and Ocean and Ecosystem Sciences Division (OESD), has a long history of conducting research activities throughout the waters of Cape Breton, including in the BLBR. In addition to Science Branch research, DFO has participated in Species at Risk Act processes, stakeholder requests and the International Council for the Exploration of the Sea (ICES) working group input for international advice; some of this work was conducted with the assistance of UINR.

The Salmon Section in the PED collects salmon population assessment data annually on several rivers in eastern Cape Breton, including Middle River, Baddeck River and North River. Information from these rivers is used to support decisions related to fisheries management, consultations with Indigenous communities, habitat management, area management, compliance and enforcement.

Beginning in 2009, the CESD supported temperature, salinity, water colour and mooring monitoring and data collection in the Bras d'Or Lake, summarized in a 2014 publication; from this research, a working Finite Volume Community Ocean Model (FVCOM) model was developed to support possible Tidal in-Stream Energy Conversion (TISEC) installations in the Lake and to answer longer-term ecosystem questions. In 2017, CESD provided funding for monitoring instrumentation to support a partnership proposal with CBU and

Eskasoni First Nations Fish and Wildlife, and provided training for collaborative monitoring activities in the Bras d'Or Lake. In 2018 and 2019, CESD participated in a number of research initiatives under several aquaculture monitoring program projects, including benthic survey coring initiatives, sediment grain size geochemistry and ATP levels; these initiatives were conducted in collaboration with CBU, Dalhousie University, the Ocean Frontier Institute, and the Nova Scotia Department of Fisheries and Aquaculture. For the past 10 years, CESD has maintained a group of temperature-pressure gauges around the Bras d'Or Lake as part of the Long Term Temperature Monitoring Program, and supported the conductivity, temperature and depth sampling conducted by CBU.

In 2016 and 2017, in collaboration with CBU, the OESD studied chemical oceanography, specifically carbon, oxygen and nutrient dynamics in the Whycocomagh area of the Bras d'Or Lake.

Bras d'Or Watch

Bras d'Or Watch is a citizen science initiative developed by the BLBRA and carried out in partnership with ACAP-CB, with cooperation from UINR, Eskasoni Fish and Wildlife, and the Cape Breton Naturalists' Society. It is an evolving program that seeks to strengthen the bond between humans and our habitat, combining citizen science and public education to help people interact with the Bras d'Or Lake, learn more about the other organisms that call the lake their home, and bring together people who share an appreciation for beautiful ecosystem. The Bras d'Or Watch Field Day is an annual event that brings together scientists, naturalists, families and community leaders to celebrate our place in the Bras d'Or Lake Biosphere Reserve. It includes family-friendly activities which help collect valuable information about the lake, to meet scientists eager to share their knowledge and lots of opportunity to meet new friends.

Forest Watch, which was an offshoot of the Bras d'Or Watch project, began in 2017 with a pilot of educational activities undertaken at a small woodlot adjoining Middle River Elementary School. It has since been expanded to include the high school at Potlotek First Nation, as well as post-secondary students from the Coady Institute at St. Francis Xavier University. BLBR volunteers were trained in forest monitoring methods by experienced staff from the Mersey Tobeatic Research Institute, located in the Southwest Nova Biosphere Reserve. The main goals of Bras d'Or Watch and Forest Watch include biotic inventories and environmental monitoring, while the citizen science aspect fosters conservation stewardship through increased awareness of the natural environment.

Eskasoni Fish and Wildlife Commission

The Eskasoni Fish and Wildlife Commission (EFWC) undertakes management and assessment of food, social and ceremonial fisheries. As well, they engage in protection of ecosystem services and promote biocultural diversity, science and authentic Mi'kmaw ecological knowledge (EFWC, 2021). EFWC is committed to the protection of the environment and, in particular, the habitat necessary for aquatic and land-based animals to survive and thrive. The organization has been involved in Atlantic salmon conservation projects since the early 1990s, including stocking local brooks with Atlantic salmon and speckled (brook)

trout and installing habitat enhancements such as wing deflectors and digger logs. They also conduct population assessments, monitor environmental conditions and monitor local construction and forestry activities for potential impacts to fish and fish habitat. In 2014, EFWC began a series of activities to assess, enhance and restore Qamsipuk (Indian Brook) and other local rivers for the health of the local fish populations and of Eskasoni First Nation through the protection of food fishery species. This program has involved monitoring pH and temperature, conducting electrofishing and dive surveys, and installing habitat restoration structures; the program is funded by Adopt-a-Stream, the Recreational Fisheries Conservation Partnership Program, and Eskasoni First Nation.

Nova Scotia Nature Trust

The Nova Scotia Nature Trust's (NSNT) Land Conservation Program protects rare, outstanding and unique natural areas throughout the province through stewardship agreements for landowners, conservation easements and land acquisition. Within the BLBR, more than 320 ha of land are protected through land donations and conservation easements. NSNT's Land Conservation Program has a particular focus on the preservation of old growth forest, iconic coastline, islands, lakes, rivers, wetlands and important habitat for wildlife. The organization is committed to long-term protection of their conservation lands by maintaining an active land stewardship program (NSNT 2021). As a result of the actions of NSNT and similar efforts from the Nature Conservancy of Canada, the amount of those lands which contribute to the core areas has increased from 252 hectares in 2010 to 780 hectares in 2020.

Port Hawkesbury Paper (PHP)

The pulp and paper mill in Point Tupper has been in operation since 1962, and was purchased by Port Hawkesbury Paper LP in 2012 (See also Section 5.1.4). Under the Forest Utilization License Agreement (FULA), the Province of Nova Scotia granted PHP the responsibility for management of FULA lands. A Sustainable Forest Management Long-term Plan and annual operating plans must be prepared by PHP and submitted to NSDLF for approval before implementation. PHP has a 100-year management plan which is updated every 5 years; it was last updated in 2015 and is currently under review again for submission to the provincial government next spring.

The mill has been certified to the Forest Stewardship Council (FSC) Maritime standard since 2008; currently, they are in the process of transitioning to the new FSC national standard for Canada which is required by summer of 2021. They have also been certified to the Sustainable Forestry Initiative (SFI) forest management standard since 2014. PHP's FSC certification requires a high conservation value forest (HCVF) assessment for the certified landbase. This assessment was initially completed in 2009 and has been implemented since then, and will be going through a review and update over the next year. These high conservation values relate to biodiversity (e.g. presence of species at risk and their habitats; areas of importance to wildlife such as deer wintering areas), consideration of large and contiguous landscape-level forests, rare or threatened ecosystems, fundamental natural services, needs of local communities (e.g. water supplies) and cultural values including traditional habitat use.

In an example of other environmental conservation measures (OECMs) in place within the BLBR, the high conservation values that have been identified by PHP are protected by mitigation measures that range from full protection through avoidance of sensitive features and creation of buffer areas, to modified management practices that maintain or enhance the quality of values. The company's full high conservation value forest assessment (PHP, 2018) is publicly available on the PHP website, as are their annual monitoring reports which summarize safety, environmental and high conservation value progress.

Conservation Legislation and Policies

A number of acts and policies have been enacted or updated in the past decade by federal and provincial governments to help ensure conservation of sensitive and important features within the BLBR. These acts and policies, detailed in Section 9.3, include:

Federal Acts and Regulations

Canadian Environmental Protection Act (GC 2020a)
Canada Wildlife Act (GC 2017a)
Environmental Enforcement Act (GC 2020b)
Fisheries Act (GC 2019a)
Impact Assessment Act (GC 2019b)
Migratory Birds Convention Act (GC 2017b)
Species at Risk Act (GC 2020c)

Provincial Acts and Regulations

Coastal Protection Act (Bill 106) (GNS 2019)
Endangered Species Act (GNS 2010a)
Environment Act (GNS 2017)
Environmental Goals and Sustainable Prosperity Act (GNS 2012a)
Forests Act (GNS 2010b)
Provincial Parks Act (GNS 2010c)
Wildlife Act (GNS 2010d)

Provincial Policies and Plans

Nova Scotia Parks and Protected Areas Plan (GNS 2013)
Nova Scotia's Old Forest Policy (GNS 2012b)
Nova Scotia Wetlands Conservation Policy (NSE 2020)
Nova Scotia Environment's Industry-specific policy and guidelines (NSE 2020)

As well, the Nova Scotia Department of Lands and Forestry provides **Special Management Practices** for industry that are intended to be protective of provincially-listed species at risk and their habitats, as well as other key habitats for wildlife in the province (NSDLF 2018). Special management practices are currently in place for Canada lynx, American marten, wood turtles, lichen species at risk, eagle nests, heron colonies and white-tailed deer. Additional special management practices are currently under development for other sensitive features and species.

4.3 In what ways are conservation activities linked to, or integrated with, sustainable development issues (e.g. stewardship for conservation on private lands used for other purposes)?

Many of the conservation activities (and their lead organizations) described in Section 4.2 have produced outcomes that are linked with fostering sustainability in the BLBR. In many cases, collaboration and cooperation between organizations has benefited all stakeholders in the BLBR with an interest in conservation and sustainable development. For example, a collaborative effort between ACAP-CB, CEPI and UINR led to the creation of a user friendly best practices guide for landowners on the Bras d'Or (ACAP-CB et al 2013). Residents were engaged to learn about topics such as coastal erosion, best practices for coastal landowners, and coastal planting at three information sessions. Participants were given an opportunity to obtain free trees and shrubs to enhance the buffer zones of their coastal Bras d'Or Lake properties.

CEPI also produced a report on development standards and best practices that are protective of the waters of the Bras d'Or (EDM 2008). Although water quality in the Bras d'Or Lake is generally good, an earlier study by CEPI/Unama'ki had found that nearly 55 % of subwatersheds feeding the lakes had experienced some measure of decline in water quality over the monitoring period; thus, a series of key initiatives were recommended. Initiatives included: increased access to serviced centres for water and sewer for future land development; recommendation of watercourse buffers for development; improvements to wastewater management; and recommendations for low impact design measures. The report's authors also encouraged coordinated action among local stakeholders and governments, public education, and improved regulation through municipal bylaws and operations. Ultimately, CEPI is seeking to create an Integrated Watershed Management Plan (IWMP) for the Bras d'Or, which will incorporate the recommendations of the 2008 document.

Data from the ACCDC, the Priority Places initiative, and other survey efforts have provided industry groups such as PHP, and regulators such as the NSDLF IRM team, with the information they need to inform sustainable land use planning and protection of sensitive ecological features such as species at risk and their habitats.

Private woodlot owners' groups such as the Federation of Nova Scotia Woodland Owners (FNSWO), Nova Scotia Woodlot Owners and Operators Association (NSWOOA), Cape Breton Privateland Partnership, and Nova Scotia Landowners and Forest Fibre Producers Association (NSLFFPA) promote good stewardship of private forests. These organizations maintain communication with NSDLF through the Association for Sustainable Forestry, an organization that also provides financial funding to implement forest improvement work on private lands. Together, these groups advocate for sustainable management and resource use, and strive to provide woodlot owners with the education and tools they need to attain their goals while preserving the ecological integrity of the resource (for example, by attaining FSC woodlot certification). Each of these groups has expressed support for the recommendations of the recent Independent Review of Forest Practices in Nova Scotia (Lahey 2018; NSWOOA 2018).

4.4 How do you assess the effectiveness of actions or strategies applied?
(Describe the methods, indicators used).

One of the best ways to assess the effectiveness of the conservation actions and strategies described in Section 4.3 is through long-term monitoring of quantifiable indicators of ecosystem health. A number of such programs and initiatives are currently underway within the BLBR.

Bras d'Or Watch

As part of the field day component of Bras d'Or Watch, teams of trained local volunteers at fixed locations around the lake measure a small set of standardized physical, chemical and biological variables in shallow waters and along the shoreline. Volunteers are also asked to document flora and fauna at the field site, with a particular emphasis on introduced and invasive species such as the European green crab.

Bras d'Or Watch was initiated in 2015, and the plan is to have local communities take ownership of their sample sites and data over the long term. Due to Covid-19 restrictions on public gatherings, a modified Bras d'Or Watch took place in 2020. Volunteers collected the standardized set of water quality variables at the fixed study locations, and participants were encouraged to document species sightings throughout the BLBR using the iNaturalist app. Such community-based monitoring programs have a great potential to inform and engage society on the relationship between water quality and Biosphere health.

Bras d'Or Institute Monitoring Efforts

In 2010, the Bras d'Or Institute at CBU (BdOI), Eskasoni Fish & Wildlife Commission and the UINR partnered with DFO to establish two permanent Atlantic Zone Monitoring Program (AZMP) sample sites in the Bras d'Or. The first site is in the centre of the great lake at a depth of 257 m, and the other is in the centre of the Whycocomagh Basin at the extreme western end of Whycocomagh Bay, at a depth of 48m. The frequency of sampling the Bras d'Or sites is at least eight times per year, depending on weather and ice conditions. High resolution optical profiles are also made at these sites for the purpose of calibrating sensors on Earth-observing satellites that can be used to estimate plankton and sediment distributions in the entire Lake. DFO terminated funding for the two Bras d'Or stations in 2018, but the BdOI staff continued the sampling on a volunteer basis. Funding was restored for a year in 2019, but the program no longer has stable, long term funding.

Early results show that the depth at which the Whycocomagh basin becomes anoxic varies seasonally by as much as 5 metres, and that the spring phytoplankton bloom in the Bras d'Or Lake occurs almost a month later than the offshore waters of the Cabot Strait, north of Cape Breton Island. Over a seven year period (2011 to 2017), AZMP monitoring methods were used to assess approximately 100 sites throughout the lake, and found that phytoplankton and dissolved nutrient levels were almost always higher in the nearshore waters than the middle of the lake, with the highest nutrient levels occurring in barrachois ponds.

Research Projects in the Irish Cove Nature Area

The Irish Cove Nature Area is a 1.6 km2 protected area set in the East Bay Hills near the community of Irish Cove. The site was previously monitored as an Ecological Monitoring and Assessment Network (EMAN) forest-monitoring plot. As documented in the BLBR nomination submission (BLBRA, 2010), the inventorying of sapling regeneration, lichen diversity and abundance, breeding bird monitoring and surveys, and soil inventory indicated a healthy ecosystem in Irish Cove.

Although the EMAN monitoring effort was concluded in the early 2000s, a renewed interest in this nature area was generated in 2019 with the selection of the site of a hydrological monitoring program intended to study the impact of forest harvesting on water resources. This project is being undertaken by the CEPI Forestry Task Team, and will be led by Dr. Fred Baechler in cooperation with staff from NSDLF. Initial baseline monitoring is scheduled to take place by the summer of 2021, prior to any forest harvesting, and will include collection of weather data, stream measurements (specific conductance, temperature, pH, turbidity and head level), groundwater measurements in springs and wetlands (head level, specific conductance, temperature and pH), and biological data collection such as standardized CABIN monitoring for aquatic ecology.

Future Initiatives: State of the Bras d'Or Report

Recently, the BLBRA has identified an opportunity to increase our overall knowledge of the ecosystem health of the Bras d'Or by compiling information from available sources into a "State of the Bras d'Or" report. The scope of this report is currently under consideration by a BLBRA committee; it is anticipated that it will include information on air temperature, water temperature, water quality, sea level and other selected indicators. The State of the Bras d'Or report will be updated periodically, allowing trends in ecosystem health to be assessed over time.

4.5 What are the main factors that influenced (positively or negatively) the successes of conservation efforts in the entire biosphere reserve? Given the experiences and lessons learned in the past ten years, what new strategies or approaches will be most effective for conservation for sustainable development?

Conservation efforts within the BLBR have undoubtedly been aided by the slow economic and population growth of Cape Breton Island in the past 10 years, with little industrial activity in the region aside from forestry and aquaculture. The focus on the tourism and hospitality sector in the region, and popularity of ecologically sustainable tourism in particular, help to ensure the success of conservation efforts in the biosphere. These aspects are further discussed in the development function of this document (Section 5). Building and maintaining positive relationships with like-minded organizations and individuals has also been instrumental to the success of conservation efforts in the Reserve.

As noted by respected hydrogeologist and BLBRA member Dr. Fred Baechler in his document, *Perspectives on the Bras d'Or's Fresh Water* (BLBRA, undated), 'you can't effectively manage what you only have a limited understanding of'. It is impossible to overstate the importance of developing an understanding of the complex ecosystems of the biosphere reserve in order to effectively conserve it for future generations to enjoy. To that end, strengthened awareness and increased research and monitoring efforts have contributed greatly to conservation efforts within the BLBR. Increased engagement by individuals and conservation groups has led to public and even legal pressure to hold governments accountable; in response, there have been new commitments by the provincial and federal government to increase protection of biodiversity through better enforcement of existing species at risk legislation and through designation of new and expanded protected areas. In 2018, an independent review of forestry practices in the province was submitted (Lahey, 2018); the report was adopted by NSDLF and efforts are currently underway to implement the report's 45 specific recommendations on Crown land. In January 2019, a group of environmental advocates launched a judicial review in the province, alleging a slew of failures under the Endangered Species Act dating back to the early 2000s (Grant, 2020); the Nova Scotia Supreme Court ruled in May 2020 that the province had failed to live up to its self-prescribed legal obligations to protect species at risk, and ordered the minister of lands and forestry to fulfil those duties. Since that ruling, NSDLF has renewed its commitment and has dedicated more resources to the protection of species at risk through appointment of species recovery teams, identification of recovery strategies, and designation of core habitat.

Given the experiences gathered over the past ten years, it is anticipated that the most effective strategies for conservation within the BLBR and beyond will involve global cooperation, particularly as it relates to climate change and its effects. In June 2019, the BLBRA and CEPI hosted a Climate Change Adaptation Forum to extend our initiative to encourage best practices in the Bras d'Or Lake Biosphere. Over the three days, the forum was held in Baddeck, Wagmatcook and Cape Breton University. Welcoming representatives from other Canadian UNESCO biospheres as well as Indigenous Circle representatives, a contingent of local indigenous youth and members of the public, the forum provided a number of leading experts to address the gathering followed by round table discussions on the problems and possible solutions presented by climate change in the various biospheres. The outcome of the forum was to develop a set of guidelines on adapting to climate change with the hope that they can be used by all the biospheres and shared with other communities across the country.

4.6 Other comments/observations from a biosphere reserve perspective.

Over the past decade, the BLBR has truly come to appreciate the importance of cooperation between Biosphere Reserves to further the conservation function. For example, through sharing of knowledge with our colleagues at the Southwest Nova BR, we were able to develop an effective Forest Watch program that will provide meaningful data over the long term. As well, Canadian BRs were able to work together to develop and promote best practices related to climate change at our 2019 CCA Forum.

5. THE DEVELOPMENT FUNCTION:

[This refers to programmes that address sustainability issues at the individual livelihood and community levels, including economic trends in different sectors that drive the need to innovate and/or adapt, the main adaptive strategies being implemented within the biosphere reserve, and initiatives to develop certain sectors such as tourism to complement and/or compensate for losses in other markets, employment, and community well-being over the past ten years]

5.1 Briefly describe the prevailing trends over the past decade in each main sector of the economic base of the biosphere reserve (e.g. agriculture and forest activities, renewable resources, non-renewable resources, manufacturing and construction, tourism and other service industries).

5.1.1 Agriculture and Local Food Movements

The interest and involvement in local food practices have intensified on Cape Breton Island in recent years resulting in the development of several significant initiatives. In 2012, local food-security activists came together to explore collaborative ways to create a more robust and sustainable community-based food system. These efforts resulted in the establishment of a community food network to enhance public awareness, foster relationships and promote policy changes to support local food initiatives. Members included government representatives, healthcare professionals, farmers and members of nonprofit organizations, farmers' markets, food banks and food-related industries. The initiative became the Local Food Network which was a significant development in Cape Breton's ecological food movement.

The network was originally concentrated within the CBRM, while most farmers and local food consumers were in more rural parts of the island. The continued support of this local food network exemplifies the growing interest in ecological food practices; by 2016, the initiative had expanded across most rural communities on Cape Breton Island, becoming the Island Food Network which is now an umbrella organization for food action on Cape Breton.

Subsequent developments include the creation of an island-wide distribution hub and local food website (capebretonfoodhub.com). These initiatives facilitate networks among producers and consumers—relationships that are often hampered by dispersed rural communities.

Although there is a history on the Island of younger generations escaping rural life for more industrial and urban areas, the Island now appeals to a younger generation of food activists who have purchased land and begun small farms in recent years. This movement is strengthened by the persistence of traditional knowledge among rural inhabitants and those first-generation farmers who are interested in the tried-and-tested skills.

Demand for locally produced and sustainably sourced food has also shaped the local tourism industry through food culture and alternative food movements. Cape Breton tourism promoters have incorporated local and traditional food into their marketing campaigns to enhance the island's appeal as a tourist destination. Tourism offerings in local food include increasing numbers of farmer's markets, food events such as strawberry festivals and lobster suppers, and locally themed menus in restaurants. In recent years, many restaurants and hotel businesses within the Biosphere Reserve have developed meaningful relationships with local food producers that demonstrate the many benefits of local food tourism.

A very successful organization, the Cape Breton Food Hub Co-op was launched in 2015 as a 2-year pilot and has evolved into an organization providing the infrastructure and distribution linking 50 food producers, and growing, with households and restaurateurs across the island. Many of the producers and clients are located in the Biosphere.

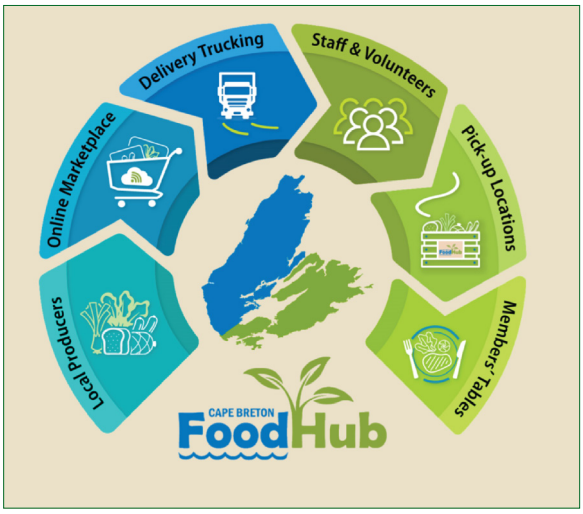


Figure 5.1 Cape Breton Food Hub Functions (website

Community gardens are also becoming more common, whether to provide a location for individuals to grow their own food or for nonprofits to grow food to supply local food banks and households in need.

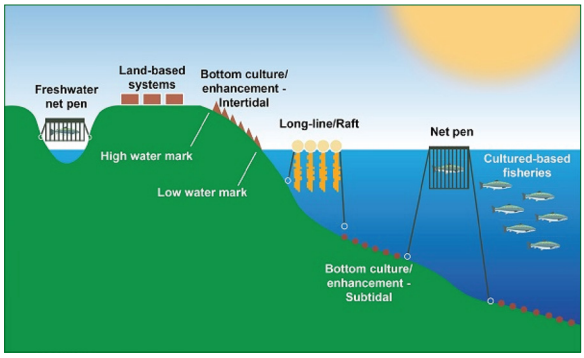
'In September 2020, Potlotek First Nation became one of the first Atlantic Indigenous communities to install a greenhouse, geothermal climate battery and sustainable in-ground heating system to address food insecurity year-round' (CBC, Dec 26, 2020). The project is being carried out with support from the Ulnooweg Digital Mi'kmaq Community Garden Project, which is 'engaged in expanding food sovereignty, reducing poverty and economic insecurity through community based agricultural and food programs. This includes job development, entrepreneurship and other opportunities engaging in all aspects of the food system.' (DigitalMi'kmaq.com). The United Way also provided some funding.

5.1.2 Fisheries and Aquaculture

There is not a significant commercial fishery within the biosphere although Eskasoni First Nation does have a fishing fleet outside the biosphere and Potlotek started a moderate livelihood fishery in 2020, outside the biosphere. Both First Nations community manages their own commercial fishery and ceremonial/food fishery. DFO Maritimes Region was a member of the CEPI Aquaculture and Recreational Fisheries Task Team in 2018 (CEPI

2020, Timeline of Significant Events) that aimed to identify additional opportunities for aquaculture and recreational fisheries in the Lake.

There is support for the development of aquaculture in the Province. Fish and aquaculture have been a major contributor to the economy in the Bras d'Or, but there have been some environmental costs. Concerns regarding overfishing, the need for a management model to control our predation, and education on how to develop the industry so it works positively for the ecosystem should be a priority. (CEPI, 2017)





Figs. 5.2a, b Types of Aquaculture (Fisheries and Oceans Canada)

Decimation of the commercial Oyster fishery in Bras d'Or Lake was covered extensively in the BLBRA 2010 submission for biosphere status. Since that time there has been no activity in oyster farming in the Bras d' Or with the exception of small scale trials in MacDonald's Pond at the head of Whycocomagh Bay. The prime reason was that the farmers had lost so many and were frightened of losing stocks again if they restock their leases. DFO offered no help to oyster farmers to try to exist in the presence of a pervasive parasite, MSX. We'kogma'q First Nation, with Joe Googoo under the direction of the late Philip Drinnan, conducted trials in a small barrachois growing oysters in floating trays. The results were very encouraging. Many thought the success was due to low salinity levels. CBU, and now the Verschuren Centre for Sustainability in Energy and the Environment under the direction of Rod Beresford decided to design a project involving several oyster lease holders to demonstrate oysters raised off the bottom.

Scientists at the Verschuren Centre and 11 industry partners have undertaken a three-year research project across the Bras d'Or Lake to try and determine what conditions will support oyster growth, reduce oyster mortality and mitigate the negative effects of the parasite. This project started in June 2019 and is showing promising results. Though it is early in the project, scientists and industry research partners are hoping for continued success over the next two years. If proven successful, there will be

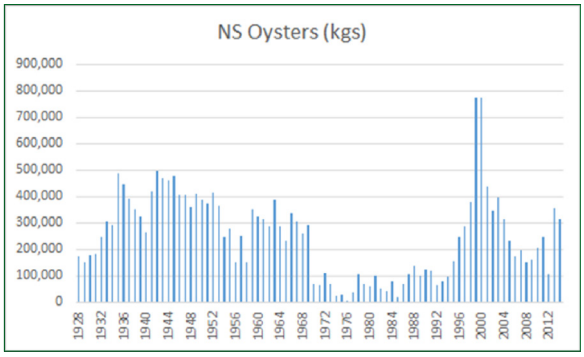


Fig. 5.3 Comparison of oyster growth and survival pre-and post- establishment of the oyster parasite, MSX, in the Bras d'Or Lakes, Canada 2019-2022

new opportunities for rural Cape Breton to rebuild the Bras d'Or Lake oyster industry beyond its previous level. Please see: https://www.dfo-mpo.gc.ca/aquaculture/rp-pr/acrdp-pcrda/projects-projets/19-g-03-eng.ht

Lake Water Temperature and We'kogma'q Trout

Temperature data collected over the past 40 years indicate a significant warming trend in the Bras d'Or. Winter temperatures have increased on average one degree Celsius in this period. This accounts for reductions of ice cover in much of the Bras d'Or Lake and estuaries. In addition to temperature increases, the climate has become more severe with more wind storms, rain events, and dry periods than just 40 years ago. Water temperatures in many of the rivers today can reach 28 degrees Celsius in the shallow ponds which salmonids have traditionally used to spawn. The lethal temperature for most salmonids is 27 degrees making these rivers unsuitable for reproduction.

Due to the increased temperatures, pests that could not survive several years ago in the Bras d'Or are now surviving and presenting challenges to the habitat. The MSX parasite is one but there are also several tunicates that are increasing each year when the winters would prevent their threat in the past. This threat will only increase.

In 2011, We'kogma'q First Nation decided to form a partnership with an Ontario trout farm, Coldwater Fisheries, who were highly successful growing trout in the Great Lakes and in Pubnico on a seasonal basis. Initially only two cages were used to train personnel and monitor survival and growth rates. The cages were 60m in circumference and were kept at low densities at less than 10kg/m3. Growth and survival was successful and over the next 4 years the farm increased in size from 15000 fish to 500,000 fish. Deciding to grow the farm on their own, We'kogma'q parted company with Coldwater in 2014.

The period from 2014 until 2020 showed incremental growth as the number and sizes of leases increased to accommodate the increased capacity of fish. They then decided to process their fish on their own. As the farm grew, equipment was purchased to improve efficiency and quality. Infrastructure and Training upgrades progressed to meet the increased production demands.

The farm also provided many jobs within the neighbouring village of Whycocomagh, including machine shops, hardware shops, restaurants, motels, trucking, etc. It was a win-win situation as both Native and non-Natives benefitted from the success of the farm.

It is and always will be the intention of the community to grow the fish in an environmentally sustainable manner at a size which would not negatively affect the wild stock of the Bras d'Or. To accomplish this they involved all the best scientific expertise from three universities, DFO, NSDFO and DOE to conduct ongoing studies to determine such things as carrying capacity models.

5.1.3 Renewable Resources

There are visible and invisible signs of renewable energy being generated and used on the island and in the Biosphere. More and more stacked wood from private woodlots, wind

turbines, solar panels, time-of-use meters, and heat pumps are visible year after year. Literature from government agencies and energy suppliers continually expound upon their energy conservation goals and their replacement of non-renewable energy with renewable sources.

Nova Scotia Power provides the electricity to the province and the Biosphere and has aggressively taken initiatives to reduce its use of fossil fuels, and using renewable sources. Incentives for solar panel installations have been offered since 2017 through the Low Carbon Economy Leadership Fund.

NS Power Energy Source	2007	2018	2020	2021 Goal
Solid Fuel	75%	52%	38%	
Natural Gas and Oil	13%	13%	6%	
Wind	1%	18%	18%	
Hydro and Tidal	7%	9%	20%	
Biomass	1%	3%	1%	
Other (Biogas, Solar, etc)	na	na	2%	
Imports	3%	5%	15%	
Renewable Total	9%	30%	40%	60%

Fig. 5.4

Nova Scotia is doing better than most Canadian provinces in making the transition from fossil to renewable sources on Energy: 25% of the province's electricity came from renewable sources in 2015, and was targeted to increase to 40 % by 2020 (NSPI 2020). Wind and Hydro are the main sources of energy to replace electricity generated by coal- and oil-fuelled power plants. There is one tidal energy source, and significant efforts have been made to harness more tidal energy, with no permanent, grid-connected production as of yet. Biomass energy has seen sporadic growth in direct industry applications. Solar energy has had the least development, mainly in small, off-grid applications. The island of Cape Breton has supplied coal for thermal energy since the 1700's. The two largest coal-fired electrical plants in the province are located on the Island, one less than 8km outside the Biosphere. The province's largest hydroelectric generating station is located in the northern highlands. All of the electricity grid in the Biosphere is fed from these three sources. In the near future, Hydroelectricity from Labrador will be routed through the Biosphere on its way to foreign markets via the Maritime Link (Energy Nova Scotia, 2020).

The largest biomass energy converter on the island is located to the west of the Biosphere on the Strait of Canso and owned by Nova Scotia Power(supplying approx. 3.5% of provincial consumption (NSPI, 2021). Minimal amounts of biomass are sourced from within the Biosphere. The plant also produces steam which is sold to Port Hawkesbury Paper for use in the paper making process. Port Hawkesbury Paper is also one of the suppliers of biomass material to Nova Scotia Power for the plant. The majority of biomass needed comes in the form of residual waste such as sawdust, bark, and fuel chips (excess chips that cannot be sold in the market) from local sawmills located on the mainland of Nova Scotia. Other smaller amounts are sourced from forest stand improvement treatments where low-grade off species of softwood and hardwood cannot be marketed for other higher valued products.

Solar Panels

Appleseed Energy, serving Cape Breton and the Biosphere, started installing solar hot water systems and some wind turbines in 2009. By 2011, solar photovoltaic cells started dropping in price and they became the core of the business. A decade later they have 8 full time

employees, 3 part time employees, and keep a few local electricians very busy. Dozens of grid-tied solar and off-grid solar systems have been installed to date. The owners love where we live and say they are grateful to be able to make a living here.

Small Scale Tidal

A comprehensive assessment of Nova Scotia's renewable energy sources in 2013 (AECOM Ltd., 2013) identified several sites in the Biosphere that are suitable for wind and tidal energy generation. The Nova Scotia Community Feed-in Tariff [COMFIT] provided an incentive for communities to sell electricity to the utility from small, renewable energy installations between 2011 and 2015. Two small wind farms have subsequently been installed in the Biosphere at Baddeck and Barrachois (Hatcher et al., 2018).

A development company was granted licences for development of two small-scale tidal projects located in the Biosphere Reserve at the entrance to the Great Bras d'Or Channel and in the Barra Strait. The option was never exercised, and the COMFIT Expired in 2015. In that same year, the Bras d'Or Lake was designated as an Area of Marine Renewable Energy Priority by provincial legislation (Government of Nova Scotia, 2015). Detailed site assessments have been undertaken in parts of the lake that are suitable for small-scale, off-grid electricity generation (McMillan et al, 2012), but no further research and development has been funded, despite many attempts to attract investment. Fossil fuel is still too inexpensive, and the demand too small to drive private sector investment, and government funding priorities are set firmly on the bigger play in the Bay of Fundy adjacent to the SW Nova Biosphere Reserve.

5.1.4 Forestry

Twenty five percent of Nova Scotia's commercial hardwood species grow in Cape Breton. Much that is harvested is burned for heat—both domestic and biomass— could create much more value for the economy. The majority of Nova Scotia forests are in the 0-80 year age class due to an extensive history of forestry activity in the Province, as well as natural disturbances, events such as disease and insect damage, forest fires and extreme weather events. Older forest stands are also present in the Province, including within the BLBR.

Forestry is critical to the economy and can be done sustainably. In 2011 and 2012, the Nova Scotia Department of Lands and Forestry (then the Department of Natural Resources) released two documents outlining a plan to move toward implementing Ecosystems-Based Management (EBM) in Nova Scotia: *The Path We Share – A Natural Resources Strategy for Nova Scotia 2011-2020* (NSDNR 2011); and, *Nova Scotia's Code of Forest Practice—A Framework for the Implementation of Sustainable Forest Management* (NSDNR, 2012).

Fulfilment of the requirements outlined in these documents is ongoing, and includes the release of guidance documents and protocols for sound ecosystems-based forest management that may be used by private woodlot owners and industrial harvesters alike. It is publicly available on the NSDLF website (see also McGrath 2017, 2018; Neily and Parsons, 2017).

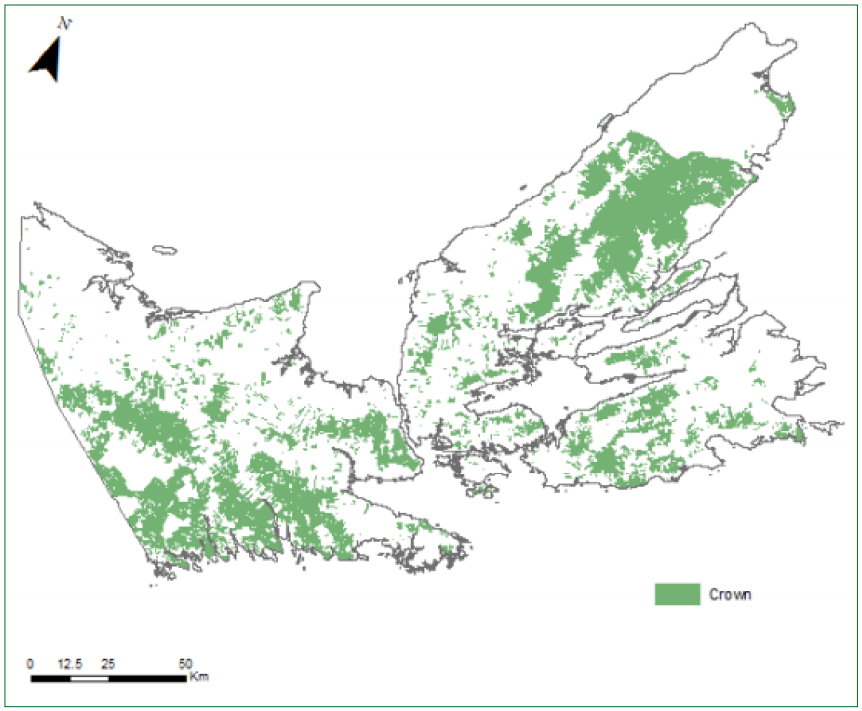


Fig. 5.5 – Land managed by PHP

Port Hawkesbury Paper (PHP) purchased the NewPage Port Hawkesbury paper mill in 2012 and is the leader in supercalendered paper manufacturing in North America, operating the largest mill in Nova Scotia. At the time, it was expected to employ 250 workers. 'The facility was shut down that September [2011], throwing 600 people out of work and affecting another 400 forestry workers in a region of the province that already had some of the country's highest unemployment rates' (680 News, 2012). PHP had managed more than 4,000 ha of land in the buffer zone but they sold that land to the NS Department of Lands and Forestry and now manage only Crown Land.

Presently, the UINR forestry program has an agreement in place with Port Hawkesbury Paper outlining provisions for forestry management services to be carried out by UINR on Unama'ki crown lands. This management includes forest planning, harvesting and silviculture. The contract gives UINR access to act as a contractor and harvest up to 30,000 tonnes of softwood and 30,000 tonnes of hardwood a year.

PHP operates as a responsible corporate citizen on the island and issues an annual monitoring report. In 2014, its Woodlands Unit became re-certified to the SFI® Forest Management and Chain-of-Custody Standards, and the PEFC™ Chain-of-Custody standard.

PHP has access to a large swath of Nova Scotia lands to feed its production requirements. The total land area minus crown wilderness area and non-forested land becomes the forested land-base. After removing permanent exclusions (off limits to forest management prescriptions, such as protected areas, old growth areas, species at risk habitat buffers, and other land-use restrictions), the remainder is the working land-base which contributes to wood supply. The working land-base is managed as per the Forest Utilization License

Agreement (PHP 2019). The total land area managed in the biosphere is 69,054 ha, all Crown Land.

There are numerous indicators that PHP employs to track progress and sustainability. Here are just a few from the 2019 report. Indicator 5.2 demonstrates that PHP has been harvesting below the sustainable harvest level for the seven years since purchasing the Mill.

Workers (includes employees, seasonal workers and contractors)					
Total	359	Women	22	Men	337

Indicator 5.2 - Communities and Sustainability - Harvest Level

OBJECTIVE	To continue to harvest at a sustainable rate.
INDICATOR	Annual harvest level.
TARGET Harvest 392,459 tonnes of softwood per year.	VARIANCE -10%
2019 Update	In 2019, the softwood volume amount harvested was 303,697 tonnes (77% of annual harvest level).

PHP FULA Crown Land

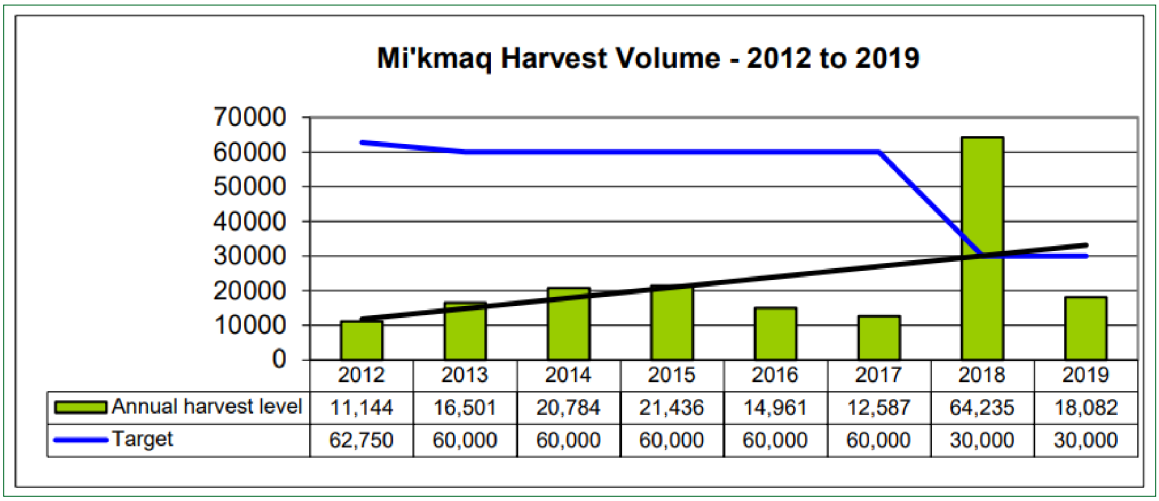
Year	Softwood Sustainable Harvest Level (tonnes)	PHP Actual Softwood Harvest (tonnes)	% AAC Harvested
2013	392,459	259,182	66%
2014	392,459	337,418	86%
2015	392,459	320,942	82%
2016	392,459	292,629	75%
2017	392,459	329,808	84%
2018	392,459	359,026	91%
2019	392,459	303,697	77%
Total	**2,747,213**	**2,202,702**	

Indicator 6.1 - Aboriginal and Treaty Rights - Respect First Nations

OBJECTIVE	To provide opportunities to better understand, recognize and respect local Mi'kmaw and Treat Rights.
INDICATOR	Number of opportunities to meet with Mi'kmaw community representatives.
TARGET Ensure a minimum of six opportunities to meet with Mi'kmaw individuals annually.	VARIANCE - 1 Meeting
2019 Update	In 2019, the company met at least 9 times with Mi'kmaq organizations, communities, or individuals related to forest management agreements and other initiatives.

Figs. 5.6a, b, c, d Source: Port Hawkesbury Paper

Indicator 6.2 - Aboriginal and Treaty Rights - First Nation Agreements		
OBJECTIVE	To build capacity within Mi'kmaq communities to provide increased employment opportunities for Mi'kmaw individuals.	
INDICATOR	Volume harvested under agreements with Mi'kmaq communities.	
TARGET To increase the softwood volume harvested under First Nation agreements to 30,000 tonnes.		VARIANCE - 5,000 tonnes
2019 Update	In 2019, the total volume harvested by Unama'ki Institute of Natural Resources was 11,068 tonnes. In 2019, the total volume harvested by Confederacy of Mainland Mi'kmaq was 7,014 tonnes.	



Figs. 5.6e, f Source: Port Hawkesbury Paper

There is also a recognized need for individual and community training to educate woodlot owners on the best practices for wood harvesting on their lot, with minimal impact to the ecosystem. In response to this observed need, the Nova Scotia Department of Lands and Forestry published a document entitled Management of Natural Acadian Forest: A Guide to Resources in 2012, and offers a Woodlot Management Home Study Program on their web-site (https://woodlot.novascotia.ca/content/woodlot-management-home-study-program).

CEPI could lead the development of a viable, manageable and economically successful forestry sector in Cape Breton with a vision toward being more than a harvesting region for industrial forestry operations. This would involve working with the Nova Scotia Woodlot Owners & Operators Association (https://www.nswooa.ca/).

5.1.5 Mining

As stated in 2.2.5 there is basically no commercial coal or gypsum mining being carried on in the Biosphere. As noted in our Original Submission, 'The local Gypsum mining companies (Georgia Pacific Ltd., Melford Mines Ltd.) have undertaken many studies of the effects of mining activities on riparian and littoral habitats and their species, and have used these to mitigate and remediate'. We have no update on current efforts.

5.1.6 Tourism

The information below discusses some of the prevailing trends and factors regarding tourism in general in Cape Breton and the Biosphere. Section 5.2 discusses more specific tourism initiatives and projects within the Biosphere.

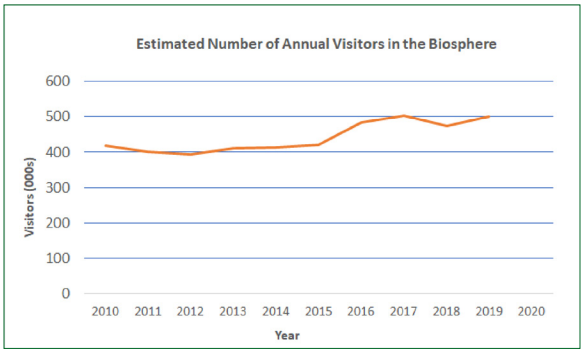


Fig. 5.7a Annual Biosphere Visitors - Exit Survey Data (Nova Scotia Tourism)

Cape Breton Island has twice been ranked as the #1 island destination in North America by *Condé Nast Traveler* readers—the latest was 2019. Cape Breton Island was also ranked the #1 Island in Canada at the prestigious 2020 Travel + Leisure World's Best Awards. These awards honour the top travel destinations and companies around the globe (CBIsland.com, 2019). The Biosphere benefits directly from promotion and tourism of Cape Breton Island in general as two of the four major highways on the island and the world famous Cabot Trail pass through the Bras d'Or Lake watershed and many of its major attractions.

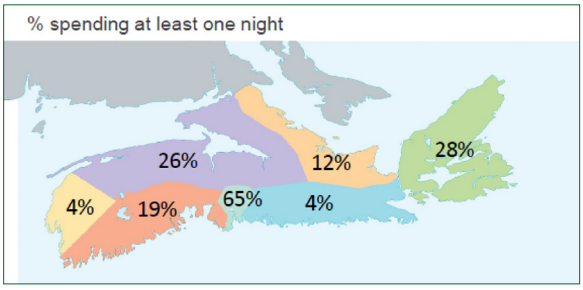


Fig. 5.7b Trips with overnight stays. (Source: Tourism HR Canada, 2018)

The Biosphere has enjoyed an 18 % increase in visitors over the last 10 years.

Room-nights is a key metric used by the tourism industry. In Cape Breton 'The demand for tourism during the peak season has been steadily increasing, with 90,000 room nights sold in August 2017, a 22 % increase over August 2011' (Tourism HR Canada, (2018). More nights means more need for local accommodations, nourishment and opportunities to enjoy and learn about the surrounding environment, ecology, attractions and activities.

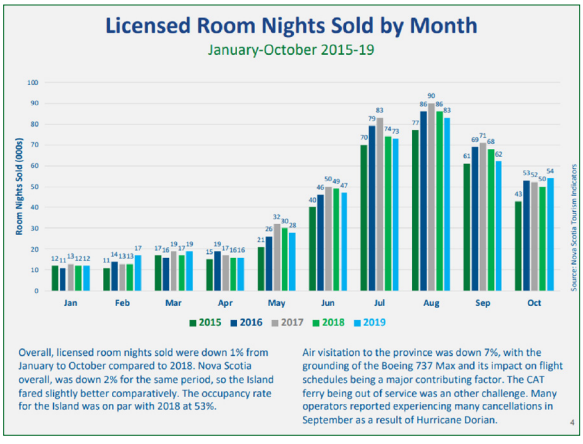


Fig. 5.7c Room nights by month (Source: DCBA 2020)

As a destination, quite a few travellers to Cape Breton chose to stay over at least one night rather than return to the mainland. This means a daily expenditure of $120 - $1,200 per person per day.

Seasonality and Labour Challenges in Rural Cape Breton

> Seasonal business cycles present many challenges, not least of which is finding the labour required to meet rapidly increasing customer demand. Research has shown that the demand for tourism services has grown faster than the ability of the Canadian labour force to supply the workers needed. This gap between labour demand and labour supply has created labour shortages. Data for the province of Nova Scotia shows that the tourism labour market entered a shortage in 2012. Between 2012 and 2019, there were an estimated 2,096 unfilled tourism jobs in Nova Scotia as a whole. If current labour market conditions remain unchanged, 5,132 tourism jobs could go unfilled by the year 2035. (Tourism HR Canada, 2018)

Baddeck, home to the Biosphere exhibit, captures 48 % of the tourism travellers to the island. St. Peter's and Whycocomagh capture 9 % each according to the Community Report 2017 Visitor Exit Survey (Source: Tourism NS, 2017).

From the 2017 Nova Scotia Visitor Exit Survey, page 56, the Biosphere enjoyed 8% of named visitation destinations.

2015 Nova Scotia Visitor Exit Survey (page 51) showed that the Biosphere was tied for third place as a named UNESCO destination in the province.

The new federal tourism strategy focusing on Indigenous cultural experiences to influ-

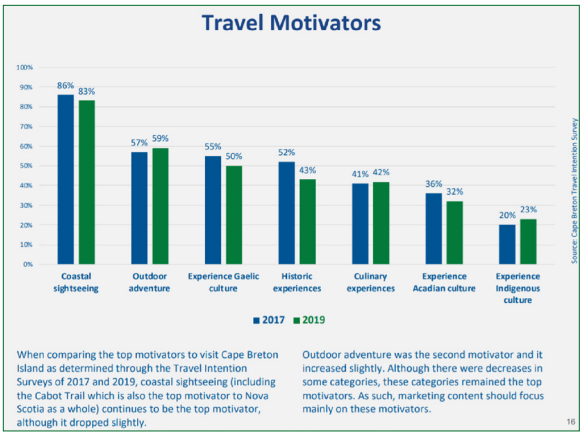


Fig. 5.7d Travel motivators to visit Cape Breton Island

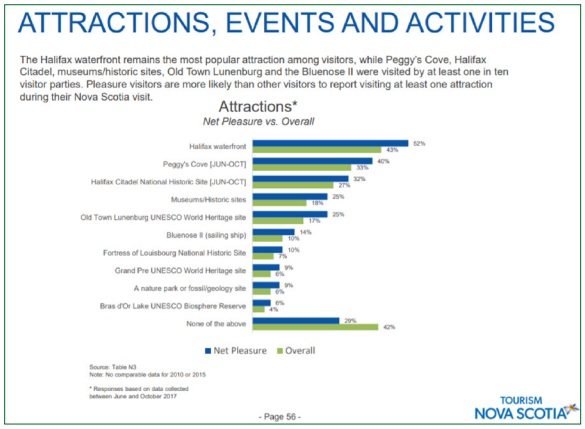


Figure 5.7e Ranking of attractions by number of visitors

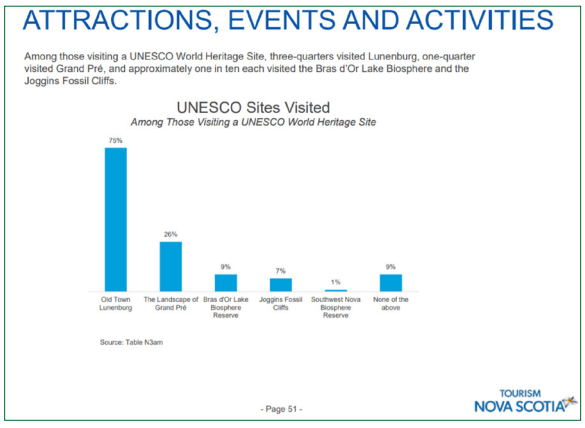


Figure 5.6f Ranking of the NS UNESCO sites by visitation

ence the growth of tourism will be a market that will show future growth in tourism for this area. The province has a goal to double tourism by 2024 as per Goal 14 of the *Ivany Report* (Ivany, 2014).

See more detail in Section 5.2 Tourism.

5.1.7 Manufacturing and Construction

There have been no major changes in manufacturing and construction over the past decade. There are numerous small contractors in the area. Many of those efforts are around residential construction, often for new immigrants from Europe and the United States, as well as fellow Canadians and Nova Scotian or Cape Breton expats seeking the benefits of a less urban environment.

5.1.8 Service and Other Industries

Increased demand for healthcare needs and services are providing employment through spas, massage therapy, physiotherapy and the like appear to be on the increase, perhaps due to the increased numbers of retired persons and their more disposable income.

There are also many artisans in the area. The scope of that industry can be appreciated by referring to the Cape Breton Centre for Craft and Design Website and Artisan map. A few of the artisans in the Biosphere are members of the Centre for Craft and Design; however, a great many home-based artisans choose to remain independent of that organization, or are not yet at a level that meets the standards for membership.

5.2 Describe the tourism industry in the biosphere reserve. Has tourism increased or decreased since nomination or the last periodic review? What new projects or initiatives have been undertaken? What types of tourism activities? What effect have these activities had on the economy, ecology and society of the biosphere reserve? Are there any studies that examine whether designation of the area as a biosphere reserve has influenced the number of tourists? Please provide the bibliographic information of any studies and/or a paper copy in an annex.

5.2.1 BLBRA Tourism Efforts

Since our designation, the BLBRA has worked to educate the tourism industry, regional entities, operators and the public about the Biosphere and how it fits into their promotion of the island. The first five years of the Biosphere marketing was limited to a website and an informational brochure utilizing the BLBR logo whenever possible to endorse community events. In 2015, 11 community information panels were posted in post offices, grocery stores or other prominent locations encouraging membership in the BLBR. By 2016, we completely redesigned our biosphere brochure. We added T-shirts, labelled seed packets, and provided BLBRA logo tattoos for children, all of which saw good use at Ocean's Day in Iona and PowWow Days in Eskasoni. The Trail Committee posted large maps of the biosphere and citizens were asked at these sites to mark existing trails around the lake.

We have also created an email list which is kept separate from our membership list. Tourist operators are contacted regularly through our newsletters or other announcements to keep them in the loop as to happenings within the Biosphere.

A Communication Committee of five Board members was formed in March of 2017. At that time one of the committee members was writing a monthly column for four local newspapers as well as weekly posts to the MaB website under the 'Proud to Share' heading. That year saw the development of a near-monthly newsletter, as well as discussions with Tourism NS representatives to give all 5 UNESCO sites in the province better coverage in their *Doers and Dreamers Travel Guide*, as well as their website. In addition, a general information digital page about the Biosphere along with a tourist friendly map and Bras d'Or Watch information was composed and sent to the four municipal units for posting on their respective web pages.

Tourism Nova Scotia, along with Destination Cape Breton Association (DCBA), began using Explorer Quotient (EQ), developed specifically for Destination Canada by Environics Research Group, as their lead market segmentation tool in 2015. Two of the nine types—Authentic Experiencers and Cultural Explorers—make up the majority of tourists who visit Cape Breton. They are interested in culture, heritage and local engagement and are ethical and eco-conscious. According to Destination Canada they are 'most likely to be seen at nature reserves, world heritage sites, hiking trails, museums, home-stays, campsites, cultural events, festivals, B&Bs and hostels.' Destination Cape Breton Association describes the island's core assets as: Coastal/Seacoast Experiences; Sightseeing and Touring; Culture, Entertainment and Heritage; Outdoor Activities; Major and International Events; and Experiential Accommodations.

The Biosphere is a perfect fit for these travellers. We embrace these Authentic Experiencers and Cultural Explorers as key to the Biosphere's tourism success.

After considerable advocacy by a board member, 2018 saw Tourism NS post in-depth information on the 5 UNESCO sites located in the province onto the 'Top 25 Attractions in NS' website. We canvassed local tourism operators around the watershed to encourage input into that site regarding accommodations, restaurants, events, etc.

Destination Cape Breton Association (DCBA) historically has focused on encouraging and educating island entrepreneurs on the creation of quality local attractions and packages and promoting Cape Breton's many attractions and cultural experiences to regional, national and international tourists. In 2020, due to COVID-19, DCBA adapted their marketing efforts to encourage the regional 'Atlantic Provincial Bubble' populations of PEI, NB and NS to enjoy 'staycations' among the three provinces. We do not always know our neighbourhood as well as our visitors. These efforts will pay dividends down the road as locals learn how rich their local area is in attractions, culture and history.

In November 2020, the Destination Cape Breton Association tourism site elevated the prominence of the UNESCO Biosphere by incorporating us in a feature box in three of its seven geographic themes of interest that overlap the geography of the biosphere and the island.

Destination Cape Breton recognition of the BLBRA: https://www.cbisland.com/tourist-attractions/bras-dor-lake-biosphere/

Tourism Nova Scotia recognition of UNESCO sites in the province:

UNESCO Sites

Tourism through the Biosphere and to Baddeck, where our main Biosphere Exhibit is in the Alexander Graham Bell National Historic site, has grown steadily. Even visitors to the national historic site, Fortress of Louisbourg, and the Cabot Trail likely travel through the Biosphere if visiting any other part of the island.

5.2.2 Significant Promotion Projects

1. Website Development

The first BLBRA website was launched in 2007. In 2017, it was realized that the biosphere was in need of a more professional looking website to give us more visibility in heavy internet traffic. Funding was sought from the Atlantic Canada Opportunities Agency (ACOA) which allowed us to launch our current website in August of 2018. Efforts are now afoot to update our home page, especially as it relates to making membership and donations headings more prominent. Also, we have come to the realization that our opening line says, "People and Nature; better together," but we need to populate the home page showing folks enjoying the benefits of nature.

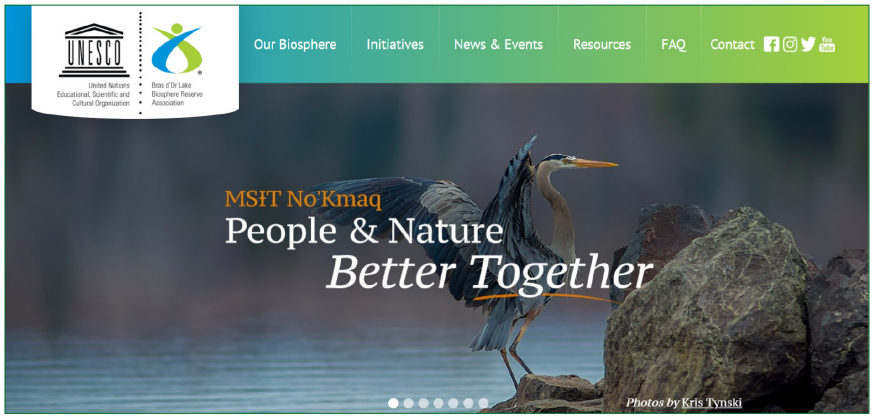


Fig. 5.8 BLBRA.CA screenshot.

2. Biosphere Exhibit Room

In the 2014 Alexander Graham Bell National Historic Site (AGBNHS) museum plan prepared by Parks Canada, (Parks Canada 2020) the BLBRA is specifically mentioned in the partner and stakeholder engagement piece. The plan goes on to mention the BLBRA on page 20, item 4:

> Explore the role of Alexander Graham Bell National Historic Site in celebrating the designation of the Bras D'Or Lake and its watershed as a UNESCO Man and Biosphere Reserve given Alexander Graham Bell's interests in Bras D'Or Lake and protecting the environment.

The AGBNHS signed an MOU, updated in 2020 (Parks Canada, 2020), with the BLBRA to establish a permanent BLBR exhibit in the main building, installed in 2015.

Take an interactive tour here of the display courtesy of Nelson Boisvert and his Geo360 virtual software.

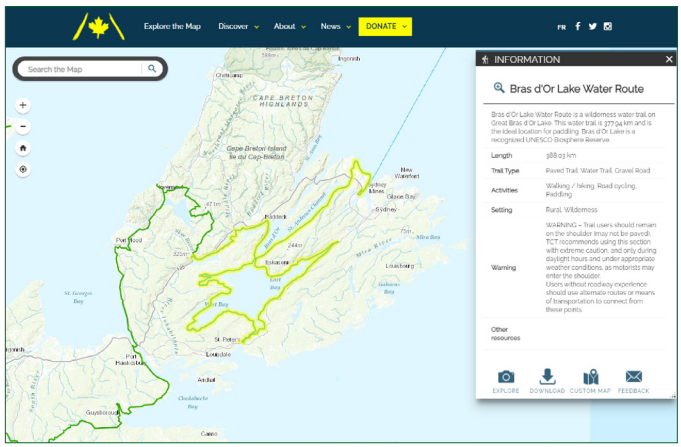




Figs. 5.9a, b Photos from Novacotia.com and contributed.

3. Signage Project

The BLBRA developed a $700K signage plan with funding from ACOA. Part of the plan called for local kiosks and these were developed at no cost to the BLBRA during a co-operative effort with the Great Trail group to install Biosphere signage at about 20 water route launch points around the Bras d'Or Lake as part of their initiative to complete the traversing of Canada by creating the Bras d'Or Lake Water Route. The BLBRA effort was managed by our Trails Committee.





Figs. 5.10a, b (Source:Great Trail screen-shot, BLBRA Photo)

The BLBRA Board then created a committee to implement the remainder of the signage plan. This plan was also funded by ACOA (69 %), the four municipalities (27 %) and the BLBRA (3 %). Twelve highway signs were installed in 2019 to complete the project. The signage includes welcoming words in English, French, Gaelic and Mi'kmaw. Our signage project puts the Biosphere in the face of motorists travelling around the island on two of the three major routes that cross through the Biosphere and at both water entry points including North America's only operational tidal lock at St. Peter's Canal NHS.



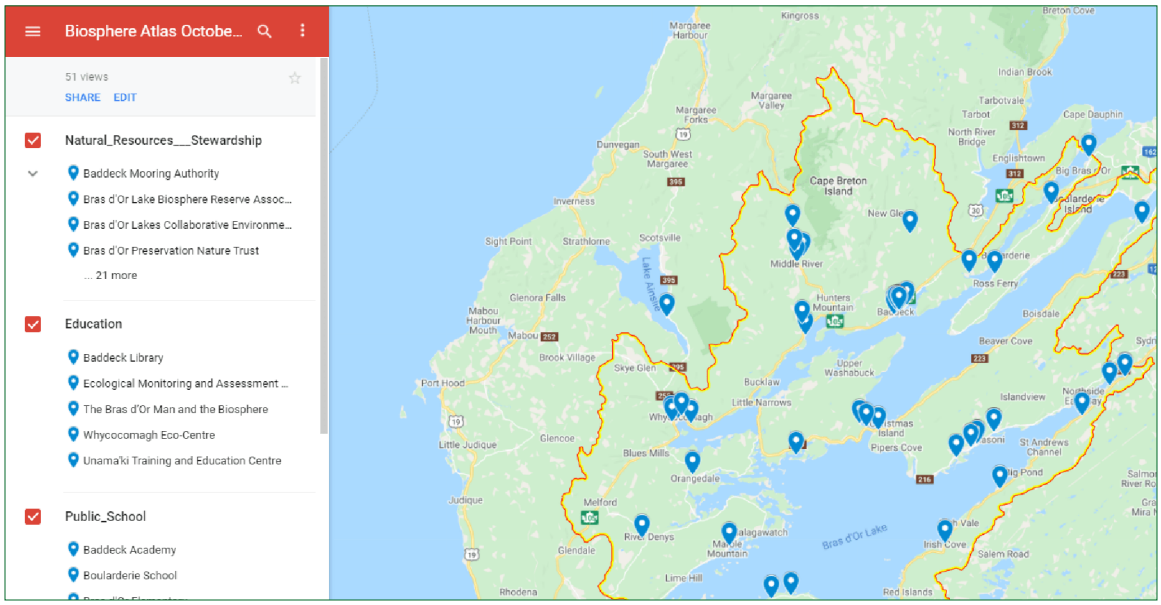


Figs. 5.11a, b Examples of Highway Signage

4. Web-Distributed Atlas for Asset Identification Project

In 2015, as a result of the 2013-2015 Strategic Plan Priority #3, to track and present progress toward the biosphere's three core functions, the BLBRA developed a comprehensive database on the Google Earth platform identifying natural resources, education, development and economy, culture, social and recreation, and science and research assets. In December 2020 we migrated to the Google Map platform to present the information to the public in a more familiar interface. Both versions of the Biosphere Atlas are available on the BLBRA website. The map's Excel database is maintained by the Secretary in conjunction with board and public input.

Fig. 5.12 The Bras d'Or Lake Biosphere Atlas (blbra.ca)



5. Walking Trail around the Bras d'Or Lake

Our vision is to make possible a walking trail around the Bras d'Or Lake Biosphere utilizing and building upon existing trails, connecting our communities and offering opportunities to explore our beautiful island. This proposed trail is not just a pathway; it is a vehicle through which communities surrounding the Lake will join together in thoughtful promotion of their environmental and community assets as they pursue ways to achieve responsible economic and socio-cultural development. Connecting existing and proposed walking trails within this vision will lead to rich recreational, educational, social and economic outcomes for the benefit of residents and visitors alike.

Outcomes align with five of six themes that the BLBRA has distilled and identified as possible key project characteristics to be discussed in the planned 2021 Strategic Plan exercise. Renewable Energy is the other. See Section 7.7.5 for more details.

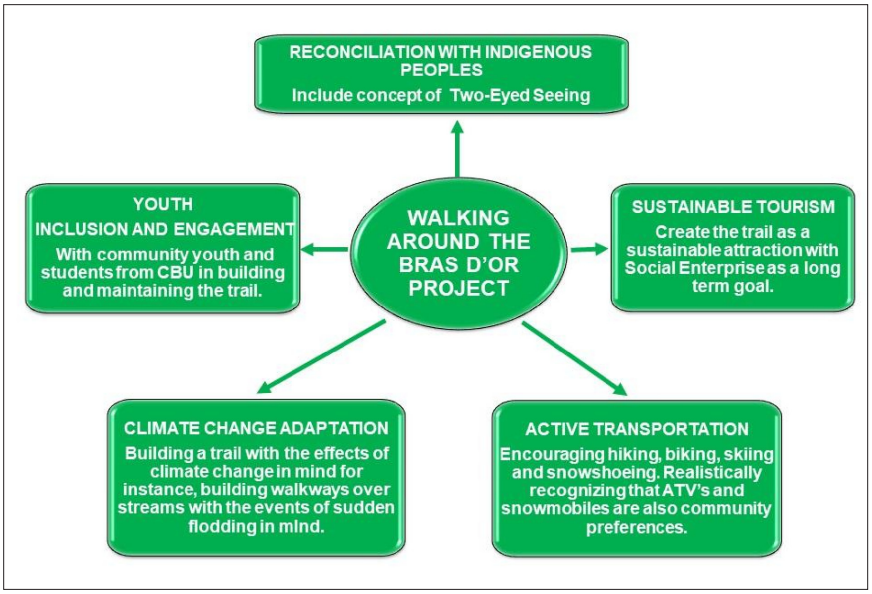


Fig. 5.13 Source: BLBRA

While recognizing that building a long distance walking trail around the Bras d'Or Lake is an ambitious endeavour, the BLBRA trail committee has undertaken several steps toward this long-term vision. Existing trails in the BLBR have been promoted on our website and our newsletter. In 2013, the committee held a series of community workshops to promote trail-building and to gather information from local citizens on potential new trail sites and linkages to existing trails. Outreach with like-minded groups within the Biosphere continues to this day. More recently, the committee has written a document intended to serve as a "toolkit" for individuals and community groups looking for guidance in planning and building new trails. In these ways, the BLBRA serves as a resource for information sharing and promotion intended to serve trail builders and trail users alike.

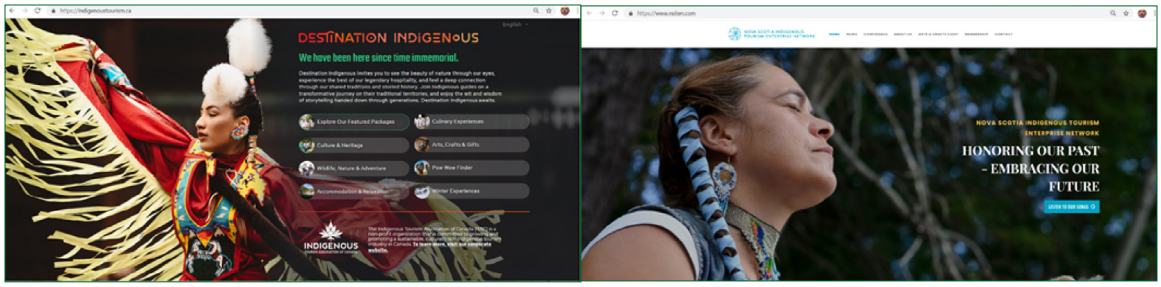


Fig. 5.14 (Source:Website Screenshots)

6. Leveraging First Nations Tourism Initiatives

Since 2014, the Indigenous Tourism Association of Canada (ITAC) has strived to support and strengthen Indigenous tourism experiences throughout Canada. Significantly, they created a Strategic Recovery Plan, investing $50 million over four years to support the ITAC's immediate response to COVID-19 and its recovery and ongoing resilience. In 2020 the ITAC created a new website to promote and plan vacations around the unique Cultural and Heritage experiences within their communities across Canada.

There is also a new and active Nova Scotia Indigenous Tourism Enterprise Network. One example of an established First Nations Tourism Initiative in the biosphere is Goat Island in Eskasoni. You will find all you need on the Eskasoni Cultural Journeys website.

We look forward to further incorporating these expanding Indigenous tourism initiatives into the Biosphere promotion as a cultural destination.

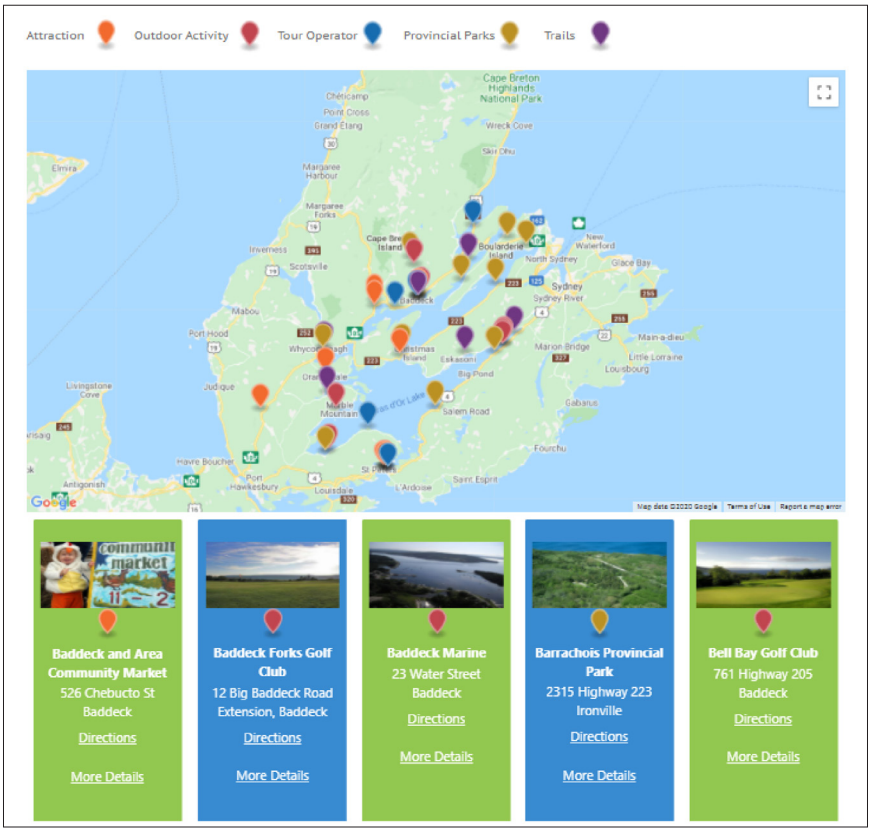


Fig. 5.15 Bras d'Or Lake Biosphere Visitors Map BLBRA.ca screenshot

7. Tourist Activities within the Biosphere

There are many cultural, heritage and outdoor activities to keep tourists from around the world occupied. Through the partnership of Tourism Nova Scotia with Destination Cape Breton and ourselves, BLBRA

was able to draw a maintained, well populated and direct feed to display an interactive Visitors Map of the Bras d'Or Lake Biosphere on our website to narrow down the visitors' searches to the Biosphere specifically. The offerings are segmented into Attractions, Outdoor Activities, Tour Operators, Provincial Parks and Trails and are maintained by our Communications Committee

8. Festivals and Event Development

The Biosphere is a well-appreciated backdrop for many island-wide events, most notably Celtic Colours, which started in 1997. The nine day event takes place at the height of the island's spectacular fall colours (early-to-mid October). Participants experience one breathtaking view after another while circumnavigating the Lake, from one community to the next, to performances celebrating Celtic music and heritage. This event grew from 46 performances and 18,323 tickets sold in 2011 to 52 performances and 24,007 tickets sold in 2019. More than 55 % of the visitors are from outside Nova Scotia. Twelve of the concerts take place in the Biosphere and represent 16 % of the total festival audience. The non-profit festival organization created a video in 2020 to recognize the Bras d'Or Lake's communities and culture.



(Photo courtesy @brasdorwatch)

Since 2011 these notable annual science, cultural and heritage events have been added to the numerous events in the Biosphere:

Bras d'Or Watch

The Bras d'Or Watch Field Day is a BLBRA annual that started in 2015. It brings together scientists, naturalists, families and community leaders to celebrate our place in the Bras d'Or Lake Biosphere Reserve with lots of opportunities to learn and to meet new friends. Sampling was conducted by scientists only in a scaled back manner in 2020 due to COVID-19 protocols.



BLBRA photo

Forest Watch

This BLBRA annual forest monitoring project, Forest Watch, was started in 2017 when the Forest Watch committee piloted some educational activities in a local school. The Forest Watch was suspended after the 2019 edition, but will be addressed in 2021 as the pandemic subsides.

KitchenFest in the Biosphere Reserve

KitchenFest was started in 2013 by other cultural groups and offers a 10-day June "celebration of all things local – music, culture, food, drink, and the people of Cape Breton Island!" It is held in multiple locations in and around Biosphere in an effort to expand into the tourism shoulder seasons.



(Photo courtesy @KitchenFestCapeBreton)

Race the Cape, in the Biosphere Reserve



Photo courtesy Cape Breton Post.

Race the Cape was an annual weeklong point-to-point sailing race started in 2012 by sailing enthusiasts and tourism operators and took participants through the Bras d'Or Lake, and along the island's Atlantic coast. Most boats came from Cape Breton, Nova Scotia or New Brunswick, but also the United States (Cape Breton Post, 2017). 50 boats participated in 2016. It was cancelled in 2017 due to lack of government funding.

World Oceans Day, Iona, Victoria County



Photo courtesy Aros na Mara.

The Aros na Mara Marine Science Centre started hosting the World Oceans Day Celebration at the Barra Strait in 2014. It was cancelled in 2020 due to COVID-19 but is expected to return in 2021.



Photo courtesy
Canada's Musical Coast.

Whycocomagh Summer Festival

This community summer festival features water activities, boat tours and ceilidhs featuring traditional Scottish and Mi'kmaw talent, all in a community on the shores of the Bras d'Or Lakes.

Seaside LobsterFest, St. Peter's



Photo courtesy Marilyn Proctor.

This multiple day non-profit community event started in 2015. In 2021 it will again be a celebration of the long-standing tradition of lobster fishing on the Cape Breton South Coast. Music, food, community and family fun awaits you in our little slice of heaven "Where the ocean meets the inland sea." Visitors can get out on a lobster boat leaving from the St. Peter's Canal National Historic site.

Pirate Days, St. Peter's



Photo courtesy
@stpeterspiratedays.

St. Peter's Pirate Days started in 2014 as a small private party and grew into a local non-profits event with three venues with music and dancing and over 700 pirates celebrating the pirate history of Cape Breton over 4 days. Pirates from near and far visit and bring their friends by land and sea.

9. Cultural and Heritage Site Developments

St. Peter's Canal National Historic Site

In 2018 a joint effort between the Village of St. Peter's and Potlotek First Nation, created the Canal Landing with financial support from ACOA. Canal Landing was nominated in 2020 for the Parks Canada CEO Award for Excellence and Innovation.



Photo courtesy St. Peter's Economic Development.

Chapel Island National Historic Site of Canada

The Mi'kmaw of Potlotek First Nation have been welcoming out-of-towners, family, and friends to St. Ann's Mission since before 1742.. Potlotek First Nation is also planning a new RV Park on the shores of the Bras d'Or to accommodate the ever-growing mission and other economic development initiatives around tourism.



Photo courtesy Potlotek First Nation.



Photo courtesy cbisland.ca.

Baile nan Gàidheal | Highland Village Museum & Celtic Heritage Site

The site was established in 1962. In 2020 the Highland Village Museum introduced a Development Plan with a vision to be the leading Gaelic cultural and folklife centre recognized provincially, nationally and internationally.



Photo courtesy AGBNHS.

Alexander Graham Bell National Historic Site

In 2015, Parks Canada installed our Biosphere Exhibit in the main building. They have added a hydrofoil virtual reality experience, refinished a rooftop patio making it more accessible and safer for visitor use and developed a new space for concerts, plays, movies and community use. They added charging stations, installed energy efficient lighting outdoors and indoors. They are now working on a greening plan.

Nicolas Denys Museum, St. Peter's

The museum commemorates Nicolas Denys (1598?-1688), a French-born explorer, colonizer, soldier and leader in New France who founded a settlement here in 1650. In 2019, major outside renovations were completed on the Nicolas Denys Museum. The renovations included raising the building to install a frost wall, and re-shingling the roof with western cedar shingles, replacing the 50-year-old shingles.



Photo courtesy St. Peter's Economic Development.

10. Private Investor Projects

Dundee Resort and Golf Club



Photo courtesy Dundee Resort.

In 2017, the Dundee Resort and Golf Club, renovated in 1992, was sold. The new owner said "I looked at the tourism numbers and it just attracted me, it's a unique place and I thought it would be interesting to come here and do business," The purchase was followed by an estimated $250k of upgrades and promoted as a wedding destination, among other things, on the western shore of the Bras d'Or Lake.

The Lakes at Ben Eoin Golf Club & Resort



Photo courtesy Cape Breton Post *2019.*

In 2018 the Ben Eoin Development Group purchased the 13-year-old Birches at Ben Eoin, on the eastern shore of the Lake, rebranding and investing some $3M to triple its capacity to 36 rooms and incorporated the adjacent golf club grounds (The Lakes) and expanded the restaurant, lounge and conference services. Additionally the group purchased a brown field ready for a 16 lot subdivision and a close by marina as an "innovative consolidation of assets to bring jobs and prosperity to the area."

The Inverary Resort, Baddeck



Photo courtesy Inverary Resort.

In 2018 the Inverary Resort in Baddeck, on the northern shore of Bras d'Or Lake, lost its main lodge to fire. The property's legacy dates back to the late 1800s. Substantial lodging capacity remained on the property after the fire but it was decided to not only rebuild but to expand and continue the experience of new and old on the 4.5 ha site. Replacement value was estimated at $4M.

Bras d'Or Lakes Inn



Photo courtesy SPEDO.

In 2018 the Bras d'Or Lakes Inn, next to the St. Peter's Canal National Historic Site also changed owners, who upgraded the building interior (including the addition of a gastropub) and exterior as well as landscaping with the confidence of sustainability.

5.2.3 Economic and Ecological Impacts

The discussion in 5.1.6 above describes how intertwined the tourism industry in the Biosphere is with the tourism industry in Cape Breton Island and related statistics.

The average group is 2.2 visitors per party and expenditures vary for first-time and return visitors. Dollars spent also varies whether the trip was by air or road.

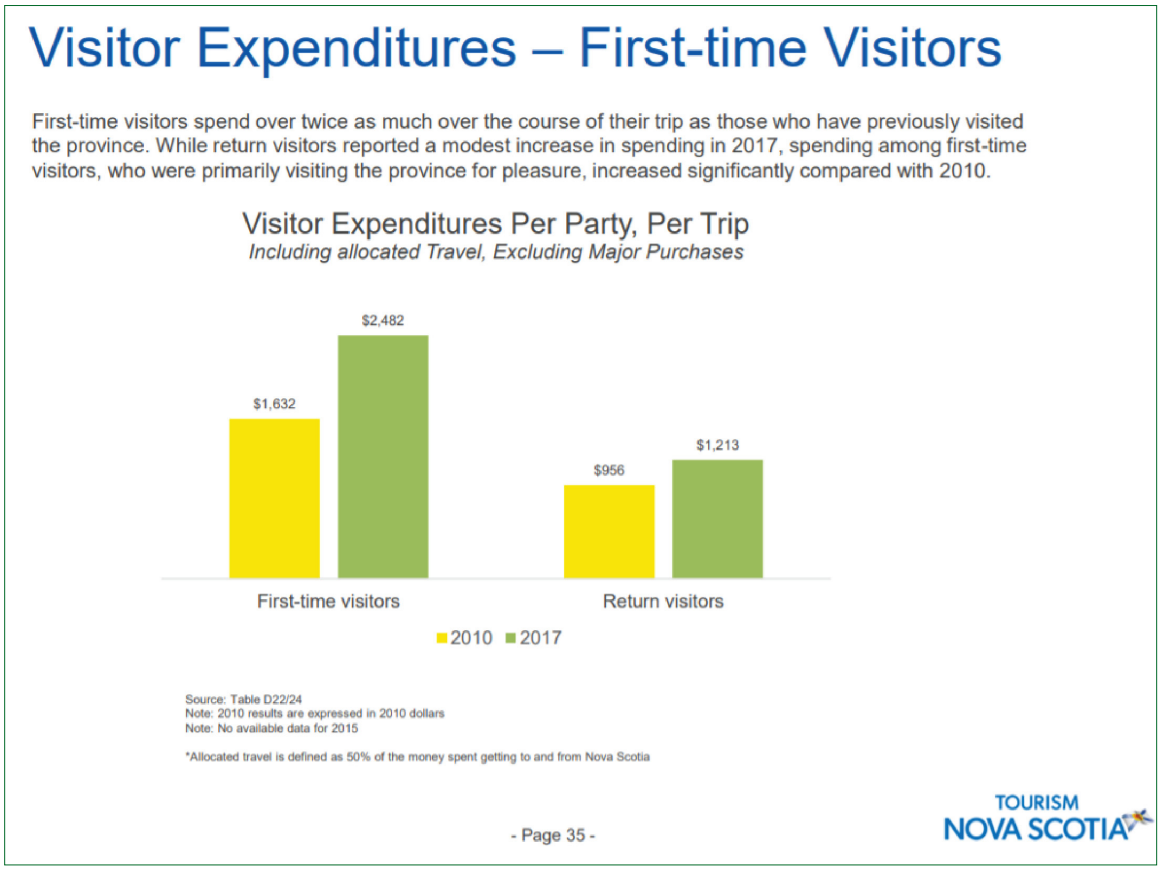


Figure 5.16a Visitor Expenditures (Source: Tourism Nova Scotia)

In 2010,

> just over one-third of visitors reported some impact of environmental sustainability on how they travel. Close to two in ten visitors ensure all their travel minimizes impact on the environment and a similar proportion has researched sustainable tourism in order to make environmentally sustainable choices when they travel. (Nova Scotia Visitor Exit Study. (2010: 60)

More investigation will be carried out by the BLBRA to see if the question has been used since—it is not found in the 2015 or 2017 reports—and whether positive responses are increasing.

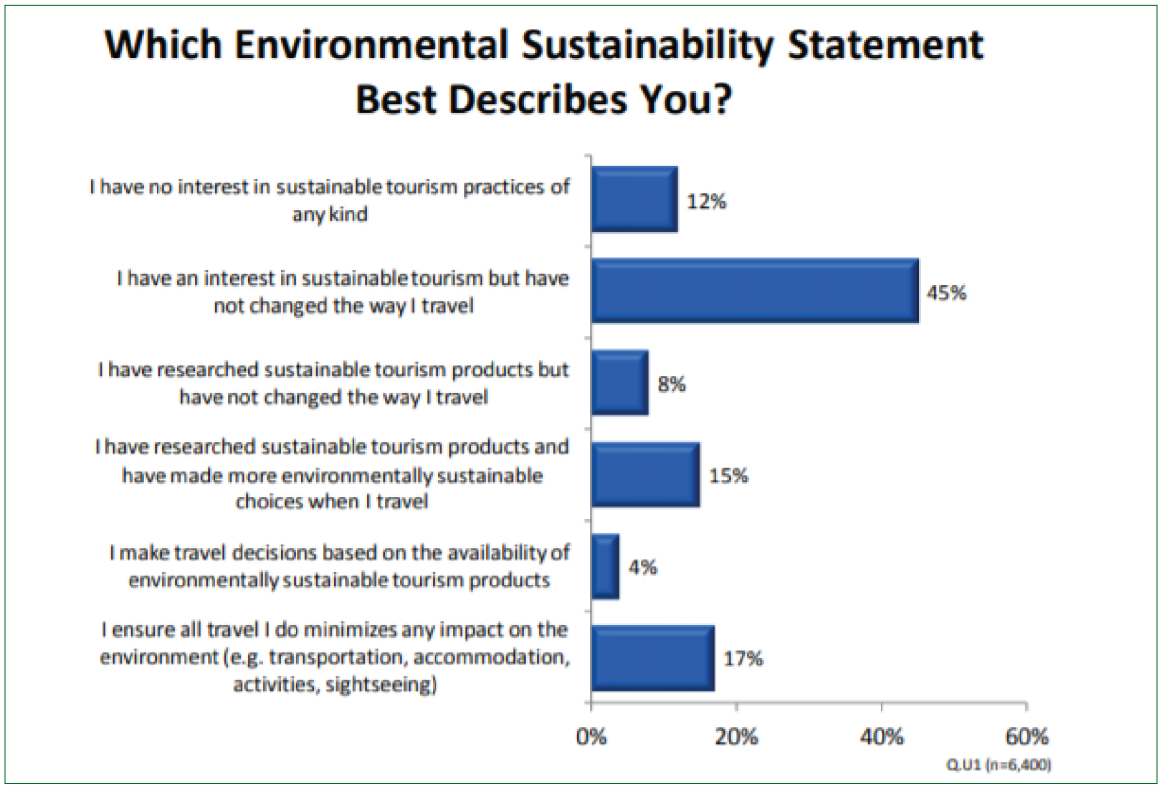


Figure 5.16b NS visitors sustainable tourism concerns (Source: Tourism Nova Scotia Exit Survey (2010))

5.3 When applicable, describe other key sectors and uses such as agriculture, fishing, forestry. Have they increased or decreased since the nomination or the last periodic review? What kind of new projects or initiatives have been undertaken? What effect have they had on the economy and ecology of the biosphere reserve, and on its biodiversity? Are there any studies that examine whether designation as a biosphere reserve has influenced the frequency of its activities? If so, provide the bibliographic information of these studies and/or a paper copy in an annex.

Key sectors discussed at the CEPI 2016 conference have been described and trends commented upon in Section 5.1 above. We have only recently adopted the North American Industry Classification System (NAICS) which is available from Scott's Directories in Canada. We were fortunate to have CBU take on a special Capstone project using that geocoded Scott's data against the Biosphere boundary file. The results for 2020 are shown below and will be tracked going forward.

Business Sector Baseline for 2020

CBU extracted available business data using Scott's Directory, a leading business database provider in Canada. This allowed us to extract business profiles that were only within the Biosphere.

Table 5.1 below shows that in 2020 there were a total of 208 businesses among 20 of the 25 sectors. Please see 5.10 for data collection and analysis strategy. Entries marked with * have been discussed in detail in Section 5.1.

Table 5.1 Scott's Data North American Industry Classification System

Sector	NAICS Description	2020
11	*Agriculture, Forestry, Fishing and Hunting	3
21	*Mining, Quarrying, and Oil and Gas Extraction	0
22	Utilities	0
23	*Construction	11
31	Manufacturing (Generally Food and Clothing Goods)	3
32	Manufacturing (Generally Non-metallic Resources)	1
33	Manufacturing (Generally Metal Resources)	3
41	Wholesale Trade	10
44	Retail Trade	13
45	Retail Trade (Sporting, Hobby, Music, General, Online)	10
48	Transportation and Warehousing (Air, Rail, Water, Road, and Pipeline)	2
49	Transportation and Warehousing (Point to Point by Manpower)	0
51	Information	5
52	Finance and Insurance	1
53	Real Estate, Rental Leasing	4
54	Professional, Scientific and Technical Services	5
55	Management of Companies and Enterprises	0
56	Administrative & Support, Waste Management and Remediation Services, Tourism	6
61	Educational Services	18
62	Health Care and Social Assistance	11
71	*Arts, Entertainment and Recreation	10
72	*Accommodation and Food Services	40
81	Other Services (except Public Administration)	32
91	Other Local, Municipal & Regional Public Admin.	2
92	Public Administration	18

Currently we do not know of any direct measurements of influence on activities or the economy of the Biosphere since designation; we do, however, have plenty of anecdotal examples from tourist operators and other service providers, as well as one study that indicates the commercial and community benefits of living in a protected area (Gardner Pinfold Consultants Inc., Oct. 2017).

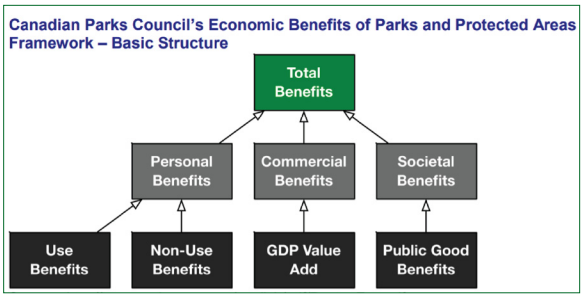


Fig. 5.17 Evaluation of Derived Economic Benefits (Source: Gardner Pinfold Consultants Inc., Oct. 2017)

The study noted:

> 'There is a broad range of commercial activities that occur in association with protected areas in Nova Scotia. Most are businesses that derive income from offering services that either make direct use of protected areas (e.g. kayak outfitters, (culling) hunting guides) or that benefit from indirect relationships with protected areas (e.g. accommodations operators, camps, educators, and other non-profits).'

These benefits can be applied to the Core, Buffer and Transition areas of the Biosphere directly. The study identifies potential benefits for protected areas in Nova Scotia and identifies opportunities, barriers and strategies to follow for the following commercial operators and community groups:

Accommodations /Campground Operators
Kayak / Boating/ Outfitters
Hunting and Fishing Guides / Outfitters
Hiking / Walking Tour Operators
Food and Beverage Operators
Other Commercial Operators
Community Groups / Museums located near a number of Protected Areas.
Municipalities / Government Departments

5.4 How do economic activities in the biosphere benefit local communities?

Communities in the Biosphere benefit from economic activities that offer full time or part time employment based on sustainable activities, as the island of Cape Breton recovers from the loss of most of its industrial based economy and related outmigration. The marketing and promotion of local and environmentally friendly businesses and entrepreneurial initiatives is attractive to residents, seasonal residents and tourists alike. Living in a place where the people can also work while attaining a balanced and sustainable relationship with the natural world certainly has a positive overall effect on creating pride of place for many. With promotion, education and facilitation, our rural communities will become more sustainable as economic activities of the same ilk increase.

Experiential tourism brings in local and external revenues and allows visitors and locals alike to immerse themselves in the culture and heritage of the area and to appreciate what is available. We know there are heritage and cultural travellers with an environmentally friendly leaning. Safeguarding our culture and heritage for economic reasons which enrich our pride of place also provides biosphere communities with opportunities to collaborate and become financially stronger.

5.5 How do you assess the effectiveness of actions or strategies applied? (Describe the methods, indicators).

The BLBRA does not currently assess the effectiveness of actions or strategies applied by development institutions. This work is done by individual collaborating institutions such as those indicated in the previous responses in section five. Current metrics are not formalized and may be just the number of attendees at an event, website visits or newsletters accessed. Effectiveness of actions taken by the BLBRA are evaluated in committee meetings, with reports to the board. As an example, when the highway signs were installed we took pictures to confirm correct installation. We actually had to have one sign corrected that had not been installed to specifications. We also heard feedback that the new signs were noticed which in turn spurred on new conversations.

5.6 Community economic development initiatives. What programmes exist to promote comprehensive strategies for economic innovation, change, and adaptation within the biosphere reserve, and to what extent are they implemented?

We are fortunate to have government, NGO's (e.g. Peter's Economic Development Organization and Baddeck & Area Business Tourism Association), CBU and Colleges (e.g. Nova Scotia community College, Colaisde na Gàidhlig / The Gaelic College) supporting economic innovation, change and adaptation on the island and within the Biosphere.

On the business development side, a significant contributor and network builder in business creation and training efforts is the Cape Breton Partnership seeking to create a thriving Cape Breton-Unama'ki.

Over one hundred and fifty organizations have committed to investing in Cape Breton's future economic growth. The current investors represent a wide cross section of industry sectors, such as tourism, transportation, retail and service, energy, arts and culture, fisheries, forestry, manufacturing, communications, and health, demonstrating Cape Breton's continued economic diversification. (CBP 2020)

The Cape Breton Regional Enterprise Network which is part of the Cape Breton Partnership was established by the Province of Nova Scotia through the Department of Municipal Affairs and Housing, and encompasses Membertou First Nation, Eskasoni First Nation, We'koqma'q [and Wagmatcook] First Nation and the rural counties Victoria, Richmond, and Inverness. The urban county of CBRM joined in 2019 (CBP, 2019). The area excluding CBRM is referred to by CBP as the Rural Strait-Western Cape Breton Region. The

network's primary goals are to support the development and attraction of new businesses, and the retention and expansion of existing businesses.



Fig. 5.18 (Source: CBP 2019)

Examples of Economic Development Support Available in the Biosphere

Atlantic Immigration Pilot (AIP) Program: An innovative employer-driven immigration program of the Atlantic provinces and the federal government to help address labour shortages in the Maritimes. As of the end of 2019, The Cape Breton Partnership had supported 197 endorsements for candidates to come to Cape Breton and work with Cape Breton employers—bringing with them 84 spouses, and 113 children. That's a total of 394 additional Cape Breton residents.

Community Innovation Hubs: Community-based innovation hubs and co-working spaces to support entrepreneurs turning their ideas into successful and growing companies. Initial pilot spaces are being established in Port Hawkesbury, Port Hood and Baddeck, with more to follow.

Dream Business Program: Led by Mash Up Labs—a Bridgewater based company specializing in supporting rural entrepreneurs—who leads aspiring entrepreneurs through a crash course in starting a business and then provides mentorship, training and support services to help them get started. Between 2018 and 2020, 80 participants in the program led to 43 new businesses.

Global Skills Strategy: The Cape Breton Partnership signed an MOU with both Immigration, Refugees and Citizenship Canada (IRCC) and Employment and Social Development Canada (ESDC) to become a referral partner on both the Global Skills Strategy and the Global Talent Stream.

Island Wide Economic and Population Growth Plan: An island wide economic and population growth strategy to replace the 2011 Cape Breton Island Prosperity Framework. For the first time in Cape Breton's history, all municipal units and First Nation are coming together to support regional economic development initiatives through the Regional Enterprise Network model.

Mobilité Francophone: Recognizing the need to sustain our French speaking communities across the Island, the Cape Breton Partnership has partnered with ANAPEC, the Moroccan government's international labour mobility division, to support employers in attracting bilingual French-speaking talent to fill skilled labour shortages across the Island.

Since July 2019, it has referred four employers with a total of 16 high-skilled positions to be filled with bilingual (French-English) speakers.

Talent Attraction: In 2019, the Cape Breton Partnership launched WelcomeToCapeBreton.ca, a one-stop shop website for anyone looking to live, work, study or invest in Cape Breton.

The Cape Breton Local Immigration Partnership (CBLIP) Council, consisting of 30 leaders from Cape Breton organizations focuses on four key priority areas: raising public awareness of the benefits of immigration and the needs of newcomers, improving coordination among newcomer service providers, supporting community-level research and planning, and fostering welcoming communities. The CBLIP hosted a successful partner update event in October, titled The Ways We Welcome. It brought together more than 100 participants for a day of updates and discussions related to the work of the CBLIP to foster welcoming and inclusive communities for newcomers in Cape Breton.

Welcoming Communities: Started the Spring of 2020, the main objective of the Welcoming Communities program is the launch of the Cape Breton Welcome Network, focused on working with community volunteers across Cape Breton who are interested in welcoming newcomers in their community. There are five emerging Welcome Groups within the Cape Breton Welcome Network.

5.7 Local business or other economic development initiatives. Are there specific "green" alternatives being undertaken to address sustainability issues? What relationships (if any) are there among these different activities?

Green Development Initiatives

Breton Forest Innovation Co-op: A community-led initiative to increase entrepreneurship and innovation in the forestry and wood products sector, based in Middle River, Victoria County.

Cape Breton Food Hub: The Cape Breton Food Hub, a community-led organization, recently purchased a former farm market facility in Big Bras D'Or to increase their ability to store and distribute local produce, as well as to support the development of food-related entrepreneurship.

Customs House Artisan Incubator: Led by the Cape Breton Centre for Craft and Design based at the former Customs House in Port Hawkesbury, this program supports emerging artists and craftspeople to develop craft businesses.

Appleseed Energy: The Cape Breton company services the Biosphere and provides fixed and mobile solar design and installations for net-metering on grid as well as off-grid implementations.

Nova Scotia Power: NSP is modernizing Nova Scotia's electricity grid to provide convenience, reliability and control and upgrading current meters to smart meters.

Potlotek First Nation "In September 2020, became one of the first Atlantic Indigenous communities to install a greenhouse, geothermal climate battery and sustainable in-ground heating system to address food insecurity year-round" (CBC, Dec 26, 2020). See Section 5.1.1 for more detail.

We are not aware of any specific relationships among or between these initiatives.

5.8 Describe the main changes (if there are any) in terms of cultural values (religious, historical, political, social, ethnological) and others, if possible with distinction between material and intangible heritage.

There have not been any major changes in terms of cultural values although immigration is gradually and steadily increasing the diversity and inclusiveness of the region.There is also growing acceptance of the LGBTQ community in the region, First Nation communities and the province. We believe all these factors will contribute positively to the economic sustainability of the region.

Historically significant, in 2018, the Board of Directors of the Bras d'Or Lake Biosphere Reserve Assoc. joined with UNESCO's networks and partners in Canada to demonstrate leadership and ensure a genuine commitment to Indigenous cultures by adopting the Pessamit Call for Reconciliation Regarding the Rights of Indigenous peoples .

It is noticeable now that many organizations on the island now articulate acknowledgement that they are living and working in the traditional, unceded territory of the Mi'kmaw nation in the district of Unama'ki, often written as Cape Breton-Unama'ki.

5.9 Community support facilities and services. What programmes in/for the biosphere reserve address issues such as job preparation and skills training, health and social services, and social justice questions. What are the relationships among them and with community economic development?

We are fortunate to have government, NGO's, a University and Colleges supporting job preparation and skills training, health and social services, and social justice questions on the island and within the Biosphere. The majority of these were identified by the Cape Breton Partnership which has the island business development, facilities and services on their radar for research, development and educational leverage for all who will make the island successful.

Examples of Support and Services Programs Supporting Economic Development.

Cape Breton Job Board: This is Cape Breton's first online job board for Cape Breton employers and job seekers locally, nationally and internationally.

Hire Me Cape Breton: Hire Me Cape Breton focused on highlighting the Island's top talent through exposure to Cape Breton employers by inviting students approaching graduation, new grads, newcomers and job seekers to submit a 60 second video pitch.

Inclusive Entrepreneurship: In an effort to remove barriers for women entrepreneurs in Cape Breton-Unama'ki, the Cape Breton Partnership commissioned two studies: the first to identify barriers for female entrepreneurs and the second to identify barriers for Indigenous female entrepreneurs. See Section 7.5.1 for greater detail.

Investor Summit: Every October, the Cape Breton Partnership hosts an annual gathering of close to 200 business, community, and government leaders to discuss building a strong economic future for Cape Breton.

Regional Enterprise Networks (RENs): Focusing on: business growth & development, labour market attraction, immigration, investment attraction, investment readiness, municipal priority projects, rural broadband and cellular, support for business planning, and industrial park development.

Skills and Workforce Training: Administered on behalf of Employment Nova Scotia (ENS), the Department of Community Services (DCS), and Service Canada for the past 12 years, the Cape Breton Partnership has provided services that focus on clients with barriers to employment. In the past year, they have run 10 programs, supporting 140 participants.

The Cape Breton Connector Program: Connects our business community with top talent, i.e. post-secondary graduates or those new to Cape Breton.

Tourism Industry Association of Nova Scotia (TIANS) Seasonality Labour Project: New resources have been made available to Cape Breton's tourism-focused businesses to increase skills for tourism workers in Nova Scotia.

Youth Recognition & Retention: The Cape Breton Partnership hosts seminars and career fairs for Cape Breton youth to help them begin their careers here.

Nova Scotia Department of Community Services: The Department of Community Services "is committed to a sustainable social service system that promotes the independence, self-reliance, and security of the people we serve. This will be achieved through excellence in service delivery, leadership and collaboration with our partners.

The CBP worked with the communities and various organizations to develop and deliver most of the projects and initiatives above to support strong and successful economic development. They also publish their ELEVATE newsletter to share information and successes among the followers and members. https://capebretonpartnership.com/category/elevate/

5.10 What indicators are in place to assess the effectiveness of activities aiming to foster sustainable development? What have these indicators shown?

The BLBRA currently has no internal process to capture metrics on our own events and initiatives. We do follow metrics provided by the public and private sectors as part of their respective mandates.

We are fortunate, as shown in earlier sections, to have both the Cape Breton Partnership (since 2004) improving their metrics regarding the business sectors on the island, and the Destination Cape Breton Association to track Tourism indicators, also presented above in section 5.2. We have been building our relationship with these two impactful organizations over the last few years and the partnership is strengthening as we understand, leverage and measure what we all bring to the table to drive the sustainability of the region.

The sector counts this year are based on GIS analysis of geocoded demographic and firmographic data provided by Census Canada, Scott's Business Directories and the four counties planning groups i.e. CBRM and Eastern District Planning Commission. That spatial data was assembled by Cape Breton University and the data mined using GIS tools. Tourism Nova Scotia, Destination Cape Breton and the Cape Breton Partnership provided non geocoded tourism and business indicators directly as well as those summarized in their annual strategic plans.

For demographic considerations of workforce, we were able to reach back over a few years of Census Canada data and look at some demographic trends including income and age groups. These numbers are found in Tables in Section 2.2.3.

For firmographic data, we looked at various historical documents that established a baseline such as the 2014 Ivany report that measures all that is Nova Scotia and the economic regions of Halifax, Cape Breton, Annapolis Valley, North Shore and the Southern Shore. Businesses by Sector can be seen in Section 5.3 above.

Agriculture/Food Production Indicators

We have identified several agriculture/food production indicators based on goals and outcomes.

Supporters of the Island Food Network (IFN) have created a Shared Food Vision to serve as a guiding document for food related change across Cape Breton Island. It was created through collaboration with diverse communities and practitioners and aims to represent the many voices, landscapes, and experiences of our local people through shared vision, values and commitments.

IFN Creating Shared Food Vision (2017 to 2020):

https://islandfoodnetwork.ca/wp-content/uploads/2020/03/IFN_SharedFoodVision_FinalReport.pdf

This report is an overview and synthesis of the Island Food Network's food policy action from 2017-2020. It is intended to serve as a key resource for the development of a Food Action Plan, a tool for deepening relationships, alignment and accountability. The associated, ongoing collaborative process will shape a set of shared goals, activities, and measurable outcomes, which will guide policies, programs and practices for the short and long term future for food in Cape Breton-Unama'ki.

IFN Shared Food Vision (2020 to 2021):

https://islandfoodnetwork.ca/wp-content/uploads/2020/03/IFN_SharedFoodVision.pdf

The Food Action Plan aims to deepen an understanding of food related change on Cape Breton Island by offering clear, intended population-level outcomes as well as indicators based on the Milan Urban Food Policy Pact (see below) which has a robust monitoring framework to provide shared tracking on progress on a number of indicators. The Island Food Network is utilizing these indicators as a framework to help us know if we are making progress toward our goals while allowing us to correct course if necessary.

Milan Urban Food Policy Pact:

https://www.milanurbanfoodpolicypact.org/wp-content/uploads/2020/12/Milan-Urban-Food-Policy-Pact-EN.pdf

The Milan Urban Food Policy Pact highlights 44 indicators for each of the following themes; governance, sustainable nutrition, social and economic equity, food production, food supply distribution and food waste.

The Island Food Network also incorporates several communication pathways as feedback mechanisms. These pathways are essential to shared ownership and the continuation of participation. Feedback mechanisms employed by the Network include regular food forums, capacity building workshops, cultivating a community of practice, an online portal for shared tracking and communication of progress, and social media/newsletter updates.

In 2019, the Island Food Network Impact Evaluation report was published in collaboration with the Ecology Action Centre. This document evaluated the breadth and depth of the first two years of impacts by the Network for the purpose of garnering insights on its programming, as well as supporting next steps through demonstration of collected data.

Island Food Network Impact Evaluation Report:

https://ecologyaction.ca/sites/default/files/images-documents/EAC-IFN-Report2019%20Share.pdf

Activities and outputs that were investigated for their impact on local food systems in Cape Breton Island included: asset mapping sessions, Up!Skilling Food Festival, food policy working group, Cape Breton farmer to farmer retreats, storying the Cape Breton food landscape research project, shared food vision presentations, community food conversations, and community communication through social media, websites, newsletters and infographics.

Overall Trends

These indicators contributed to establishing the trends are described in section 2.2.5 and 5.1 thru 5.3 by sector.

5.11 What are the main factors that influenced (positively or negatively) the success of development efforts in the entire biosphere reserve? Given the experiences and lessons learned in the past ten years, what new strategies or approaches will be most effective?

A very comprehensive business profile of the area encompassing the Biosphere Reserve, i.e Strait-Western Cape Breton Region) was compiled by the Cape Breton Partnership with Federal and Provincial support programs and statistics identified for skills, industry research, network building, product development, technology adoption, commercialization and export (A Profile of Strait-Western Cape Breton Region CBP, 2020).

The report commented on the main factors influencing the success of development efforts as follows.

> When a region such as rural Cape Breton succeeds in specific industries, it is the result of the fact that its leadership, resource advantages, and business environment are outward facing, dynamic, and constantly seeking to "up their game." Building on regional assets also has the effect of attracting talent, capital, and technologies that enhance efficiency (i.e. productivity) and market effectiveness (i.e. impact) to a region. These resources are drawn to durable, clustered relationships: geographic concentrations of interconnected firms (e.g. suppliers and service providers) and associated institutions (educational or research based) that operate in a streamlined regulatory environment with access to modern infrastructure. These are some of the factors that explain why innovation and entrepreneurship are now sought after as the new drivers of economic development. (CBP, 2020)

According to research by Massachusetts Institute of Technology (MIT, 2017), and their working paper suggesting a method to capture a set of globally-available metrics to assess innovation and entrepreneurship and the ecosystems in which they flourish.

A region's capacity for innovation-driven entrepreneurship can be broken down into five areas:

- **People** – the appropriate talent in a region with the relevant education, training, and experience for either innovation or entrepreneurship (or both).
- **Funding** – a variety of types of funding (from the public and private sectors) that support innovation and entrepreneurship throughout the journey from idea to economic impact.
- **Infrastructure** – the physical infrastructure necessary to support innovation and entrepreneurship at their different stages—including space.
- **Demand** – the level and nature of specialized demand for innovation and entrepreneurial capacities.

- **Culture and Incentives** – having role models and individuals who are celebrated; the social norms ("culture") that shape acceptable career choices; and the incentives that shape individual and team behaviours. (CBP 2020)

The report goes on to say

> Regions that focus their economic development efforts on their natural strengths are much more successful in achieving growth that is both long lasting and inclusive. Comparative advantage is most easily measured by assessing the existing areas of economic specialization in a given region, such as specific industry sectors.

New Strategies and Approaches to Consider

In Now or Never Nova Scotia (Ivany, 2014) , the authors speak of alternate indicators that measure success: "Indicators that measure more broadly defined prosperity, such the Human Development Index and the Genuine Progress Indicator, are gaining credibility but have not been widely adopted for use by nation states who operate in financial systems bound to dominant indicators." The authors recommend "Indicators such as the Human Development Index, Well-being Index, or GPI should be adopted to accompany standard economic indicators such as GDP in Nova Scotia." The *Strait Regions Vital Signs Report 2019* provides a great deal of data on indicators related to the economic, physical and mental health of children and families but it is not specific to our Biosphere Reserve. The report does contain specific population data on Potlotek and We'koqma'q. Perhaps we could explore a vital signs report for the biosphere.

Lessons Learned and Strategy Going Forward

The Biosphere has capacity in all the identified areas to create successful outcomes in innovative entrepreneurship and tourism. The BLBRA will identify what outcomes are desired for the 2021 - 2025 StrategicPlan.

6. THE LOGISTIC FUNCTION:

[This refers to programs that enhance the capacity of people and organizations in the biosphere reserve to address both conservation and development issues for sustainable development as well as research, monitoring, demonstration projects and education needed to deal with the specific context and conditions of the biosphere reserve.]

6.1 Describe the main institutions conducting research or monitoring in the biosphere reserve, and their programmes. Comment on organizational changes (if any) in these institutions over the past ten years as they relate to their work in the biosphere reserve.

BLBRA's partner, CEPI carried out the main coordinating structure for research and monitoring in the Biosphere with implementation by its constituent organizations. In 2018 CEPI updated their focus to include more programs related to sustainable development and youth (see CEPI ToR 2018). Their recent programs, since 2018, have been:

- Development of forestry task team, 2018
- CEPI Youth Conference, 2018
- Development of recreational fishery and aquaculture task team, 2019
- Partnership with UINR on community nominated places for species at risk around Cape Breton-Unama'ki, 2019
- CEPI/BLBRA Forum on Climate Change Adaptation, 2019
- Development of Barachois task team, 2020
- Partnership with Ocean's North on sustainable forestry initiatives, 2020
- CEPI Youth partnership with Oceans North on species at risk social media work, 2020

The main institutions conducting research or monitoring in the biosphere reserve have not changed much since 2010. Their programs were described in the BLBRA original submission (2010). Any changes to their organizational structure are listed in Table 6.1. A few new institutions have developed research and/or monitoring programs in the past ten years or were not mentioned in the original submission; their programs are described below.

Table 6.1 - Main Organizations Conducting Research and Monitoring			
Institution	**Description**	**Program(s)**	**Organizational Changes**
Atlantic Canada Conservation Data Centre	Compiles and provides objective data about biological diversity in Atlantic Canada	• Undertake fieldwork to further knowledge of the distribution and status of species and ecological communities of conservation concern. • Canada's Community-Nominated Priority Places (CNPP) for Species at Risk	No organizational changes in the past ten years.
Atlantic Coastal Action Program (ACAP)	An environmental non-profit organization that offers the knowledge that Cape Bretoners need to make greener choices, and works directly on practical solutions that help protect and restore our natural environment.	• Habitat Restoration • "Trashformers" community cleanups • Educational Programs • Bat monitoring • Lumière Project • Reducing, reusing, recycling	New Executive Director, new board but no staff changes and no change in relationship with BLBRA.
Cape Breton University, Bras d'Or Institute for Ecosystem Research	Educational Institution	• Ecosystem Monitoring & Modelling • Aquaculture Monitoring • Salmon Ecology • Marine Habitat Mapping • Coastal Erosion Monitoring • Climate Change Adaptation Research • Protected Area Planning	No organizational changes in the past ten years.
Cape Breton Weather Mesonet Network	A cooperative of private owners and partners with daily monitoring and archiving	• 84 weather stations in total • 77 on CB Island • 20 in the Biosphere	Constantly growing in size
Dalhousie University Depts. of Biology & Oceanography	Educational Institution	• Eel and Lobster Biology & Tracking • Sediment Biogeochemistry • Oceanographic Monitoring & Modelling	No organizational changes in the past ten years.
DFO	Federal Gov.	• Oceanographic Monitoring Program • Chemistry of Anoxic Basins • Eastern Scotian Shelf Integrated Management Program (ESSIM)	Some changes Dr. B. Hatcher can provide info if needed

Cape Breton University	Ecological Monitoring and Assessment Network (EMAN)	• Forest Biodiversity Monitoring. Irish Cove EMAN forest-monitoring plot. Pg. 155 of submission doc.	This is no longer maintained as an EMAN site. However, a private individual is setting up stream monitoring as baseline pre tree harvest.
Eskasoni Fish & Wildlife Commission (EFWC)	Mi'kmaq	Terrestrial and Marine Resource Management	No organizational changes in the past ten years.
Nova Scotia Salmon Federation	There have been some projects ongoing in the Bras d'Or watershed in the past 10 years, not in the River Denys though they have been working on the Adopt A Stream database and so far have 2013-2019 inputted.	They have annual project reports from the Eskasoni Fish and Wildlife Commission – extensive restoration on going in Qamsipuk (Indian Brook on the map) and ACAP CB / Cape Breton Island Wildlife Association – Toms and McNabs Brooks and reports on restoration work we (the Nova Scotia Salmon Association (Adopt A Stream program) completed in Irish Cove.	This group was not mentioned in our initial submission document with only a single mention of the Adopt-a-Stream database. They partner with EFWC for various projects such as; Continuation of in-stream enhancement of Qamsipuk (Indian Brook) and Christmas Brook, Eskasoni, Nova Scotia
Nature Conservancy of Canada	Charitable Organization which secures protected areas and conducts research	• established the Central Cape Breton Natural area: 417,671 ha of land prioritized for their conservation work. • secured 711 ha (1758 ac) of important conservation lands including forests, wetlands, and shorelines. • had one of our Cape Breton properties designated as provincial Nature Reserve carried out three outreach/volunteer events providing 50 participants opportunity to learn the importance of Cape Breton biodiversity and NCC conservation activities. • Carried out an Active River Analysis that included all of the Cape Breton Natural Area	New Director but no organizational changes
NS Dept. of Environment	Role is mostly enforcement (compliance monitoring)	Nova Scotia Protected Areas Program - Wilderness Areas and Nature Reserves	Organization has not changed

NS Dept. of Fisheries & Aquaculture	Legislated mandate to manage, promote, support and develop the fishing, aquaculture and seafood processing industries that contribute to the economic, environmental and social prosperity of Nova Scotia's coastal and rural communities.	• Inland (recreational) Fisheries Research on Sea Trout populations in River Denys. • Aquaculture Research Branch	No Organizational Changes
NS Dept. of Lands and Forestry	The Department of Lands and Forestry has broad responsibilities relative to the development, management, conservation and protection of forest, mineral, parks and wildlife resources and the administration of the province's Crown land.	• Integrated Resource Management Program • Nova Scotia Provincial Parks Program Biodiversity research: • FBSAC_StrategicResearchPlan Ecosystem-based forestry: • Systematic-Approach • Ecological-Land-Classification-guide • Procedural Guide for Ecological Landscape Analysis Veg-types/printable Lahey Report_ExecSummary Government-Response-to-Independent-Forestry-Report	Name change to Dept.of Lands and Forestry A combined Parks and Protected Areas plan issued in 2013. New actions – biodiversity act Lahey report led to significant changes to Lands and Forestry
Perennia Inc.	Perennia Food and Agriculture Inc. is a provincial development agency with the mission to support growth, transformation and economic development in Nova Scotia's agriculture, seafood, and food and beverage sectors.	Centre for Marine Aquaculture research	Dr B. Hatcher can provide info if needed
Port Hawkesbury Paper	Manage Crown Land in the Biosphere; engaged in harvesting.	2019 Annual Monitoring Report for SFM Indicators and High Conservation Values	New owners of the Paper Mill in 2012.
Unama'ki Institute of Natural Resources (UINR)	UINR represents Cape Breton's Mi'kmaw voice on natural resources and environmental concerns	• Environmental Monitoring • Aboriginal Traditional Ecological Knowledge	Director: Lisa Young. No Changes

Another important organization providing monitoring information within the BLBR, but also throughout Cape Breton Island, is the Cape Breton Weather Mesonet Network founded by Jonathan Buffett, a weather technician. It began several years ago as just one station in Port Hawkesbury (2005). Currently, there are 84 stations in Nova Scotia within the Cape Breton Mesonet—77 are on Cape Breton Island—of which 47 stations can be considered 'partner' as they are owned by the landowner/host. The remaining stations have been purchased by Jonathan over the last 15 years and are hosted on private property. Due to the fact that the Cape Breton Mesonet is more in line with what one might consider a cooperative, it is hard to define owner and partner; it is very much a community project that Jonathan has helped push forward. Twenty of the Mesonet weather stations are in the Bras d'Or Watershed.

Data is archived on the Mesonet website for each station. When you click on a station page there is a link to the archive at the bottom of each page. Once on the archive page anyone can view daily, monthly and hourly data. Some of these stations have data going back as far as 2005. The live and archived data is open-source and free for anyone to use, whether they are a private citizen or local/federal government.

Climate change could have significant impacts (both positive and negative) on the Bras d'Or Lake and its watershed. Monitoring and archiving any changes in weather patterns, such as wind speeds, air and water temperature, and precipitation could prove to be very useful in future research of the Bras d'Or Lake watershed. Live station monitoring data can be found at www.capebretonweather.ca . A Facebook page for the CB Weather Mesonet has been created to help increase the awareness of this wonderful initiative.

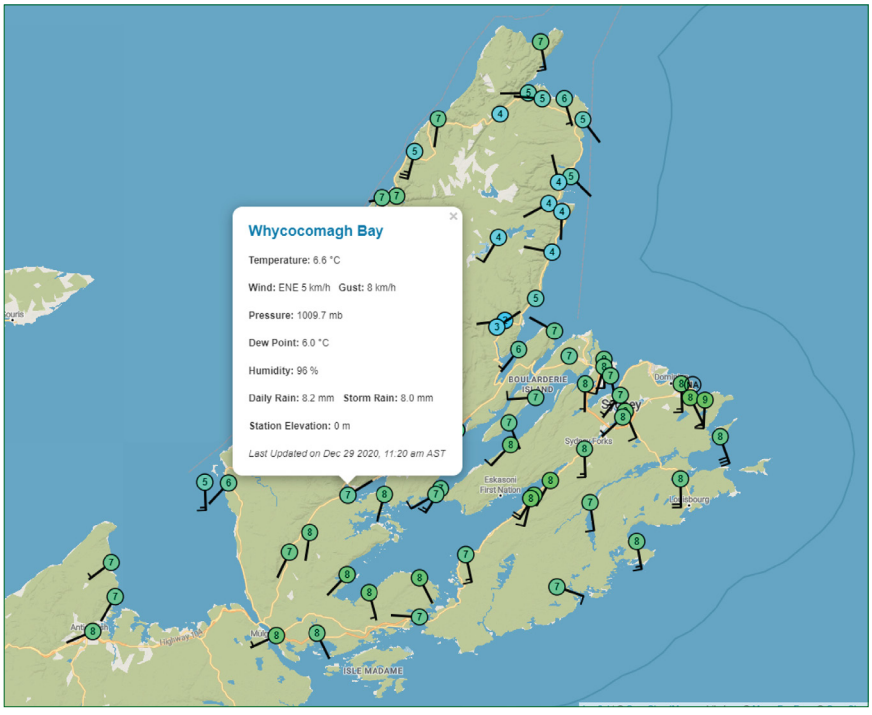


Fig. 6.1 Mesonet Data Fields (Screen capture http://www.capebretonweather.ca/)

Nova Scotia Dept. of Fisheries and Aquaculture (NSFA) has been conducting research on the Sea Trout angling population in River Denys since 2008. They conduct tagging and morphological studies as well as a hooking mortality study. No reports have been released to date.

Port Hawkesbury Paper (PHP) operates a paper mill in Port Hawkesbury and a portion of their fiber supply comes from the BLBR as well as many of their staff. We describe their contribution to sustainable development in section 5.1.4 and to conservation in section 4.2. They have a license to manage Crown land on behalf of the province of Nova Scotia which includes a research and monitoring program. PHP develops and implements annual operating plans, 5-year landscape management plans, and a 100-year sustainable long-term forest management plan. Each of these planning phases are critical to the long-term responsible management of forest lands in eastern Nova Scotia.

Port Hawkesbury Paper manages and implements a modern silviculture program including full reforestation of all harvested areas and stand tending treatments of young forests. This program is designed to increase the yield and quality of fibre produced within the principles of sustainable development. Since 2012, Port Hawkesbury Paper has planted approximately 25 million trees on the Crown land-base it manages. Forest stands are also assessed two years following harvest to determine if natural regeneration is sufficient to restock the forest area or if planting of tree seedlings is required. Approximately 50-60 % of the annual harvest area successfully regenerates naturally. Port Hawkesbury Paper has also maintained a non-herbicide use policy since 1997, which has benefited forest stands to regenerate to their natural forest conditions and successional species.

DFO Maritimes Region Science (a.k.a. Science Branch) has a long history of conducting research activities throughout the waters of Cape Breton, including in the Bras d'Or Lake:

- The Salmon Section in the Science Branch's Population Ecology Division (PED) conducted annual salmon population assessment data on several rivers in eastern Cape Breton (Middle River, Baddeck River and North River). Information from these rivers is used to support decisions related to fisheries management, consultations with Indigenous communities, habitat management, area management, compliance and enforcement;
- *Species at Risk Act* processes, stakeholder requests, and International Council for the Exploration of the Sea (ICES) working group input for international advice. Some of this work was conducted with the assistance of UINR;
- Beginning in 2009, the Science Branch's Coastal Ecosystem Science Division (CESD) supported temperature, salinity, ocean colour and mooring monitoring and data collection in the Bras d'Or Lake, resulting in a 2014 publication from which a working Finite Volume Community Ocean Model (FVCOM) was developed to support possible Tidal in-Stream Energy Conversion (TISEC) installations in the lake and to answer longer term ecosystem questions;
- In 2016-17, the Science Branch's Ocean and Ecosystem Sciences Division (OESD) worked on chemical oceanography, specifically carbon, oxygen, and nutrient dynamics

in the Whycocomagh area of the Bras d'Or Lake, in collaboration with Cape Breton University (CBU);

- In 2017, CESD provided funding for monitoring instrumentation to support a partnership proposal with CBU and Eskasoni First Nations Fish and Wildlife, and provided training for collaborative monitoring activities in the Bras d'Or Lake.
- In 2018 and 2019, CESD participated in a number of research initiatives under several aquaculture monitoring program projects, including benthic survey coring initiatives, sediment grain size geochemistry, and ATP levels, in collaboration with CBU, Dalhousie University, the Ocean Frontier Institute (OFI) and the Nova Scotia Department of Fisheries and Aquaculture;
- For the past 10 years, CESD has maintained a group of temperature-pressure gauges around the Bras d'Or Lake as part of the Long Term Temperature Monitoring Program, and supported the conductivity, temperature and depth (CTD) sampling conducted by CBU.

6.2 Summarize the main themes of research and monitoring undertaken over the past ten years and the area(s) in which they were undertaken in order to address specific questions related to biosphere reserve management and for the implementation of the management plan (please refer to variables in Annex I).

(For each specific topic provide reference citations. Provide the full citations alphabetically by lead author at the end of Section 6 or in a separate annex).

Bras d'Or Institute

Dr. B. Hatcher can provide info if needed

The following is a description and summary of research, with citations, by many institutions over the past ten years. We have made an attempt to categorize these activities related to the main themes of research and monitoring; 1/ Abiotic, 2/ Biodiversity, 3/ Socio-economic and 4/ Integrated monitoring. Much of the information comes from Table 6.2 below which lists a number of projects undertaken by the Eskasoni Fish and Wildlife Commission (EFWC) in the past ten years.

1) Abiotic (e.g. air quality and temperature, climatology, contaminates, geology, hydrology, topography etc.)

ACAP Cape Breton, a non-profit charitable community organization dedicated to science and monitoring-based projects and other environmental initiatives, has undertaken a number of research activities within the BLBR in the past ten years, including erosion and sediment impact monitoring, erosion mitigation using natural techniques (living shorelines) and bat research. These activities are detailed in Section 4.2.

EFWC summarized their aquatic monitoring program in the following program report; Denny S., (2015), *Community Aquatic Monitoring program* (CAMP).

2) Biodiversity (e.g. invasive species, benthos, biology, birds, boreal forest systems, coastal/marine systems, ecosystem assessment etc.)

Canada's Community-Nominated Priority Places (CNPP) for Species at Risk: Maliamuki'k msit Ko'kmanaq Priority Places Initiative is a 4-year project that began in 2020 and focuses on identifying key habitats and species hotspots within the BLBR using existing data, and subsequently filling information gaps through monitoring efforts and engaging traditional knowledge holders. This project is discussed in Section 4.2.

EFWC summarized their TEK on Oyster populations in the following paper; Denny,S., et al. (2016), *Mn'tmu'kMi'kmaq Ecological Knowledge Eastern Oysters in Unama'ki*.

3) Socio-economic (e.g. Cultural aspects, Economic studies, Fishery, Forestry, Indigenous people's issues)

Research and monitoring of Socio-economic indicators was covered extensively in the *Ivany Report* (2014).

EFWC produced this forest products report; Simpson, J. (2018) *UINR Forest Products Report*.

Port Hawkesbury Paper produced the following monitoring report (PHP) (2019) -2019 Annual Monitoring Report for SFM Indicators and High Conservation Values.

Research on sport and commercial fishing have been documented in the following reports: Paul,T., (2012), P*eju COD in the Bras d'Or Lakes*; and Denny S., (2012) *Ji'kaw-Striped BASS in the Bras d'Or Lakes*.

4) Integrated monitoring (e.g. Climate change, Ecosystem approach, Ecosystem approach, Geographic Information System (GIS), Interdisciplinary studies)

Climate Change monitoring is conducted by private landowners on the lake, the Municipalities and the Mi'kmaq communities. The following consultants report, commissioned by EFWC provides the research needed to make informed decisions on future mitigation actions; Davies,M., et al. (March 2016), Impacts of Climate Change and Sea Level Rise on the Mi'kmaq Communities of the Bras d'Or Lakes Phase Two Project Report AANDC Climate Change Adaptation Program.

Table 6.2 EFWC Research Projects 2010-2020		
Project Title	**Year**	**Theme**
Maintenance of oyster populations in the Bras d'Or Lakes (e.g. Vercaemer B., P. St-Onge, K. Spence, S. Gould and A. McIsaac, 2010. Assessment of biodiversity of American oyster (*Crassostrea virginica*) populations of Cape Breton, NS and the Maritimes (Can. Tech. Rep. Fish. Aquat. Sci. 2872: vi + 32 p.)	1994 to present	Biodiversity / Socio-economic
River clean-up to improve habitat and fish passage	2010	Biodiversity
Atlantic Zone Monitoring Program	2010-2012	Integrated monitoring
Rapid Biodiversity Assessment	2010-2012	Biodiversity
Green Crab survey (Vercaemer B., J. Ouellette-Plante, J. T. Johnson and A. McIsaac, 2011. Assessment of Green Crab (*Carcinus maenas*) abundance in the Bras d'Or Lake of Cape Breton, N.S. Can. Tech. Rep. Fish. Aquat. Sci. 2965: vi +42 p.)	2010	Biodiversity
Monitoring for the presence of Striped Bass within the Bras d'Or Lake and her watershed.	2011-2012	Integrated monitoring
Oyster Habitat Enhancement	2012-2018	Integrated monitoring
Installation of a weather station in Eskasoni First Nation	2012	Abiotic
In-stream enhancement of Rink Brook, Eskasoni FN	2012	Abiotic
Investigation of the genetic origin, abundance and movements of striped bass (*Morone saxatilis*) in Bras d'Or Lake and coastal waters of Cape Breton-Unama'ki.	2012-2014	Biodiversity
Developing capacity in environmental monitoring for aquaculture	2012	Integrated monitoring
Investigating the decline of Atlantic cod in the Bras d'Or Lakes, Cape Breton-Unama'ki.	2014-2017	Biodiversity / Integrated monitoring
Development of Hatchery Support for Oyster Aquaculture in Disease Impacted Regions of Nova Scotia	2015-2018	Socio-economic
Environmental monitoring for aquaculture	2015-present	Integrated monitoring
Continuation of in-stream enhancement of Qamsipuk (Indian Brook) and Christmas Brook, Eskasoni FN	2013-present	Abiotic
Identification of indicators for land use planning and management of the forest ecosystem within Eskasoni FN	2017-present	Integrated monitoring
Comparison of oyster growth and survival pre- and post-establishment of the oyster parasite, MSX	2019-present	Biodiversity
Canada Nature Fund – Development of an Indigenous Protected and Conserved Area (IPCA)	2019-present	Integrated monitoring
Land Use Planning and Mapping Species at Risk and Other Important Species in and Around Eskasoni First Nation	2020	Biodiversity

6.3 Describe how traditional and local knowledge and knowledge from relating to management practices have been collected, synthesized and disseminated. Explain how such knowledge is being applied to new management practices, and how and if it has been integrated into training and educational programmes.

The concept of traditional ecological knowledge is quite advanced among BLBRA members, indeed most inhabitants of Cape Breton, and we have opted to offer a single response to 6.3 and 6.4.

6.4 Environmental/sustainability education. Which are the main educational institutions ("formal" – schools, colleges, universities, and "informal" services for the general public) that are active in the biosphere reserve? Comment on organizational changes (if any) in institutions and programmes that were identified in the biosphere reserve ten or so years ago (e.g. closed down, redesigned, new initiatives). Refer to programmes and initiatives of UNESCO Associated Schools networks, UNESCO Chairs and Centers where applicable. Describe their programmes, including special school or adult education programmes, as these contribute towards the functions of the biosphere reserve.



Fig. 6.2 MaB Sustainable Development Goals.

The Bras d'Or Lake Biosphere Reserve (BLBR) is nestled in the heart of Unama'ki, one of the seven traditional districts of the Mi'kmaw nation. This territory is covered by the Treaties of Peace and Friendship which Mi'kmaq and Wolastoqey (Maliseet) finalized with the British Crown in 1762. The treaties did not deal with surrender of lands and resources

but in fact recognized Mi'kmaw and Wolastoqiyik (Maliseet) sovereignty and established the rules for what was to be an ongoing relationship between nations. The Indigenous Mi'kmaq have been joined by settlers from all over the world in this ancestral territory.

The work of the Bras d'Or Lake Biosphere Reserve Association is a partnership between Mi'kmaw stakeholders and those settlers (SDG 17). CEPI (Bras d'Or Lakes Collaborative Environmental Planning Initiative) arose from a request from First Nations Chiefs in 2003 to develop an overall environmental management plan for the Bras d'Or Lake and watershed lands. This collaborative partnership is among five First Nations, four counties, three provincial government departments, three federal government departments, and several non-governmental organizations.

So, before the BLBR came to the attention of UNESCO, we were already working together to sustain the integrity of our natural home (Hatcher, A., 2018). In partnership with CEPI, the BLBRA hosted a Climate Change Adaptation Forum in June 2019, which led to the publication of 'Guidelines for Climate Change Adaptation in Canada's UNESCO Biosphere Reserves' (Hatcher, S., 2019) which presents guidelines for climate change adaptation projects within UNESCO Biosphere Reserves and communities within those reserves (SDG 13).

Teaching and outreach programs developed by the BLBRA follow Mi'kmaw teachings shared by members of the board and local Elders (SDG 4, 14 and 15). We embrace a co-learning approach which seamlessly incorporates both Mi'kmaw and mainstream knowledge systems in an environment of respect. Our educational philosophy is underpinned by the understanding that what you know is on equal footing with how you came to know it and how it relates to you. We have produced educational resources such as Inquiry-based Ecological Explorations in the Bras d'Or Lake Biosphere (Hatcher, 2018) which emphasize balance, allowing Mother Earth to be your teacher (Educational Resources). These have been accepted and distributed by the provincial department of education to enhance an integrated curriculum. They have also been adopted in a local program for young women to engage them in science (Island WISE). Four inquiry-based, integrated, multidisciplinary, intercultural curriculum resources for elementary classrooms in the Bras d'Or Lake Biosphere were developed and approved.

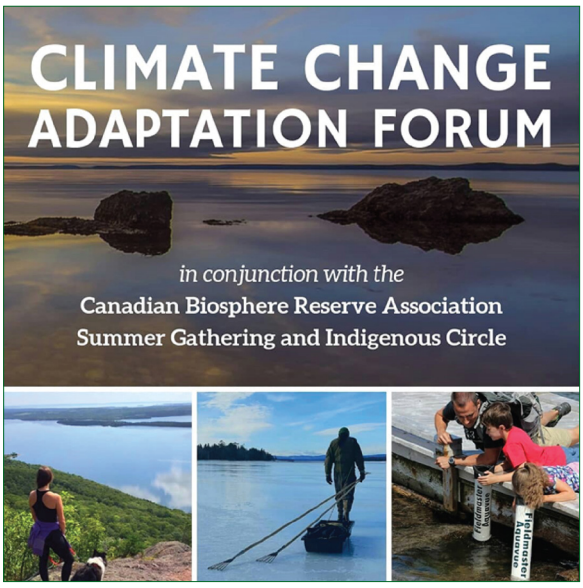


Fig. 6.3 Poster for the Climate Change Adaptation Forum

- Adapting to Watery Habitats
- Forest Unit
- Animals and their Habitats; A Question of Balance
- Inquiry-based Geological Explorations in the Bras d'Or Lake Biosphere

The BLBRA has published a monthly column in four local newspapers for five years, to inspire residents and visitors to look at our Biosphere as the ancestors saw it—with the Mi'kmaw calendar as our guide: See *Cape Breton Post* example (SDG 10; Hatcher, A., 2020).

Our annual citizen science project called Bras d'Or Watch is primarily designed to guide participants in their understandings of nature. The data collection aspect provides a structure to join many communities around the Biosphere in a common cause. It also provides an avenue to introduce people to non-human members of the ecosystem. Effective environmental stewardship is underpinned by basic understanding. Bras d'Or Watch provides opportunities for all residents and visitors to visit the lakeside Mi'kmaw community of Eskasoni to participate in biological sampling led by the Mi'kmaw organization Unama'ki Institute of Natural Resources. This is part of the process of reconciling with the land. See: YouTube example (SDG 16, 17).

A description of the Bras d'Or Watch project can be found at: Biosphere Journal Article on the Bras d'Or Watch. (SDG 4, 10, 14, 15).

We did not attend to measuring the success of these initiatives in terms of behavioral change. Instead, success is being measured by monitoring engagement in promoted best practices through social media and participation in the programs of the BLBRA.

Forest Watch

Our forest monitoring project started by piloting some activities in a local school (Middle River Elementary). A small woodlot adjoining the school provided the perfect location to discuss forests and get the students into the woods. In early June 2017, we identified trees, shrubs and animals found in and around the woodlot. The number of trees and the species living in this forested area were reported, as well as the number of dead trees both standing and down.





Figs. 6.4a, b Middle River Elem. School children making a inventory of living things. Photos by E. Crosby.

The main focus was to give elementary students an insight into inventorying a forest stand and the concept that a tree, like any living thing, has a lifespan. Living creatures on both live and dead trees were examined to help teach students that these trees are part of animal habitat no matter the tree's state of existence. We used student activities such as the Thicket Game, the setting up salamander habitats, and time spent in the classroom looking at and identifying collections to round out their experience. In September (2017), the volunteers returned to Middle River Elementary to review forest species and look for living things found within the woodlot in the fall.

An additional activity occurred in June of 2017 when the forest monitoring volunteers established a connection with the Mersey Tobeatic Research Institute to participate in adaptation practices designed to familiarize some of the volunteers with forestry tools and methods for later application in our forestry monitoring program.

A preliminary meeting with Potlotek First Nations High School to develop a High School program in the forest took place as well. Weather and time constraints made it impossible to have a field day in the fall; it was conducted on May 14th, 2018.

In early November 2017, the forestry committee of the BLBRA played host to 35 international students from the Coady Institute of St. Francis Xavier University. Students were given a tour of a woodlot in Johnstown highlighting on-going restoration work of the woodlot. Old forests and their importance were highlighted with lots of questions about the Biosphere itself.





Figs. 6.5a, b (L)Mersey Tobeatic Research Institute Volunteers (R) Coady Institute students on a woodlot tour. Photos by E. Crosby.

Due to NS Teachers' Union work-to-rule action in late 2018-2019, this committee was unable to carry out its planned objectives. It will be re-activated once Covid concerns have ended. Plans are already afoot.

A new institute was established at Cape Breton University which provides residents of the Biosphere Reserve with sustainability education. Founded in 2018, the World Tourism Institute is a

Locally rooted, globally focused sustainable development.' education initiative. The foundation of the WTI is rooted in the depth and diversity of the Cape Breton Tourism Sector, the long history of Tourism and Hospitality Programming at CBU and the established Industry and Community relationships.

Programs include:

Master of Business Administration in Community Economic Development (MBA CED) focused on community economic development, and supporting students who want to make a difference where they live and work. Students can choose from Marketing and International Business as well as Tourism and First Nations Option.

The MBA CED First Nations Option invites students to explore the dynamics of CED in urban and rural First Nations and the **MBA CED Tourism Option** examines tourism management and planning and cultural tourism marketing.

The following two tables provided updates on the Environmental/sustainability education programs addressed in our application document (2011).

Table 6.3a – Main formal educational institutions actively providing environmental and/or sustainability education in the Biosphere reserve.

Organization	Program Description	Changes
Unama'ki First Nations	Reserves have evolved self-government for education, social services and other components of Reserve administration.	Eskasoni has a Mi'kmaw Immersion School
Bras d'Or Institute for Ecosystem Research at CBU	Programs relating to aquatic and general environmental sustainability	No Changes
Nautical Institute at NSCC in Port Hawkesbury	Providing a wide range on nautical programs including adult education	No Changes
Aquatic Resources degree program at St. Francis Xavier University	Aquatic Resources (AR) is an interdisciplinary, four-year dual major program, leading to a B. or a BSc degree.	No Changes
Institute for Integrative Science, Cape Breton University	Bringing together Indigenous and Western scientific knowledges and ways of knowing.	In 2010 transferred to Unama'ki College, Cape Breton University,
Unama'ki College, Cape Breton University	As the vibrant heartbeat of Indigenous education at CBU for more than 40 years, Unama'ki College offers an environment that embraces the knowledge, wisdom and traditions of the Mi'kmaq.	No Changes
Cape Breton Centre for Craft and Design (CBCCD)	Programs that preserve, elevate, expand and enhance the creation of craft.	No Changes

Table 6.3b Main informal educational institutions actively providing environmental and/or sustainability education in the Biosphere Reserve.		
Organization	**Program Description**	**Changes**
Atlantic Coastal Action Program Cape Breton (ACAP-CB)	Tours for school and community groups Active education through community projects	No Change
Bras d'Or Lake Biosphere Reserve Association	Formed in 2011.	Developed Educational curricula for grade 4-5 and the Bras d'Or Watch program
Canadian Biosphere Reserves Association (CBRA)	Promotes national awareness of Biosphere Reserves	No Change
Eskasoni Fish and Wildlife Commission	Courses related to developing a professional Mi'kmaw fishing industry;	No Change
Enterprise Cape Breton Corporation (ECBC) and the province's Regional Development Agencies (RDAs).	Support for Businesses	No longer active. Replaced by ACOA and the Cape Breton Partnership
Whycocomagh Education Centre (public school) Includes the Whycocomagh Eco Center	The Eco-Centre encourages connections with nature through environmental programs and encourages awareness of the pristine environment of Cape Breton.	A daycare renovation was completed in 2010-2011 and a mental health clinician was added one afternoon/ week
New Dawn Enterprises, Sydney	reinvestment of earnings back into the community to develop mutually supportive enterprises	Still very active in the community of Cape Breton, including within the boundaries of the Biosphere Reserve
Cape Breton Partnership	Mission to Transform Cape Breton-Unama'ki into the most creative and prosperous place on earth. Provides educational programs to businesses	Formed in 2004 but was not involved with the BLBRA organization
Alexander Graham Bell National Historic Site and Museum	Provides a wide range of environmental and Indigenous training as well as cultural tourism development	No Change
Bras d'Or Stewardship Society	Their goal is to promote an appropriate strategy for conservation, restoration and protection of the lakes for ourselves and future generations using education as one approach.	Made donation to BLBRA in 2019 and members became lifetime members of BLBRA
Bras d'Or Preservation Nature Trust	Operates the Bras d'Or Interpretation Centre in Baddeck. During the school year when the Centre would otherwise be closed, it is devoted to the education of children. Henry Mugga was long time member of our board	No Change

Baile nan Gàidheal | Highland Village	The site brings to life various aspects of Gaelic linguistic and cultural expression through the animation of eleven period buildings on its 17-ha site.	No Change
Silver Dart Centennial Association	A capital legacy plan is currently active, with a goal of developing a capital expansion to the AGB Museum in which to house the Silver Dart replica and an Innovation Centre.	Expansion completed and the society disbanded in 2014
Wagmatcook Cultural and Heritage Centre for Aboriginal History	The Wagmatcook Culture & Heritage Centre management supports a number of operations that simultaneously work together to provide a wide array of services for the community of Wagmatcook.	The Nova Scotia Community College (NSCC) also hosts year-round carpentry training courses here since 2011. The Centre is an NSCC affiliate training site.
Camp Rankin	a summer education and recreation facility for 4-H members,	No Changes
Aros na Mara Marine Science Centre, Iona. [PROPOSED]	Hosts the annual World Oceans Day in June at Iona	This popular public activity has been running for 6 years. The World Oceans Day event was cancelled in 2020 due to Covid-19

6.5 How do you assess the effectiveness of actions or strategies applied? (Describe the methods, indicators)

6.5.1 Describe the biosphere reserve's main internal and external communication mechanisms/systems

The Bras d'Or Lake Biosphere Reserve Association is a volunteer organization with members spread out over a large geographic area and without a permanent facility or meeting place. The advantages of ad hoc encounters onsite are not possible so more formal and planned, and less informal and unplanned interactions are facilitated by regular communication and as needed Board of Directors meetings and committee meetings, either face-to-face or online; emails and telephone calls.

Our communication network is quite diverse in scope and needs. The graphic and table shown below reflect the communication objec-

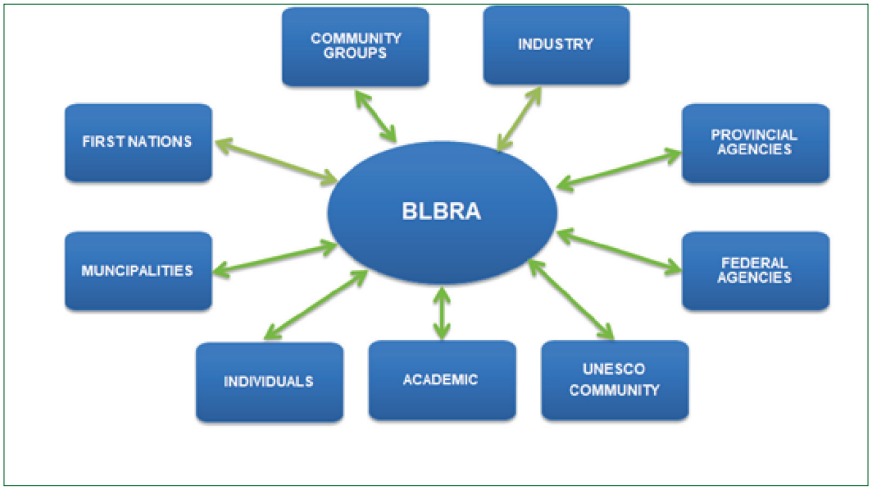


Fig. 6.6 The BLBRA Network (blbra.ca)

tives identified to date. They reflect a strategy to support a communication channel for governance and to stakeholders, as well as a strong communication channel to project/committee team members, target audiences, etc. As well, we recognize the four languages of Acadian French, English, Mi'kmaw and Gaelic, which are reflective of the cultural heritages found and still practiced in the area.

In 2017, substantial insights on Community Outreach and Partnership were garnered from the engagement of two student projects from Dalhousie's College of Sustainability Cap-

Table 6.4 The BLBRA Communication Plan

No	Objective	Audience	Distribution Method	Frequency
1	BLBRA operations and administration	Directors, committees, key partners and other stakeholders	Face-to-face and online meetings, telephone, email. Hold meetings in different Biosphere Reserve communities to give more exposure.	Typically, six times per year and as required
2	Project facilitation, logistical support, membership enrollment and fundraising	Directors, committees, key partners and other stakeholders sponsors, private and public entities	Face-to-face and video meetings, telephone, segmented email lists, social media	As required
3	Seek service providers	Consultants, venue, food, entertainment, EHS, safety, security and volunteers	Segmented email lists, social media, mail	As required for successful delivery.
4	Publicize experiences, encourage participation and citizen science.	BLBRA members, local community, Cape Breton island, Atlantic Canada	Segmented email lists, social media, websites, newspapers, radio, posters, brochures, rack cards, church bulletins, sandwich boards, electronic billboards	Countdown from December of year before for tourism-related promotion, 3 months, week of and day(s) of event
5	Develop and distribute educational and research resource material	Private and public institutions, the public, Canadian Biospheres, World Network of Biospheres	BLBRA website, meetings, segmented email lists, social media, mail, events, report card	As required
6	Way-finding	Ensure participants can find their way.	Signage, sandwich boards, banners, posters, email, social media, websites	Immediately preceding and date of the event
7	Drive enthusiasm	Participants and want to-bees seeing themselves or participation on line	Live streaming	During major activities and points of interest

stone classes to develop ‘A Comprehensive Walking Trail Implementation Toolkit’ (Christie, C. et al 2017) These have been and will continue to be a good reference impacting our outreach.

These channels and collateral include segmented face-to-face and online meetings, telephone calls, email lists, social media, websites, newsletters, church bulletins, brochures, rack cards, newspapers, banners, radio, posters, sandwich boards, signage and electronic Billboards. The content is developed using any combination of text, graphics, video, audio and live interaction as budget and timeframes allow.

6.5.2 Is there a biosphere reserve website? If so, provide the link.

There is a Bras d’Or Lake Biosphere Reserve website and it has gone through two iterations. The site was developed and continues to be maintained by a local digital agency with expertise in media production and members of the communications committee.

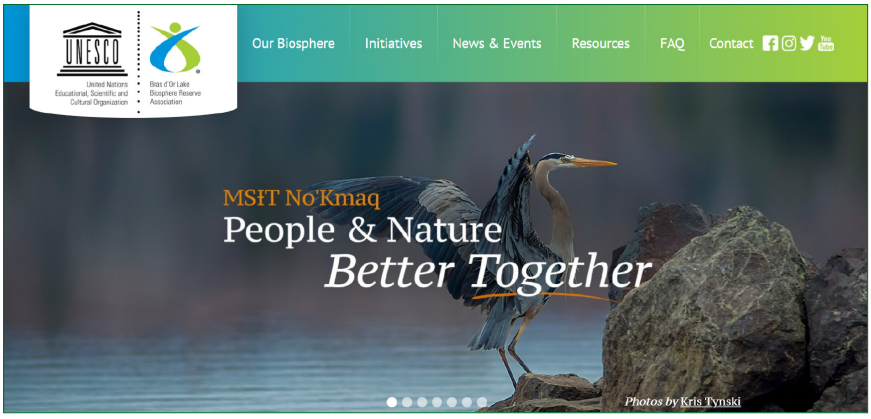


Fig. 6.7 Homepage http://www.BLBRA.ca.

6.5.3 Is there an electronic newsletter? How often is it published? (provide the link, if applicable).

BIOSPHERE HIGHLIGHTS was first issued August 2017 as a monthly newsletter distributed through the website, social media and email. In 2020, it became a quarterly issue to coincide with the Vernal Equinox (March), Summer Solstice (June), Autumnal Equinox (September) and the Winter Solstice (December). It continues to be distributed through the website, social media and emailed to all our segmented 850 subscribers. There is an average 34.3 % engagement rate which compares favourably with expectations.

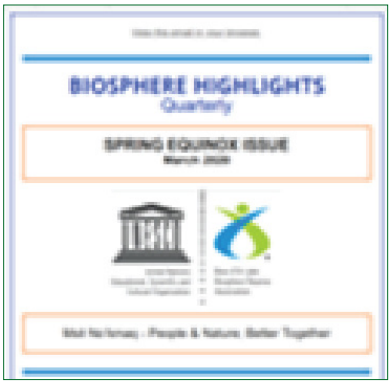


Fig. 6.8 https://blbra.ca/resources/

The past and current newsletters can be found on our website on the resource page.

6.5.4 Does the biosphere reserve belong to a social network (Facebook, Twitter, etc.)? Provide the contact.

We are on social networks and accessible online. BLBRA has 2,210 Facebook likes as of Nov. 20, 2020.

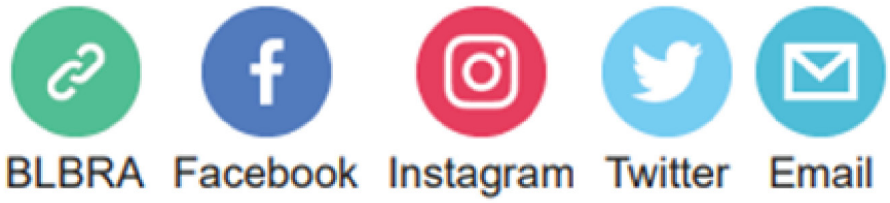


Fig. 6.9 www.blbra.ca| @blbra @BrasdOrWatch #brasdorlakebiosphere @BL_Biosphere info@blbra.ca

6.5.5 Are there any other internal communication systems? If so, describe them.

We started using Google Docs in 2020 to facilitate development of our periodic review self-assessment document. We have found the platform useful and are considering using it in the future.

6.6 Describe how the biosphere reserve currently contributes to the World Network of Biosphere Reserves and/or could do so in the future.

Our Biosphere Reserve has contributed numerous articles to UNESCO (see the bibliographic entries from Annamarie Hatcher who chaired the Bras d'Or Watch and was a contributing member to the education and communication committees for many years).

In the future, we could learn more about the international network of Biosphere Reserves and consider joining some of the groups listed below especially the UNESCO School Network as a means of encouraging youth to become engaged in the Biosphere as there are several schools located in the watershed and some quite close to the shore line.

- World Network of Island and Coastal Biosphere Reserves (WNICBR) http://www.islandbiosphere.org/Member Biospheres as of Jan. 14, 2021 are listed here: http://islandbiosphere.org/Publicacions/llistat.aspx?tipo=ME#anclaCon
- European and North American Biosphere Reserves - 302 sites in 38 countries in Europe and North America
- World Network of Biosphere Reserves https://en.unesco.org/biosphere/wnbr
- UNESCO School Network https://en.ccunesco.ca/networks/unesco-schools-network

6.6.1 Describe any collaboration with existing biosphere reserves at national, regional, and international levels, also within regional and bilateral agreements.

At the provincial level, there is one other biosphere - Southwest Nova Biosphere. The BLBR has had some collaboration with SWN in the past but not significant collaboration.

At the national level, we have one Board member who represents the BLBRA on a regular basis and communicates any information from CBRA back to the Board, while another Board member represented the BLBR at the Indigenous Circle for the past two years. In addition, in 2019, CBRA held their summer session in conjunction with the three day Climate Change Adaptation Forum hosted by the BLBRA and CEPI in Baddeck, Wagmatcook and Cape Breton University. It was a great opportunity to interact with 13 of the 18 biosphere representatives from across the country. The CCA Forum was also attended by representatives from provincial and municipal governments, community colleges, universities, CEPI Youth and members of the public.



Fig. 6.10 CCA Forum, Baddeck, 2019. Photo courtesy E. Crosby



Fig. 6.11 Volunteers planted seedlings at Irish Cove. Photo courtesy E. Crosby

In May of 2018, the BLBRA, with the help of about 45 volunteers, planted 1,000 red spruce seedlings in the reclaimed Irish Cove Limestone Quarry. The purpose of this project was part of a national effort to involve all 18 UNESCO Biospheres across Canada by planting 100,000 seedlings as a gesture to offset the carbon footprint created by the G7 Summit, June 2018, in Charlevoix, Quebec.

The BLBRA agreed to participate in this national project headed up by Global Affairs Canada and coordinated by the Charlevoix Biosphere Reserve. BLBRA members were joined by residents from the adjacent communities, students and instructors from the Port Hawkesbury Campus of Nova Scotia Community College, Eskasoni Envirothon, NS Natural Resources and Environment personnel, as well as the lead organizer for this national project from the Charlevoix Biosphere. This project was under the direction of an NSCC Instructor and a regional supervisor from Natural Resources. Assistance was provided by Port Hawkesbury Paper and the Bras d'Or Lakers Seniors Assoc. The seedlings were kindly donated by Port Hawkesbury Paper.

6.6.2 What are the current and expected benefits of international cooperation for the biosphere reserve?

The BLBRA can provide an independent assessment (e.g. this review) of the cooperating institution's efforts to achieve the MaB Sustainable Development Goals. We also provided a benefit by completing a survey for Environment Canada, through CBRA, of our opinion on how well our Biosphere Reserve addresses the SDG's. We also provided benefit by posting a number of items under the "Proud to Share" including this video, https://youtu.be/wJQ1VskBHs0.

6.6.3 How do you intend to contribute to the World Network of Biosphere Reserves in the future and to the Regional and Thematic Networks?

The BLBRA intends to continue to share items of interest in a digital format between the WNBR website and our newsletters or website. We recognize that these networks are important and during our post-pandemic strategic planning session we will develop a strategy and tactics to increase contributions in the form of articles, collateral, attendance or hosting events for example. Our major challenge is to enroll more partnerships to complement our volunteer board structure. Our organization would be able to contribute in a more substantial way if we had more funding in place.

6.7 What are the main factors that influenced (positively or negatively) the success of activities contributing to the logistic support function?

Education is a constant process and activity, both for building awareness about the BLBR and more importantly about the international mandates for conservation of biodiversity, logistic support for climate change action, and sustainable development at all levels.

The main factor that influences BLBRA activities contributing to logistic support is primarily networking. Our biosphere has several well-established cooperating organizations since its nomination in 2011. Essential among these organizations are the CEPI, ACAP, ACOA, four local municipalities and the five First Nations communities. It is absolutely necessary that we maintain and deepen these connections and seek additional networking partners to maintain and increase our ability to facilitate various programs.

6.8 Other comments/observations from a biosphere reserve perspective.

No further comments.

7. GOVERNANCE, BIOSPHERE RESERVE MANAGEMENT AND COORDINATION:

[Biosphere reserve coordination/management coordinators/managers have to work within extensive overlays of government bodies, business enterprises, and a 'civil society' mix of non-governmental organizations and community groups. These collectively constitute the structures of governance for the area of the biosphere reserve. Success in carrying out the functions of a biosphere reserve can be crucially dependent upon the collaborative arrangements that evolve with these organizations and actors. Key roles for those responsible for the biosphere reserve coordination/management are to learn about the governance system they must work within and to explore ways to enhance its collective capacities for fulfilling the functions of the biosphere reserve.]

PREAMBLE:

The Bras d'Or Lake Biosphere has a long, complex history of governance structures and processes. The post-glacial landscape was shared by the Atlantic region's seasonally nomadic Indigenous people—the Mi'kmaq. Waves of European colonization produced various zonations, resulting in the current mosaic. Most of the forested land within the Bras d'Or watershed is recognized as Crown land; most of the water and road frontage land is owned by private citizens and small businesses; and five parcels adjacent to the lake are reserved for the Mi'kmaq. Two villages, four county municipalities and the five Mi'kmaw communities comprise levels of local governance that fall within the jurisdictions of one provincial and one federal government. As a result, at least 18 agencies are empowered with legal authority over various aspects of human society and occupation within the biosphere. The geographical boundaries of the Bras d'Or Lake Biosphere Reserve are not defined by the boundaries of any of these jurisdictions, and the Bras d'Or Lake Biosphere Reserve Association (BLBRA) is not one of those empowered agencies.

In reporting on governance and management within the Biosphere, we recognize two overarching principles: that which is internal to and controlled by the BLBRA, and that which is the domain of various democratically empowered agencies that can, at best, only be influenced by the Biosphere Reserve Association. We can write definitively about former and can only make informed interpretations of the latter because of special partner relationships; we cannot speak for them.

At the same time that the BLBRA was formed and preparing the application for BR designation, a Mi'kmaw community-led initiative was already convening most of the empowered agencies to join a collaborative planning forum (the Collaborative Environmental Planning Initiative, CEPI) for the Bras d'Or. The CEPI is a cooperating partner of the

BLBRA, with reciprocal memberships, common areas of interest and a shared vision for sustaining ecosystem functions and economic development. While CEPI has no mandate to govern, its forum encourages coordinated management decisions by the empowered agencies with a specific focus on the Biosphere and its people. While the BLBRA has no mandate to govern either, its forum brings an international perspective and access to success stories from Biosphere Reserves around the world and in turn the wider world learns from our successes.

7.1 What are the technical and logistical resources for the coordination of the biosphere reserve?

The BLBRA has a very dedicated resource pool of individuals and organizations that provide the technical and logistical needs of the biosphere reserve. As much as such collaboration has sufficed to date, the BLBRA is steadily growing its resource base and is looking forward to having a greater tangible presence. The BLBRA uses various means to initiate, coordinate, participate in and communicate initiatives within the Biosphere and beyond to support the main pillars of the UNESCO MaB Project. These include face-to-face and online meetings, telephone calls, email, social media, websites, newsletters, church bulletins, brochures, rack cards, newspaper articles, banners, radio, posters, sandwich boards and fixed road signage. The content for such media developed using any combination of text, graphics, video, audio and live interaction as budget and timeframes allow. We are thankful for the support from others who often step in to donate services.

The Association recently implemented Google Suite (Google Workspace) which will allow us to better manage and share both internal and external communications, calendars and documents, hold longer online meetings and generally be more efficient and transparent.

Our Communication Plan, presented in 6.5.1, is a living document that identifies our target audience; it is quite diverse in scope, needs and frequency of communication. The audiences can be segmented in various ways but generally fall into eight groups described in Section 6.5.1, with tourism rapidly becoming a subset of the Industry segment.

The BLBRA Network

At the core of the logistical operation of the Biosphere Association is the Board of Directors and subcommittees. The working Board of Directors has representation from municipal governments and from communities throughout the watershed area. Board meetings occur 6-9 times per year and are held at various community venues around the Biosphere, including the Annual General meeting (AGM). All meetings are open to the public and open to requests for presentations. The dialogue is open and respectful in the interest of mutual cooperation and support. Sub-committees are formed as initiatives and projects are identified, and report back to the Board meetings.

A geographic shape file (see section 9.1) of the Biosphere, displaying the boundary and identifying Core, Buffer and Transition Areas is provided by the NS Department of Lands and Forestry, with input from the Nature Conservancy of Canada, Bras d'Or Preservation Nature Trust and the Nova Scotia Nature Trust, to name a few.

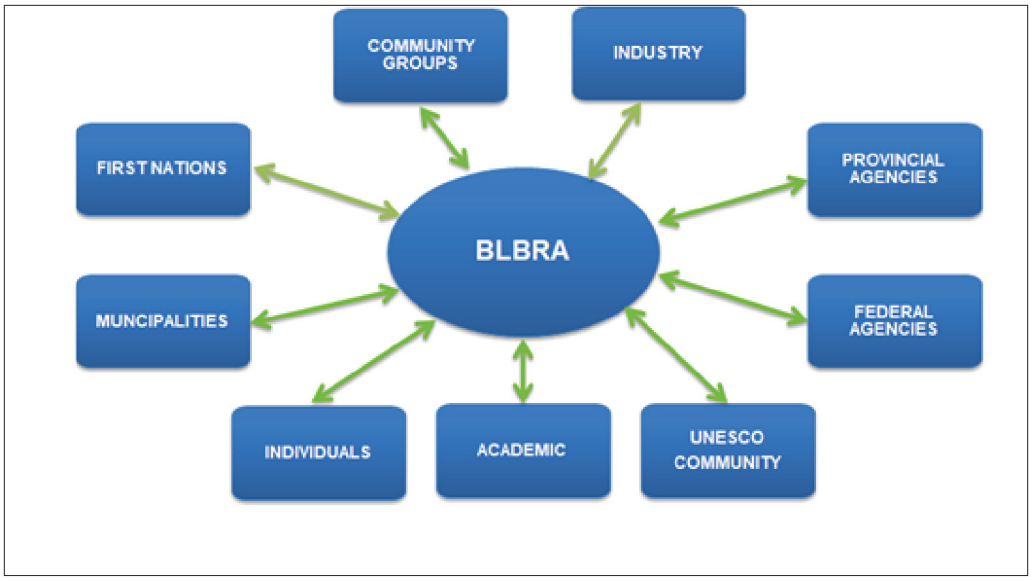


Fig. 7.1

There are further technical and logistical resources provided by the cooperating agencies that are mainly charter members of CEPI. Additional organizations providing technical and logistical support for sustainable development include: The Celtic Colours International Festival, Destination Cape Breton Association, the Cape Breton Partnership and the Cape Breton Centre for Craft and Design.

7.2 What is the overall framework for governance in the area of the biosphere reserve? Identify the main components and their contributions to the biosphere reserve.

7.2.1 - The BLBRA and its contributions

The BLBRA is membership driven and is a registered non-profit society in Nova Scotia. It offers lifetime, family, individual and business memberships. As of November 5, 2020, there were a total of 140 members.

The 20-member Board of Directors is elected from the membership to set policy and oversee the day-to-day affairs of the association. The BLBRA operates in an open, transparent way under a constitution and set of by-laws (BLBRA, 2019), as approved by the general membership.

The Board of Directors (Table 7.1) elects Officers from within the BOD and uses a management team model of governance (20 members; similar to a corporate-style of management; task oriented with various committees struck as required). Directors and Committee members are all volunteers.We are part of a local area/watershed network.

7.2.2 Other Organizations and their contribution

CEPI stands out as a unique partner—one that preceded the Biosphere designation. The seventeen signatures affixed to their charter document represent the collective intent, or 'will,' of the relevant governments with responsibilities for the management and protection of Bras d'Or Lake and its watershed. The charter includes the signatures of Nova Scotia

Director (Position)	Position; Work or Affiliation; Community
John MacLennan (ex officio)	Representative of the Municipality of the County of Inverness
Kirsty Lock (ex officio)	Representative of the Nova Scotia Community College (NSCC)
Perla MacLeod (ex officio)	Representative of the Municipality of the County of Victoria
Stan Johnson (ex officio)	Representative of The Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI)
Steve Parsons (ex officio)	Representative of the Cape Breton Regional Municipality (CBRM)
Vacant (ex officio)	Representative of the Municipality of the County of Richmond
Allison McIsaac	Member at Large; Eskasoni Fish and Wildlife Commission (EFWC)
Brian MacDougall (Treasurer)	Member at Large; Retired; Kempt Head, Victoria County
Eileen Crosby (Chair)	Member at Large; Retired; Ben Eoin, Cape Breton County
Eliot Frosst	Member at Large; Ross Ferry, Victoria County
Elizabeth MacCormick	Member at Large; Verschuren Centre for Sustainability in Energy and the Environment
Foncie Farrell	Member at Large; Port Hawkesbury Paper
Gordon Kerr	Member at Large; St. Peter's Economic Development Org.; St. Peter's, Richmond County
Maureen Cameron-MacMillan (Vice-chair)	Member at Large; Nova Scotia Department of Lands & Forestry
Pierre LaRochelle (Secretary)	Member at Large; Retired; St. Peter's, Richmond County
Rod Beresford	Member at Large; Cape Breton University (CBU)
Rodney Chaisson	Member at Large; Baile nan Gàidheal | Highland Village history museum and cultural centre, Iona, Victoria County
Tracy Marshall	Member at Large; CEPI Youth; Potlotek First Nation

Table 7.1

Provincial Government Deputy Ministers and Government of Canada Directors-General, Municipal Wardens/Mayors, and Mi'kmaw chiefs. Its existence is extremely significant, truly a historic document that lays the foundation for a unique and inspiring form of collaboration that cannot be found anywhere else.

Many other groups (see 7.1) are focused on sustainable development in the watershed—work together with the CEPI and the BLBRA with mutual support.

7.3 Describe social impact assessments or similar tools and guidelines used to support Indigenous and local rights and cultural initiatives (e.g. CBD Akwé:Kon guidelines, Free, Prior, and Informed Consent Programme/policy, access and benefit sharing institutional arrangements, etc.).

The BLBRA is always looking for ways to positively support Indigenous and local rights and cultural initiatives. Indigenous initiatives were acknowledged from the outset and their participation was an important element in the development of the initial designation submission. The Mi'kmaw concept of *Netukulimk* (nay-du-gu-limk) promotes sustainability in interactions with the environment—one of the core functions of a Biosphere Reserve.

The participation of Mi'kmaw communities has strengthened over the past 10 years—shown most recently by the forum on Climate Change Adaptation in which the BLBRA partnered with the Collaborative Environmental Planning Initiative (CEPI) in June 2019.

The Sobey School of Business at St. Mary's University has developed an impact assessment lab through their Centre for Leadership Excellence. It would be possible for the BLBRA to reach out to them for information on assessments in the watershed.

7.4 What (if any) are the main conflicts relating to the biosphere reserve and what solutions have been implemented?

There have been no significant conflicts since the Biosphere Reserve designation was awarded in 2011.

Not considered a 'conflict' per se, coordination and sharing of information of the network's activities within the watershed was indeed a hurdle. An informal discussion group was formed: Organizations Related to the Bras d'Or (ORB) which includes the UINR, the BLBRA, ACAP-CB, Pitu'paq Partnership, Bras d'Or Institute at CBU, Bras d'Or Stewardship Society, Bras d'Or Preservation Nature Trust and CEPI. Representatives of these groups met face-to-face twice a year from 2012 to 2018 to share what each organization is doing/planning or looking for help with. The function of the ORB is now achieved through joint membership between groups, newsletters, web sites and social media posts.

7.4.1 Describe the main conflicts regarding access to, or the use of, resources in the area and the relevant timeframe. If the biosphere reserve has contributed to preventing or resolving some of these conflicts, explain what has been resolved or prevented, and how this was achieved for each zone?

Forestry activities in the buffer zone (called C2 lands) have generated conflicts between groups who see the use of forests differently. Clear-cutting practices on some provincially owned lands are allowed under the Integrated Management Practices adopted by the Nova Scotia government. Nonetheless, many believe certain kinds of forestry practices, albeit within the sustainable forestry guidelines of certification bodies internationally, FSC for example, should not be allowed on the basis of ecosystem degradation and loss of diversity. The BLBRA sees its role as; (1) fostering respectful dialogue on these differing viewpoints and (2) providing access to information on best forestry practices from biospheres around the world through the UNESCO MaB resources.

In the Fall of 2020, Potlotek First Nation initiated a moderate livelihood fishery in St. Peter's Bay in accordance with the Supreme Court of Canada's *1999 Marshall* decision (cited in our 2010 submission). There was concern in the community that there might be animated resistance, but the fishery has proceeded without incident. The Biosphere Reserve Association has not been directly involved.

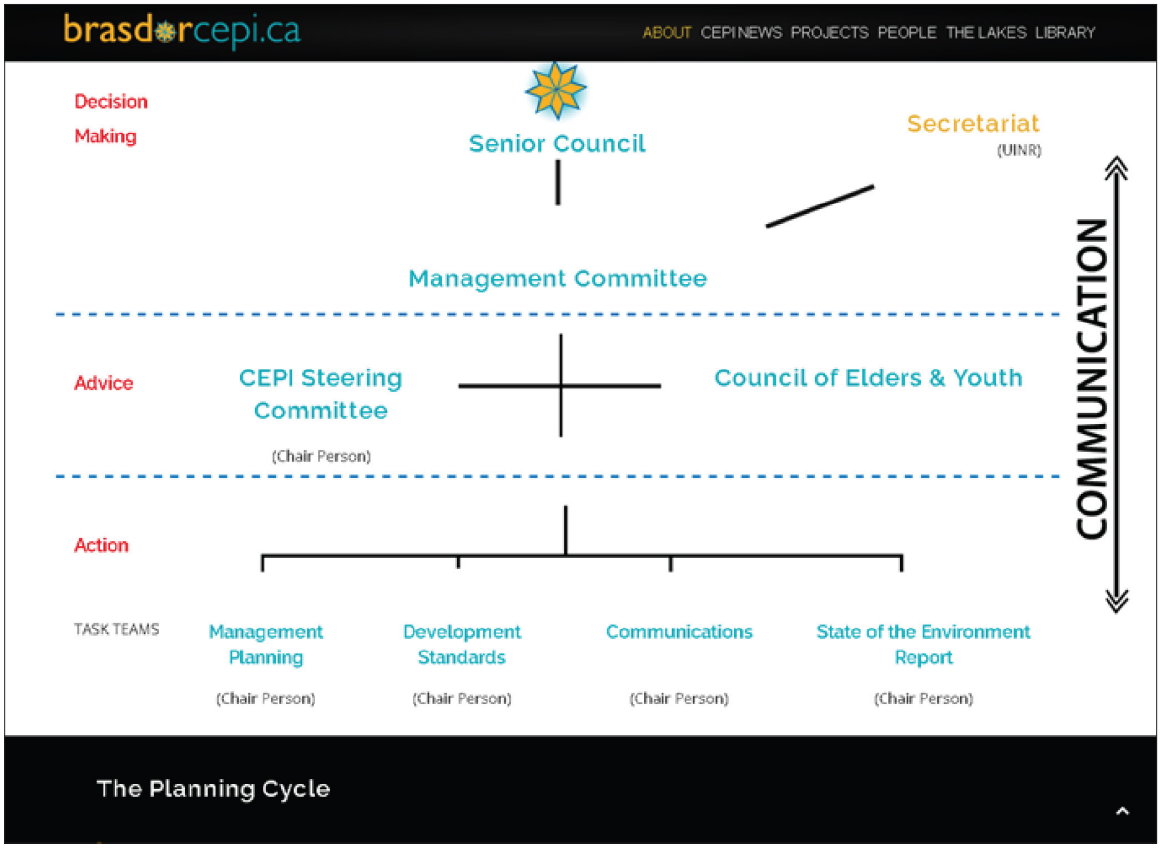


Fig. 7.2 - CEPI Structure

7.4.2 Describe any conflicts in competence among the different administrative authorities involved in the management of the area comprising the biosphere reserve.

There are no known conflicts in competence at this current time.

7.4.3 Explain the means used to resolve these conflicts, and their effectiveness. Describe its composition and functioning, resolution on a case-by-case basis. Are there local mediators; if so, are they approved by the biosphere reserve or by another authority?

Not applicable.

7.5 Updated information about the representation and consultation of local communities and their participation in the life of the biosphere reserve:

7.5.1 Describe how local people (including women and Indigenous people) are represented in the planning and management of the biosphere reserve, for example assembly of representatives, consultation of associations, women's groups.

In accordance with the Association's by-laws, the Board of the BLBRA has six *ex officio* seats which can be assigned to various organizations that complement the work of the Board. Currently, these seats are held by one representative from the Nova Scotia Community College, one from the Collaborative Environmental Planning Initiative (CEPI), and typically all four of the municipalities that share the Biosphere's watershed. One exception to this has been the lack of representation from Richmond Co. in the past few years due to councillors' time restraints. Notably, all four municipalities provided funding (27%) for Biosphere highway signage along the main thoroughfares around the lake. All four Municipalities have Community Integrated Sustainability Plans and Climate Change Adaptation Plans which are allied with the Biosphere's pillars of Sustainable Development and Capacity Building. Outcomes of these plans are extensive and are included as support documents in Section 9.

The five First Nations communities within the Biosphere, Potlotek, Esksoni, We'kogma'q, Wagmatcook and Malagawatch, among many other stakeholders, are represented on the BLBRA Board of Directors by the ex officio Director from the CEPI. The CEPI has a functioning organizational model (Fig. 7.2) which includes a Steering Committee that meets quarterly with federal, provincial, municipal and Mi'kmaw governments, industry, academia and NGO representatives, a management committee which meets monthly to hear from and discuss task teams, management plans and funding, etc., a Mi'kmaw Elders' council, and a senior council that meets annually. The senior council is composed of federal Regional Directors General, provincial Deputy Ministers, municipal Mayors and Wardens, and First Nations Chiefs.

A CEPI Youth Coordinator is also on the BLBRA Board, reporting on projects undertaken by Mi'kmaw youth from the five First Nations communities. Most recently, CEPI youth were engaged in Species Watch, a contest where they learn about species-at-risk in the Bras d'Or Lake Biosphere.



Fig. 7.3 Photo:CEPI Youth Facebook)

There are several smaller communities and villages around the Biosphere, typically located with easy access to the estuaries and the alluring waters of the Bras d'Or Lake, or Pitu'paq (Mi'kmaq for 'flowing into oneness'). Many of those communities organize one-off and annual events that integrate the promotion of the Biosphere and its environmental, educational or cultural imperatives. These events include Bras d'Or Watch (Citizen Science) held in Ross Ferry, St. Peter's, Whycocomagh, Ben Eoin and Grand Narrows; World Oceans Day in Iona and Hike the Hill in Ben Eoin during Celtic Colours. These events require substantial organization, promotion and volunteer involvement. In recognition of these smaller communities the BLBRA purposely holds its Board of Directors meetings in different locales around the watershed.





Figs. 7.4, 7.5 CBRA Reps. who attended the CCA Forum in Baddeck and Wagmatcook (photo: E. Crosby)

Various events have been held by the BLBRA over the last 10 years. The largest of these (co-hosted by CEPI) was the three day Climate Change Adaptation Forum held in June 2019 in conjunction with the Canadian Biosphere Reserves Association Summer Gathering. Along with invited guests and organizational representatives, the general public was invited to participate. (See: Climate Change Adaptation, Guidelines & Best Practices.) Since March of 2020, the Covid-19 pandemic has limited Biosphere participatory events to a great extent.

Women play a significant part in the planning and management of the Biosphere. Historically, women make up 25% of the 20 person board. Our first Chair was Dr. Teresa MacNeil (C.M.), an adult educator, and advocate for community economic development who is a well-respected leader throughout the country. Currently both the Chair and Vice-Chair of the Board are women. A First Nations' woman currently represents Indigenous Youth. Various committees such as the Communications Committee, Trail Committee, Education Committee, and Bras d'Or Watch Committee have all been led by women.

In the Fall of 2020, the municipalities of Richmond County voted in two women on a five member council, electing one of those women as the warden. Inverness County elected three women to a six-member council electing one of these women as the warden. Similarly, the Cape Breton Regional Municipality voted in their first female Mayor. We reached out to them with congratulations and hope they will consider the Biosphere during their many deliberations.

Two recent studies were conducted regarding women's issues of equality in the workplace. The first, Cape Breton Partnership (2019), *Barriers to Success for Indigenous Female Entrepreneurs in Cape Breton - Unama'ki* is summarized below:

> Focus Groups and Survey Summary
>
> With assistance from the advisory committee, focus groups were held in each community with a total of 27 Indigenous female entrepreneurs participating in discussions and 25 providing responses to a survey. Forty-two women, including four economic development representatives, attended the wrap-up meeting in Membertou, First Nation.

A summary of the survey results revealed:

- 64% of respondents are currently active in business
- Craft and design was selected as the most common business/industry
- 84% of respondents have not completed a business plan
- Lack of funding was identified as the top barrier to business success or growth
- Only 4% of respondents have contacted a traditional financial institution

The second study was a gender-based analysis (Vibe Creative Group (2019), *Enhancing Entrepreneurial Supports for Women Living and Working in Cape Breton,* The key take-away was;

> While the research uncovered many challenges experienced by women entrepreneurs, the programs and services offered in Cape Breton do not vary between women and men—… no program-specific gender bias [was exposed]. Therefore, it may be easy to [assert] that women have as much opportunity for support as their male counterparts. This is not true. Based on the findings of this study, it may be clearly stated that women entrepreneurs do not have the same opportunities as male entrepreneurs. Much of this comes down to sector-specific programming. A heavy percentage of entrepreneurial programs are directed at sectors where women typically do not start businesses—the majority of women-owned businesses are located in the services sector. Governments, financial institutions, venture capitalists and other support organizations are slow to recognize the value embedded in such businesses. To move forward and achieve gender equity in entrepreneurship in Cape Breton and beyond, all partners in the business eco-system, including governments, must work together to achieve a successful outcome for women entrepreneurs in all sectors. (p. 5)



Fig. 7.6 Report: Enhancing Entrepreneurial Supports, p. 28.

Another nugget from this study pointed to cultural barriers for women entrepreneurs.

> There were also cultural barriers to women's entrepreneurship identified through this research. One service provider working in a rural, quite traditional community, reported that several of her women clients did not possess a driver's license as this was a cultural norm in their community. Others were not encouraged in their business venture as their spouse did not support the notion of the entrepreneur working outside of the home. In such situations, often these women did not have personal credit as the spouse held all the personal finances in their name. This makes it especially challenging for these women to access lending from traditional banks as well as non-traditional lending agencies. (p. 23)

So, from the BLBRA perspective, when planning future projects, especially where community capacity building is concerned, these imbalances should be recognized and addressed.

7.5.2 What form does this representation take: companies, associations, environmental associations, trade unions (list the various groups)?

The BLBRA has strengthened as a resource, strong in information collection, dissemination, facilitation and organization. We currently segment our information providers, stakeholders and target audience from the communities into 11 categories : Business/Industry, Gov. County, Gov. First Nation, Gov. Municipal, Gov. Provincial, Gov. Federal, Institution, Academia, Organization, Museum, Venue.

We communicate with these stakeholder groups in many ways as outlined in our communication plan, Section 6.5.1. Many of our efforts involve pushing out information via our Website, Social Media or Newsletter. Individuals, groups and organizations above are invited to contact us by email or messenger, subscribe to our newsletter, to take out an individual, family or business membership, observe our meetings, volunteer to be on committees, stand for election to the Board of Directors through our nomination process or invite us to speak with them individually or formally.

The Board of Directors represent a broad cross-section of our community including Eskasoni Fish and Wildlife Commission (EFWC), Ross Ferry Park, Cape Breton University (CBU), paper industry, economic development, nonprofit, municipal government, Nova Scotia Community College, Nova Scotia Dept. Lands & Forestry, tourism, Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI) and CEPI Youth. It cannot be understated how much insight from federal, provincial, municipal and Mi'kmaw governments, industry, academia and NGOs and the CEPI representative brings to our table.

The public and others are always welcome to request an opportunity to address or present at our Board of Director meetings, forums, workshops and the annual general meeting. Section 7.5.3 below explains how we are being proactive in identifying why and with whom the BLBRA needs to develop stronger, on-going partnerships and networking support.

7.5.3 Indicate whether there are procedures for integrating the representative body of local communities (e.g., financial, election of representatives, traditional authorities).

As mentioned in 7.5 and 7.5.2, our Board has 6 non-designated *ex officio* seats which we can fill according to our board requirements at any particular time. For example, if a municipal unit wasn't sending a representative to our meetings then that seat could be filled by another association or organization willing to participate.

In addition, the BLBRA cooperates with a number of other organizations such as the CEPI, ACAP, Eskasoni Fish and Wildlife, Cape Breton University and others mentioned in section 2.4.7.

7.5.4 How long-lived is the consultation mechanism (e.g., permanent assembly, consultation on specific projects)?

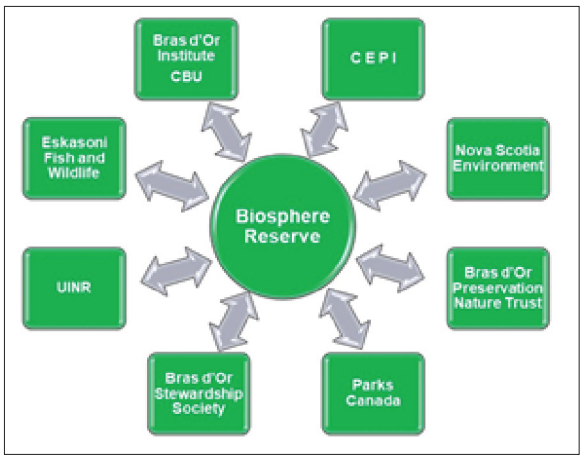


Fig. 7.7 - BLBRA Cooperation Plan

A Plan of Cooperation can be found in the original submission document for the BLBRA, (p. 203-15). That plan was based on the work of the original Nomination Committee of the BLBRA which met with many stakeholder organizations in and around the Biosphere designated watershed. The purpose was to develop partnerships with the BLBRA to work on various projects which involved the three goals of a UNESCO biosphere. The consultation mechanism on projects became somewhat diluted over the past 10-year period for one main reason. The Plan of Cooperation was omited from the strategic plan of 2013-2015, and due to the fact that there have been no follow-up strategic plans since 2015, it is clear that the original bonds with those stakeholder relationships have weakened.

This Periodic Review has allowed the BLBRA to re-emphasize the importance of strategic planning with a strong emphasis on stakeholder relationship building which will be an intended point of focus in our strategic planning sessions scheduled for post-Covid 2021.

As noted above, we are already looking at formalizing the integration of the impactful representative bodies making up our local communities. This will help ensure that we have the tactics in place to attract and retain partnerships that will continue to ensure the goals of the Biosphere are propagated throughout the community and for decades to come.

7.5.5 What is the impact of this consultation on the decision-making process (decisional, consultative or merely to inform the population)?

The BLBRA is a very inclusive and transparent organization. Meetings are publicized and Minutes of Meetings are available on its website. While engaged in various projects and sharing updates on committee initiatives and reports at Board meetings, we discover new possibilities and paths forward, or articulate our conclusions. Each time we have a Director, observer or presenter provide feedback at our meetings, we take note. Motions are openly questioned and moved upon. We sought out new perspectives when we held our Climate Change Adaptation Forum (see 7.5.1) and other workshops. Our online presence also means that we can receive both solicited and unsolicited input quite easily. In the end, we consider and act on the input as transparently and timely as possible and publicize it on our website, Facebook pages or other media channels.

7.5.6 At which step in the existence of a biosphere reserve is the population involved: creation of the biosphere reserve, drawing up of the management plan, implementation of the plan, day to day management of the biosphere reserve? Give some practical examples.

The general population has always been encouraged to be involved in whatever aspects of the BR they choose. The process for nominations between 2005-2010 was dominated by public outreach through presentations about the UNESCO Man and the Biosphere Programme as we built support for our designation. All aspects of the management of our activities are open to the public and our membership has no boundaries. All are welcome.

As an example, our website strongly solicits the involvement of the general public to join the association or volunteer. The Bras d'Or Watch program solicits participation by all residents to experience a day of citizen science in the watershed. Regular Board meetings are public events that are held throughout the BR's extensive geography, and the Annual General Meeting must have a quorum from the membership as specified in our bylaws.

7.6 Update on management and coordination structure:

7.6.1 Describe any changes regarding administrative authorities that have competence for each zone of the biosphere reserve (core area(s), buffer zone(s) and transition area(s))? If there are any changes since the nomination form/last periodic review report, please submit the original endorsements for each area.

The coordination and management of the Biosphere has not changed and remains with various agencies of government (federal and provincial), such as Fisheries, Environment, Natural Resources, Rural and Economic Development, and Agriculture. Certainly CEPI remains a key influencer.

7.6.2 Update information about the manager(s)/coordinator(s) of the biosphere reserve including designation procedures.

There is no designated manager/coordinator of the biosphere reserve. Federal funding, previously given to all biosphere reserves in Canada for such operational expenses, was

eliminated shortly before our designation. To date, Ffnancial resources, albeit growing, have not been sufficient to hire a manager/coordinator; these functions are carried out by volunteers – primarily members of the Board of Directors but also from the general membership of the association.

7.6.3 Are there any changes with regard to the coordination structure of the biosphere reserve? (if yes, describe in detail its functioning, composition and the relative proportion of each group in this structure, its role and competence.). Is this coordination structure autonomous or is it under the authority of local or central government, or of the manager of the biosphere reserve?).

There are no changes in the coordination structure of the biosphere reserve. It is autonomous in nature.

7.6.4 How has the management/coordination been adapted to the local situation?

As a registered charitable society and with a not-for-profit operational model, coordination and volunteer management is a reflection of the population of the biosphere reserve. Board membership is drawn from all areas of the biosphere including 6 appointees and up to 14 members at large. Appointees include representation from municipal governance bodies, educational institutions, land trust organizations, the Collaborative Environmental Planning Initiative (CEPI) and First Nations.

7.6.5 Was the effectiveness of the management/coordination evaluated? If yes, was it according to a procedure?

The evaluation of the effectiveness of our work is an organic exercise in which volunteers are asked to report regularly on their areas of responsibility. All actions—completed out or not—are accountable to the greater membership of the association. The Annual General Meeting (AGM) of the membership includes an Annual Report from the Board of Directors and that is open for questions and comments.

During our self-assessment we discovered that Annual Reports did not include financial reports in our publicly available documents, although the financial reports were presented at the AGM. We also found some recent reports missing. Our current executive is taking steps to rectify these shortcomings. Regular monthly Executive Committee meetings will now take place, which was not the practice in the past.

7.7 Update on the management/cooperation plan/policy:

7.7.1 Are there any changes with regard to the management/cooperation plan/policy and the stakeholders involved? If yes, provide detailed information on the process for involvement of stakeholders, adoption and revision of the plan.

The cooperation plan policy originally outlined in the BLBRA nomination document (p. 203-15) is still in effect. Consequently, the BLBRA primarily functions as a facilitator among its partner organizations. However, due to the facts that there is considerable competition for scarce financial resources and that we have not had a strategic plan in place

since 2015, we need to redouble our efforts at strengthening those partnerships and developing others.

A Strategic Plan (2013-2015) for the Bras d'Or Lake Biosphere Reserve was created in 2012-13. Thyagrissen Consulting Limited of Truro, NS, was hired, with funds from Enterprise Cape Breton Corporation (Federal). The purpose was to assist the group in this exercise, facilitating them through focus group sessions involving 16-19 dedicated volunteers representing various organizations involved in Bras d'Or Lake-related projects. That report presented the outcomes of the strategic planning exercise. It is considered a 'living document' which the BLBRA will continue to expand upon as they fine-tune the goals and strategies and as changes occur within the environment (Thyagrissen Consulting Limited, 2013).

As planning and policy ideas become initiatives, steering committees are formed with volunteers and their chairpersons reporting back to the Board of Directors. These included an Atlas Committee, Nominations Committee, Membership Committee, Communications Committee, Museum Committee, Signage Committee, Education Committee, Bras d'Or Watch Committee, Trail Committee, Periodic Review Committee, and Climate Change Adaptation Forum Committee. Committees are dissolved when their project is completed.

A brief overview of the outcomes of the plan are covered in section 2.4.2 with details covered in section 7.7.5.

7.7.2 Describe contents of the management/cooperation plan (provide some examples of measures and guidelines). Is the plan binding? Is it based on consensus?

The draft cooperation plan referenced in the original submission document was updated as a strategic plan completed in 2013. It prioritized 3 areas through its Goals:

1. Promotion of Best Practices (Education)
2. Increasing awareness of the designation (Marketing)
3. Track and measure progress of 3 core functions of the BR (On-line Database)

It was approved unanimously and a copy can be found in Section 9.5. As of 2020 it needs to be updated and plans are underway for this to happen.

7.7.3 Describe the role of the authorities in charge of the implementation of the plan. Describe institutional changes since the nomination form/last periodic review report. Please provide evidence of the role of these authorities.

The authorities in charge have not changed. The implementation of the plan is under the direction of the Board of Directors and ultimately the general membership. Committees are formed for specific tasks such as 'Education,' 'Atlas,' 'Signage,' 'Trails,'and 'Citizen Science' for example. The actions taken on the goals are listed in sections 7.7.1 and 7.7.5

7.7.4 Indicate how the management plan addresses the objectives of the biosphere reserve.

The plan was created within the context of the 3 core functions of Biosphere Reserves: Conservation, Sustainable Development and Logistic Support. The plan re-affirmed the vision and mission statements for the association:

Our vision statement: 'We envision the Bras d'Or Lake watershed as a special place where communities are joined together in thoughtful promotion of environmental assets and responsible economic development.'

Our mission statement is, '…to engage all peoples in the balanced and sustainable development of the exceptional cultural, social, environmental and economic assets within the Bras d'Or Lake watershed.'

7.7.5 What are the progresses with regard to the guidelines of the management/cooperation plan/policy?

We have considered the guidelines of the management/cooperation plan/policy to be the three goals of the Strategic Plan which is provided in Section 9. We implemented the three goals as outlined below:

Education has been addressed through the development of four self-inquiry units on the Biosphere for use in upper elementary schools. These units have been approved by the NS Department of Education. Last year the BLBRA published a Climate Change Adaptation Guidelines booklet for use in other UNESCO biospheres and communities.

The CCAF also produced some concrete actions that can be taken immediately. They were:

1. Initiate a fundraising event to begin building resources for community-based adaptation.

2. Begin a project in your biosphere to monitor some key indicators of ecosystem health. These form the backbone of the overall UBR adaptation plan.

3. Outline and share the governance model at work in your UBR with other UBRs in Canada. With such a diverse set of arrangements, there is certainly room for collaborative learning on how to overcome governance challenges.

4. Search out climate service organizations that might have already created regional and local projections of expected climate change. Or visit Environment Canada's climate information portal to determine expected local and regional changes (Here is an example of the federal information portal for Baddeck: https://climatedata.ca/explore/location/?loc=CABFY).

5. Use social media to reach out and engage people around the issue. Create a hashtag or start a blog for your UBR. Begin sharing videos of local adaptation actions on YouTube. The CCAF suggested we begin an "Adaptation Minute" format that could briefly explain ongoing work within Canada's UBRs. This communica-

tion tool could be spearheaded by a CBRA committee that would engage potential funders and partners.

6. Hold a workshop in your UBR in order to get all voices to the table to have their say on what they see as part of the UBR's future.

7. Distribute the one-pager associated with these guidelines to your managing board members.

8. Determine a storage space to put all currently existing relevant information on climate change adaptation within your UBR. There are many options for this. It could be as simple as a shared Dropbox, or a full-blown website.

In addition, our newsletter's Best Practices section, includes monthly articles highlighting the natural history of the BLBRA and field trips on forestry practices are also ways in which we address the goal of education.

Marketing has focused on brochures, newspaper articles, signage, logo development and registration, school curriculum development and website creation/renewal.

An on-line database was created through volunteers and contract work and is accessed on through our website.

In preparation for the self-study required for the UNESCO decadal Periodic Review that the Bras d'Or Lake Biosphere will be subjected to in 2021, we conducted a poll of the 20 directors and 7 observers of the association to identify and rank priority themes and activities. (This does not supplant the strategic planning exercise that will follow in 2021). The results of this survey provide insights to potential outcomes that may leverage funding because they are consistent with government policies and priorities.

Priority Theme I: Climate Change Adaptation. This is the defining challenge of the 21st century, requiring planful actions from all levels of society; from individuals to the United Nations. The BLBR is Canada's Biosphere leader as a result of BLBRA/CEPI 2019 Climate Change Adaption Forum (Guidelines enclosed).

PriorityAction: develop a Climate Change Adaptation Plan for the Bras d'Or Lake Biosphere. It will serve as a local, national and international example of best local adaptation practices.

Priority Theme II: Environmental Conservation and Sustainability. This is a foundational and crosscutting goal, ranging from protecting species-at-risk by preserving essential habitat, to conserving exploited populations and ecosystems so they can support future generations.

Priority Actions: Engage citizens of the Bras d'Or Biosphere in monitoring changes in indicators of the health of the ecosystem and its communities. The Bras d'Or Watch program has operated for 5 years in communities all around the lake, and a forest monitoring program has been trialed at one site. With assistance from research institutions, the results will be summarized in an annual 'report card' on the status of the Biosphere, and incorporated

into a digital geographic and cultural atlas of the Biosphere. An emerging initiative is the generation of Other Environmental Conservation Measures (OECM), especially for the Lake, which has no core areas designated.

Priority Theme III: Reconciliation with Indigenous peoples. Approximately 30% of the Biosphere's human population is indigenous. The five Mi'kmaw First Nations bring unique perspectives and skills to the BR, in which they are engaged at many levels, including the Collaborative Environmental Planning Initiative (CEPI).

Priority Actions: incorporate the principle of 'two-eyed seeing' (see sec. 6.3 & 6.4 for details) in all projects and activities undertaken in the Biosphere. Obvious examples are educational materials (e.g. school curricula, highway signs, Parks Canada displays), public engagement (e.g. Bras d'Or Watch, Climate Change Adaptation Forum), and governance (e.g. CEPI projects). Emerging examples include OECMs and Indigenous Protected & Conserved Areas.

Priority Theme V: Youth inclusion and engagement. The demographic of the Biosphere is highly skewed towards the elderly. Elders are to be valued, but the future lies in the youth, who need to seefutures for themselves in the Biosphere if they are to stay and contribute.

Priority Actions: include and encourage participation and leadership by young people in ALL projects and activities undertaken in the Biosphere. The CEPI Youth leader is a Director of the Biosphere Association, and in the past, Canada Summer Jobs students have worked on various Biosphere projects. We seek to increase the number and range of opportunities from youth experience, social enterprise and employment within the Association. With adequate resourcing, the Walking Around the Bras d'Or project could provide youth-oriented opportunities for healthy living, active transportation and outdoor employment.

Priority Theme V: Sustainable Tourism. The tourism industry provides livelihoods for people in Biosphere Reserves world wide, and is currently the most valuable industry in the Bras d'Or Biosphere. The potential for eco- and cultural tourism is far greater than what is currently realized.

Priority Actions: Assist entrepreneurs in developing businesses and social enterprises that are resilient both economically and ecologically. Offer incentives based on the value of the UNESCO Biosphere Reserve brand to encourage diversified, experiential activities to both staycationers and vacationers, as well as school and cultural groups that highlight the natural and cultural attributes of the Biosphere.

Priority Theme VI: Renewable energy. Global, National and Provincial focus is on renewable energy for mitigation of Global warming. The Bras d'Or Lake is one of only two Marine Renewable Electricity Priority Areas in Nova Scotia; yet nothing is being done to realize the potential for sustainable living in the Biosphere without fossil fuels.

Priority Action: Work with Federal and Provincial Government agencies, academia and the private sector to promote investment in the Bras d'Or Lake Biosphere as a logistically and culturally feasible and secure place to explore opportunities and technologies for the generation, distribution and conservation of renewable energy sources.

7.7.6 Were there any factors and/or changes that impeded or helped with the implementation of the management/coordination plan/policy? (Reluctance of local people, conflicts between different levels of decision-making).

There has been good cooperation with CEPI membership organizations, local people, funding agencies etc. while implementing the cooperation plan policy originally outlined in the BLB nomination document (p. 203-15).

The lack of staff (manager/co-ordinator) and requisite funding has slowed down the progress of implementing the Cooperation Plan and the subsequently developed Strategic Plan. All progress has been from the dedication of volunteers.

As previously noted, the BLBRA primarily functions as a facilitator through its partner organizations. Due to the fact that there is considerable competition for scarce financial resources and that we have not developed a new strategic plan since 2015, we need to redouble our efforts at strengthening those partnerships and developing others. To enhance the organization's role as a facilitator, the BLBRA needs to enhance the relationship with our current cooperating organizations throughout the Bras d'Or Lake Biosphere over the next several years and continue to connect with other similar minded organizations or community groups.

7.7.7 If applicable, how is the biosphere integrated in regional/national strategies? Vice versa, how are the local/municipal plans integrated in the planning of the biosphere reserve? (Please provide detailed information if there are any changes since the nomination form/last periodic review report).

All Biosphere Reserves in Canada take guidance from the Canadian Commission for UNESCO (CCUNESCO) (https://en.ccunesco.ca/) and the integration of our activities is managed through the Canadian Biosphere Reserves Association (CBRA) (https://www.biospherecanada.ca/). We are an active member of the CBRA since designation.

All BRs are different and focus on issues that are of priority in their region but these are always held up against the guidance from UNESCO/CCUNESCO/CBRA and are measured, in part, through activities such as this Periodic Review.

CBRA has developed a strategic plan for 2020 through 2025 which provides guidance for all Canadian Biosphere Reserves. A copy of this plan is provided in section 9.4.

Canada's Federal Tourism Strategy 2019 mentions BRs: 'Canada's UNESCO Biosphere Reserves and Geoparks will be positioned as key destinations for sustainable tourism, and local communities will be supported in their collective efforts to achieve and maintain these prestigious UNESCO designations' (p. 27).

The four municipalities with portions of their boundaries located within the Biosphere Reserve have Integrated Community Sustainability Plans which were issued about the same time the BLBRA status was declared and were referenced in the 2010 submission document. Outcomes of the plans are discussed in section 2.4.2.

An excerpt from the 2010 Richmond County plan page 36 reads: 'As such, the Lakes [*sic*] are more vulnerable to impacts from development and due to its unique history and ecology, have been nominated as a UNESCO Biosphere Reserve.' The plans are perfectly aligned with worldwide sustainability goals.

These Municipalities also have Climate Change Adaptation Plans, issued in 2013 which do reference the BLBRA as providing input. These plans are consistent with the goals of the biosphere and are referenced in Section 9.4.

Destination Cape Breton features the BLBR prominently on their promotional website.

The Federal Sustainable Development Strategy 2019 also mentions biosphere reserves as follows:

> Consider contacting the Canadian Biosphere Reserves Association to explore the potential of partnering with one of Canada's 18 UNESCO biosphere reserves on collaborative, community-based initiatives to protect our coasts and oceans. (p. 59)
>
> Many of Canada's UNESCO designated biosphere reserves include coastal and marine areas and facilitate multi-partner initiatives to conserve the health of these waters. From grassroots stewardship projects to collaborations with Indigenous peoples, universities, youth and governments, biosphere reserves create opportunities for organizations to work together to protect aquatic species at risk and increase the protection of marine and coastal areas. (p. 60)

8. CRITERIA AND PROGRESS MADE:

[Conclude by highlighting the major changes, achievements, and progress made in your biosphere reserve since nomination or the last periodic review. How does your biosphere reserve fulfill the criteria. Develop justification for the site to be a biosphere reserve and rationale for the zonation. What is lacking, and how could it be improved? What can your biosphere reserve share with others on how to implement sustainable development into practice?]

Brief justification of the way in which the biosphere reserve fulfills each criteria of article 4 of the Statutory Framework of the World Network of Biosphere Reserves:

8.1 "Encompass a mosaic of ecological systems representative of major biogeographic region(s), including a gradation of human interventions".

(The term "major biogeographic region" is not strictly defined but it would be useful to refer to the Udvardy classification system (http://www.unep-wcmc.org/udvardys-biogeographical-provinces-1975_745.html)).

As described in the nomination submission document (BLBRA, 2010), the BLBR comprises an area of approximately 357,000 ha. The Bras d'Or Lake itself accounts for about 31 % of the area of the Reserve (109,154 ha), and is composed of estuarine ecosystems with different salinities, temperature ranges, upwellings, downwellings and water circulation patterns. These characteristics arise from the narrow links to the Gulf of St. Lawrence and Atlantic Ocean, a complicated bathymetry, low rates of flushing and freshwater discharges into the Lake from twelve different subwatersheds, mostly along the western side.

The lake is bounded by a 247,434 ha terrestrial area of relatively steep hills surrounding a narrow coastal plain, providing topographic variety that includes elevated plateaus and tablelands, deep ravines and bottomlands all with diverse forest mosaics. Much of the area is second growth successional forests resulting from extensive forest cutting. There are also a number of small farms around the lake. There are a number of communities within the BLBR, the two largest being Baddeck and Eskasoni. Human interventions range from shipping, fishing and aquaculture, quarries, intensive forest uses, mixed agriculture, golf courses, a number of small settlements and extensive seasonal tourism. Open-pit gypsum mining, which was active in the BLBR ten years ago, is no longer so.

8.2 "Be of Significance for biological diversity conservation".

As noted in Section 8.1, the bathymetric configuration of the lake results in a diverse range of salinities and temperatures, and as a consequence, its aquatic habitats support a distinctive mix of marine and freshwater fauna, with a number of taxa existing close to their physiological thresholds. Some species assemblages that occur within the BLBR are normally associated with Arctic environments, while others are more typical of coastal marine ecosystems of Virginia in the eastern United States.

The biodiversity of the BLBR is described in Section 4.1, while Table 1 in Section 9.5 provides a list of species documented within the BLBR. Terrestrial species of significance within the Reserve include moose, white-tailed deer, black bear, bobcat, red fox and coyote. A diverse assemblage of bird fauna is found within the varied terrestrial and aquatic habitats. The sizeable local population of Bald Eagles around the lake is particularly noteworthy, and has even been included in advertising of the Bras d'Or as a tourist attraction for nature lovers.

As well, the BLBR provides habitat (and, in core and buffer areas, protection) for more than 400 internationally, federally and regionally rare species and populations, as noted in Section 4.1. Since our 2010 submission, a number of species at risk and species of conservation concern were newly recorded within the BLBR and many species that were known to occur in the Reserve have undergone status changes due to changes in (or increased knowledge of) the species' population trends and distribution (see Table 2 in Annex IV). The endangered Bicknell's Thrush, Canada lynx and American marten reside in forested habitats of the BLBR, while wood turtles, Rusty Blackbirds and boreal felt lichen favour watercourses and wet forested areas.

8.3. "Provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale".

(Including examples or learning experiences from putting sustainable development into practice).

The BLBRA is a good example of cultures working together to provide sustainable livelihoods. The CEPI Youth group, referenced in this document, is a great example of passing knowledge from generation to generation. The digital revolution is happening all over the world and the BLBRA is no exception Our partner DCBA has provided an amazing platform of one-stop shopping for prospective visitors and a platform for our local tourism operators to display their digital marketing.

In coastal areas such as the shorelines of the Bras d'Or Lake, sustainable development must include the incorporation of resilience to climate change and sea level rise into new and existing infrastructure. A number of local organizations have taken notice of this important aspect of sustainable development, and have taken action to address it. For example, a collaborative effort between ACAP-CB, CEPI and UINR led to a series of information sessions and the subsequent creation of a user-friendly best-practices guide for landowners on

the Bras d'Or (ACAP-CB et al 2013) covering topics such as coastal erosion, and coastal planting. As well, in 2015, ACAP-CB initiated the planting of a living shoreline in Eskasoni with the help of partners at Saint Mary's University, CEPI, UINR and the Unama'ki Fishery and Land Guardians; as detailed in Section 4.2, living shorelines are meant to work with natural hydrogeological processes and create and enhance habitat for birds, fish, snails and other invertebrates while stabilizing and expanding the shoreline. In areas where they are applicable, they can also be much more cost-effective to build and maintain than traditional, structural methods of erosion mitigation such as placement of armourstone.

8.4. "Have an appropriate size to serve the three functions of biosphere reserves".

The size was appropriate when we received our designation and the overall size has not changed.

8.5. Appropriate zonation to serve the three functions.

The overall size of each zone was presented in PART I – SUMMARY section (i). Notably, all Marine areas are considered to be a transition zone. An explanation of the zonation changes over the past ten years is provided in section 2.2.4 and 2.4.8. Further details about changes in each core area are provided in ANNEX V along with zonation maps comparing 2010 to 2020.

The zonation was deemed appropriate when we received our 2011 designation. Since much of the watershed is in private hands the usual concentric plan by many biospheres of core zone surrounded by buffer zone surrounded by transition zones was not possible in our biosphere.

In the ten years since, the size of the core area increased by 156 % and the buffer area decreased by 21% with the transition area increasing by 0.5 %. Notably, the terrestrial portion of the BLBR designated as core area has increased from 3.1 % to 8.0 %, helping to protect additional rare and vulnerable ecosystem types including older forest, wetlands and karst habitats. We consider that the zonation continues to be appropriate to serve the three functions of a biosphere reserve.

8.6. "Organizational arrangements should be provided for the involvement and participation of a suitable range of inter alia public authorities, local communities and private interests in the design and the carrying out of the functions of a biosphere reserve".

The organization, Bras d'Or Lake Biosphere Reserve Association, is the legal entity and charitable organization established specifically to coordinate BLBR activities. As detailed in section 7, it is governed by a volunteer Board of Directors, with a wide representation of interest—both public and private and geographically. The five First Nations' communities are represented by the Collaborative Environmental Planning Initiative (CEPI) representative on the Board as well as through a CEPI Youth representative. There is frequent com-

munication with public authorities at all levels (local, municipal, provincial, national) and positive working relationships with those bodies that hold jurisdiction over core protected zones. The BLBRA is seen as a facilitator of collaborative partnerships, and will provide leadership where requested by stakeholders. The CEPI also provides these organizational arrangements. All the cooperating institutions are represented on the CEPI Steering Committee and are active participants.

8.7. Mechanisms for implementation:

a) Mechanisms to manage human use and activities

The core and buffer zones are regulated by provincial departments of Environment and Lands and Forestry. Transition areas most often come under municipal regulations.

b) Management policy or plan

With the designation in 2011, a cooperation plan was developed to harmonize planning and activities with other stakeholder organizations that have similar interests in and concerns for the lake and its watershed. Essentially, this cooperation plan means aligning BLBRA's objectives with those of the other key stakeholders in terms of the three functions of a biosphere.

c) Authority or mechanism to implement this policy or plan

As stated in Section 7 our Board of Directors has no direct authority to mandate policy or plans over the Biosphere Reserve itself but other levels of government do as stated in the original submission document. NGO organizations who have a vested interest in the Biosphere can forge agreements to harmonize on projects which reflect the three functions of a biosphere

d) Programmes for research, monitoring, education and training

Yes, there are a number of these activities operating within the BLBR independently. While the BLBRA does not do any monitoring currently, we are engaged in a number of education projects through best practices, promoting CCA Forum guidelines and trail development, combining Bras d'Or Watch and Forest Watch with the 4-unit inquiry-based grade 4 curriculum based on two-eyed seeing (see Secction 2.3.7).

8.8. Does the biosphere reserve have cooperative activities with other biosphere reserves (exchanges of information and staff, joint programmes, etc.)?

At the national level:

We sought and received membership in the Canadian Biosphere Reserve Association (CBRA) immediately upon the designation being granted. We were in attendance, in Alma, New Brunswick, for the 2010 Annual General Meeting of CBRA. One of our Board members acts as the BLBR representative and participates in CBRA national meetings. One of our representatives was a member of the CBRA Executive Committee as well as a term as 2nd Vice Chair.

We hosted the Climate Change Adaptation Forum for CBRA in 2019, inviting CBRA to hold its summer gathering just prior to the start of the forum. Details of the forum are provided in section 6.6.1.

In 2018, the BLBR participated in a national tree-planting initiative led by Charlevoix BR as part of the G7 Carbon Offset project.

Tom Johnson, a past board member, is also a member of the CBRA Executive Committee as well as the BLB representative on the Indigenous Circle. He reports to us regularly.

The BLBRA was also involved in two pilot projects:

We were part of a project, coordinated by the national office and with a Memorandum of Understanding (MOU), to provide educational examples of sustainable development from Biospheres in Canada.

One of our members participated as a member of the project's contributing committee representing Canada's Biosphere Reserves. Participation included discussions during a two-day assembly in Quebec, regular teleconferences and written contributions. The publication of this work was "Learning from Each Other: Proven good practices in Canadian biosphere reserves (2013)".

At the regional level:

The Executive Director of Fundy Biosphere Reserve made a presentation at the Climate Change Adaptation Forum (June 2019). Phone conversations with the Director of South-West Nova Biosphere occur from time to time to seek clarification or assistance on a variety of matters.

Through twinning and/or transboundary biosphere reserves:

N/A

Within the World Network:

Tom Johnson produced the video for the Euro MaB through the "Proud to Share" video series in June 2018. Tom also attended the EuroMaB Conference in Ireland in April 2019 making a presentation/workshop on languages.

What has our biosphere done to embrace the UNESCO documents on interacting with Indigenous peoples and the Rights of indigenous people?

In April of 2018, the Board of Directors of the BLBRA officially joined the Pessamit Call for Reconciliation initiated in part by the Canadian Biosphere Reserve Association. It can be found on our website here. In doing so we have agreed to make reconciliation a priority and to take action by ensuring a genuine commitment to Indigenous cultures,guaranteeing that the BLBRA will uphold the UN declaration on the Rights of Indigenous People.

8.9. Obstacles encountered, measures to be taken and, if appropriate, assistance expected from the Secretariat:

As a carryover from the previous comment on reconciliation, having the word 'reserve' in the Biosphere's title is not acceptable in terms of branding given the negative connotation of that word here in Canada. There are five First Nation communities (once called reserves) within the Bras d'Or Lake Biosphere Reserve. As a sign of recognizing past grievances in the treatment of indigenous people in this country, we must remove the term 'reserve' from our current title. We haven't asked for an official name change yet but will be doing so in the near future. Generally, we refer to the Bras d'Or Lake Biosphere dropping the term 'reserve'.

A second obstacle encountered since the initial submission is the fact that the BR Association lacks a centre of operations. This is one area where we require more support. As an entirely volunteer Board with no office or staff member, we are more like a travelling road show. It makes it more difficult for the general public to recognize us. The only answer here is to see if the CEPI or one of the four municipal governments or possibly another public space would house us gratis. The federal government does not provide grants for either rental space or staff employment. This would give us much more consistent visibility among local residents of the BLBR than websites, newsletters, social media posts, etc. currently do.

The third obstacle has been our neglect of strategic planning. The periodic review has made that point very clear to us. This will be our main priority early in 2021. Funding will be sought to secure a professional individual to assist us with this task.

Another area that needs improvement is in strengthening our Board members and their skills through board initiation and a board manual to guide them. New Board members should have an introductory session with the Board Chair prior to their first meeting. This has not been a past practice.

Finally, our partnership with the local university must be strengthened and extended to other faculties other than just the Bras d'Or Institute. Meeting with the current President of the University to address this need to reach agreement in terms of our cooperation plan will help to remedy this situation.

8.10. Main objectives of the Biosphere Reserve:

The main objectives of the BLBRA are in the 2013-2015 strategic plan and have been updated at Directors meetings with updates provided on our website. Integrating the three functions of a UNESCO biosphere into the sustainable development objectives for the coming years will be incorporated in the strategic plan to be completed in 2021.

8.11 - Lessons Learned by the BLBRA during the periodic review:

- The absolute need for following and up-dating a strategic plan
- The need to strengthen connections and communication with cooperating organizations
- Improvements to the generation and content of the BLBRA Annual Reports
- Orientation of new Board members and building board skills
- Need for a board manual. Now completed
- Focus on continuous board recruitment

Table 8.1

Principle Objectives	Main Focused Achievements
Education	To promote and increase the use of "best practices" for a healthy society, culture, economy and environment. CCA Forum, 4 inquiry-based grade 4 curricula Pessamit call for reconciliation Bras d'Or Watch Forest Watch Trail development
Marketing	To increase awareness of the Biosphere among the biosphere residents by at least 20 %/year. highway signage enhanced website regular newsletters (4 x/yr.) almost daily Facebook updates promotional material—brochures, posters logo usage—door/window decals for businesses Instagram account monthly newspaper articles
Web-based distributed Atlas	To track and present progress towards the three biosphere core functions of sustainable development, biodiversity conservation and capacity building within the BLBR. web-based atlas

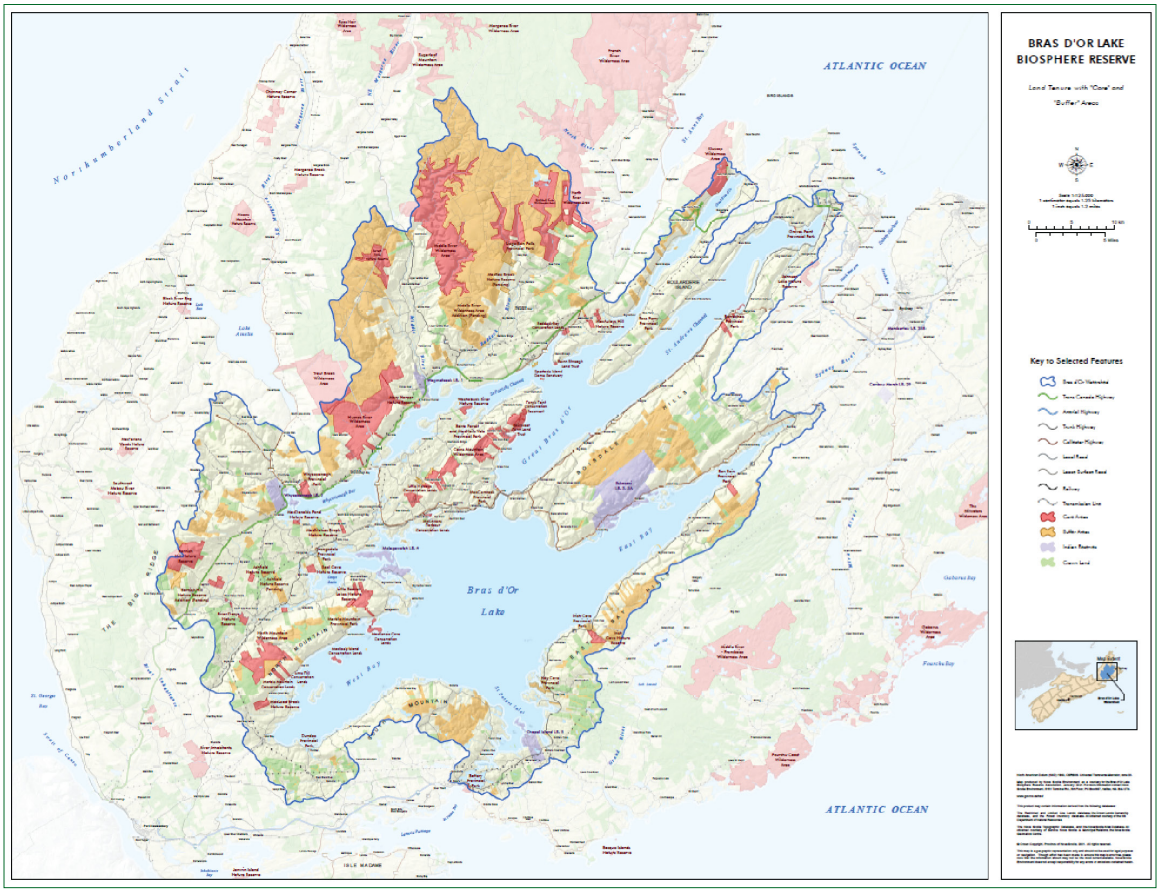
9. SUPPORTING DOCUMENTS

[List of the annexes submitted with periodic review report.]

9.1 Updated location and zonation map with coordinates

[Provide the biosphere reserve's standard geographical coordinates (all projected under WGS 84). Provide a map on a topographic layer of the precise location and delimitation of the three zones of the biosphere reserve (Map(s) shall be provided in both paper and electronic copies). Shapefiles (also in WGS 84 projection system) used to produce the map must also be attached to the electronic copy of the form. If applicable, also provide a link to access this map on the internet (e.g. Google map, website…).]

Fig. 9.1 Land Tenure Map. Core and buffer zones indicated within the Biosphere boundary. For a high resolution version please see: https://blbra.ca/wp-content/uploads/Brasdor_BioRes_Land_Cover_E_2021017713.pdf.



9.2 Updated vegetation map or land cover map

[A vegetation map or land cover map showing the principal habitats and land cover types of the biosphere reserve should be provided, if available.]

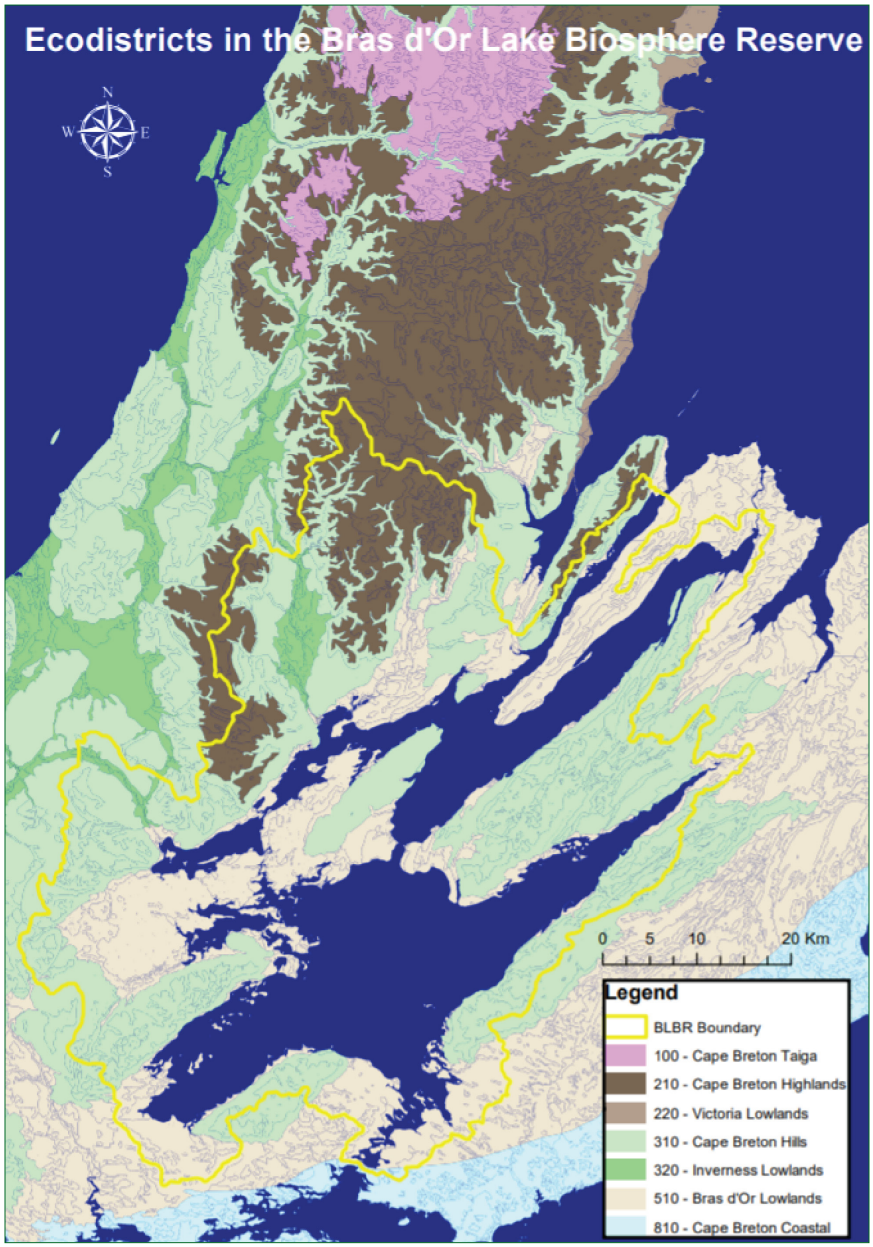


Fig. 9.2 Ecodistricts in the Bras d'Or Lake Bioshpere Reserve. For a high resolution version please see: https://blbra.ca/wp-content/uploads/BLBRA-Ecodistricts.pdf

The land classifications are described here, and summarized in Section 4.1: https://novas-cotia.ca/natr/forestry/ecological/pdf/Ecological-Land-Classification-guide.pdf

9.3 Updated list of legal documents (if possible with English, French or Spanish synthesis of its contents and a translation of its most relevant provisions)

[If applicable update the principal legal documents since the nomination of the biosphere reserve and provide a copy of these documents.]

Association Constitution and By-laws last updated in 2019. Copy online.

Constitution and By-Laws of the Bras d'Or Lake Biosphere Reserve Association, 6th ed.:

https://blbra.ca/wp-content/uploads/BLBRA-By-laws_Jun2019.pdf.

Coastal Protection Act (Bill 106), April 2019:

https://nslegislature.ca/legc/bills/63rd_2nd/1st_read/b106.htm

The purpose of this *Act* is to protect the Province's coast for future generations by preventing development and activity in locations adjacent to the coast that damage the environment by interfering with the natural dynamic and shifting nature of the coast, or put residences and buildings at risk of damage or destruction from sea-level rise, coastal flooding, storm surges and coastal erosion.

Endangered Species Act (2010). https://nslegislature.ca/sites/default/files/legc/statutes/endspec.htm

The purpose of this *Act* is to provide for the protection, designation, recovery and other relevant aspects of conservation of species at risk in the Province, including habitat protection, while recognizing that:

a) the goal of preventing any species in the Province from extirpation or extinction as a consequence of human activities;
b) the conservation of species at risk is a key component of a broader strategy to maintain biodiversity and to use biological resources in a sustainable manner;
c) the commitment of Government to a national cooperative approach for the conservation of species at risk, as agreed to in the National Accord for the Protection of Species at Risk;
d) all Nova Scotians share responsibility for the conservation of species at risk and governments have a leadership role to play in this regard;
e) Nova Scotians be provided with the opportunity for meaningful participation in relation to conservation of species at risk;
f) the Indigenous peoples of the Province have an important role in conserving species at risk;
g) the importance of promoting the purposes of this *Act* primarily through non-regulatory means such as cooperation, stewardship, education and partnerships instead of punitive measures, including such preventative actions as education, incentives, sustainable management practices and integrated resource management; and that

h) the precautionary principle that a lack of full scientific certainty must not be used as a reason for postponing measures to avoid or minimize the threat of a species at risk in the Province.

For greater certainty, nothing in this *Act* shall be construed so as to abrogate or derogate from the protection provided for existing aboriginal or treaty rights of the Indigenous peoples of Canada by the recognition and affirmation of those rights in section 35 of the Constitution Act, 1982.

Environment Act (2017). https://nslegislature.ca/sites/default/files/legc/statutes/environment.pdf

The purpose of this *Act* is to support and promote the protection, enhancement and prudent use of the environment while recognizing the following goals:

a) maintaining environmental protection as essential to the integrity of ecosystems, human health and the socio-economic well-being of society;
b) maintaining the principles of sustainable development, including
  i) the principle of ecological value, ensuring the maintenance and restoration of essential ecological processes and the preservation and prevention of loss of biological diversity,
  ii) the precautionary principle will be used in decision-making so that where there are threats of serious or irreversible damage, the lack of full scientific certainty shall not be used as a reason for postponing measures to prevent environmental degradation,
  iii) the principle of pollution prevention and waste reduction as the foundation for long-term environmental protection; including
c) the conservation and efficient use of resources;
d) the promotion of the development and use of sustainable, scientific and technological innovations and management systems; and
e) the importance of reducing, reusing, recycling and recovering the products of our society;
f) the principle of shared responsibility of all Nova Scotians to sustain the environment and the economy, both locally and globally, through individual and government actions;
g) the stewardship principle, which recognizes the responsibility of a producer for a product from the point of manufacturing to the point of final disposal;
h) the linkage between economic and environmental issues, recognizing that long-term economic prosperity depends upon sound environmental management and that effective environmental protection depends on a strong economy; and
i) the comprehensive integration of sustainable development principles in public policy-making in the Province;
j) the polluter-pay principle confirming the responsibility of anyone who creates an adverse effect on the environment that is not *de minimis* to take remedial action and pay for the costs of that action;
k) taking remedial action and providing for rehabilitation to restore an adversely affected area to a beneficial use;

l) Government having a catalyst role in the areas of environmental education, environmental management, environmental emergencies, environmental research and the development of policies, standards, objectives and guidelines and other measures to protect the environment;
m) encouraging the development and use of environmental technologies, innovations and industries;
n) the Province being responsible for working cooperatively and building partnerships with other provinces, the Government of Canada, other governments and other persons respecting transboundary matters and the coordination of legislative and regulatory initiatives;
o) providing access to information and facilitating effective public participation in the formulation of decisions affecting the environment, including opportunities to participate in the review of legislation, regulations and policies and the provision of access to information affecting the environment;
p) providing a responsive, effective, fair, timely and efficient administrative and regulatory system;
q) promoting this *Act* primarily through non-regulatory means such as cooperation, communication, education, incentives and partnerships.

Environmental Goals and Sustainable Prosperity Act (2012).

https://nslegislature.ca/sites/default/files/legc/statutes/environmental%20goals%20and%20sustainable%20prosperity.pdf

This *Act* has both environmental and economic objectives, including establishing clear goals to foster an integrated approach to environmental sustainability and economic well-being, and improving the measures of success for social, environmental and economic indicators of prosperity.

Forests Act (2010). https://nslegislature.ca/sites/default/files/legc/statutes/forests.htm

The intent and purpose of this *Act* is directed toward:

a) developing a healthier, more productive forest capable of yielding increased volumes of high quality products;
b) encouraging the development and management of private forest land as the primary source of forest products for industry in the Province;
c) supporting private landowners to make the most productive use of their forest land;
d) providing effective management of all Crown lands;
e) maintaining or enhancing wildlife and wildlife habitats, water quality, recreational opportunities and associated resources of the forest;
f) enhancing the viability of forest-based manufacturing and processing industries;
g) doubling of forest production by the year 2025;
h) creating more jobs immediately and in the longer term through improved productivity.

Provincial Parks Act (2010).

https://nslegislature.ca/sites/default/files/legc/statutes/provpark.htm

All provincial parks are dedicated, in perpetuity, for the benefit of present and future generations of Nova Scotians. The purpose of this *Act* is to develop and operate provincial parks to:

> a) provide opportunities for a wide variety of outdoor recreational opportunities ranging from relatively high intensity near-urban facilities to low intensity wildland experiences;
> b) preserve unique, rare, representative or otherwise significant elements of the natural environment and historic resources of Nova Scotia;
> c) provide opportunities for exploration, understanding and appreciation of Nova Scotia's natural and cultural heritage through interpretation, information and educational programs;
> d) provide resident travellers and out-of-Province visitors with opportunities to discover, experience and enjoy Nova Scotia's distinctive outdoor recreational and heritage resources; and
> e) assemble and maintain, within a system of provincial parks and park reserves, a land base adequate to meet present and future needs of Nova Scotians for outdoor recreation and heritage resource protection.

Wildlife Act (2010). https://nslegislature.ca/sites/default/files/legc/statutes/wildlife.pdf

The object and purpose of this *Act* is to:

> a) develop and implement policies and programs for wildlife designed to maintain diversity of species at levels of abundance to meet management objectives;
> b) integrate appropriate protective measures into policies for use on Crown lands and in guidelines for forest management and other programs on privately owned land to ensure adequate habitat for established populations of wildlife;
> c) recognize that angling, hunting and trapping are valued and safe parts of the heritage of the Province and that the continuing opportunity to participate in those activities will be maintained in accordance with this *Act* and the regulations;
> d) provide for the regulation of hunting and fishing and the possession and sale of wildlife; and
> e) provide for the continuing renewal of the resource while managing for its optimum recreational and economic uses.

Nova Scotia Parks and Protected Areas Plan (2013)

https://novascotia.ca/parksandprotectedareas/pdf/Parks-Protected-Plan.pdf

In 2013, the Nova Scotia government released the document "Our Parks and Protected Areas – a Plan for Nova Scotia" which identified lands which could be legally protected to

support provincial land and biodiversity protection objectives, including the protection of 12 % of the provincial land-base by 2015. Selection of candidate areas was science-based, using criteria such as ecological representation and integrity, the presence of unique/rare/endangered habitats and natural phenomenon, and the provision of critical core habitat. Implementation of the Plan is ongoing, but it has resulted in an increase in the amount of core areas from 3.1 % of the terrestrial lands in the biosphere reserve to the current level of 8.0 %.

The plan proposes nine goals and numerous actions to ensure a strong, viable parks and protected areas system that will thrive well into the future. These goals and actions are designed to:

- ensure protection
- provide strategic direction
- challenge Nova Scotians to work together
- collaborate with the Mi'kmaq
- deepen appreciation of the natural world
- provide nature-based recreation
- market and promote our parks and protected areas
- encourage organizational excellence
- address protection gaps

Nova Scotia's Old Forest Policy (August 2012).

https://novascotia.ca/natr/library/forestry/reports/Old-Forest-Policy-2012.pdf

This policy consolidates the Department's efforts to maintain old forests and associated biodiversity in the forested landscape. It builds upon the initiatives of the Interim Old Forest Policy of 1999. Old forests develop unique biological and social values as they evolve over long periods in the absence of major disturbance. Old growth within the Acadian Forest Region throughout Nova Scotia has declined significantly through several centuries of land use. The Old Forest Policy will conserve the remaining old growth forests on public land and ensure that a network of the best old forest restoration opportunities is established. This network will support, and be supported by, broader sustainable forest management initiatives that address maturity and community representation across ecological landscapes. The policy focuses on public land and emphasizes lands currently under protection.

Nova Scotia Wetlands Conservation Policy (September 2011; updated October 2019).

https://novascotia.ca/nse/wetland/docs/Nova.Scotia.Wetland.Conservation.Policy.pdf

The Nova Scotia Wetlands Conservation Policy provides direction and a framework for the conservation of wetlands. It supplements and provides context to legislation, regulations

and operational policies designed to protect and to guide management of wetlands in Nova Scotia. It is a comprehensive policy for the provincial government to ensure that the benefits that wetlands provide are maintained for the people of Nova Scotia.

Wilderness Areas Protection Act (2019)

https://nslegislature.ca/sites/default/files/legc/statutes/wilderness%20areas%20protection.pdf

The purpose of this *Act* is to provide for the establishment, management, protection and use of wilderness areas, in perpetuity, for present and future generations, in order to achieve the following primary objectives: (a) maintain and restore the integrity of natural processes and biodiversity; (b) protect representative examples of natural landscapes and ecosystems; (c) protect outstanding, unique, rare and vulnerable natural features and phenomena, and the following secondary objectives: (d) provide reference points for determining the effects of human activity on the natural environment; (e) protect and provide opportunities for scientific research, environmental education and wilderness recreation; and (f) promote public consultation and community stewardship in the establishment and management of wilderness areas, while providing opportunities for public access for sport fishing and traditional patterns of hunting and trapping (1998, c. 27, s. 2).

Special Places Protection Act (2010)

https://nslegislature.ca/sites/default/files/legc/statutes/specplac.htm

The purpose of this *Act* is to:

> (a) provide for the preservation, protection, regulation, exploration, excavation, acquisition and study of archaeological and historical remains and palaeontological sites which are considered important parts of the natural or human heritage of the Province;
> (b) provide for the preservation, protection, regulation, acquisition and study of ecological sites which are considered important parts of the natural heritage of the Province and, notwithstanding the generality of the foregoing, preserve, regulate, acquire and study those ecological sites that
> (i) are suitable for scientific research and educational purposes,
> (ii) are representative examples of natural ecosystems within the Province,
> (iii) serve as examples of ecosystems that have been modified by man and offer an opportunity to study the natural recovery of ecosystems from such modification,
> (iv) contain rare or endangered native plants or animals in their natural habitats,
> (v) provide educational or research field areas for the long-term study of natural changes and balancing forces in undisturbed ecosystems, and
> (c) promote understanding and appreciation among the people of the Province of the scientific, educational and cultural values represented by the establishment of special places (R.S., c. 438, s. 2).

Conservation Easements Act (2012)

https://nslegislature.ca/sites/default/files/legc/statutes/conservation%20easements.pdf

The nature and purpose of conservation easement is an agreement entered into between an owner and an eligible body that (a) grants rights and privileges to the easement holder over the owner's land that relate to the purposes for which the conservation easement is granted; (b) may impose obligations, either positive or negative, on the owner or the easement holder, or both, respecting the owner's land that relate to the purposes for which the conservation easement is granted; and (c) is made for the purpose of protecting, restoring or enhancing land primarily dedicated for the protection of biodiversity and natural processes that (i) contains natural ecosystems or constitutes the habitat of rare, threatened or endangered plant or animal species, (ii) contains outstanding botanical, zoological, geological or morphological features, (iii) exhibits exceptional and diversified scenery, (iv) provides a haven for concentrations of birds and animals, (v) provides opportunities for scientific or educational programs in aspects of the natural environment, (vi) is representative of the ecosystems, landforms or landscapes of the Province, or (vii) meets any other purpose prescribed by the regulations (2001, c. 28, s. 4; 2012, c. 18, s. 3).

Crown Lands Act (2012)

https://nslegislature.ca/sites/default/files/legc/statutes/crownlan.htm

The object and purpose of this *Act* is to provide for the most effective utilization of Crown lands by:

> (a) the application of proven forest management techniques to enhance productivity on Crown lands and to provide for an increasing harvest of better quality forest products;
> (b) requiring that leasing and licensing arrangements on Crown lands are providing for equitable stumpage rates, adequate investments in forest improvements and improved market access for privately produced wood;
> (c) the integration of wildlife and outdoor recreation considerations in the forest management planning process on Crown lands; and
> (d) the more effective administration and management of all Crown lands (R.S., c. 114, s. 2).

Wildlife Habitat and Watercourses Protection Regulations (2002)

https://novascotia.ca/just/regulations/regs/fowhwp.htm

These regulations came into effect on January 14, 2002. They are designed to protect water quality and to maintain various elements of wildlife habitat on all forest harvest sites. These new laws are mandatory on all lands; private, industrial and Crown. Responding to requests from the forest industry, the government made certain elements of the 1989 Forest/Wildlife Guidelines and Standards into law. Buffer zones on most watercourses and wetlands, clumps of living trees and abundant coarse woody debris are now required within all harvested areas. The Department of Lands and Forestry is working with industry and

landowners to explain the new requirements in detail and to discuss other ways to maintain or enhance wildlife habitat on their woodlands.

In addition, **industry-specific policy and guidelines** documents are available at the Nova Scotia Environment Department's website (https://novascotia.ca/nse/dept/nse.policies.asp).

Canadian Environmental Protection Act

https://laws-lois.justice.gc.ca/eng/acts/C-15.31/index.html

This *Act* is the cornerstone of Canada's environmental legislation and an important part of Canada's broader legislative framework aimed at preventing pollution and protecting the environment and human health.

Canada Wildlife Act

https://laws-lois.justice.gc.ca/eng/acts/W-9/

This *Act* allows for the conservation and study of wildlife and the creation of National Wildlife Areas.

Environmental Enforcement Act

https://www.canada.ca/en/environment-climate-change/services/environmental-enforcement/acts-regulations/about-act.html

This *Act* is omnibus legislation that created new enforcement tools, amended the fine regimes and introduced the sentencing provisions to nine existing *Acts* to promote more effective enforcement of the laws that protect Canada's national parks, air, land, water and wildlife.

Fisheries Act

https://www.canada.ca/en/environment-climate-change/services/managing-pollution/effluent-regulations-fisheries-act.html

The *Fisheries Act* is administered by the Minister of Fisheries and Oceans Canada, although the Minister of the Environment and Climate Change is responsible for the sections of the *Fisheries Act* that deal with water pollution. Along with the *Canadian Environmental Protection Act*, the *Fisheries Act* plays a major role in protecting the quality of the natural environment.

Impact Assessment Act

https://laws-lois.justice.gc.ca/eng/acts/I-2.75/index.html

This Act focuses on major projects and their environmental effects on areas of federal jurisdiction and as a result of federal decisions associated with a project. While for the most part administered by the Impact Assessment Agency of Canada, other bodies such as the Canadian Nuclear Safety Commission, National Energy Board, and Environment and

Climate Change Canada support the implementation of this *Act* with analysis, advice and, where required, enforcement.

Migratory Birds Convention Act

https://laws.justice.gc.ca/eng/acts/M-7.01/

Most species of birds in Canada are protected under this *Act*, which was first enacted in 1917 to implement the Migratory Birds Convention with the United States. The associated regulations outline requirements on potentially harmful human activities that may affect migratory birds, such as hunting, culling and the use of migratory birds for scientific research.

Species at Risk Act

https://laws.justice.gc.ca/eng/acts/S-15.3/

This *Act* is one of the Canadian government's main conservation tools to protect species at risk, maintain healthy ecosystems and preserve Canada's natural heritage.

9.4 Updated list of land use and management/cooperation plans

[List existing land use and management/cooperation plans (with dates and reference numbers) for the administrative area(s) included within the biosphere reserve. Provide a copy of these documents. It is recommended to produce an English, French or Spanish synthesis of its contents and a translation of its most relevant provisions.]

Table 9.1 following pages.

Table 9.1 - Land Use and Management/Cooperation Plans		
Legend: 1-Management/Cooperation Plan; 2-Core Area Land Use Plan; 3-Buffer Area Land Use Plan; 4-Transition Area Land Use Plan.		
TYPE	**ORGANIZATION**	**PLAN**
1	**BLBRA**	**BLBRA (2013) Strategic Plan 2013-2015** This plan, together with the draft cooperation plan (BLBRA 2011), have guided the activities of the BLBRA over the past ten years.
1	**Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI)**	**CEPI (2018) CEPI Terms of Reference 2018** CEPI renewed its focus in 2018 to include sustainable development efforts and published these updated terms of reference.
1	**Canadian Biosphere Reserves Association (CBRA)**	**CBRA (2020) CBRA Strategic Plan 2020-2025** This provides continuity between the strategies of all Canadian BRs with a focus on the Canadian government initiatives to address the MaB Sustainable Development Goals.
4	**Municipality - Cape Breton Regional Municipality**	**CBRM Climate Change Action Plan 2012** The Cape Breton Regional Municipality established an Adaptation Committee to develop its Municipal Climate Change Action Plan (MCCAP) to identify past impacts and vulnerable areas for future climate hazards, and provide clear recommendations for adaptation and mitigation measures.
4	**Municipality of Inverness County**	Inverness and Victoria Counties Municipal Climate Change Adaptation Plans (2013). **http://www.edpc.ca/plan_docs.htm** shows Generalized Future Land Use Maps for various areas. A combined Climate Change Adaptation Plan was developed for Port Hawkesbury, Inverness county and Victoria county. The Nova Scotia government created a Municipal Climate Change Action Plan Guidebook to assist municipalities with the development of their Action Plans. The Municipalities of Victoria County, Inverness County and the Town of Port Hawkesbury came together to pool resources and implement a project to look at climate change adaptation and mitigation actions they could undertake jointly or individually. The counties have also updated their land use bylaws.
4	Municipality of the County of Victoria	Inverness and Victoria Counties Municipal Climate Change Adaptation Plans (2013). See Inverness county, above, for background on the plan. **http://www.edpc.ca/plan_docs.htm** shows Generalized Future Land Use Maps for various areas.

4	**Municipality of the County of Richmond**	**Richmond County (2013) Climate Change Action Plan 2013** The Municipal Climate Change Action Plan (MCCAP) is a blueprint to assist municipalities to address and adapt to the impacts of climate change. The plan seeks to reduce greenhouse gas emissions from municipal operations and prepare the municipality for the anticipated impacts of climate change. Municipal Land Use bylaw.(Richmond 2020) **http://www.edpc.ca/plan_docs.htm** shows Generalized Future Land Use Maps for various areas.
2	NS Dept. of Environment	Protected Areas Branch is responsible for planning and managing Nova Scotia's Wilderness Areas, Nature Reserves and Heritage Rivers, and for encouraging and supporting private land conservation. Recognizing the challenge and importance of protecting biodiversity across Nova Scotia, an ecological framework is used for protected area planning and management. Wilderness Areas and Nature Reserves, which represent the bulk of the core areas in the Bras d'Or, watershed are administered and managed by Nova Scotia Environment under the *Wilderness Areas Protection Act* and the *Special Places Protection Act* respectively. No Wilderness Areas or Nature Reserves within the biosphere have had management plans prepared for them. Conservation easements on privately-owned lands are created under the authority of the *Conservation Easements Act* and are managed through agreements between the individual owners and the particular land conservation organization who holds the easement. These organizations also acquire lands through sale or donation and simply manage those lands themselves for the primary purpose of biodiversity conservation. The relevant *Acts*,*Wilderness Areas Protection Act* (2019), *Special Places Protection Act* (2010) and *Conservation Easements Act* (2012) are reviewed in section 9.3.
3	NS Dept. of Lands and Forestry	Nova Scotia Integrated Resource Management Program
3	NS Dept. of Lands and Forestry	Nova Scotia Protected Areas Program Parks and Protected Areas Plan
3	NS Dept. of Lands and Forestry	Targeted Geoscience Initiative (TGI)
3	NS Dept. of Lands and Forestry	Nova Scotia Provincial Parks Program
3	Port Hawkesbury Paper – Forestry Practices	2015 Sustainable Long-term Forest Management Plan for FULA Lands

9.5 Updated species list (to be annexed)

[Provide a list of important species occurring within the proposed biosphere reserve, including common names, wherever possible.]

See ANNEX IV for an updated species list, as well as a list of Species of Conservation Concern within the BLBR.

(6) Updated list of main bibliographic references (to be annexed)

[Provide a list of the main publications and articles of relevance to the proposed biosphere reserve.]

See ANNEX VI for the bibliography.

(7) Further supporting documents.

There are no other supporting documents referenced.

10. ADDRESSES

10.1 Contact address of the proposed biosphere reserve:

[Government agency, organization, or other entity (entities) to serve as the main contact to whom all correspondence within the World Network of Biosphere Reserves should be addressed.]

Eileen Crosby, Chair,
Board of Directors,
Bras d'Or Lake Biosphere Reserve Association
PO Box 404, East Bay Main PO
East Bay, Nova Scotia, B1J 2E2
Canada
1-902-574-5185
e.crosbyblb@gmail.com
http://www.blbra.ca

10.2 Administering entity of the core area(s):

Name: Nova Scotia Environment – Protected Areas Branch
Street or P.O. Box: 1903 Barrington Place, Suite 2085, PO Box 442
City & postal code: Halifax, Nova Scotia, B3J 2P8
Country: Canada
Telephone: (902) 424-3600
E-mail: ProtectedAreas@novascotia.ca
Web site: https://novascotia.ca/nse/protectedareas/

10.3 Administering entity of the buffer zone(s):

Name: Nova Scotia Department of Lands and Forestry
Street or P.O. Box: 300 Mountain Road
City & postal code: Sydney (Coxheath), Nova Scotia, B1L 1A9
Country: Canada
Telephone: (902) 563-3370
E-mail: DNR-COXHEATH@novascotia.ca
Web site: https://novascotia.ca/natr/

10.4. Administering entity of the transition area(s):

Cape Breton Regional Municipality
320 Espanade, Sydney, Nova Scotia, B1P 7B9
Telephone: 902.574.0290
E-mail: mayor@cbrm.ns.ca
Web site: www.cbrm.ns.ca

Municipality of the County of Victoria
Post Office Box 370
495 Chebucto Street, Baddeck, Nova Scotia, B0E 1B0
Telephone: 902.295.3231
E-mail: Leanne.maceachen@countyvictoria.ns.ca
Web site: www.victoriacounty.com

Municipality of Inverness
375 Main Street, Port Hood, Nova Scotia, B0E 2W0
Telephone: 902.323.0019
E-mail: laurie.cranton@invernesscounty.ca
Web site: www.invernesscounty.ca

Municipality of the County of Richmond
2357 Highway 206
P.O. Box 120, Arichat, Nova Scotia, B0E 1A0
Telephone: 902.226.2400
E-mail: dmarchand@richmondcounty.ca
Web site: www.richmondcounty.ca

Potlotek First Nation
12004 Highway 4, Chapel Island, Nova Scotia, B0E 3B0
Telephone: 902.535.3317
Web site: www.potlotek.ca

Membertou First Nation
111 Membertou Street, Membertou, Nova Scotia, B1S 3W3
Telephone: 902.564.6466 (ext 5023)
Web site: www.membertou.ca

Eskasoni Band Council
PO Box 7040, 63 Mini Mall Drive, Eskasoni, Nova Scotia, B1W 1A1
Telephone: 902.379.2800
Web site: www.eskasoni.ca

Wagmatcook First Nation
P.O. Box 30001, Wagmatcook, Nova Scotia, B0E 3N0
Telephone: 902.295.2598
E-mail:
Web site: www.wagmatcook.ca

We'kogma'q First Nation
P.O. Box 149, 150 Reservation Road, Whycocomagh, Nova Scotia, B0E 3M0
Telephone: 902.756.2337
E-mail:
Web site: www.we'kogma'q.ca

Bras d'Or Lake Biosphere Reserve

Periodic Review – Final Submission

Annexes Only

Updated August 2021



United Nations
Educational, Scientific and
Cultural Organization

Bras d'Or Lake
biosphere

Biosphere Reserve Periodic Review, Updated August 2021
Bras d'Or Lake Biosphere Reserve
Annexes I - VI

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Annex I to the Biosphere Reserve Periodic Review, Updated August 2021

MABnet Directory of Biosphere Reserves

Administrative details

Country: Canada
Name of BR: Bras d'Or Lake Biosphere Reserve
Year designated: 2011
Administrative authorities: Various agencies of government (federal and provincial), such as Fisheries, Environment, Natural Resources, Rural and Economic Development, and Agriculture.
Name Contact:Eileen Crosby,
Chair of the Board of Directors,
Bras d'Or Lake Biosphere Reserve Association
Contact address: PO Box 404
East Bay Main PO
East Bay, NS B1J 2E2
CANADA
Tél.: 1-902-574-5185
Email: info@blbra.ca

Related links: *www.blbra.ca*
Social networks:
Facebook: @blbra
Facebook Bras d'Or Watch: @BrasdOrWatch

Description

General description:

The Bras d'Or Lake Biosphere Reserve is located in Nova Scotia, Canada on Cape Breton Island – Unama'ki, in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq people.The biosphere includes a salt-water estuary watershed 'inland sea' with three passages to the Atlantic Ocean. The Holocene transgression flooded a complex river-lake system of diverse geology, creating a small, deep inland sea with 12 significant watersheds draining both highlands and lowlands.

The terrestrial, marine and coastal habitats provide a home for human populations, as well as other organisms. The original settlers colonized the region following the retreat of glaciers, and today their descendants make up the five Mi'kmaq communities that account for a significant proportion of the population occupying large areas of the watershed.

Major ecosystem type:
Major habitats & land cover types:
Bioclimatic zone:
Location:
Latitude: 45°38'16"N – 46°23'23"N
Longitude: 60°18'40"W – 61°19'35"W
Midpoint: 45°53'13"N – 60°42'13"W
Total Area (terrestrial and marine):356,788 ha
Core area*(s):* 19,762 ha
Buffer zone*(s):* 48,397 ha
Transition area*(s) :* 179,261 ha
Different existing zonation:
Altitudinal range *(*metres above sea level): 0 - 457 m
Zonation map(s) (refer to section 2.2.2):

Main objectives of the biosphere reserve

Brief description

Approximately 5 lines

(i):To promote climate change adaptation and increase best practices for a healthy society, culture, economy and environment measuring success by behaviour changes.
(ii) To encourage tourism and develop a trail system which completely encircles the BLBR by engaging with community trails organizations and guiding new developing trails.
(iii) To promote education about the BLBR through citizen science activities including Bras d'Or Watch, Forest Watch. and the development of specific educational resources.based on two eyed seeing.

Research

Brief description

Approximately 5 lines

People have studied the natural history of the BLBR since the end of the last glaciation. Modern cultural research began in the late 1600's, and scientific research began in the late 1880's. The major disciplines have all received attention, with cultural and natural history receiving most. In-depth programmes are rare, with foci on Mi'kmaq and Scottish culture, exploited natural resources, and conservation biology. Major research gaps include archaeology, oceanography, ecosystem dynamics and climate change. A diverse group of academic, government, NGO and private sector research institutions work in the Biosphere, with significant contributions from indigenous entities. Coordination of effort is limited, but growing.

Monitoring

Brief description

Approximately 5 lines

Ongoing scientific monitoring of the BLBR has been sporadic and of limited scope. Potable and estuarine water quality are best measured. Forest cover and a few terrestrial and aquatic species-at-risk are also tracked well. Some aquatic and estuarine habitat monitoring is underway, but there is no repeated mapping or shoreline profiling. There is an excellent network of weather stations. Much of the long-term monitoring is done by federal and provincial agencies, while indigenous institutions and NGO citizen-science programmes have initiated more focused monitoring during the last decade.

Specific variables (fill in the table below and tick the relevant parameters)

Abiotic		Biodiversity	
Abiotic factors		Afforestation/Reforestation	x
Acidic deposition/Atmospheric factors		Algae	
Air quality		Alien and/or invasive species	x
Air temperature	x	Amphibians	
Climate, climatology		Arid and semi-arid systems	
Contaminants (aquatic)	x	Autoecology	
Drought		Beach/soft bottom systems	
Erosion	x	Benthos	x
Geology	x	Biodiversity aspects	x
Geomorphology	x	Biogeography	
Geophysics		Biology	
Glaciology		Biotechnology	
Global change		Birds	x
Groundwater	x	Boreal forest systems	x
Habitat issues	x	Breeding	
Heavy metals	x	Coastal/marine systems	x
Hydrology	x	Community studies	x
Indicators		Conservation	x
Meteorology	x	Coral reefs	
Modeling	x	Degraded areas	x
Monitoring/methodologies		Desertification	
Nutrients	x	Dune systems	
Physical oceanography	x	Ecology	x
Pollution, pollutants	x	Ecosystem assessment	
Siltation/sedimentation	x	Ecosystem functioning/structure	
Soil		Ecosystem services	
Speleology		Ecotones	
Topography		Endemic species	
Toxicology		Ethology	
UV radiation		Evapotranspiration	
		Evolutionary studies/Palaeoecology	
		Fauna	x
		Fires/fire ecology	
		Fishes	x
		Flora	x
		Forest systems	x
		Freshwater systems	x
		Fungi	
		Genetic resources	
		Genetically modified organisms	
		Home gardens	
		Indicators	x
		Invertebrates	x
		Island systems/studies	
		Lagoon systems	x
		Lichens	x
		Mammals	x

Abiotic		Biodiversity	
		Mangrove systems	
		Mediterranean type systems	
		Microorganisms	
		Migrating populations	
		Modeling	
		Monitoring/methodologies	
		Mountain and highland systems	
		Natural and other resources	x
		Natural medicinal products	x
		Perturbations and resilience	
		Pests/Diseases	
		Phenology	
		Phytosociology/Succession	
		Plankton	x
		Plants	x
		Polar systems	
		Pollination	x
		Population genetics/dynamics	
		Productivity	
		Rare/Endangered species	x
		Reptiles	
		Restoration/Rehabilitation	
		Species (re) introduction	x
		Species inventorying	x
		Sub-tropical and temperate rainforest systems	
		Taxonomy	
		Temperate forest systems	
		Temperate grassland systems	
		Tropical dry forest systems	
		Tropical grassland and savannah systems	
		Tropical humid forest systems	
		Tundra systems	
		Vegetation studies	
		Volcanic/Geothermal systems	
		Wetland systems	x
		Wildlife	x

Socio-economic		Integrated monitoring	
Agriculture/Other production systems		Biogeochemical studies	x
Agroforestry	x	Carrying capacity	
Anthropological studies		Climate change	
Aquaculture	x	Conflict analysis/resolution	
Archaeology		Ecosystem approach	
Bioprospecting		Education and public awareness	x
Capacity building		Environmental changes	
Cottage (home-based) industry		Geographic Information System (GIS)	
Cultural aspects	x	Impact and risk studies	x
Demography	x	Indicators	x
Economic studies	x	Indicators of environmental quality	x
Economically important species	x	Infrastructure development	
Energy production systems		Institutional and legal aspects	
Ethnology/traditional practices/knowledge	x	Integrated studies	x
Firewood cutting	x	Interdisciplinary studies	
Fishery	x	Land tenure	
Forestry	x	Land use/Land cover	x
Human health	x	Landscape inventorying/monitoring	x
Human migration		Management issues	
Hunting	x	Mapping	
Indicators		Modeling	
Indicators of sustainability		Monitoring/methodologies	
Indigenous people's issues	x	Planning and zoning measures	
Industry		Policy issues	
Livelihood measures		Remote sensing	x
Livestock and related impacts		Rural systems	
Local participation		Sustainable development/use	
Micro-credits		Transboundary issues/measures	
Mining		Urban systems	
Modeling		Watershed studies/monitoring	x
Monitoring/methodologies			
Natural hazards			
Non-timber forest products	x		
Pastoralism			
People-Nature relations	x		
Poverty			
Quality economies/marketing	x		
Recreation			
Resource use	x		
Role of women			
Sacred sites			
Small business initiatives			
Social/Socio-economic aspects			
Stakeholders' interests			
Tourism			
Transports			

Annex II to the Biosphere Reserve Periodic Review
Updated August 2021
Bras d'Or Lake Biosphere Reserve
Promotion and Communication Materials (DRAFT)

Provide some promotional material regarding the site, notably high-quality photos, and/or short videos on the site so as to allow the Secretariat to prepare appropriate files for press events. To this end, a selection of photographs in high resolution (300 dpi), with photo credits and captions and video footage (rushes), without any comments or sub-titles, of professional quality – DV CAM or BETA only, will be needed.

In addition, return a signed copy of the following Agreements on Non-Exclusive Rights for photo(s) and video(s)

We have started to collect various photos and video titles for review but still have vetting and final sign offs to pursue. We do have several videos and photos on the website and Facebook pages that can be linked to and are expediting the signoff on waivers for the others.

The Communications Committee has also started discussions to create a video and photo curator to manage the current photo and video resources supplied via the Destination Cape Breton Association, our Explore the Bras d'Or intiative and our own website and Facebook pages.

A	B	C	D	E	F
Video Title	Document Description	Credit	Length	Host	Hyperlink
2019 Global Symposium - Albert Marshall - Two-Eyed Seeing	Two-Eyed Seeing adamantly, respectfully, and passionately asks that we bring together our different ways of knowing so we can leave the world a better place for the next seven	Samuel Centre for Social Connectedness	0.025208333	YouTube	https://youtu.be/DTJtAdH9_mk
Mi'kmaq 'jingle sisters' reflect on regalia and why they dance	Two Mi'kmaq 'jingle sisters' talk about why they started dancing at powwows and the significance of the regalia they wear.	CBC News	0.003310185	YouTube	https://youtu.be/uVuglK23j3A
Land & Sea: The Mi'kmaq journey	From the deep woods of Nova Scotia - to the Smithsonian archives in Washington - the long journey to protect Mi'kmaq culture for the future. Original air date: May 5,	CBC Nova Scotia	1.495138889	YouTube	https://youtu.be/WU25FefT9U0
At the Heart of Reconcilliation in Canada's UNESCO Biosphere Reserves	In February 2018, Indigenous Peoples from territories that host UNESCO biosphere reserves in Canada gathered in Ottawa on the occasion of the Canadian Biosphere	Canadian Biosphere Reserve Association	0.006817129	YouTube	https://www.youtube.com/watch?v=biZcD3-hsJ0
Biosphere Reserves in a Nutshell	What are UNESCO biosphere reserves? How do they work? How does the balance between the interests of environmental protection and social and economic	UNESCO - Produced by German Biosphere Reserves	0.001851851	YouTube	https://www.youtube.com/watch?v=Gkzar079rKI
Bras d'Or Lake Biosphere Reserve Canada	Bras d'Or Lake is located in Nova Scotia and consists of a salt-water estuary watershed 'inland sea' with three passages to the	UNESCO	0.000763888	YouTube	https://www.youtube.com/watch?v=DwUzJHhup-k
Bras d'Or Lake Biosphere Reserve - Overview	For more information about the Bras d'Or Lake Biosphere Reserve visit our website at http://www.blbra.ca or check us out on facebook http://www.facebook.com/blbra	BLBRA	0.003125	YouTube	https://www.youtube.com/watch?v=57nOv5vscJk
Striking Balance S1E4	Striking Balance, a TVO Original documentary series, explores some of Canada's most breathtaking, UNESCO-designated biosphere reserves.	TVO	0.035347222	YouTube	https://www.youtube.com/watch?v=qMmLEhju0pI&list=PLgBne2KTlDUxuGYwkkboHA746nmA6B2-T&index=4
A Road Trip with Yvette Rodgers: The Bras d'Or Lake		Celtic Colours International festival	0.004236111	YouTube	https://www.youtube.com/watch?v=6KW9gRRT7-s&feature=youtu.be

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Submitted on behalf of the Bras d'Or Lake Biosphere Reserve Association

United Nations Educational, Scientific and Cultural Organization

United Nations Educational, Scientific and Cultural Organization
Organisation des Nations Unies pour l'éducation, la science et la culture
Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura
Организация Объединенных Наций по вопросам образования, науки и культуры
منظمة الأمم المتحدة للتربية والعلم والثقافة
联合国教育、科学及文化组织

UNESCO Photo Library

Bureau of Public Information

AGREEMENT GRANTING NON-EXCLUSIVE RIGHTS **(PHOTOS)**

Reference:

1. a) I the undersigned, copyright-holder of the above mentioned photo(s) hereby grant to UNESCO free of charge the non-exclusive right to exploit, publish, reproduce, diffuse, communicate to the public in any form and on any support, including digital, all or part of the photograph(s) and to licence these rights to third parties on the basis of the rights herein vested in UNESCO

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c) The name of the photographer will be cited alongside UNESCO's whenever his/her work is used in any form.

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b) The photo(s) is/are in no way whatever a violation or an infringement of any existing copyright or licence, and contain(s) nothing obscene, libellous or defamatory.

Name and Address:

Signature : Date :

(Sign, return to UNESCO two copies of the Agreement and retain the original for yourself)

Mailing address: 7 Place Fontenoy, 75352 Paris 07 SP, Direct Telephone: 00331 – 45681687

Direct Fax: 00331 – 45685655; e-mail: photobank@unesco.org; m.ravassard@unesco.org

United Nations Educational, Scientific and Cultural Organization

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Submitted on behalf of the Bras d'Or Lake Biosphere Reserve Association

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Bureau of Public Information

AGREEMENT GRANTING NON-EXCLUSIVE RIGHTS **(VIDEOS)**

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Annex III to the Biosphere Reserve Periodic Review, January 2013
The Statutory Framework of the World Network of Biosphere Reserves

Introduction

Within UNESCO's Man and the Biosphere (MAB) programme, biosphere reserves are established to promote and demonstrate a balanced relationship between humans and the biosphere. Biosphere reserves are designated by the International Coordinating Council of the MAB Programme, at the request of the State concerned. Biosphere reserves, each of which remains under the sole sovereignty of the State where it is situated and thereby submitted to State legislation only, form a World Network in which participation by the States is voluntary.

The present Statutory Framework of the World Network of Biosphere Reserves has been formulated with the objectives of enhancing the effectiveness of individual biosphere reserves and strengthening common understanding, communication and co-operation at regional and international levels.

This Statutory Framework is intended to contribute to the widespread recognition of biosphere reserves and to encourage and promote good working examples. The delisting procedure foreseen should be considered as an exception to this basically positive approach, and should be applied only after careful examination, paying due respect to the cultural and socio-economic situation of the country, and after consulting the government concerned.

The text provides for the designation, support and promotion of biosphere reserves, while taking account of the diversity of national and local situations. States are encouraged to elaborate and implement national criteria for biosphere reserves which take into account the special conditions of the State concerned.

Article 1 - Definition

Biosphere reserves are areas of terrestrial and coastal/marine ecosystems or a combination thereof, which are internationally recognized within the framework of UNESCO's programme on Man and the Biosphere (MAB), in accordance with the present Statutory Framework.

Article 2 - World Network of Biosphere Reserves

1. Biosphere reserves form a worldwide network, known as the World Network of Biosphere Reserves, hereafter called the Network.

2. The Network constitutes a tool for the conservation of biological diversity and the sustainable use of its components, thus contributing to the objectives of the Convention on Biological Diversity and other pertinent conventions and instruments.

3. Individual biosphere reserves remain under the sovereign jurisdiction of the States where they are situated. Under the present Statutory Framework, States take the measures which they deem necessary according to their national legislation.

Article 3 - Functions

In combining the three functions below, biosphere reserves should strive to be sites of excellence to explore and demonstrate approaches to conservation and sustainable development on a regional scale:

(i) conservation - contribute to the conservation of landscapes, ecosystems, species and genetic variation;

(ii) development - foster economic and human development which is socio-culturally and ecologically sustainable;

(iii) logistic support - support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development.

Article 4 - Criteria

General criteria for an area to be qualified for designation as a biosphere reserve:

1. It should encompass a mosaic of ecological systems representative of major biogeographic regions, including a gradation of human interventions.

2. It should be of significance for biological diversity conservation.

3. It should provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale.

4. It should have an appropriate size to serve the three functions of biosphere reserves, as set out in Article 3.

5. It should include these functions, through appropriate zonation, recognizing:

(a) a legally constituted core area or areas devoted to long-term protection, according to the conservation objectives of the biosphere reserve, and of sufficient size to meet these objectives;

(b) a buffer zone or zones clearly identified and surrounding or contiguous to the core area or areas, where only activities compatible with the conservation objectives can take place;

(c) an outer transition area where sustainable resource management practices are promoted and developed.

6. Organizational arrangements should be provided for the involvement and participation of a suitable range of inter alia public authorities, local communities and private interests in the design and carrying out the functions of a biosphere reserve.

7. In addition, provisions should be made for:

(a) mechanisms to manage human use and activities in the buffer zone or zones;

(b) a management policy or plan for the area as a biosphere reserve;

(c) a designated authority or mechanism to implement this policy or plan;

(d) programmes for research, monitoring, education and training.

Article 5 - Designation procedure

1. Biosphere reserves are designated for inclusion in the Network by the International Coordinating Council (ICC) of the MAB programme in accordance with the following procedure:

(a) States, through National MAB Committees where appropriate, forward nominations with supporting documentation to the secretariat after having reviewed potential sites, taking into account the criteria as defined in Article 4;

(b) the secretariat verifies the content and supporting documentation: in the case of incomplete nomination, the secretariat requests the missing information from the nominating State;

(c) nominations will be considered by the Advisory Committee for Biosphere Reserves for recommendation to ICC;

(d) ICC of the MAB programme takes a decision on nominations for designation. The Director-General of UNESCO notifies the State concerned of the decision of ICC.

2. States are encouraged to examine and improve the adequacy of any existing biosphere reserve, and to propose extension as appropriate, to enable it to function fully within the Network. Proposals for extension follow the same procedure as described above for new designations.

3. Biosphere reserves which have been designated before the adoption of the present Statutory Framework are considered to be already part of the Network. The provisions of the Statutory Framework therefore apply to them.

Article 6 - Publicity

1. The designation of an area as a biosphere reserve should be given appropriate publicity by the State and authorities concerned, including commemorative plaques and dissemination of information material.

2. Biosphere reserves within the Network, as well as the objectives, should be given appropriate and continuing promotion.

Article 7 - Participation in the Network

1. States participate in or facilitate cooperative activities of the Network, including scientific research and monitoring, at the global, regional and sub-regional levels.

2. The appropriate authorities should make available the results of research, associated publications and other data, taking into account intellectual property rights, in order to ensure the proper functioning of the Network and maximize the benefits from information exchanges.

3. States and appropriate authorities should promote environmental education and training, as well as the development of human resources, in cooperation with other biosphere reserves in the Network.

Article 8 - Regional and thematic subnetworks

States should encourage the constitution and co-operative operation of regional and/or thematic subnetworks of biosphere reserves, and promote development of information exchanges, including electronic information, within the framework of these subnetworks.

Article 9 - Periodic review

1. The status of each biosphere reserve should be subject to a periodic review every ten years, based on a report prepared by the concerned authority, on the basis of the criteria of Article 4, and forwarded to the secretariat by the State concerned.

2. The report will be considered by the Advisory Committee for Biosphere Reserves for recommendation to ICC.

3. ICC will examine the periodic reports from States concerned.

4. If ICC considers that the status or management of the biosphere reserve is satisfactory, or has improved since designation or the last review, this will be formally recognized by ICC.

5. If ICC considers that the biosphere reserve no longer satisfies the criteria contained in Article 4, it may recommend that the State concerned take measures to ensure conformity with the provisions of Article 4, taking into account the cultural and socio-economic context of the State concerned. ICC indicates to the secretariat actions that it should take to assist the State concerned in the implementation of such measures.

6. Should ICC find that the biosphere reserve in question still does not satisfy the criteria contained in Article 4, within a reasonable period, the area will no longer be referred to as a biosphere reserve which is part of the Network.

7. The Director-General of UNESCO notifies the State concerned of the decision of ICC.

8. Should a State wish to remove a biosphere reserve under its jurisdiction from the Network, it notifies the secretariat. This notification shall be transmitted to ICC for information. The area will then no longer be referred to as a biosphere reserve which is part of the Network.

Article 10 - Secretariat

1. UNESCO shall act as the secretariat of the Network and be responsible for its functioning and promotion. The secretariat shall facilitate communication and interaction among individual biosphere reserves and among experts. UNESCO shall also develop and maintain a worldwide accessible information system on biosphere reserves, to be linked to other relevant initiatives.

2. In order to reinforce individual biosphere reserves and the functioning of the Network and sub-networks, UNESCO shall seek financial support from bilateral and multilateral sources.

3. The list of biosphere reserves forming part of the Network, their objectives and descriptive details, shall be updated, published and distributed by the secretariat periodically.

Annex IV to the Biosphere Reserve Periodic Review, January 2020
Bras d'Or Lake Biosphere Reserve
Species Lists and Letters of Support

Table of Contents

1. BLBR Species of Concern
2. BLBR Full Species List
3. BLBR Letters of Support

Bras d'Or Lake Biosphere
Species of Concern (2020)

Table 2: List of Species of Conservation Concern in the BLBR with Status Rankings

Taxon	Scientific Name	Common Name			Status Rank				Previously Reported (BLBRA 2011)	2010 Status Rank (if different from current)
			NS General Status	National Rank	S-Rank	COSEWIC	SARA	NS ESA		
Birds	*Accipiter gentilis*	Northern Goshawk	4 Secure	G5	S3S4				X	S3B
Birds	*Actitis macularius*	Spotted Sandpiper	3 Sensitive	G5	S3S4B					
Birds	*Aegolius funereus*	Boreal Owl			S2?B					
Birds	*Alca torda*	Razorbill			S2B,S4N					
Birds	*Ammospiza nelsoni*	Nelson's Sparrow	4 Secure	G5	S3S4B				X	S2S3B
Birds	*Anas acuta*	Northern Pintail	2 May Be At Risk	G5	S1B					
Birds	*Arenaria interpres*	Ruddy Turnstone			S3M					
Birds	*Asio flammeus*	Short-eared Owl			S1S2B	Special Concern	Special Concern			
Birds	*Asio otus*	Long-eared Owl	2 May Be At Risk	G5	S2S3				X	S1S2B
Birds	*Aythya americana*	Redhead	4 Secure	G5	SHB,SNAM					
Birds	*Botaurus lentiginosus*	American Bittern			S3S4B					
Birds	*Bucephala albeola*	Bufflehead			S3S4N					
Birds	*Bucephala clangula*	Common Goldeneye	4 Secure	G5	S2B,S5N				X	S2B
Birds	*Bucephala islandica (Eastern*	Barrow's Goldeneye - Eastern pop.			S1N	Special Concern	Special Concern			
Birds	*Buteo lagopus*	Rough-legged Hawk			S3N					
Birds	*Calidris alba*	Sanderling			S3M,S2N					
Birds	*Calidris maritima*	Purple Sandpiper			S3?N					
Birds	*Calidris minutilla*	Least Sandpiper			S1B,S3M					
Birds	*Calidris pusilla*	Semipalmated Sandpiper			S3M					
Birds	*Cardellina canadensis*	Canada Warbler	1 At Risk	G5	S3B	Threatened	Threatened	Endangered	X	COSEWIC; NS ESA: T
Birds	*Cardellina pusilla*	Wilson's Warbler	3 Sensitive	G5	S3B					
Birds	*Cathartes aura*	Turkey Vulture			S2S3B					
Birds	*Catharus bicknelli*	Bicknell's Thrush	1 At Risk	G4	S1S2B	Threatened	Threatened	Endangered	X	COSEWIC: SC; NS ESA: V
Birds	*Catharus fuscescens*	Veery			S3S4B					
Birds	*Catharus ustulatus*	Swainson's Thrush	4 Secure	G5	S3S4B					
Birds	*Chaetura pelagica*	Chimney Swift	1 At Risk	G5	S2B,S1M	Threatened	Threatened	Endangered	X	COSEWIC; NS ESA: T
Birds	*Charadrius melodus melodus*	Piping Plover melodus ssp			S1B	Endangered	Endangered	Endangered		
Birds	*Charadrius semipalmatus*	Semipalmated Plover			S1B,S3S4M					
Birds	*Charadrius vociferus*	Killdeer			S3B					
Birds	*Chordeiles minor*	Common Nighthawk	1 At Risk	G5	S2B	Special Concern	Threatened	Threatened	X	COSEWIC; NS ESA: T
Birds	*Chroicocephalus ridibundus*	Black-headed Gull	4 Secure	G5	S3N					
Birds	*Circus hudsonius*	Northern Harrier			S3S4B					
Birds	*Coccothraustes vespertinus*	Evening Grosbeak	4 Secure	G5	S3S4B,S3N	Special Concern	Special Concern	Vulnerable		
Birds	*Coccyzus erythropthalmus*	Black-billed Cuckoo	2 May Be At Risk	G5	S3B				X	
Birds	*Contopus cooperi*	Olive-sided Flycatcher	1 At Risk	G4	S2B	Special Concern	Threatened	Threatened	X	COSEWIC; NS ESA: T
Birds	*Contopus virens*	Eastern Wood-Pewee	3 Sensitive	G5	S3S4B	Special Concern	Special Concern	Vulnerable		
Birds	*Dolichonyx oryzivorus*	Bobolink	3 Sensitive	G5	S3S4B	Threatened	Threatened	Vulnerable	X	No COSEWIC listing / S3B
Birds	*Dumetella carolinensis*	Gray Catbird	2 May Be At Risk	G5	S3B					
Birds	*Empidonax flaviventris*	Yellow-bellied Flycatcher	3 Sensitive	G5	S3S4B					
Birds	*Euphagus carolinus*	Rusty Blackbird	2 May Be At Risk	G4	S2B	Special Concern	Special Concern	Endangered	X	COSEWIC; NS ESA: T
Birds	*Falco peregrinus*	Peregrine Falcon			S1B,SNAM		Special Concern	Vulnerable		
Birds	*Falco sparverius*	American Kestrel	4 Secure	G5	S3B					
Birds	*Fratercula arctica*	Atlantic Puffin			S3B,S5N					
Birds	*Fulica americana*	American Coot			S1B					
Birds	*Gallinago delicata*	Wilson's Snipe	3 Sensitive	G5	S3B					
Birds	*Haemorhous purpureus*	Purple Finch			S4S5B,S3S4N					
Birds	*Hirundo rustica*	Barn Swallow	1 At Risk	G5	S2S3B	Threatened	Threatened	Endangered		
Birds	*Icterus galbula*	Baltimore Oriole	2 May Be At Risk	G5	S2S3B					
Birds	*Lanius borealis*	Northern Shrike			S3S4N					
Birds	*Leiothlypis peregrina*	Tennessee Warbler	3 Sensitive	G5	S3S4B					
Birds	*Limnodromus griseus*	Short-billed Dowitcher			S3M					

Bras d'Or Lake Biosphere
Species of Concern (2020)

Table 2: List of Species of Conservation Concern in the BLBR with Status Rankings

Taxon	Scientific Name	Common Name	NS General Status	National Rank	Status Rank				Previously Reported (BLBRA 2011)	2010 Status Rank (if different from current)
					S-Rank	COSEWIC	SARA	NS ESA		
Birds	*Limosa haemastica*	Hudsonian Godwit			S1S2M	Threatened				
Birds	*Loxia curvirostra*	Red Crossbill	4 Secure	G5	S3S4				X	S3S4B
Birds	*Mergus serrator*	Red-breasted Merganser	4 Secure	G5	S3S4B,S5N				X	S2S3B
Birds	*Mimus polyglottos*	Northern Mockingbird	4 Secure	G5	S1B				X	S3B
Birds	*Molothrus ater*	Brown-headed Cowbird			S2B					
Birds	*Morus bassanus*	Northern Gannet	4 Secure	G5	SHB,S5M					
Birds	*Myiarchus crinitus*	Great Crested Flycatcher			S1B					
Birds	*Nycticorax nycticorax*	Black-crowned Night-heron			S1B					
Birds	*Oceanodroma leucorhoa*	Leach's Storm-Petrel			S3B,S5M					
Birds	*Oreothlypis peregrina*	Tennessee Warbler			S3S4B					
Birds	*Oxyura jamaicensis*	Ruddy Duck			S1B					
Birds	*Passerella iliaca*	Fox Sparrow	4 Secure	G5	S3S4B					
Birds	*Perisoreus canadensis*	Canada Jay	3 Sensitive	G5	S3					
Birds	*Petrochelidon pyrrhonota*	Cliff Swallow	2 May Be At Risk	G5	S2S3B					
Birds	*Phalacrocorax carbo*	Great Cormorant	3 Sensitive	G5	S2S3					
Birds	*Pheucticus ludovicianus*	Rose-breasted Grosbeak			S2S3B					
Birds	*Picoides arcticus*	Black-backed Woodpecker			S3S4					
Birds	*Picoides dorsalis*	American Three-toed Woodpecker			S1?					
Birds	*Pinicola enucleator*	Pine Grosbeak	2 May Be At Risk	G5	S2S3B,S5N					
Birds	*Piranga olivacea*	Scarlet Tanager			S2B					
Birds	*Pluvialis dominica*	American Golden-Plover			S1S2M					
Birds	*Pluvialis squatarola*	Black-bellied Plover			S3M					
Birds	*Poecile hudsonicus*	Boreal Chickadee	3 Sensitive	G5	S3					
Birds	*Pooecetes gramineus*	Vesper Sparrow			S2B					
Birds	*Progne subis*	Purple Martin	2 May Be At Risk	G5	SHB					
Birds	*Regulus calendula*	Ruby-crowned Kinglet	3 Sensitive	G5	S3S4B					
Birds	*Riparia riparia*	Bank Swallow			S2S3B	Threatened	Threatened	Endangered		
Birds	*Rissa tridactyla*	Black-legged Kittiwake	3 Sensitive	G5	S3B,S5N					
Birds	*Sayornis phoebe*	Eastern Phoebe	3 Sensitive	G5	S4B				X	S2S3B
Birds	*Setophaga castanea*	Bay-breasted Warbler	3 Sensitive	G5	S3S4B					
Birds	*Setophaga striata*	Blackpoll Warbler	3 Sensitive	G5	S3S4B					
Birds	*Setophaga tigrina*	Cape May Warbler	3 Sensitive	G5	S2B					
Birds	*Sialia sialis*	Eastern Bluebird			S3B					
Birds	*Sitta canadensis*	Red-breasted Nuthatch	4 Secure	G5	S3					
Birds	*Somateria mollissima*	Common Eider			S3S4					
Birds	*Spatula clypeata*	Northern Shoveler	2 May Be At Risk	G5	S2B					
Birds	*Spatula discors*	Blue-winged Teal	2 May Be At Risk	G5	S3S4B					
Birds	*Spinus pinus*	Pine Siskin	3 Sensitive	G5	S2S3					
Birds	*Sterna hirundo*	Common Tern	3 Sensitive	G5	S3B				X	
Birds	*Sterna paradisaea*	Arctic Tern	2 May Be At Risk	G5	S3B				X	
Birds	*Tringa flavipes*	Lesser Yellowlegs			S3M					
Birds	*Tringa melanoleuca*	Greater Yellowlegs	3 Sensitive	G5	S3B,S3S4M					
Birds	*Tringa semipalmata*	Willet			S2S3B					
Birds	*Tringa solitaria*	Solitary Sandpiper			SUB,S3S4M					
Birds	*Turdus migratorius*	American Robin			S5B,S3N					
Birds	*Tyrannus tyrannus*	Eastern Kingbird			S3B					
Birds	*Vireo gilvus*	Warbling Vireo	5 Undetermined	G5	S1B				X	S2B
Birds	*Vireo philadelphicus*	Philadelphia Vireo	5 Undetermined	G5	S2?B				X	S2B
Fishes	*Alosa pseudoharengus*	Alewife			S3					
Fishes	*Anguilla rostrata*	American Eel	4 Secure	G4	S2	Threatened				

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					S-Rank	COSEWIC	SARA	NS ESA		
Fishes	*Menidia menidia*	Atlantic Silverside		G5	S3					
Fishes	*Salmo salar*	Atlantic Salmon (eastern Cap	2 May Be At Risk	G5	S1	Endangered			X	No COSEWIC listing / S2
Fishes	*Salvelinus fontinalis*	Brook Trout			S3					
Fishes	*Urophycis tenuis*	White Hake				Threatened				
Invertebrates	*Aeshna canadensis*	Canada Darner	4 Secure	G5	S5				X	S3
Invertebrates	*Aeshna eremita*	Lake Darner	4 Secure	G5	S4				X	S3
Invertebrates	*Aeshna subarctica*	Subarctic Darner	4 Secure	G5	S4				X	S3
Invertebrates	*Aeshna tuberculifera*	Black-Tipped Darner	4 Secure	G4	S5				X	S3
Invertebrates	*Aglais milberti*	Milbert's Tortoiseshell			S2					
Invertebrates	*Amblyscirtes hegon*	Pepper and Salt Skipper	4 Secure	G5	S2S3				X	
Invertebrates	*Amphiagrion saucium*	Eastern Red Damsel	4 Secure	G5	S3				X	S2
Invertebrates	*Anax junius*	Common Green Darner	4 Secure	G5	S5B				X	S3
Invertebrates	*Argia fumipennis violacea*	Variable Dancer	4 Secure	G5T5	S5				X	S3
Invertebrates	*Basiaeschna janata*	Springtime Darner	4 Secure	G5	S5				X	S3
Invertebrates	*Boloria chariclea*	Arctic Fritillary			S2					
Invertebrates	*Bombus terricola*	Yellow-banded Bumblebee	3 Sensitive	G2G4	S3	Special Concern	Special Concern	Vulnerable		No COSEWIC/NS ESA status
Invertebrates	*Boyeria vinosa*	Fawn Darner	4 Secure	G5	S4				X	S3
Invertebrates	*Calopteryx amata*	Superb Jewelwing	4 Secure	G4	S5				X	S3
Invertebrates	*Chromagrion conditum*	Aurora Damsel	4 Secure	G5	S5				X	S3
Invertebrates	*Coenagrion interrogatum*	Subarctic Bluet	2 May Be At Risk	G5	S1				X	
Invertebrates	*Cordulegaster diastatops*	Delta-Spotted Spiketail	4 Secure	G5	S5				X	S3
Invertebrates	*Cordulegaster maculata*	Twin-Spotted Spiketail	4 Secure	G5	S5				X	S3
Invertebrates	*Cordulia shurtleffii*	American Emerald	4 Secure	G5	S5				X	S3
Invertebrates	*Danaus plexippus*	Monarch	3 Sensitive	G5	S2B	Endangered	Special Concern	Endangered		
Invertebrates	*Dorocordulia libera*	Racket-Tailed Emerald	4 Secure	G5	S4				X	S2
Invertebrates	*Enallagma aspersum*	Azure Bluet	4 Secure	G5	S5				X	S2
Invertebrates	*Enallagma boreale*	Boreal Bluet	4 Secure	G5	S5				X	S3
Invertebrates	*Enallagma carunculatum*	Tule Bluet	5 Undetermined	G5	SNR				X	S1
Invertebrates	*Enallagma civile*	Familiar Bluet	4 Secure	G5	S5				X	S3
Invertebrates	*Enallagma ebrium*	Marsh Bluet	4 Secure	G5	S5				X	S3
Invertebrates	*Enallagma hageni*	Hagen's Bluet	4 Secure	G5	S5				X	S3
Invertebrates	*Enallagma vernale (syn. Enallagma cyathigerum vernale)*	Vernal Bluet	5 Undetermined	G4Q	S3				X	S1
Invertebrates	*Epitheca canis*	Beaverpond Baskettail	4 Secure	G5	S5				X	S3
Invertebrates	*Epitheca spinigera*	Spiny Baskettail	4 Secure	G5	S5				X	S3
Invertebrates	*Euphydryas phaeton*	Baltimore Checkerspot			S2S3					
Invertebrates	*Euphyes vestris*	Dun Skipper	4 Secure	G5	S5					
Invertebrates	*Gomphaeschna furcillata*	Harlequin Darner	3 Sensitive	G5	S3				X	S1
Invertebrates	*Gomphus adelphus*	Moustached Clubtail	4 Secure	G4	S5				X	S2
Invertebrates	*Gomphus borealis*	Beaverpond Clubtail	4 Secure	G4	S5				X	S2
Invertebrates	*Gomphus descriptus*	Harpoon Clubtail	3 Sensitive	G4	S2S3				X	S2
Invertebrates	*Gomphus exilis*	Lancet Clubtail	4 Secure	G5	S5				X	S3
Invertebrates	*Gomphus spicatus*	Dusky Clubtail	4 Secure	G5	S5				X	S2
Invertebrates	*Helocordulia uhleri*	Uhler's Sundragon	4 Secure	G5	S5				X	S3
Invertebrates	*Iphthiminus opacus*	a Darkling Beetle			S3					
Invertebrates	*Ischnura posita*	Fragile Forktail	4 Secure	G5	S5				X	S3
Invertebrates	*Ladona julia*	Chalk-Fronted Corporal	4 Secure	G5	S5				X	S3
Invertebrates	*Lanthus parvulus*	Northern Pygmy Clubtail			S3S4					
Invertebrates	*Lestes congener*	Spotted Spreadwing	4 Secure	G5	S5				X	S3

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Invertebrates	*Lestes dryas*	Emerald Spreadwing	4 Secure	G5	S5				X	S3
Invertebrates	*Lestes eurinus*	Amber-Winged Spreadwing	4 Secure	G4	S4				X	S2
Invertebrates	*Lestes forcipatus*	Sweetflag Spreadwing	4 Secure	G5	S5				X	S2
Invertebrates	*Lestes rectangularis*	Slender Spreadwing	4 Secure	G5	S5				X	S3
Invertebrates	*Lestes unguiculatus*	Lyre-Tipped Spreadwing	4 Secure	G5	S5				X	S2
Invertebrates	*Leucorrhinia frigida*	Frosted Whiteface	4 Secure	G5	S5				X	S3
Invertebrates	*Leucorrhinia glacialis*	Crimson-Ringed Whiteface	4 Secure	G5	S5				X	S3
Invertebrates	*Leucorrhinia hudsonica*	Hudsonian Whiteface	4 Secure	G5	S5				X	S3
Invertebrates	*Leucorrhinia intacta*	Dot-Tailed Whiteface	4 Secure	G5	S5				X	S3
Invertebrates	*Leucorrhinia proxima*	Red-Waisted Whiteface	4 Secure	G5	S5				X	S3
Invertebrates	*Lycaena dorcas*	Dorcas Copper	6 Not Assessed	G5	S1?					
Invertebrates	*Margaritifera margaritifera*	Eastern Pearlshell			S2					
Invertebrates	*Megisto cymela*	Little Wood-satyr			S3					
Invertebrates	*Nymphalis l-album*	Compton Tortoiseshell			S1S2					
Invertebrates	*Oeneis jutta*	Jutta Arctic			S3					
Invertebrates	*Ophiogomphus aspersus*	Brook Snaketail			S2S3					
Invertebrates	*Ophiogomphus carolus*	Riffle Snaketail	4 Secure	G5	S5				X	S3
Invertebrates	*Pantala hymenaea*	Spot-Winged Glider			S2?B					
Invertebrates	*Papilio brevicauda bretonens*	Short-tailed Swallowtail			S1					
Invertebrates	*Plathemis lydia*	Common Whitetail	4 Secure	G5	S5				X	S3
Invertebrates	*Polygonia faunus*	Green Comma			S3					
Invertebrates	*Polygonia interrogationis*	Question Mark			S3B					
Invertebrates	*Polygonia progne*	Grey Comma	4 Secure	G4G5	S3S4					
Invertebrates	*Polygonia satyrus*	Satyr Comma			S1?					
Invertebrates	*Somatochlora cingulata*	Lake Emerald	4 Secure	G5	S4				X	S2
Invertebrates	*Somatochlora elongata*	Ski-Tailed Emerald	4 Secure	G5	S4				X	S3
Invertebrates	*Somatochlora forcipata*	Forcipate Emerald	2 May Be At Risk	G5	S2S3				X	S2
Invertebrates	*Somatochlora minor*	Ocellated Emerald	4 Secure	G5	S4				X	S2
Invertebrates	*Somatochlora septentrionalis*	Muskeg Emerald	3 Sensitive	G5	S2				X	S1
Invertebrates	*Somatochlora tenebrosa*	Clamp-Tipped Emerald	4 Secure	G5	S3				X	S2
Invertebrates	*Somatochlora walshii*	Brush-Tipped Emerald	4 Secure	G5	S5				X	S3
Invertebrates	*Somatochlora williamsoni*	Williamson's Emerald	2 May Be At Risk	G5	S2				X	S1
Invertebrates	*Speyeria aphrodite*	Aphrodite Fritillary			S3					
Invertebrates	*Sympetrum costiferum*	Saffron-Winged Meadowhaw	4 Secure	G5	S5				X	S3
Invertebrates	*Sympetrum danae*	Black Meadowhawk	3 Sensitive	G5	S3				X	S2
Invertebrates	*Sympetrum obtrusum*	White-Faced Meadowhawk	4 Secure	G5	S5				X	S3
Invertebrates	*Sympetrum semicinctum*	Band-Winged Meadowhawk	4 Secure	G5	S5				X	S3
Invertebrates	*Sympetrum vicinum*	Autumn Meadowhawk	4 Secure	G5	S5				X	S3
Invertebrates	*Thorybes pylades*	Northern Cloudywing	3 Sensitive	G5	S2S3					
Mammals	*Lynx canadensis*	Canadian Lynx	1 At Risk	G5	S1			Endangered	X	
Mammals	*Martes americana*	American Marten	1 At Risk	G5	S1			Endangered	X	
Mammals	*Microtus chrotorrhinus*	Rock Vole	4 Secure	G4	S2				X	
Mammals	*Myotis lucifugus*	Little Brown Myotis	1 At Risk	G3	S1	Endangered	Endangered	Endangered		
Mammals	*Sorex dispar (formerly S. gasp*	Long-tailed (Gaspe) Shrew	3 Sensitive	G4	S2				X	NS ESA: V
Mammals	*Synaptomys cooperi*	Southern Bog Lemming	4 Secure	G5	S3				X	S3S4
Mammals	*Vespertilionidae sp.*	bat species			S1S2					
Reptiles and Amphibians	*Chelydra serpentina*	Snapping Turtle			S3	Special Concern	Special Concern	Vulnerable		
Reptiles and Amphibians	*Glyptemys insculpta*	Wood Turtle	3 Sensitive	G3	S2	Threatened	Threatened	Threatened	X	COSEWIC: SC; NS ESA: V
Reptiles and Amphibians	*Dermochelys coriacea*	Leatherback Sea Turtle				Endangered	Endangered			
Reptiles and Amphibians	*Hemidactylium scutatum*	Four-toed Salamander	4 Secure	G5	S3				X	

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					S-Rank	COSEWIC	SARA	NS ESA		
Fungi and Lichens	*Anaptychia palmulata*	Shaggy Fringed Lichen			S3S4					
Fungi and Lichens	*Cladonia floerkeana*	Gritty British Soldiers Lichen			S3S4					
Fungi and Lichens	*Cladonia pocillum*	Rosette Pixie-cup Lichen			S3?					
Fungi and Lichens	*Coccocarpia palmicola*	Salted Shell Lichen			S3S4					
Fungi and Lichens	*Collema bachmanianum*	Bachman's Tarpaper Lichen			S1S2					
Fungi and Lichens	*Collema cristatum*	Fingered Tarpaper Lichen			S1					
Fungi and Lichens	*Collema tenax*	Soil Tarpaper Lichen			S3					
Fungi and Lichens	*Erioderma pedicellatum (Atla*	Boreal Felt Lichen (Atlantic po	1 At Risk	G1G2Q	S1	Endangered	Endangered	Endangered	X	
Fungi and Lichens	*Fuscopannaria ahlneri*	Corrugated Shingles Lichen			S3					
Fungi and Lichens	*Fuscopannaria leucosticta*	White-rimmed Shingle Lichen			S2S3	Threatened				
Fungi and Lichens	*Heterodermia neglecta*	Fringe Lichen	4 Secure		S3S4					
Fungi and Lichens	*Hypogymnia vittata*	Slender Monk's Hood Lichen			S3S4					
Fungi and Lichens	*Leptogium acadiense*	Acadian Jellyskin Lichen			S3S4					
Fungi and Lichens	*Leptogium lichenoides*	Tattered Jellyskin Lichen			S3					
Fungi and Lichens	*Leptogium tenuissimum*	Birdnest Jellyskin Lichen			S2S3					
Fungi and Lichens	*Nephroma arcticum*	Arctic Kidney Lichen	2 May Be At Risk	G5?	S2?					
Fungi and Lichens	*Nephroma bellum*	Naked Kidney Lichen			S3					
Fungi and Lichens	*Pannaria lurida*	Wrinkled Shingle Lichen	2 May Be At Risk	G3G5	S1S2	Threatened	Threatened	Threatened		
Fungi and Lichens	*Pectenia plumbea*	Blue Felt Lichen	4 Secure	GNR	S3	Special Concern	Special Concern	Vulnerable		
Fungi and Lichens	*Peltigera collina*	Tree Pelt Lichen	3 Sensitive	G3G4	S2?					
Fungi and Lichens	*Peltigera hydrothyria*	Eastern Waterfan	2 May Be At Risk	G4	S1	Threatened	Threatened	Threatened		
Fungi and Lichens	*Peltigera lepidophora*	Scaly Pelt Lichen			S1					
Fungi and Lichens	*Peltigera neckeri*	Black-saddle Pelt Lichen	5 Undetermined	G4G5	S1S3					
Fungi and Lichens	*Phaeophyscia pusilloides*	Pompom-tipped Shadow Lichen			S3?					
Fungi and Lichens	*Platismatia norvegica*	Oldgrowth Rag Lichen			S3					
Fungi and Lichens	*Sticta fuliginosa*	Peppered Moon Lichen			S3					
Fungi and Lichens	*Usnea mutabilis*	Bloody Beard Lichen			S2S3					
Mosses	*Atrichum angustatum*	Lesser Smoothcap Moss			S2?					
Mosses	*Brachythecium erythrorrhizor*	Taiga Ragged Moss			S1?					
Mosses	*Buxbaumia minakatae*	Hump-Backed Elves			S1S2					
Mosses	*Calliergon giganteum*	Giant Spear Moss			S3?					
Mosses	*Campylium polygamum*	a Moss			S2?					
Mosses	*Campylium radicale*	Long-stalked Fine Wet Moss			S2?					
Mosses	*Cinclidium stygium*	Sooty Cupola Moss			S1					
Mosses	*Cyrtomnium hymenophylloid*	Short-pointed Lantern Moss			S2?					
Mosses	*Dicranella varia*	a Moss			S3S4					
Mosses	*Encalypta procera*	Slender Extinguisher Moss			S3S4					
Mosses	*Fissidens exilis*	Pygmy Pocket Moss			S1S2					
Mosses	*Fontinalis sullivantii*	a Moss			S2?					
Mosses	*Hamatocaulis vernicosus*	a Moss			S1S2					
Mosses	*Limprichtia revolvens*	a Moss			S2S3					
Mosses	*Metacalypogeia schusterana*	Schuster's Pouchwort			S1?					
Mosses	*Mnium stellare*	Star Leafy Moss			S3?					
Mosses	*Moerckia hibernica*	Irish Ruffwort			S1?					
Mosses	*Paludella squarrosa*	Tufted Fen Moss			S1?					
Mosses	*Platydictya confervoides*	a Moss			S1S2					
Mosses	*Scorpidium scorpioides*	Hooked Scorpion Moss			S2?					
Mosses	*Sphagnum lindbergii*	Lindberg's Peat Moss			S3S4					
Mosses	*Sphagnum platyphyllum*	Flat-leaved Peat Moss			S1S2					
Mosses	*Sphagnum riparium*	Streamside Peat Moss			S3?					
Mosses	*Sphagnum subnitens*	Lustrous Peat Moss			S2?					

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Mosses	*Tortella fragilis*	Fragile Twisted Moss			S2?					
Vascular Plants	*Agalinis purpurea var. parvifl*	Small-flowered Purple False Foxglove			S1					
Vascular Plants	*Agrimonia gryposepala*	Hooked Agrimony	4 Secure	G5	S3					
Vascular Plants	*Alopecurus aequalis*	Short-awned Foxtail			S3					
Vascular Plants	*Amelanchier fernaldii*	Fernald's Serviceberry	5 Undetermined	G2G4Q	S2S3				X	S2?
Vascular Plants	*Amelanchier spicata*	Running Serviceberry			S3					
Vascular Plants	*Anemone quinquefolia*	Wood Anemone	3 Sensitive	G5	S2				X	
Vascular Plants	*Anemone virginiana var. alba*	Virginia Anemone	3 Sensitive	G5T4T5	S1S2				X	
Vascular Plants	*Arabis hirsuta var. pycnocarp*	Hairy Rockcress							X	S1S2
Vascular Plants	*Arabis pycnocarpa*	Cream-flowered Rockcress			S1S2					
Vascular Plants	*Asplenium trichomanes*	Maidenhair Spleenwort	4 Secure	G5	S3				X	S2
Vascular Plants	*Asplenium viride*	Green Spleenwort	3 Sensitive	G5	S3				X	S2
Vascular Plants	*Atriplex glabriuscula var. frar*	Frankton's Saltbush			S3S4					
Vascular Plants	*Bartonia virginica*	Yellow Bartonia			S3					
Vascular Plants	*Betula pumila*	Bog Birch			S3					
Vascular Plants	*Bistorta vivipara (syn. Polygonum viviparum)*	Alpine Bistort	2 May Be At Risk	G5	S1				X	
Vascular Plants	*Boechera stricta*	Drummond's Rockcress	3 Sensitive	G5	S2				X	
Vascular Plants	*Bolboschoenus robustus (formerly Schoenoplectus robustus)*	Sturdy Bulrush	5 Undetermined	G5	S1?				X	
Vascular Plants	*Botrychium lanceolatum ssp.*	Narrow Triangle Moonwort			S2S3					
Vascular Plants	*Calamagrostis stricta ssp. stri*	Slim-stemmed Reed Grass			S1S2					
Vascular Plants	*Caltha palustris*	Yellow Marsh Marigold			S2					
Vascular Plants	*Campanula aparinoides*	Marsh Bellflower			S3					
Vascular Plants	*Cardamine dentata*	Toothed Bittercress			S1					
Vascular Plants	*Carex argyrantha*	Silvery-flowered Sedge			S3S4					
Vascular Plants	*Carex atratiformis*	Scabrous Black Sedge	3 Sensitive	G5	S2				X	
Vascular Plants	*Carex bebbii*	Bebb's Sedge	3 Sensitive	G5	S2				X	S1S2
Vascular Plants	*Carex castanea*	Chestnut Sedge	2 May Be At Risk	G5	S2					
Vascular Plants	*Carex cryptolepis*	Hidden-scaled Sedge			S3					
Vascular Plants	*Carex eburnea*	Bristle-leaved Sedge	3 Sensitive	G5	S3					
Vascular Plants	*Carex granularis*	Limestone Meadow Sedge			S1					
Vascular Plants	*Carex gynocrates*	Northern Bog Sedge			S1					
Vascular Plants	*Carex haydenii*	Hayden's Sedge			S1					
Vascular Plants	*Carex hirtifolia*	Pubescent Sedge			S2S3					
Vascular Plants	*Carex hystericina*	Porcupine Sedge			S2					
Vascular Plants	*Carex rosea*	Rosy Sedge			S3					
Vascular Plants	*Carex tribuloides*	Blunt Broom Sedge			S3					
Vascular Plants	*Carex tuckermanii*	Tuckerman's Sedge			S2					
Vascular Plants	*Carex viridula var. elatior*	Greenish Sedge			S1					
Vascular Plants	*Carex wiegandii*	Wiegand's Sedge			S3					
Vascular Plants	*Caulophyllum thalictroides*	Blue Cohosh	2 May Be At Risk	G4G5	S2				X	
Vascular Plants	*Comandra umbellata*	Bastard's Toadflax	2 May Be At Risk	G5	S2				X	
Vascular Plants	*Cryptogramma stelleri*	Steller's Rockbrake	2 May Be At Risk	G5	S1S2				X	
Vascular Plants	*Cypripedium parviflorum*	Yellow Lady's-slipper	3 Sensitive	G5	S2S3					
Vascular Plants	*Cypripedium parviflorum var.*	Small Yellow Lady's-Slipper			S2					
Vascular Plants	*Cypripedium parviflorum var.*	Greater Yellow Lady's-slipper	3 Sensitive	G5T5	S2					
Vascular Plants	*Cypripedium reginae*	Showy Lady's-Slipper	2 May Be At Risk	G4	S2				X	

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Vascular Plants	*Cystopteris bulbifera*	Bulblet Bladder Fern	4 Secure	G5	S3S4					
Vascular Plants	*Cystopteris laurentiana*	Laurentian Bladder Fern	2 May Be At Risk	G3	S2				X	S1?
Vascular Plants	*Cystopteris tenuis*	A Bladderfern	4 Secure	G5	S4				X	S3S4
Vascular Plants	*Decodon verticillatus*	Swamp Loosestrife			S3					
Vascular Plants	*Dichanthelium clandestinum*	Deer-tongue Panic Grass	4 Secure	G5?	S3					
Vascular Plants	*Diphasiastrum complanatum*	Northern Ground-cedar			S3S4					
Vascular Plants	*Diphasiastrum sitchense*	Sitka Ground-cedar	4 Secure	G5	S3					
Vascular Plants	*Diphasiastrum x sabinifolium (formerly Lycopodium sabinifolium)*	Savin-leaved Ground-cedar	4 Secure	G4	S3?				X	
Vascular Plants	*Draba arabisans*	Rock Whitlow-Grass	3 Sensitive	G4	S2				X	
Vascular Plants	*Eleocharis erythropoda*	Red-stemmed Spikerush			S1					
Vascular Plants	*Eleocharis quinqueflora*	Few-flowered Spikerush	3 Sensitive	G5	S2				X	
Vascular Plants	*Endotropis alnifolia*	alder-leaved buckthorn			S3					
Vascular Plants	*Epilobium coloratum*	Purple-veined Willowherb	3 Sensitive	G5	S2?					
Vascular Plants	*Epilobium strictum*	Downy Willowherb			S3					
Vascular Plants	*Equisetum hyemale*	Common Scouring-rush			S3S4					
Vascular Plants	*Equisetum hyemale ssp. affin*	Common Scouring-rush	4 Secure		S3S4					
Vascular Plants	*Equisetum pratense*	Meadow Horsetail			S3					
Vascular Plants	*Equisetum scirpoides*	Dwarf Scouring-Rush			S3S4					
Vascular Plants	*Equisetum variegatum*	Variegated Horsetail	4 Secure	G5	S3					
Vascular Plants	*Erigeron hyssopifolius*	Hyssop-leaved Fleabane	3 Sensitive	G5	S3					
Vascular Plants	*Erigeron philadelphicus*	Philadelphia Fleabane	3 Sensitive	G5	S2				X	
Vascular Plants	*Eriophorum gracile*	Slender Cottongrass			S2S3					
Vascular Plants	*Eriophorum russeolum*	Russet Cottongrass			S3S4					
Vascular Plants	*Euphorbia polygonifolia*	Seaside Spurge			S2S3					
Vascular Plants	*Floerkea proserpinacoides*	False Mermaidweed			S2					
Vascular Plants	*Fragaria vesca ssp. american*	Woodland Strawberry			S3S4					
Vascular Plants	*Fraxinus excelsior*	European Ash	7 Exotic	GNR	SNA					
Vascular Plants	*Fraxinus nigra*	Black Ash	1 At Risk	G5	S1S2	Threatened		Threatened		
Vascular Plants	*Fraxinus pennsylvanica*	Red Ash			S1					
Vascular Plants	*Galium kamtschaticum*	Northern Wild Licorice			S3					
Vascular Plants	*Galium labradoricum*	Labrador Bedstraw	3 Sensitive	G5	S2				X	
Vascular Plants	*Goodyera repens*	Lesser Rattlesnake-plantain			S3					
Vascular Plants	*Halenia deflexa*	Spurred Gentian			S2S3					
Vascular Plants	*Hieracium umbellatum*	Umbellate Hawkweed	4 Secure	G5	SNR				X	S2?
Vascular Plants	*Hypericum majus*	Large St John's-wort	3 Sensitive	G5	S2				X	S1
Vascular Plants	*Hypericum x dissimulatum*	Disguised St. John's-wort			S2S3					
Vascular Plants	*Impatiens pallida*	Pale Jewelweed	3 Sensitive	G5	S2				X	
Vascular Plants	*Juncus acuminatus*	Sharp-Fruit Rush			S3S4					
Vascular Plants	*Juncus alpinoarticulatus ssp.*	Northern Green Rush	2 May Be At Risk	G5	S1S2				X	
Vascular Plants	*Juncus dudleyi*	Dudley's Rush			S3					
Vascular Plants	*Lilium canadense*	Canada Lily			S2					
Vascular Plants	*Liparis loeselii*	Loesel's Twayblade			S3S4					
Vascular Plants	*Lobelia kalmii*	Brook Lobelia	2 May Be At Risk	G5	S2				X	S1S2
Vascular Plants	*Luzula parviflora*	Small-flowered Woodrush			S3S4					
Vascular Plants	*Myriophyllum sibiricum*	Siberian Water Milfoil			S3S4					
Vascular Plants	*Myriophyllum verticillatum*	Whorled Water Milfoil			S2					
Vascular Plants	*Neottia bifolia*	Southern Twayblade	4 Secure	G4	S3				X	S1
Vascular Plants	*Ophioglossum pusillum*	Northern Adder's-tongue			S2S3					

Bras d'Or Lake Biosphere
Species of Concern (2020)

Table 2: List of Species of Conservation Concern in the BLBR with Status Rankings

Taxon	Scientific Name	Common Name			Status Rank				Previously Reported (BLBRA 2011)	2010 Status Rank (if different from current)
			NS General Status	National Rank	S-Rank	COSEWIC	SARA	NS ESA		
Vascular Plants	*Oreojuncus trifidus*	Highland Rush	3 Sensitive	G5	S2S3				X	S2
Vascular Plants	*Osmorhiza longistylis*	Smooth Sweet Cicely	2 May Be At Risk	G5	S2				X	
Vascular Plants	*Oxybasis rubra*	Red Goosefoot			S2					
Vascular Plants	*Packera paupercula*	Balsam Groundsel			S3					
Vascular Plants	*Panicum philadelphicum*	Philadelphia Panicgrass			S3S4					
Vascular Plants	*Parnassia parviflora*	Small-flowered Grass-of-Parnassus			S1S2					
Vascular Plants	*Persicaria pensylvanica*	Pennsylvania Smartweed			S3					
Vascular Plants	*Plantago rugelii*	Rugel's Plantain	4 Secure	G5	S3					
Vascular Plants	*Platanthera grandiflora*	Large Purple Fringed Orchid			S3					
Vascular Plants	*Platanthera hookeri*	Hooker's Orchid			S3					
Vascular Plants	*Platanthera huronensis*	Fragrant Green Orchid			S1S2					
Vascular Plants	*Platanthera orbiculata*	Small Round-leaved Orchid			S3					
Vascular Plants	*Poa glauca*	Glaucous Blue Grass			S2S3					
Vascular Plants	*Polygonum oxyspermum ssp.*	Ray's Knotweed			S2S3					
Vascular Plants	*Polypodium appalachianum*	Appalachian Polypody			S3					
Vascular Plants	*Polystichum braunii*	Braun's Holly Fern	4 Secure	G5	S4					
Vascular Plants	*Polystichum lonchitis*	Northern Holly Fern	3 Sensitive	G5	S2				X	
Vascular Plants	*Potamogeton obtusifolius*	Blunt-leaved Pondweed	4 Secure	G5	S3				X	S2
Vascular Plants	*Potamogeton praelongus*	White-stemmed Pondweed			S3					
Vascular Plants	*Potamogeton richardsonii*	Richardson's Pondweed			S2					
Vascular Plants	*Primula laurentiana*	Laurentian Primrose			S3					
Vascular Plants	*Proserpinaca palustris*	Marsh Mermaidweed			S3					
Vascular Plants	*Pyrola asarifolia*	Pink Pyrola			S3					
Vascular Plants	*Pyrola minor*	Lesser Pyrola	3 Sensitive	G5	S3				X	S2
Vascular Plants	*Ranunculus gmelinii*	Gmelin's Water Buttercup	4 Secure	G5	S3					
Vascular Plants	*Rhamnus alnifolia*	Alder-leaved Buckthorn	4 Secure		S3					
Vascular Plants	*Rhinanthus minor ssp. groenl*	Little Yellow Rattle	2 May Be At Risk	G5T5?	S1					
Vascular Plants	*Rhynchospora capillacea*	Slender Beakrush	2 May Be At Risk	G4	S1				X	
Vascular Plants	*Rumex persicarioides*	Peach-leaved Dock			S2?					
Vascular Plants	*Rumex salicifolius*	Willow Dock							X	S2
Vascular Plants	*Rumex triangulivalvis*	Triangular-valve Dock			S2					
Vascular Plants	*Salix pedicellaris*	Bog Willow			S2					
Vascular Plants	*Salix petiolaris*	Meadow Willow			S3S4					
Vascular Plants	*Samolus parviflorus*	Seaside Brookweed			S3					
Vascular Plants	*Sanguinaria canadensis*	Bloodroot			S3S4					
Vascular Plants	*Sanicula odorata*	Clustered Sanicle	2 May Be At Risk	G5	S1				X	
Vascular Plants	*Saxifraga paniculata ssp. laes*	Laestadius' Saxifrage			S2					
Vascular Plants	*Sceptridium dissectum*	Dissected Moonwort			S3					
Vascular Plants	*Schizaea pusilla*	Little Curlygrass Fern			S3S4					
Vascular Plants	*Scrophularia lanceolata*	Lance-leaved Figwort			S1					
Vascular Plants	*Selaginella selaginoides*	Low Spikemoss	2 May Be At Risk	G5	S1S2					
Vascular Plants	*Senecio pseudoarnica*	Seabeach Ragwort	3 Sensitive	G5	S2S3				X	S2
Vascular Plants	*Shepherdia canadensis*	Soapberry	3 Sensitive	G5	S2S3				X	S2
Vascular Plants	*Sparganium androcladum*	Branching Bur-Reed			S1					
Vascular Plants	*Sparganium natans*	Small Burreed			S3					
Vascular Plants	*Spiranthes ochroleuca*	Yellow Ladies'-tresses			S3					
Vascular Plants	*Stellaria crassifolia*	Fleshy Stitchwort			S1					
Vascular Plants	*Stuckenia filiformis*	Thread-leaved Pondweed			S2S3					
Vascular Plants	*Stuckenia vaginata*	Sheathed Pondweed		G5	SNA				X	S1
Vascular Plants	*Symphyotrichum boreale*	Boreal Aster	3 Sensitive	G5	S2?				X	
Vascular Plants	*Teucrium canadense*	Canada Germander			S3					

Bras d'Or Lake Biosphere
Species of Concern (2020)

Table 2: List of Species of Conservation Concern in the BLBR with Status Rankings

Taxon	Scientific Name	Common Name			Status Rank				Previously Reported (BLBRA 2011)	2010 Status Rank (if different from current)
			NS General Status	National Rank	S-Rank	COSEWIC	SARA	NS ESA		
Vascular Plants	*Thuja occidentalis*	Eastern White Cedar	1 At Risk	G5	S1			Vulnerable		
Vascular Plants	*Triglochin gaspensis*	Gaspé Arrowgrass	5 Undetermined	G3G4	S3S4				X	S1?
Vascular Plants	*Triosteum aurantiacum*	Orange-fruited Tinker's Weed	3 Sensitive	G5	S2S3				X	S2
Vascular Plants	*Trisetum spicatum*	Narrow False Oats			S3S4					
Vascular Plants	*Vaccinium boreale*	Northern Blueberry	3 Sensitive	G4	S3				X	S2
Vascular Plants	*Vaccinium cespitosum*	Dwarf Bilberry	4 Secure		S3				X	S2
Vascular Plants	*Verbena hastata*	Blue Vervain			S3					
Vascular Plants	*Veronica serpyllifolia*	Thyme-Leaved Speedwell	4 Secure	G5	SNA					
Vascular Plants	*Viola nephrophylla*	Northern Bog Violet	3 Sensitive	G5	S2				X	
Vascular Plants	*Woodsia alpina*	Alpine Cliff Fern	2 May Be At Risk	G4	S1S2				X	
Vascular Plants	*Woodsia glabella*	Smooth Cliff Fern	3 Sensitive	G5	S2				X	

Brs d'Or Lake Biosphere
Full List of Species (2020)

Table 1: Full list of species documented in the BLBR (Sources: ACCDC, 2020; OBIS, 2020; iNaturalist, 2020)

Higher Taxon	Family	Scientific Name	Common Name	COSEWIC Assessment	SARA Listing	NSESA Listing	Provincial Rank	National Rank	Global Rank
Birds	Gaviidae	*Gavia stellata*	Red-throated Loon				S4N	N5B,N5N	G5
Birds	Gaviidae	*Gavia immer*	Common Loon	Not At Risk			S4B,S4N	N5B,N5N	G5
Birds	Podicipedidae	*Podilymbus podiceps*	Pied-billed Grebe				S4B	N5B	G5
Birds	Podicipedidae	*Podiceps auritus*	Horned Grebe	Special Concern	Special Concern		S4N	N5B	G5
Birds	Podicipedidae	*Podiceps grisegena*	Red-necked Grebe	Not At Risk			S4N	N5B,N5N	G5
Birds	Hydrobatidae	*Pelagodroma marina*	White-faced Storm-Petrel				SNA		G5
Birds	Hydrobatidae	*Oceanodroma leucorhoa*	Leach's Storm-Petrel				S3B,S5M	N4N,N5B	G5
Birds	Sulidae	*Morus bassanus*	Northern Gannet				SHB,S5M	N4B,N5N	G5
Birds	Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant				S2S3	N4B,N4N	G5
Birds	Phalacrocoracidae	*Phalacrocorax auritus*	Double-crested Cormorant	Not At Risk			S4B	N5B	G5
Birds	Ardeidae	*Botaurus lentiginosus*	American Bittern				S3S4B	N3N,N5B	G5
Birds	Ardeidae	*Ardea herodias*	Great Blue Heron				S4B	N5B	G5
Birds	Ardeidae	*Nycticorax nycticorax*	Black-crowned Night-heron				S1B	N4B	G5
Birds	Anatidae	*Anser anser*	Graylag Goose				SNA		
Birds	Anatidae	*Branta canadensis*	Canada Goose				S4N	N5B,N5N	G5
Birds	Anatidae	*Aix sponsa*	Wood Duck				S5B	N5B,N5N	G5
Birds	Anatidae	*Anas crecca*	Green-winged Teal				S4S5B	N5B,N5N	G5
Birds	Anatidae	*Anas rubripes*	American Black Duck				S5	N5B,N5N	G5
Birds	Anatidae	*Anas platyrhynchos*	Mallard				S5	N5B,N5N	G5
Birds	Anatidae	*Anas platyrhynchos x rubripes*	Mallard x Black Duck hybrid						
Birds	Anatidae	*Anas acuta*	Northern Pintail				S1B	N5B,N5N	G5
Birds	Anatidae	*Spatula discors*	Blue-winged Teal				S3S4B	N5B	G5
Birds	Anatidae	*Spatula clypeata*	Northern Shoveler				S2B	N4N,N5B	G5
Birds	Anatidae	*Mareca penelope*	Eurasian Wigeon				SNA	N4N	G5
Birds	Anatidae	*Mareca americana*	American Wigeon				S4B	N5B,N5N	G5
Birds	Anatidae	*Aythya americana*	Redhead				SHB,SNAM	N3N,N5B	G5
Birds	Anatidae	*Aythya collaris*	Ring-necked Duck				S5B	N5N,N5B	G5
Birds	Anatidae	*Aythya marila*	Greater Scaup				S4N	N5B,N5N	G5
Birds	Anatidae	*Aythya affinis*	Lesser Scaup				SNA	N5B,N5N	G5
Birds	Anatidae	*Somateria mollissima*	Common Eider				S3S4	N5B,N5N	G5
Birds	Anatidae	*Melanitta perspicillata*	Surf Scoter				S4N	N5B,N5N	G5
Birds	Anatidae	*Melanitta americana*	Black Scoter				S4N	N4B,N4N	G5
Birds	Anatidae	*Melanitta deglandi*	White-winged Scoter				S4N	N5B,N5N	G5
Birds	Anatidae	*Bucephala clangula*	Common Goldeneye				S2B,S5N	N5B,N5N	G5
Birds	Anatidae	*Bucephala islandica (Eastern pop.)*	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern		S1N	N5B,N5N	G5
Birds	Anatidae	*Bucephala albeola*	Bufflehead				S3S4N	N5B,N5N	G5

Brs d'Or Lake Biosphere
Full List of Species (2020)

Table 1: Full list of species documented in the BLBR (Sources: ACCDC, 2020; OBIS, 2020; iNaturalist, 2020)

Higher Taxon	Family	Scientific Name	Common Name	COSEWIC Assessment	SARA Listing	NSESA Listing	Provincial Rank	National Rank	Global Rank
Birds	Anatidae	*Lophodytes cucullatus*	Hooded Merganser				S5B	N5B	G5
Birds	Anatidae	*Mergus merganser*	Common Merganser				S5	N5B,N5N	G5
Birds	Anatidae	*Mergus serrator*	Red-breasted Merganser				S3S4B,S5N	N5B,N5N	G5
Birds	Anatidae	*Oxyura jamaicensis*	Ruddy Duck				S1B	N5B	G5
Birds	Cathartidae	*Cathartes aura*	Turkey Vulture				S2S3B	N5B	G5
Birds	Accipitridae	*Pandion haliaetus*	Osprey				S4B	N5B	G5
Birds	Accipitridae	*Haliaeetus leucocephalus*	Bald Eagle	Not At Risk			S5	N5B,N5N	G5
Birds	Accipitridae	*Circus hudsonius*	Northern Harrier	Not At Risk			S3S4B	N4N,N5B	G5
Birds	Accipitridae	*Accipiter striatus*	Sharp-shinned Hawk	Not At Risk			S5	N5B,N5N	G5
Birds	Accipitridae	*Accipiter gentilis*	Northern Goshawk	Not At Risk			S3S4	N5	G5
Birds	Accipitridae	*Buteo platypterus*	Broad-winged Hawk				S5B	N5B	G5
Birds	Accipitridae	*Buteo jamaicensis*	Red-tailed Hawk	Not At Risk			S5	N5B	G5
Birds	Accipitridae	*Buteo lagopus*	Rough-legged Hawk	Not At Risk			S3N	N5B,N5N	G5
Birds	Falconidae	*Falco sparverius*	American Kestrel				S3B	N5B	G5
Birds	Falconidae	*Falco columbarius*	Merlin	Not At Risk			S5B	N4N,N5B	G5
Birds	Falconidae	*Falco peregrinus pop. 1*	Peregrine Falcon - anatum/tundrius	Not At Risk	Special Concern	Vulnerable	S1B,SNAM	NNR	G4T4
Birds	Phasianidae	*Phasianus colchicus*	Ring-necked Pheasant				SNA	NNA	G5
Birds	Phasianidae	*Falcipennis canadensis*	Spruce Grouse				S4	N5	G5
Birds	Phasianidae	*Bonasa umbellus*	Ruffed Grouse				S5	N5	G5
Birds	Rallidae	*Porzana carolina*	Sora				S5B	N5B	G5
Birds	Rallidae	*Fulica americana*	American Coot	Not At Risk			S1B	N5B	G5
Birds	Charadriidae	*Pluvialis squatarola*	Black-bellied Plover				S3M	N4B	G5
Birds	Charadriidae	*Pluvialis dominica*	American Golden-Plover				S1S2M	N5B	G5
Birds	Charadriidae	*Charadrius semipalmatus*	Semipalmated Plover				S1B,S3S4M	N5B	G5
Birds	Charadriidae	*Charadrius melodus melodus*	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B	N3B	G3T3
Birds	Charadriidae	*Charadrius vociferus*	Killdeer				S3B	N5B	G5
Birds	Scolopacidae	*Tringa melanoleuca*	Greater Yellowlegs				S3B,S3S4M	N5B	G5
Birds	Scolopacidae	*Tringa flavipes*	Lesser Yellowlegs				S3M	N5B	G5
Birds	Scolopacidae	*Tringa solitaria*	Solitary Sandpiper				SUB,S3S4M	N5B	G5
Birds	Scolopacidae	*Tringa semipalmata*	Willet				S2S3B	N5B	G5
Birds	Scolopacidae	*Actitis macularius*	Spotted Sandpiper				S3S4B	N5B	G5
Birds	Scolopacidae	*Limosa haemastica*	Hudsonian Godwit	Threatened			S1S2M	N4B	G4
Birds	Scolopacidae	*Arenaria interpres*	Ruddy Turnstone				S3M	N5B	G5
Birds	Scolopacidae	*Calidris alba*	Sanderling				S3M,S2N	N5B	G5
Birds	Scolopacidae	*Calidris pusilla*	Semipalmated Sandpiper				S3M	N5B	G5
Birds	Scolopacidae	*Calidris minutilla*	Least Sandpiper				S1B,S3M	N5B	G5
Birds	Scolopacidae	*Calidris maritima*	Purple Sandpiper				S3?N	N5B,N5N	G5

Brs d'Or Lake Biosphere
Full List of Species (2020)

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Birds	Scolopacidae	*Limnodromus griseus*	Short-billed Dowitcher				S3M	N5B	G5
Birds	Scolopacidae	*Gallinago delicata*	Wilson's Snipe				S3B	N5B	G5
Birds	Scolopacidae	*Scolopax minor*	American Woodcock				S5B	N5B	G5
Birds	Laridae	*Leucophaeus atricilla*	Laughing Gull				SHB	N1B,N4N	G5
Birds	Laridae	*Chroicocephalus ridibundus*	Black-headed Gull				S3N	N3	G5
Birds	Laridae	*Chroicocephalus philadelphia*	Bonaparte's Gull				S5M	N4N5N,N5B	G5
Birds	Laridae	*Larus delawarensis*	Ring-billed Gull				SUB,S5N	N5B,N5N	G5
Birds	Laridae	*Larus argentatus*	Herring Gull				S5	N5B,N5N	G5
Birds	Laridae	*Larus marinus*	Great Black-backed Gull				S4S5	N5B,N5N	G5
Birds	Laridae	*Larus glaucoides*	Iceland Gull				S4N	N5B,N5N	G5
Birds	Laridae	*Rissa tridactyla*	Black-legged Kittiwake				S3B,S5N	N5B,N5N	G5
Birds	Laridae	*Hydroprogne caspia*	Caspian Tern	Not At Risk			SNA	N4B	G5
Birds	Laridae	*Sterna hirundo*	Common Tern	Not At Risk			S3B	N5B	G5
Birds	Laridae	*Sterna paradisaea*	Arctic Tern				S3B	N5B	G5
Birds	Laridae	*Sterna forsteri*	Forster's Tern				SNA	N3B	G5
Birds	Alcidae	*Uria lomvia*	Thick-billed Murre				S5N	N5B,N5N	G5
Birds	Alcidae	*Alca torda*	Razorbill				S2B,S4N	N4B,N4N	G5
Birds	Alcidae	*Cepphus grylle*	Black Guillemot				S4	N5B,N5N	G5
Birds	Alcidae	*Fratercula arctica*	Atlantic Puffin				S3B,S5N	N5B	G5
Birds	Columbidae	*Columba livia*	Rock Pigeon				SNA	NNA	G5
Birds	Columbidae	*Zenaida asiatica*	White-winged Dove				SNA	NNA	G5
Birds	Columbidae	*Zenaida macroura*	Mourning Dove				S5	N5	G5
Birds	Cuculidae	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3B	N5B	G5
Birds	Strigidae	*Bubo virginianus*	Great Horned Owl				S4	N5	G5
Birds	Strigidae	*Strix varia*	Barred Owl				S5	N5	G5
Birds	Strigidae	*Asio otus*	Long-eared Owl				S2S3	N5B,N5N	G5
Birds	Strigidae	*Asio flammeus*	Short-eared Owl	Special Concern	Special Concern		S1S2B	N3N,N4B	G5
Birds	Strigidae	*Aegolius funereus*	Boreal Owl	Not At Risk			S2?B	N5	G5
Birds	Strigidae	*Aegolius acadicus*	Northern Saw-whet Owl				S4B	N5B,N5N	G5
Birds	Caprimulgidae	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S2B	N4B	G5
Birds	Apodidae	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Endangered	S2B,S1M	N4B	G4G5
Birds	Trochilidae	*Archilochus colubris*	Ruby-throated Hummingbird				S5B	N5B	G5
Birds	Alcedinidae	*Megaceryle alcyon*	Belted Kingfisher				S5B	N5B	G5

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Birds	Picidae	*Melanerpes carolinus*	Red-bellied Woodpecker				SUB	N4	G5
Birds	Picidae	*Sphyrapicus varius*	Yellow-bellied Sapsucker				S4S5B	N5B	G5
Birds	Picidae	*Dryobates pubescens*	Downy Woodpecker				S5	N5	G5
Birds	Picidae	*Dryobates villosus*	Hairy Woodpecker				S5	N5	G5
Birds	Picidae	*Picoides arcticus*	Black-backed Woodpecker				S3S4	N5	G5
Birds	Picidae	*Picoides dorsalis*	American Three-toed Woodpecker				S1?	N5	G5
Birds	Picidae	*Colaptes auratus*	Northern Flicker				S5B	N5B	G5
Birds	Picidae	*Dryocopus pileatus*	Pileated Woodpecker				S5	N5	G5
Birds	Tyrannidae	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S2B	N5B	G4
Birds	Tyrannidae	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Vulnerable	S3S4B	N5B	G5
Birds	Tyrannidae	*Empidonax flaviventris*	Yellow-bellied Flycatcher				S3S4B	N5B	G5
Birds	Tyrannidae	*Empidonax alnorum*	Alder Flycatcher				S5B	N5B	G5
Birds	Tyrannidae	*Empidonax minimus*	Least Flycatcher				S4S5B	N5B	G5
Birds	Tyrannidae	*Sayornis phoebe*	Eastern Phoebe				S4B	N5B	G5
Birds	Tyrannidae	*Myiarchus crinitus*	Great Crested Flycatcher				S1B	N5B	G5
Birds	Tyrannidae	*Tyrannus tyrannus*	Eastern Kingbird				S3B	N5B	G5
Birds	Hirundinidae	*Tachycineta bicolor*	Tree Swallow				S4B	N5B	G5
Birds	Hirundinidae	*Riparia riparia*	Bank Swallow	Threatened	Threatened	Endangered	S2S3B	N5B	G5
Birds	Hirundinidae	*Petrochelidon pyrrhonota*	Cliff Swallow				S2S3B	N5B	G5
Birds	Hirundinidae	*Hirundo rustica*	Barn Swallow	Threatened	Threatened	Endangered	S2S3B	N5B	G5
Birds	Corvidae	*Perisoreus canadensis*	Canada Jay				S3	N5	G5
Birds	Corvidae	*Cyanocitta cristata*	Blue Jay				S5	N5	G5
Birds	Corvidae	*Corvus brachyrhynchos*	American Crow				S5	N5B,N5N	G5
Birds	Corvidae	*Corvus corax*	Common Raven				S5	N5	G5
Birds	Paridae	*Poecile atricapillus*	Black-capped Chickadee				S5	N5	G5
Birds	Paridae	*Poecile hudsonicus*	Boreal Chickadee				S3	N5	G5
Birds	Sittidae	*Sitta canadensis*	Red-breasted Nuthatch				S3	N5	G5
Birds	Sittidae	*Sitta carolinensis*	White-breasted Nuthatch				S4	N5	G5
Birds	Certhiidae	*Certhia americana*	Brown Creeper				S5	N5	G5
Birds	Troglodytidae	*Troglodytes hiemalis*	Winter Wren				S5B	N5B	G5
Birds	Regulidae	*Regulus satrapa*	Golden-crowned Kinglet				S5	N5	G5

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Birds	Regulidae	*Regulus calendula*	Ruby-crowned Kinglet				S3S4B	N5B	G5
Birds	Turdidae	*Sialia sialis*	Eastern Bluebird	Not At Risk			S3B	N4B	G5
Birds	Turdidae	*Catharus fuscescens*	Veery				S3S4B	N5B	G5
Birds	Turdidae	*Catharus ustulatus*	Swainson's Thrush				S3S4B	N5B	G5
Birds	Turdidae	*Catharus guttatus*	Hermit Thrush				S5B	N5B	G5
Birds	Turdidae	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Threatened	Endangered	S1S2B	N3B	G4
Birds	Turdidae	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened		SUB	N5B	G4
Birds	Turdidae	*Turdus migratorius*	American Robin				S5B,S3N	N5B,N5N	G5
Birds	Mimidae	*Dumetella carolinensis*	Gray Catbird				S3B	N5B	G5
Birds	Mimidae	*Mimus polyglottos*	Northern Mockingbird				S1B	N4	G5
Birds	Bombycillidae	*Bombycilla garrulus*	Bohemian Waxwing				S5N	N5B,N5N	G5
Birds	Bombycillidae	*Bombycilla cedrorum*	Cedar Waxwing				S5B	N5	G5
Birds	Laniidae	*Lanius borealis*	Northern Shrike				S3S4N	N5B,N5N	G5
Birds	Sturnidae	*Sturnus vulgaris*	European Starling				SNA	NNA	G5
Birds	Vireonidae	*Vireo solitarius*	Blue-headed Vireo				S5B	N5B	G5
Birds	Vireonidae	*Vireo flavifrons*	Yellow-throated Vireo				SNA	N4B	G5
Birds	Vireonidae	*Vireo gilvus*	Warbling Vireo				S1B	N5B	G5
Birds	Vireonidae	*Vireo philadelphicus*	Philadelphia Vireo				S2?B	N5B	G5
Birds	Vireonidae	*Vireo olivaceus*	Red-eyed Vireo				S5B	N5B	G5
Birds	Parulidae	*Oreothlypis peregrina*	Tennessee Warbler				S3S4B	N5B	G5
Birds	Parulidae	*Oreothlypis ruficapilla*	Nashville Warbler				S4S5B	N5B	G5
Birds	Parulidae	*Setophaga americana*	Northern Parula				S5B	N5B	G5
Birds	Parulidae	*Setophaga petechia*	Yellow Warbler				S5B	N5B	G5
Birds	Parulidae	*Setophaga pensylvanica*	Chestnut-sided Warbler				S5B	N5B	G5
Birds	Parulidae	*Setophaga magnolia*	Magnolia Warbler				S5B	N5B	G5
Birds	Parulidae	*Setophaga tigrina*	Cape May Warbler				S2B	N5B	G5
Birds	Parulidae	*Setophaga caerulescens*	Black-throated Blue Warbler				S5B	N5B	G5
Birds	Parulidae	*Setophaga coronata*	Yellow-rumped Warbler				S5B	N5B	G5
Birds	Parulidae	*Setophaga virens*	Black-throated Green Warbler				S5B	N5B	G5
Birds	Parulidae	*Setophaga fusca*	Blackburnian Warbler				S4B	N5B	G5
Birds	Parulidae	*Setophaga palmarum*	Palm Warbler				S5B	N5B	G5
Birds	Parulidae	*Setophaga castanea*	Bay-breasted Warbler				S3S4B	N5B	G5
Birds	Parulidae	*Setophaga striata*	Blackpoll Warbler				S3S4B	N5B	G5
Birds	Parulidae	*Mniotilta varia*	Black-and-White Warbler				S5B	N5B	G5

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Birds	Parulidae	*Setophaga ruticilla*	American Redstart				S4S5B	N5B	G5
Birds	Parulidae	*Seiurus aurocapilla*	Ovenbird				S5B	N5B	G5
Birds	Parulidae	*Parkesia noveboracensis*	Northern Waterthrush				S4B	N5B	G5
Birds	Parulidae	*Geothlypis philadelphia*	Mourning Warbler				S4B	N5B	G5
Birds	Parulidae	*Geothlypis trichas*	Common Yellowthroat				S5B	N5B	G5
Birds	Parulidae	*Cardellina pusilla*	Wilson's Warbler				S3B	N5B	G5
Birds	Parulidae	*Cardellina canadensis*	Canada Warbler	Threatened	Threatened	Endangered	S3B	N5B	G5
Birds	Thraupidae	*Piranga olivacea*	Scarlet Tanager				S2B	N5B	G5
Birds	Cardinalidae	*Cardinalis cardinalis*	Northern Cardinal				S4	N5	G5
Birds	Cardinalidae	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S2S3B	N5B	G5
Birds	Cardinalidae	*Passerina caerulea*	Blue Grosbeak				SNA	NNA	G5
Birds	Cardinalidae	*Passerina ciris*	Painted Bunting				SNA	NNA	G5
Birds	Emberizidae	*Pipilo erythrophthalmus*	Eastern Towhee				SNA	N4B	G5
Birds	Emberizidae	*Spizella passerina*	Chipping Sparrow				S4B	N5B	G5
Birds	Emberizidae	*Spizella pallida*	Clay-colored Sparrow				SNA	N5B	G5
Birds	Emberizidae	*Pooecetes gramineus*	Vesper Sparrow				S2B	N5B	G5
Birds	Emberizidae	*Passerculus sandwichensis*	Savannah Sparrow				S4S5B	N5B	G5
Birds	Emberizidae	*Ammodramus savannarum pratensis*	Grasshopper Sparrow, pratensis subspecies	Special Concern	Special Concern			NNR	G5TU
Birds	Emberizidae	*Ammospiza nelsoni*	Nelson's Sparrow	Not At Risk			S3S4B	N5B	G5
Birds	Emberizidae	*Passerella iliaca*	Fox Sparrow				S3S4B	N5B	G5
Birds	Emberizidae	*Melospiza melodia*	Song Sparrow				S5B	N5B,N5N	G5
Birds	Emberizidae	*Melospiza lincolnii*	Lincoln's Sparrow				S4B	N5B	G5
Birds	Emberizidae	*Melospiza georgiana*	Swamp Sparrow				S5B	N5B	G5
Birds	Emberizidae	*Zonotrichia albicollis*	White-throated Sparrow				S5B	N5B	G5
Birds	Emberizidae	*Junco hyemalis*	Dark-eyed Junco				S4S5	N5B,N5N	G5
Birds	Icteridae	*Dolichonyx oryzivorus*	Bobolink	Threatened	Threatened	Vulnerable	S3S4B	N5B	G5
Birds	Icteridae	*Agelaius phoeniceus*	Red-winged Blackbird				S4B	N5B,N5N	G5
Birds	Icteridae	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2B	N4B	G4
Birds	Icteridae	*Quiscalus quiscula*	Common Grackle				S5B	N5B	G5
Birds	Icteridae	*Molothrus ater*	Brown-headed Cowbird				S2B	N5B	G5
Birds	Icteridae	*Icterus galbula*	Baltimore Oriole				S2S3B	N5B	G5
Birds	Fringillidae	*Pinicola enucleator*	Pine Grosbeak				S2S3B,S5N	N5	G5
Birds	Fringillidae	*Haemorhous purpureus*	Purple Finch				S4S5B,S3S4N	N5B,N5N	G5

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Birds	Fringillidae	*Loxia leucoptera*	White-winged Crossbill				S4S5	N5	G5
Birds	Fringillidae	*Loxia curvirostra*	Red Crossbill				S3S4	N5	G5
Birds	Fringillidae	*Acanthis flammea*	Common Redpoll				S5N	N5B,N5N	G5
Birds	Fringillidae	*Spinus pinus*	Pine Siskin				S2S3	N5	G5
Birds	Fringillidae	*Spinus tristis*	American Goldfinch				S5	N5B,N5N	G5
Birds	Fringillidae	*Carduelis carduelis*	European Goldfinch				SNA	NNA	G5
Birds	Fringillidae	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern	Vulnerable	S3S4B,S3N	N5	G5
Birds	Passeridae	*Passer domesticus*	House Sparrow				SNA	NNA	G5
Fishes	Anguillidae	*Anguilla rostrata*	American Eel	Threatened			S2	N4	G4
Fishes	Clupeidae	*Alosa pseudoharengus*	Alewife				S3	N5	G5
Fishes	Salmonidae	*Oncorhynchus mykiss*	Rainbow Trout				SNA	N5	G5
Fishes	Salmonidae	*Salmo salar pop. 4*	Atlantic Salmon - Eastern Cape Breton pop.	Endangered			S1	NNR	G5TNR
Fishes	Salmonidae	*Salmo trutta*	Brown Trout				SNA	NNA	G5
Fishes	Salmonidae	*Salvelinus fontinalis*	Brook Trout				S3	N5	G5
Fishes	Osmeridae	*Osmerus mordax*	Rainbow Smelt				S5	N5	G5
Fishes	Cyprinodontidae	*Fundulus heteroclitus*	Mummichog				S5	NNR	G5
Fishes	Atherinidae	*Menidia menidia*	Atlantic Silverside				S3	NNR	G5
Fishes	Gasterosteidae	*Gasterosteus aculeatus*	Threespine Stickleback				S5	N5	G5
Fishes	Gasterosteidae	*Gasterosteus wheatlandi*	Blackspotted Stickleback				SU	N5	G5
Fishes	Labridae	*Tautogolabrus adspersus*	Cunner						
Fishes	Moronidae	*Morone saxatilis*	Striped Bass						
Fishes	Pholidae	*Pholis gunnellus*	Rock Gunnel						
Fishes	Squalidae	*Squalus acanthias*	Spiny Dogfish						
Fishes	Actinopterygii	*Pleuronectiformes*	A flatfish						
Invertebrates	Porcellionidae	*Porcellio scaber*	Common Rough Woodlouse				SNA	NNR	GNR
Invertebrates	Blattellidae	*Ectobius lapponicus*					SNA		GNR
Invertebrates	Cicindelidae	*Cicindela limbalis*	Common Claybank Tiger Beetle				S4	N5	G5
Invertebrates	Cerambycidae	*Stictoleptura canadensis*	a Longhorned Beetle				S5		G5
Invertebrates	Coccinellidae	*Coccinella septempunctata*	Seven-spotted Lady Beetle				SNA		GNR
Invertebrates	Coccinellidae	*Propylaea quatuordecimpunctata*	a Ladybird Beetle				SNA		GNR
Invertebrates	Coccinellidae	*Harmonia axyridis*	Multi-coloured Asian Lady Beetle				SNA		GNR

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Invertebrates	Coccinellidae	*Adalia bipunctata*	Two-spotted Lady Beetle				SU		G5
Invertebrates	Coccinellidae	*Anatis mali*	a Ladybird Beetle				S5		G5
Invertebrates	Coccinellidae	*Brachiacantha ursina*	a Ladybird Beetle				S5		G5
Invertebrates	Curculionidae	*Polydrusus formosus*	A Broad-nosed Weevil				SNA		GNR
Invertebrates	Lampyridae	*Ellychnia corrusca*	a Firefly Beetle				SU		G5
Invertebrates	Coccinellidae	*Mulsantina hudsonica*	a Ladybird Beetle				S5		G5
Invertebrates	Coccinellidae	*Psyllobora vigintimaculata*	a Ladybird Beetle				S5		G5
Invertebrates	Tenebrionidae	*Iphthiminus opacus*	a Darkling Beetle				S3		G5
Invertebrates	Cerambycidae	*Monochamus scutellatus*	a Longhorned Beetle				S5		G5
Invertebrates	Cerambycidae	*Monochamus notatus*	a Longhorned Beetle				S5		G5
Invertebrates	Forficulidae	*Forficula auricularia*	European Earwig				SNA		GNR
Invertebrates	Tabanidae	*Chrysops excitans*	Bothersome Deer Fly				S5	NNR	G5
Invertebrates	Tabanidae	*Stonemyia tranquilla*	a Horse Fly				S5	NNR	G5
Invertebrates	Tabanidae	*Hybomitra lurida*	Broad-headed Horse Fly				S5	NNR	G5
Invertebrates	Tabanidae	*Hybomitra epistates*	a Horse Fly				S5	NNR	G5
Invertebrates	Tabanidae	*Hybomitra lasiophthalma*	Orange-sided Horse Fly				S5	NNR	G5
Invertebrates	Tabanidae	*Hybomitra minuscula*	a Horse Fly				S5	NNR	G5
Invertebrates	Syrphidae	*Eristalis arbustorum*	a Hoverfly				SNA		GNR
Invertebrates	Syrphidae	*Eristalis dimidiata*	a Hoverfly				SU		G5
Invertebrates	Syrphidae	*Eristalis flavipes*	a Hoverfly				SU		G5
Invertebrates	Syrphidae	*Toxomerus geminatus*	a Hoverfly				SU		G5
Invertebrates	Bombyliidae	*Bombylius major*	a Bee Fly				S5		G5
Invertebrates	Bombyliidae	*Anthrax irroratus*	a Bee Fly				SU		G5
Invertebrates	Syrphidae	*Merodon equestris*	a Hoverfly				SNA		GNR
Invertebrates	Syrphidae	*Sericomyia chrysotoxoides*	a Hoverfly				S5		G5
Invertebrates	Syrphidae	*Sericomyia militaris*	a Hoverfly				S4S5		G5
Invertebrates	Miridae	*Adelphocoris rapidus*	Rapid Plant Bug				SNR		GNR
Invertebrates	Cicadellidae	*Scaphytopius acutus*	Sharpnosed Leafhopper				SNR	NNR	GNR
Invertebrates	Apidae	*Bombus borealis*	Northern Amber Bumblebee				S5	N4N5	G4G5
Invertebrates	Apidae	*Bombus fervidus*	Yellow Bumblebee				S4	N4?	G3G4
Invertebrates	Apidae	*Bombus perplexus*	Confusing Bumblebee				S5	N5	G5
Invertebrates	Apidae	*Bombus rufocinctus*	Red-belted Bumblebee				S4S5		G4G5

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Invertebrates	Apidae	*Bombus ternarius*	Tri-coloured Bumblebee				S5		G5
Invertebrates	Apidae	*Bombus terricola*	Yellow-banded Bumblebee	Special Concern	Special Concern	Vulnerable	S3	NU	G3G4
Invertebrates	Apidae	*Bombus bimaculatus*	Two-spotted Bumblebee				SU	N5	G5
Invertebrates	Apidae	*Bombus impatiens*	Common Eastern Bumblebee				S5	N5	G5
Invertebrates	Apidae	*Bombus insularis*	Indiscriminate Bumblebee				S4S5	N4N5	G3
Invertebrates	Apidae	*Bombus fernaldae*	Fernald's Cuckoo Bumblebee				S4S5	NNR	G5?
Invertebrates	Formicidae	*Lasius minutus*	an Ant				SU		G?
Invertebrates	Vespidae	*Ancistrocerus adiabatus*	A Potter Wasp				SU		G5
Invertebrates	Vespidae	*Ancistrocerus albophaleratus*	A Potter Wasp				SU		G5
Invertebrates	Vespidae	*Ancistrocerus catskill*	A Potter Wasp				SU		G5
Invertebrates	Andrenidae	*Andrena vicina*	an Andrenid Bee				SU		G5
Invertebrates	Andrenidae	*Andrena nubecula*	An Andrenid Bee				SU		GNR
Invertebrates	Vespidae	*Vespula maculifrons*	A Yellowjacket				SU		G5
Invertebrates	Vespidae	*Vespula acadica*	A Yellowjacket				SU		G5
Invertebrates	Vespidae	*Vespula alascensis*	Old World Yellowjacket				SU		G5
Invertebrates	Apidae	*Apis mellifera*	a Honeybee				SNA		GNR
Invertebrates	Vespidae	*Polistes fuscatus*	Common Paper Wasp				SU		G5
Invertebrates	Pelecinidae	*Pelecinus polyturator*	American Pelecinid Wasp				SNR	NNR	GNR
Invertebrates	Vespidae	*Dolichovespula arenaria*	Aerial Yellow-jacket				SU		G5
Invertebrates	Vespidae	*Dolichovespula norvegicoides*	A Yellowjacket				SU		G5
Invertebrates	Vespidae	*Dolichovespula maculata*	Bald-faced Hornet				SU		G5
Invertebrates	Halictidae	*Halictus rubicundus*	A Sweat Bee				S5		G5
Invertebrates	Megachilidae	*Megachile gemula*	a Leaf-cutter Bee				SU		G5
Invertebrates	Megachilidae	*Megachile latimanus*	A Leaf-cutter Bee				SU		G4G5
Invertebrates	Vespidae	*Eumenes crucifera*	A Potter Wasp				SU		G5
Invertebrates	Tortricidae	*Cenopis reticulatana*	Reticulated Fruitworm Moth				SU		GNR
Invertebrates	Hesperiidae	*Thorybes pylades*	Northern Cloudywing				S2S3	N5	G5
Invertebrates	Hesperiidae	*Erynnis icelus*	Dreamy Duskywing				S5	N5	G5
Invertebrates	Hesperiidae	*Carterocephalus palaemon*	Arctic Skipper				S5	N5	G5
Invertebrates	Hesperiidae	*Ancyloxypha numitor*	Least Skipper				S5	N5	G5
Invertebrates	Hesperiidae	*Thymelicus lineola*	European Skipper				SNA	NNA	G5

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Invertebrates	Hesperiidae	*Hesperia comma*	Common Branded Skipper				S4	N5	G5
Invertebrates	Hesperiidae	*Polites peckius*	Peck's Skipper				S5	N5	G5
Invertebrates	Hesperiidae	*Polites themistocles*	Tawny-edged Skipper				S5	N5	G5
Invertebrates	Hesperiidae	*Polites mystic*	Long Dash Skipper				S5	N5	G5
Invertebrates	Hesperiidae	*Poanes hobomok*	Hobomok Skipper				S5	N5	G5
Invertebrates	Hesperiidae	*Euphyes vestris*	Dun Skipper				S5	N5	G5
Invertebrates	Hesperiidae	*Amblyscirtes hegon*	Pepper and Salt Skipper				S2S3	N4	G5
Invertebrates	Papilionidae	*Papilio polyxenes*	Black Swallowtail				S4	N5	G5
Invertebrates	Papilionidae	*Papilio polyxenes asterius*	Black Swallowtail				S4	N5	G5T5
Invertebrates	Papilionidae	*Papilio brevicauda bretonensis*	Short-tailed Swallowtail				S1	N2N3	G5T3
Invertebrates	Papilionidae	*Papilio canadensis*	Canadian Tiger Swallowtail				S5	N5	G5
Invertebrates	Pieridae	*Pieris rapae*	Cabbage White				SNA	NNA	G5
Invertebrates	Pieridae	*Pieris oleracea*	Mustard White				S4	N4N5	G5
Invertebrates	Pieridae	*Colias philodice*	Clouded Sulphur				S5	N5	G5
Invertebrates	Pieridae	*Colias interior*	Pink-edged Sulphur				S5	N5	G5
Invertebrates	Pieridae	*Pyrisitia lisa*	Little Yellow				SNA	NNA	G5
Invertebrates	Lycaenidae	*Lycaena phlaeas*	American Copper				S5	N5	G5
Invertebrates	Lycaenidae	*Lycaena epixanthe*	Bog Copper				S5	N4N5	G5
Invertebrates	Lycaenidae	*Lycaena dorcas*	Dorcas Copper				S1?	N5	G5
Invertebrates	Lycaenidae	*Callophrys augustinus*	Brown Elfin				S5	N5	G5
Invertebrates	Lycaenidae	*Callophrys polios*	Hoary Elfin				S4	N4	G5
Invertebrates	Lycaenidae	*Celastrina lucia*	Northern Spring Azure				S5	N5	G5
Invertebrates	Lycaenidae	*Glaucopsyche lygdamus*	Silvery Blue				S5	N5	G5
Invertebrates	Lycaenidae	*Glaucopsyche lygdamus mildredae*	Mildred's Silvery Blue				SNR		
Invertebrates	Lycaenidae	*Plebejus idas*	Northern Blue				S5	N5	G5
Invertebrates	Lycaenidae	*Plebejus idas empetri*	Crowberry Blue				S5	N3N4	G5T5
Invertebrates	Nymphalidae	*Speyeria cybele*	Great Spangled Fritillary				S5	N5	G5
Invertebrates	Nymphalidae	*Speyeria aphrodite*	Aphrodite Fritillary				S3	N5	G5
Invertebrates	Nymphalidae	*Speyeria atlantis*	Atlantis Fritillary				S5	N5	G5
Invertebrates	Nymphalidae	*Boloria selene*	Silver-bordered Fritillary				S5	N5	G5
Invertebrates	Nymphalidae	*Boloria selene atrocostalis*	Silver-bordered Fritillary				S5	NNR	G5T5
Invertebrates	Nymphalidae	*Boloria chariclea*	Arctic Fritillary				S2	N5	G5
Invertebrates	Nymphalidae	*Chlosyne harrisii*	Harris's Checkerspot				S5	N3N4	G5
Invertebrates	Nymphalidae	*Phyciodes cocyta*	Northern Crescent				S5	N5	G5

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Invertebrates	Nymphalidae	*Euphydryas phaeton*	Baltimore Checkerspot				S2S3	N3N4	G5
Invertebrates	Nymphalidae	*Polygonia interrogationis*	Question Mark				S3B	N5B	G5
Invertebrates	Nymphalidae	*Polygonia satyrus*	Satyr Comma				S1?	N5	G5
Invertebrates	Nymphalidae	*Polygonia faunus*	Green Comma				S3	N5	G5
Invertebrates	Nymphalidae	*Polygonia gracilis*	Hoary Comma				SU	N5	G5
Invertebrates	Nymphalidae	*Polygonia progne*	Grey Comma				S3S4	N5	G5
Invertebrates	Nymphalidae	*Nymphalis l-album*	Compton Tortoiseshell				S1S2	N5	G5
Invertebrates	Nymphalidae	*Nymphalis antiopa*	Mourning Cloak				S5	N5	G5
Invertebrates	Nymphalidae	*Aglais milberti*	Milbert's Tortoiseshell				S2	N5	G5
Invertebrates	Nymphalidae	*Vanessa virginiensis*	American Lady				S5B	N5B	G5
Invertebrates	Nymphalidae	*Vanessa cardui*	Painted Lady				S4B	N5B	G5
Invertebrates	Nymphalidae	*Vanessa atalanta*	Red Admiral				S4B	N5B	G5
Invertebrates	Nymphalidae	*Limenitis arthemis*	White Admiral				S5	N5	G5
Invertebrates	Nymphalidae	*Limenitis archippus*	Viceroy				S5	N5	G5
Invertebrates	Nymphalidae	*Lethe anthedon*	Northern Pearly-Eye				S4	N5	G5
Invertebrates	Nymphalidae	*Lethe eurydice*	Eyed Brown				S5	N4	G5
Invertebrates	Nymphalidae	*Megisto cymela*	Little Wood-satyr				S3	N5	G5
Invertebrates	Nymphalidae	*Coenonympha tullia*	Common Ringlet				S5	N5	G5
Invertebrates	Nymphalidae	*Coenonympha tullia inornata*	Inornate Ringlet				S5	NNR	GNR
Invertebrates	Nymphalidae	*Cercyonis pegala*	Common Wood-Nymph				S5	N5	G5
Invertebrates	Nymphalidae	*Cercyonis pegala nephele*	Dull-eyed Grayling				S5	N5	G5T5
Invertebrates	Nymphalidae	*Oeneis jutta*	Jutta Arctic				S3	N5	G5
Invertebrates	Nymphalidae	*Danaus plexippus*	Monarch	Endangered	Special Concern	Endangered	S2B	N4N5B	G4
Invertebrates	Drepanidae	*Habrosyne scripta*	Lettered Habrosyne				SU		G5
Invertebrates	Drepanidae	*Drepana arcuata*	Arched Hooktip				S4S5		G5
Invertebrates	Geometridae	*Itame pustularia*	Lesser Maple Spanworm Moth				SU		G5
Invertebrates	Geometridae	*Iridopsis larvaria*	an Inchworm Moth				SU		G5
Invertebrates	Geometridae	*Campaea perlata*	Pale Beauty				SU		G5
Invertebrates	Geometridae	*Ennomos magnaria*	Maple Spanworm Moth				SU		G5
Invertebrates	Geometridae	*Lambdina fiscellaria*	Hemlock Moth				SU		G5
Invertebrates	Geometridae	*Eutrapela clemataria*	Curve-toothed Geometer Moth				SU		G5
Invertebrates	Geometridae	*Idaea dimidiata*	an Inchworm Moth				SU		G5
Invertebrates	Geometridae	*Cyclophora pendulinaria*	Sweetfern Geometer				SU		G5
Invertebrates	Geometridae	*Ecliptopera silaceata*	Small Phoenix Moth				SU		G5

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Invertebrates	Geometridae	*Euphyia intermediata*	Sharp-angled Carpet Moth				SU		G5
Invertebrates	Lasiocampidae	*Malacosoma disstria*	Forest Tent Caterpillar Moth				S4S5		G5
Invertebrates	Saturniidae	*Dryocampa rubicunda*	Rosy Maple Moth				S4S5		G5
Invertebrates	Saturniidae	*Antheraea polyphemus*	Polyphemus Moth				S4S5		G5
Invertebrates	Saturniidae	*Actias luna*	Luna Moth				S4S5		G5
Invertebrates	Sphingidae	*Paonias excaecata*	Blind-eyed Sphinx				SU		G5
Invertebrates	Sphingidae	*Pachysphinx modesta*	Big Poplar Sphinx				SU	N5	G5
Invertebrates	Sphingidae	*Hemaris thysbe*	Hummingbird Moth				S4S5		G5
Invertebrates	Sphingidae	*Hemaris diffinis*	Snowberry Clearwing				SNA	N4N5	G5
Invertebrates	Notodontidae	*Schizura unicornis*	Unicorn Caterpillar Moth				SU		G5
Invertebrates	Erebidae	*Haploa lecontei*	Leconte's Haploa				SU		G5
Invertebrates	Arctiidae	*Pyrrharctia isabella*	Isabella Tiger Moth; Banded Woollybear (larva)				SU		G5
Invertebrates	Arctiidae	*Spilosoma virginica*	Virginian Tiger Moth; Yellow Woollybear (larva)				SU		G5
Invertebrates	Arctiidae	*Hyphantria cunea*	Fall Webworm				SU		G5
Invertebrates	Erebidae	*Grammia virgo*	Virgin Tiger Moth				SU		G5
Invertebrates	Arctiidae	*Halysidota tessellaris*	Pale Tussock Moth				SU		G5
Invertebrates	Arctiidae	*Lophocampa maculata*	Spotted Tussock Moth				SU		G5
Invertebrates	Arctiidae	*Ctenucha virginica*	Virginia Ctenucha				SU		G5
Invertebrates	Arctiidae	*Cisseps fulvicollis*	Yellow-collared Scape Moth				SU		G5
Invertebrates	Lymantriidae	*Orgyia leucostigma*	White-marked Tussock Moth				SU		G5
Invertebrates	Noctuidae	*Parallelia bistriaris*	a Noctuid Moth				SU		G5
Invertebrates	Noctuidae	*Catocala semirelicta*	Semirelict Underwing				SU	NNR	G5
Invertebrates	Noctuidae	*Autographa precationis*	Common Looper Moth				S4S5		G5
Invertebrates	Noctuidae	*Raphia frater*	The Brother				S4S5		G5T5
Invertebrates	Noctuidae	*Acronicta americana*	a Noctuid Moth				S4S5		G5
Invertebrates	Noctuidae	*Phlogophora periculosa*	a Noctuid Moth				S4S5		G5
Invertebrates	Noctuidae	*Lacinipolia renigera*	a Noctuid Moth				S4S5		G5
Invertebrates	Noctuidae	*Nephelodes minians*	a Noctuid Moth				S4S5		G5
Invertebrates	Noctuidae	*Feltia herilis*	a Noctuid Moth				S4S5		G5
Invertebrates	Noctuidae	*Ochropleura implecta*	Flame-shouldered Dart Moth				S4S5		G5

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Invertebrates	Noctuidae	*Anicla forbesi*	a Noctuid Moth				SU		G4
Invertebrates	Noctuidae	*Noctua pronuba*	a Noctuid Moth				SNA		GNR
Invertebrates	Corydalidae	*Chauliodes pectinicornis*	a hellgrammite				SNR	NNR	GNR
Invertebrates	Cordulegasteridae	*Cordulegaster diastatops*	Delta-Spotted Spiketail				S5	N4	G5
Invertebrates	Cordulegasteridae	*Cordulegaster maculata*	Twin-Spotted Spiketail				S5	N5	G5
Invertebrates	Gomphidae	*Gomphus borealis*	Beaverpond Clubtail				S5	N3	G5
Invertebrates	Gomphidae	*Gomphus descriptus*	Harpoon Clubtail				S2S3	N3	G4G5
Invertebrates	Gomphidae	*Gomphus exilis*	Lancet Clubtail				S5	N5	G5
Invertebrates	Gomphidae	*Gomphus spicatus*	Dusky Clubtail				S5	N5	G5
Invertebrates	Gomphidae	*Gomphus adelphus*	Moustached Clubtail				S5	N4	G5
Invertebrates	Gomphidae	*Lanthus parvulus*	Northern Pygmy Clubtail				S3S4	N4	G4G5
Invertebrates	Gomphidae	*Ophiogomphus aspersus*	Brook Snaketail				S2S3	N4	G4
Invertebrates	Gomphidae	*Ophiogomphus carolus*	Riffle Snaketail				S5	N3N4	G5
Invertebrates	Aeshnidae	*Aeshna canadensis*	Canada Darner				S5	N5	G5
Invertebrates	Aeshnidae	*Aeshna eremita*	Lake Darner				S4	N5	G5
Invertebrates	Aeshnidae	*Aeshna interrupta*	Variable Darner				S5	N5	G5
Invertebrates	Aeshnidae	*Aeshna sitchensis*	Zigzag Darner				S4	N5	G5
Invertebrates	Aeshnidae	*Aeshna subarctica*	Subarctic Darner				S4	N5	G5
Invertebrates	Aeshnidae	*Aeshna tuberculifera*	Black-Tipped Darner				S5	N4	G5
Invertebrates	Aeshnidae	*Aeshna umbrosa*	Shadow Darner				S5	N5	G5
Invertebrates	Aeshnidae	*Anax junius*	Common Green Darner				S5B	N5	G5
Invertebrates	Aeshnidae	*Basiaeschna janata*	Springtime Darner				S5	N5	G5
Invertebrates	Aeshnidae	*Boyeria vinosa*	Fawn Darner				S4	N5	G5
Invertebrates	Aeshnidae	*Gomphaeschna furcillata*	Harlequin Darner				S3	N2N3	G5
Invertebrates	Corduliidae	*Cordulia shurtleffii*	American Emerald				S5	N5	G5
Invertebrates	Corduliidae	*Dorocordulia libera*	Racket-Tailed Emerald				S4	N5	G5
Invertebrates	Corduliidae	*Epitheca canis*	Beaverpond Baskettail				S5	N5	G5
Invertebrates	Corduliidae	*Epitheca spinigera*	Spiny Baskettail				S5	N5	G5
Invertebrates	Corduliidae	*Helocordulia uhleri*	Uhler's Sundragon				S5	N4	G5
Invertebrates	Corduliidae	*Somatochlora cingulata*	Lake Emerald				S4	N5	G5
Invertebrates	Corduliidae	*Somatochlora elongata*	Ski-Tailed Emerald				S4	N4	G5
Invertebrates	Corduliidae	*Somatochlora forcipata*	Forcipate Emerald				S2S3	N5	G5
Invertebrates	Corduliidae	*Somatochlora incurvata*	Incurvate Emerald				S5	N4	G5
Invertebrates	Corduliidae	*Somatochlora minor*	Ocellated Emerald				S4	N5	G5
Invertebrates	Corduliidae	*Somatochlora septentrionalis*	Muskeg Emerald				S2	N5	G5
Invertebrates	Corduliidae	*Somatochlora tenebrosa*	Clamp-Tipped Emerald				S3	N3N4	G5

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Invertebrates	Corduliidae	*Somatochlora walshii*	Brush-Tipped Emerald				S5	N5	G5
Invertebrates	Corduliidae	*Somatochlora williamsoni*	Williamson's Emerald				S2	N5	G5
Invertebrates	Libellulidae	*Leucorrhinia frigida*	Frosted Whiteface				S5	N5	G5
Invertebrates	Libellulidae	*Leucorrhinia glacialis*	Crimson-Ringed Whiteface				S5	N5	G5
Invertebrates	Libellulidae	*Leucorrhinia hudsonica*	Hudsonian Whiteface				S5	N5	G5
Invertebrates	Libellulidae	*Leucorrhinia intacta*	Dot-Tailed Whiteface				S5	N5	G5
Invertebrates	Libellulidae	*Leucorrhinia proxima*	Red-Waisted Whiteface				S5	N5	G5
Invertebrates	Libellulidae	*Libellula quadrimaculata*	Four-Spotted Skimmer				S5	N5	G5
Invertebrates	Libellulidae	*Plathemis lydia*	Common Whitetail				S5	N5	G5
Invertebrates	Libellulidae	*Ladona julia*	Chalk-Fronted Corporal				S5	N5	G5
Invertebrates	Libellulidae	*Pantala flavescens*	Wandering Glider				S5B	N4	G5
Invertebrates	Libellulidae	*Pantala hymenaea*	Spot-Winged Glider				S2?B	NNR	G5
Invertebrates	Libellulidae	*Sympetrum costiferum*	Saffron-Winged Meadowhawk				S5	N5	G5
Invertebrates	Libellulidae	*Sympetrum internum*	Cherry-Faced Meadowhawk				S5	N5	G5
Invertebrates	Libellulidae	*Sympetrum obtrusum*	White-Faced Meadowhawk				S5	N5	G5
Invertebrates	Libellulidae	*Sympetrum semicinctum*	Band-Winged Meadowhawk				S5	N5	G5
Invertebrates	Libellulidae	*Sympetrum vicinum*	Autumn Meadowhawk				S5	N5	G5
Invertebrates	Calopterygidae	*Calopteryx aequabilis*	River Jewelwing				S5	N5	G5
Invertebrates	Calopterygidae	*Calopteryx amata*	Superb Jewelwing				S5	N4	G5
Invertebrates	Calopterygidae	*Calopteryx maculata*	Ebony Jewelwing				S5	N5	G5
Invertebrates	Lestidae	*Lestes dryas*	Emerald Spreadwing				S5	N5	G5
Invertebrates	Lestidae	*Lestes forcipatus*	Sweetflag Spreadwing				S5	N5	G5
Invertebrates	Lestidae	*Lestes congener*	Spotted Spreadwing				S5	N5	G5
Invertebrates	Lestidae	*Lestes disjunctus*	Northern Spreadwing				S5	NNR	G5
Invertebrates	Lestidae	*Lestes eurinus*	Amber-Winged Spreadwing				S4	N4	G5
Invertebrates	Lestidae	*Lestes rectangularis*	Slender Spreadwing				S5	N5	G5
Invertebrates	Lestidae	*Lestes unguiculatus*	Lyre-Tipped Spreadwing				S5	N5	G5

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Invertebrates	Coenagrionidae	*Argia fumipennis violacea*	Variable Dancer				S5	N5	G5T5
Invertebrates	Coenagrionidae	*Argia moesta*	Powdered Dancer				S5	N5	G5
Invertebrates	Coenagrionidae	*Enallagma boreale*	Boreal Bluet				S5	N5	G5
Invertebrates	Coenagrionidae	*Enallagma carunculatum*	Tule Bluet				SNR	N5	G5
Invertebrates	Coenagrionidae	*Enallagma vernale*	Vernal Bluet				S3	N4N5	G5
Invertebrates	Coenagrionidae	*Enallagma aspersum*	Azure Bluet				S5	N4	G5
Invertebrates	Coenagrionidae	*Enallagma civile*	Familiar Bluet				S5	N5	G5
Invertebrates	Coenagrionidae	*Enallagma annexum*	Northern Bluet				S5	N5	G5
Invertebrates	Coenagrionidae	*Enallagma ebrium*	Marsh Bluet				S5	N5	G5
Invertebrates	Coenagrionidae	*Enallagma hageni*	Hagen's Bluet				S5	N5	G5
Invertebrates	Coenagrionidae	*Ischnura posita*	Fragile Forktail				S5	N4N5	G5
Invertebrates	Coenagrionidae	*Ischnura verticalis*	Eastern Forktail				S5	N5	G5
Invertebrates	Coenagrionidae	*Nehalennia irene*	Sedge Sprite				S5	N5	G5
Invertebrates	Coenagrionidae	*Amphiagrion saucium*	Eastern Red Damsel				S3	N5	G5
Invertebrates	Coenagrionidae	*Chromagrion conditum*	Aurora Damsel				S5	N5	G5
Invertebrates	Acrididae	*Melanoplus bivittatus*	Two-striped Grasshopper				SU		G5
Invertebrates	Tetrigidae	*Tetrix subulata*	Slender Grouse Locust				SU		G5
Invertebrates	Tettigoniidae	*Scudderia pistillata*	Broad-winged Bush Katydid				SU		G5
Invertebrates	Acrididae	*Dissosteira carolina*	Carolina Grasshopper				SU		G5
Invertebrates	Acrididae	*Stethophyma gracile*	Northern Sedge Locust				SU		G5
Invertebrates	Conocephalidae	*Conocephalus fasciatus*	Slender Meadow Katydid				SU	N5	G5
Invertebrates	Gryllidae	*Gryllus pennsylvanicus*	Fall Field Cricket				SU		G5
Invertebrates	Acrididae	*Pseudochorthippus curtipennis*	Marsh Meadow Grasshopper				SU		
Invertebrates	Salticidae	*Salticus scenicus*	Zebra Jumper				SNA	NNR	GNR
Invertebrates	Unionidae	*Elliptio complanata*	Eastern Elliptio				S5	N5	G5
Invertebrates	Margaritiferidae	*Margaritifera margaritifera*	Eastern Pearlshell				S2	N4	G4
Invertebrates	Unionidae	*Pyganodon cataracta*	Eastern Floater				S5	N5	G5
Invertebrates	Mytilidae	*Mytilus edulis*	Common Mussel						
Invertebrates	Mactridae	*Spisula solidissima*	Atlantic Surfclam						G5
Invertebrates	Limacidae	*Limax maximus*	Giant Garden Slug				SNA	NNA	G5
Invertebrates	Buccinidae	*Buccinum ciliatum*	a Whelk						
Invertebrates	Littorinidae	*Littorina littorea*	Common Periwinkle						
Invertebrates	Polychaeta		A polychaete						
Invertebrates	Cancridae	*Cancer irroratus*	Rock crab						
Invertebrates	Carcinidae	*Carcinus maenas*	Green crab						
Invertebrates	Crangonidae	*Crangon septemspinosa*	A sand shrimp						
Invertebrates	Nephropidae	*Homarus americanus*	Lobster						

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Invertebrates	Paguridae	*Pagurus*	A hermit crab						
Invertebrates	Bryozoa		A bryozoan						
Invertebrates	Actiniaria		A sea anemone						
Invertebrates	Ceriantharia		A tube-dwelling anemone						
Invertebrates	Echinarachniidae	*Echinarachnius parma*	Common Sand Dollar						
Invertebrates	Strongylocentrotidae	*Strongylocentrotus droebachiensis*	Green Sea Urchin						
Invertebrates	Asteroidea		A sea star						
Invertebrates	Cardiidae	*Cardiidae*	A cockle						
Invertebrates	Littorinidae	*Littorina*	A periwinkle						
Invertebrates	Mytilidae	*Mytilus*	A mussel						
Invertebrates	Naticidae	*Naticidae*	A moon snail						
Invertebrates	Pectinidae	*Placopecten magellanicus*	Atlantic deep-sea scallop						
Invertebrates	Veneridae	*Mercenaria mercenaria*	Quahog						
Invertebrates	Bivalvia		A bivalve						
Invertebrates	Gastropoda		A gastropod						
Invertebrates	Neogastropoda		A sea snail						
Invertebrates	Polyplacophora		A chiton						
Invertebrates	Porifera		A sponge						
Mammals	Soricidae	*Sorex dispar*	Long-tailed Shrew	Not At Risk			S2	N1N2	G4
Mammals	Vespertilionidae	*Myotis lucifugus*	Little Brown Myotis	Endangered	Endangered	Endangered	S1	N3	G3
Mammals	Vespertilionidae	*Vespertilionidae sp.*	bat species				S1S2		
Mammals	Leporidae	*Lepus americanus*	Snowshoe Hare				S5	N5	G5
Mammals	Sciuridae	*Tamias striatus*	Eastern Chipmunk				S5	N5	G5
Mammals	Sciuridae	*Tamiasciurus hudsonicus*	Red Squirrel				S5	N5	G5
Mammals	Castoridae	*Castor canadensis*	American Beaver				S5	N5	G5
Mammals	Muridae	*Peromyscus maniculatus*	North American Deermouse				S5	N5	G5
Mammals	Muridae	*Myodes gapperi*	Southern Red-backed Vole				S5	N5	G5
Mammals	Muridae	*Microtus chrotorrhinus*	Rock Vole				S2	N4	G5
Mammals	Muridae	*Ondatra zibethicus*	Common Muskrat				S5	N5	G5
Mammals	Muridae	*Synaptomys cooperi*	Southern Bog Lemming				S3	N5	G5
Mammals	Muridae	*Rattus norvegicus*	Brown Rat				SNA	NNA	G5
Mammals	Canidae	*Canis latrans*	Eastern Coyote				S5	N5	G5
Mammals	Canidae	*Vulpes vulpes*	Red Fox				S5	N5	G5
Mammals	Ursidae	*Ursus americanus*	American Black Bear	Not At Risk			S5	N5	G5
Mammals	Procyonidae	*Procyon lotor*	Northern Raccoon				S5	N5	G5

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Mammals	Mustelidae	*Martes americana*	American Marten			Endangered	S1	N5	G5
Mammals	Mustelidae	*Neovison vison*	American Mink				S5	N5	G5
Mammals	Mustelidae	*Lontra canadensis*	North American River Otter				S5	N5	G5
Mammals	Phocidae	*Phoca vitulina*	Harbour Seal	Data Deficient			SNR	N5	G5
Mammals	Phocidae	*Halichoerus grypus*	Gray Seal	Not At Risk			SNR	N4N5	G5
Mammals	Felidae	*Lynx canadensis*	Canadian Lynx	Not At Risk		Endangered	S1	N5	G5
Mammals	Felidae	*Lynx rufus*	Bobcat				S5	N5	G5
Mammals	Felidae	*Puma concolor pop. 1*	Eastern Cougar	Data Deficient			SU	NH	G5TNR
Mammals	Cervidae	*Odocoileus virginianus*	White-tailed Deer				S5	N5	G5
Mammals	Cervidae	*Alces americanus*	Moose			Endangered	S1	N5	G5
Mammals	Cervidae	*Alces americanus pop. 1*	Moose (Cape Breton pop.)				S5	NNR	G5TNR
Reptiles and Amphibians	Ambystomatidae	*Ambystoma laterale*	Blue-spotted Salamander				S5	N5	G5
Reptiles and Amphibians	Ambystomatidae	*Ambystoma maculatum*	Spotted Salamander				S5	N5	G5
Reptiles and Amphibians	Plethodontidae	*Hemidactylium scutatum*	Four-toed Salamander	Not At Risk			S3	N4	G5
Reptiles and Amphibians	Plethodontidae	*Plethodon cinereus*	Eastern Red-backed Salamander				S5	N5	G5
Reptiles and Amphibians	Salamandridae	*Notophthalmus viridescens*	Eastern Newt				S5	N5	G5
Reptiles and Amphibians	Salamandridae	*Notophthalmus viridescens viridescens*	Red-spotted Newt				S5	N5	G5T5
Reptiles and Amphibians	Bufonidae	*Anaxyrus americanus*	American Toad				S5	N5	G5
Reptiles and Amphibians	Bufonidae	*Anaxyrus americanus americanus*	Eastern American Toad				S5		G5T5
Reptiles and Amphibians	Hylidae	*Pseudacris crucifer*	Spring Peeper				S5	N5	G5
Reptiles and Amphibians	Ranidae	*Lithobates catesbeianus*	American Bullfrog				S5	N5	G5
Reptiles and Amphibians	Ranidae	*Lithobates clamitans*	Green Frog				S5	N5	G5
Reptiles and Amphibians	Ranidae	*Lithobates palustris*	Pickerel Frog	Not At Risk			S5	N5	G5
Reptiles and Amphibians	Ranidae	*Lithobates pipiens*	Northern Leopard Frog	Not At Risk			S5	N5	G5
Reptiles and Amphibians	Ranidae	*Lithobates septentrionalis*	Mink Frog				S5	N5	G5
Reptiles and Amphibians	Ranidae	*Lithobates sylvaticus*	Wood Frog				S5	N5	G5
Reptiles and Amphibians	Chelydridae	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	N5	G5
Reptiles and Amphibians	Emydidae	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2	N3	G3
Reptiles and Amphibians	Dermochelyidae	*Dermochelys coriacea*	Leatherback Sea Turtle	Endangered	Endangered				
Reptiles and Amphibians	Colubridae	*Storeria occipitomaculata occipitomaculata*	Northern Redbelly Snake				S5	N5	G5T5
Reptiles and Amphibians	Colubridae	*Thamnophis sirtalis*	Common Gartersnake				S5	N5	G5

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Reptiles and Amphibians	Colubridae	*Thamnophis sirtalis pallidulus*	Maritime Garter Snake				S5	NNR	G5T5
Reptiles and Amphibians	Colubridae	*Opheodrys vernalis*	Smooth Greensnake				S4	N5	G5
Mosses	Aneuraceae	*Aneura pinguis*	a Greasewort				S4S5	NNR	G5T5
Mosses	Lepidoziaceae	*Bazzania trilobata*	Three-lobed Whipwort				S5	NNR	G5
Mosses	Pseudolepicoleaceae	*Blepharostoma trichophyllum*	Hairy Threadwort				S5	NNR	G5
Mosses	Conocephalaceae	*Conocephalum conicum*	Snakeskin Liverwort				SNR	NNR	G5
Mosses	Conocephalaceae	*Conocephalum salebrosum*	Snake Liverwort				S5	NNR	G5
Mosses	Lepidoziaceae	*Lepidozia reptans*	Creeping Fingerwort				S5	NNR	G5
Mosses	Jungermanniaceae	*Lophozia gillmanii*	Gillman's Notchwort				SU	NNR	G5
Mosses	Marchantiaceae	*Marchantia polymorpha*	Green-tongue Liverwort				S5	NNR	G5
Mosses	Calypogeiaceae	*Metacalypogeia schusterana*	Schuster's Pouchwort				S1?	N1N2	G3G4
Mosses	Metzgeriaceae	*Metzgeria furcata*	Forked Veilwort				S4?	NNR	G5
Mosses	Pallaviciniaceae	*Moerckia hibernica*	Irish Ruffwort				S1?	NNR	G4?
Mosses	Pallaviciniaceae	*Pallavicinia lyellii*	Lyell's Ribbonwort				S5	NNR	G5
Mosses	Plagiochilaceae	*Plagiochila porelloides*	Lesser Featherwort				S5	NNR	G5
Mosses	Porellaceae	*Porella platyphylla*	Wall Scalewort				S5	NNR	G5
Mosses	Marchantiaceae	*Preissia quadrata*	Narrow-lobed Mushroom-headed Liverwort				S4S5	N5	G5
Mosses	Aneuraceae	*Riccardia latifrons*	Bog Germanderwort				S5	NNR	G5
Mosses	Aneuraceae	*Riccardia palmata*	Palmate Germanderwort				SU	NNR	G5
Mosses	Scapaniaceae	*Scapania gymnostomophila*	Narrow-lobed Earwort				SU	NNR	G4
Mosses	Trichocoleaceae	*Trichocolea tomentella*	Woolly Liverwort				S5	NNR	G5
Mosses	Jungermanniaceae	*Tritomaria exsecta*	Cut Notchwort				SU	NNR	G5
Mosses	Jungermanniaceae	*Tritomaria quinquedentata*	Lyon's Notchwort				SU	N4	G5
Mosses	Amblystegiaceae	*Amblystegium serpens*	Creeping Feather Moss				S5	NNR	G5
Mosses	Andreaeaceae	*Andreaea rupestris*	Black Rock Moss				S5	NNR	G5
Mosses	Anomodontaceae	*Anomodon attenuatus*	Slender Anomodon Moss				S5	NNR	G5
Mosses	Anomodontaceae	*Anomodon rostratus*	Common Anomodon Moss				S5	NNR	G5
Mosses	Polytrichaceae	*Atrichum angustatum*	Lesser Smoothcap Moss				S2?	NNR	G5
Mosses	Polytrichaceae	*Atrichum oerstedianum*	a Moss					NNR	G5
Mosses	Polytrichaceae	*Atrichum crispulum*	a Moss				SU		G5
Mosses	Aulacomniaceae	*Aulacomnium palustre*	Glow Moss				S5		G5

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Mosses	Pottiaceae	*Barbula unguiculata*	Bird's-claw Beard Moss				S5	NNR	G5
Mosses	Bartramiaceae	*Bartramia pomiformis*	Common Apple Moss				S5	NNR	G5
Mosses	Seligeriaceae	*Blindia acuta*	a Moss				S5	NNR	G5
Mosses	Brachytheciaceae	*Brachythecium campestre*	Field Ragged Moss				S5	NNR	G4G5Q
Mosses	Brachytheciaceae	*Brachythecium erythrorrhizon*	Taiga Ragged Moss				S1?	NNR	G5
Mosses	Brachytheciaceae	*Brachythecium plumosum*	Rusty Ragged Moss				S5	NNR	G5
Mosses	Brachytheciaceae	*Brachythecium reflexum*	a moss				S5	N5	G5
Mosses	Brachytheciaceae	*Brachythecium laetum*	Long-capsuled Ragged Moss				S4?	NNR	G5
Mosses	Sematophyllaceae	*Brotherella recurvans*	Recurved Brotherella Moss				S5	NNR	G5
Mosses	Brachytheciaceae	*Bryhnia graminicolor*	a Moss				S5	NNR	G5
Mosses	Brachytheciaceae	*Bryhnia novae-angliae*	New England Bryhnia Moss				S5	NNR	G5
Mosses	Pottiaceae	*Bryoerythrophyllum recurvirostre*	Red Beard Moss				S5	NNR	G5
Mosses	Bryaceae	*Bryum capillare*	Capillary Bryum Moss				S4	NNR	G5
Mosses	Bryaceae	*Bryum pseudotriquetrum*	Common Green Bryum Moss				S5	NNR	G5
Mosses	Bryaceae	*Bryum uliginosum*	a Moss				SU	NNR	G3G5
Mosses	Bryaceae	*Bryum lisae var. cuspidatum*	a Moss				S5	NNR	G5
Mosses	Buxbaumiaceae	*Buxbaumia minakatae*	Hump-Backed Elves				S1S2	N2	G2G4
Mosses	Hypnaceae	*Callicladium haldanianum*	Beautiful Branch Moss				S5	NNR	G5
Mosses	Amblystegiaceae	*Calliergon cordifolium*	Heart-leaved Spear Moss				S4S5	NNR	G5
Mosses	Amblystegiaceae	*Calliergon giganteum*	Giant Spear Moss				S3?	NNR	G5
Mosses	Amblystegiaceae	*Calliergon stramineum*	Straw Moss				S5	NNR	G5
Mosses	Amblystegiaceae	*Calliergonella cuspidata*	Common Large Wetland Moss				S5	NNR	G5
Mosses	Amblystegiaceae	*Campylium chrysophyllum*	Golden Creeping Moss				S5	NNR	G5
Mosses	Amblystegiaceae	*Campylium polygamum*	a Moss				S2?	NNR	G5
Mosses	Amblystegiaceae	*Campylium radicale*	Long-stalked Fine Wet Moss				S2?	NNR	G3G5
Mosses	Amblystegiaceae	*Campylium stellatum*	Yellow Starry Fen Moss				S5	NNR	G5
Mosses	Mniaceae	*Cinclidium stygium*	Sooty Cupola Moss				S1	NNR	G5
Mosses	Climaciaceae	*Climacium dendroides*	Northern Tree Moss				S5	NNR	G5

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Mosses	Amblystegiaceae	*Cratoneuron filicinum*	Fern-leaved Hook Moss				S4?	NNR	G5
Mosses	Dicranaceae	*Dicranella varia*	a Moss				S3S4	NNR	G5
Mosses	Dicranaceae	*Dicranum majus*	Greater Broom Moss				S4?	NNR	G5
Mosses	Dicranaceae	*Dicranum scoparium*	Common Broom Moss				S5	NNR	G5
Mosses	Dicranaceae	*Dicranum spurium*	Spurred Broom Moss				S4?	NNR	G5
Mosses	Dicranaceae	*Dicranum undulatum*	a Dicranum Moss				S5	NNR	G5
Mosses	Dicranaceae	*Dicranum viride*	Green Broom Moss				S5	NNR	G5
Mosses	Pottiaceae	*Didymodon fallax*	False Beard Moss				S5	NNR	G5
Mosses	Diphysciaceae	*Diphyscium foliosum*	a Moss				S5	NNR	G5
Mosses	Ditrichaceae	*Distichium capillaceum*	Erect-fruited Iris Moss				S5	NNR	G5
Mosses	Amblystegiaceae	*Drepanocladus aduncus*	Drepanocladus Moss				S5	NNR	G5
Mosses	Encalyptaceae	*Encalypta procera*	Slender Extinguisher Moss				S3S4	NNR	G5
Mosses	Brachytheciaceae	*Eurhynchium pulchellum*	Elegant Beaked Moss				S5	NNR	G5
Mosses	Fissidentaceae	*Fissidens adianthoides*	Maidenhair Pocket Moss				S5	NNR	G5
Mosses	Fissidentaceae	*Fissidens exilis*	Pygmy Pocket Moss	Not At Risk			S1S2	N1	G3G4
Mosses	Fissidentaceae	*Fissidens dubius*	Rock Pocket Moss				S5	NNR	G5
Mosses	Fontinalaceae	*Fontinalis sphagnifolia*	a Fontinalis moss				SNA	NNR	G3G5
Mosses	Fontinalaceae	*Fontinalis sullivantii*	a Moss				S2?	NNR	G3G5
Mosses	Funariaceae	*Funaria hygrometrica*	Common Cord Moss				S5	NNR	G5
Mosses	Pottiaceae	*Gymnostomum aeruginosum*	Tufted Rock Beardless Moss				S4?	NNR	G5
Mosses	Hedwigiaceae	*Hedwigia ciliata*	Ciliate Hedwigia Moss				S5	NNR	G5
Mosses	Hypnaceae	*Herzogiella striatella*	Round Stump Moss				S5	NNR	G5
Mosses	Hypnaceae	*Herzogiella turfacea*	Flat Stump Moss				S5	NNR	G5
Mosses	Pterigynandraceae	*Heterocladium dimorphum*	Dimorphous Tangle Moss				S4?	NNR	G5
Mosses	Neckeraceae	*Homalia trichomanoides*	Common Flat-branch Moss				S4?	NNR	G5
Mosses	Amblystegiaceae	*Hygrohypnum eugyrium*	a Moss				S5	NNR	G5
Mosses	Hylocomiaceae	*Hylocomium splendens*	Stairstep Moss				S5	NNR	G5
Mosses	Hypnaceae	*Hypnum cupressiforme var. filiforme*	a Moss				SU	NNR	G5TNR
Mosses	Hypnaceae	*Hypnum curvifolium*	Curved-leaved Plait Moss				S4?	NNR	G5
Mosses	Hypnaceae	*Hypnum imponens*	Pellucid Plait Moss				S5	NNR	G5

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Mosses	Hypnaceae	*Hypnum lindbergii*	Lindberg's Plait Moss				S5	NNR	G5
Mosses	Hypnaceae	*Hypnum plicatulum*	Northern Plait Moss				S5	NNR	G5
Mosses	Bryaceae	*Leptobryum pyriforme*	Golden Thread Moss				S4?	NNR	G5
Mosses	Amblystegiaceae	*Leptodictyum riparium*	Kneiff's Feather Moss				S4?	NNR	G5
Mosses	Amblystegiaceae	*Leptodictyum humile*	Constricted Feather Moss				S4S5	NNR	G5T5
Mosses	Leucobryaceae	*Leucobryum glaucum*	White Pincushion Moss				S5	NNR	G5
Mosses	Leucodontaceae	*Leucodon andrewsianus*	a Moss				S4	NNR	G5
Mosses	Mniaceae	*Mnium hornum*	Swan's-neck Leafy Moss				S5	NNR	G5
Mosses	Mniaceae	*Mnium marginatum*	Bordered Leafy Moss				S4?	NNR	G5
Mosses	Mniaceae	*Mnium stellare*	Star Leafy Moss				S3?	NNR	G5
Mosses	Pterigynandraceae	*Myurella sibirica*	a Moss				S5	NNR	G5
Mosses	Neckeraceae	*Neckera complanata*	a Moss				S5	NNR	G5
Mosses	Neckeraceae	*Neckera pennata*	Feathery Neckera Moss				S5	NNR	G5
Mosses	Meesiaceae	*Paludella squarrosa*	Tufted Fen Moss				S1?	NNR	G5
Mosses	Bartramiaceae	*Philonotis fontana*	Fountain Apple Moss				S5	NNR	G5
Mosses	Bartramiaceae	*Plagiopus oederiana*	Oeder's Apple Moss				S4?	NNR	G5
Mosses	Plagiotheciaceae	*Plagiothecium cavifolium*	Round Silk Moss				S5	NNR	G5
Mosses	Plagiotheciaceae	*Plagiothecium laetum*	Bright Silk Moss				S5	NNR	G5
Mosses	Hypnaceae	*Platydictya confervoides*	a Moss				S1S2	NNR	G4G5
Mosses	Hylocomiaceae	*Pleurozium schreberi*	Red-stemmed Feather Moss				S5	NNR	G5
Mosses	Polytrichaceae	*Polytrichum commune*	Common Haircap Moss				S5	NNR	G5
Mosses	Polytrichaceae	*Polytrichum pallidisetum*	Eastern Haircap Moss				SU	NNR	G5
Mosses	Pterigynandraceae	*Pterigynandrum filiforme*	Capillary Wing Moss				S5	NNR	G5
Mosses	Hypnaceae	*Ptilium crista-castrensis*	Knight's Plume Moss				S5	NNR	G5
Mosses	Grimmiaceae	*Racomitrium aciculare*	a Moss				S5	NNR	G5
Mosses	Grimmiaceae	*Racomitrium canescens*	Grey Rock Moss				S4?	NNR	G5
Mosses	Grimmiaceae	*Racomitrium fasciculare*	a Moss				S4S5	NNR	G5
Mosses	Grimmiaceae	*Racomitrium heterostichum*	Yellow-green Rock Moss				S5	NNR	G5
Mosses	Mniaceae	*Rhodobryum ontariense*	Ontario Rose Moss				S4?	NNR	G5
Mosses	Hylocomiaceae	*Rhytidiadelphus loreus*	Lanky Moss				S4S5	NNR	G5
Mosses	Hylocomiaceae	*Rhytidiadelphus triquetrus*	Electrified Cat's-tail Moss				S5	NNR	G5

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Mosses	Hylocomiaceae	*Rhytidiadelphus subpinnatus*	a Moss				S5	NNR	G5
Mosses	Amblystegiaceae	*Scorpidium scorpioides*	Hooked Scorpion Moss				S2?	NNR	G5
Mosses	Seligeriaceae	*Seligeria pusilla*	Small Limestone moss				SNA	NNR	G3G5
Mosses	Sphagnaceae	*Sphagnum angermanicum*	a Peatmoss				S5	N4	G5
Mosses	Sphagnaceae	*Sphagnum capillifolium*	Northern Peatmoss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum centrale*	Central Peat Moss				S4?	NNR	G5
Mosses	Sphagnaceae	*Sphagnum cuspidatum*	Feathery Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum fimbriatum*	Fringed Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum flavicomans*	a Peatmoss				S5	N4	G5
Mosses	Sphagnaceae	*Sphagnum fuscum*	Brown Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum girgensohnii*	Green Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum lindbergii*	Lindberg's Peat Moss				S3S4	NNR	G5
Mosses	Sphagnaceae	*Sphagnum magellanicum*	Magellan's Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum palustre*	Blunt-leaved Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum papillosum*	Papillose Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum platyphyllum*	Flat-leaved Peat Moss				S1S2	NNR	G5
Mosses	Sphagnaceae	*Sphagnum pulchrum*	Beautiful Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum pylaesii*	Simple Peatmoss				S5	NNR	G4
Mosses	Sphagnaceae	*Sphagnum quinquefarium*	Five-ranked Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum riparium*	Streamside Peat Moss				S3?	NNR	G5
Mosses	Sphagnaceae	*Sphagnum russowii*	Russow's Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum squarrosum*	Shaggy Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum subnitens*	Lustrous Peat Moss				S2?	NNR	G5
Mosses	Sphagnaceae	*Sphagnum subsecundum*	Orange Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum tenellum*	Soft Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum teres*	Rigid Peat Moss				S4S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum warnstorfii*	Warnstorf's Peat Moss				S4S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum wulfianum*	Wulf's Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum contortum*	Twisted Peat Moss				SU	NNR	G5
Mosses	Sphagnaceae	*Sphagnum angustifolium*	Narrowleaf Peatmoss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum lescurii*	a Peatmoss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum rubellum*	Red Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum affine*	a Peatmoss				S5		G5

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Mosses	Sphagnaceae	*Sphagnum fallax*	Flat-top Peat Moss				S5	NNR	G5
Mosses	Sphagnaceae	*Sphagnum subfulvum*	a Peatmoss				S5	NNR	G5
Mosses	Thuidiaceae	*Thuidium delicatulum*	Delicate Fern Moss				S5	NNR	G5
Mosses	Thuidiaceae	*Thuidium recognitum*	Hook-leaved Fern Moss				S5	NNR	G5
Mosses	Pottiaceae	*Tortella fragilis*	Fragile Twisted Moss				S2?	NNR	G5
Mosses	Pottiaceae	*Tortella tortuosa*	Frizzled Crisp Moss				S4?	NNR	G5
Mosses	Orthotrichaceae	*Ulota crispa*	Crisped Pincushion Moss				S5	NNR	G5
Mosses	Orthotrichaceae	*Ulota hutchinsiae*	Hutchins' Pincushion Moss				S4?	NNR	G5
Mosses	Mniaceae	*Plagiomnium ciliare*	Toothed Leafy Moss				S5	NNR	G5
Mosses	Mniaceae	*Plagiomnium medium*	Common Leafy Moss				S4S5	NNR	G5
Mosses	Amblystegiaceae	*Warnstorfia exannulata*	a Moss				S5	NNR	G5
Mosses	Amblystegiaceae	*Sanionia uncinata*	Sickle Moss; Hood Moss				S5	NNR	G5
Mosses	Amblystegiaceae	*Hamatocaulis vernicosus*	a Moss				S1S2	NNR	G5
Mosses	Amblystegiaceae	*Limprichtia revolvens*	a Moss				S2S3	NNR	G5
Mosses	Amblystegiaceae	*Limprichtia cossonii*	a Moss				SU		G5
Mosses	Grimmiaceae	*Schistidium apocarpum*	Radiate Bloom Moss				S5	NNR	G5
Mosses	Pottiaceae	*Hymenostylium recurvirostre*	Hymenostylium Moss				S4?	NNR	G5T5
Mosses	Hylocomiaceae	*Loeskeobryum brevirostre*	a Moss				S5	NNR	G5
Mosses	Hylocomiaceae	*Hylocomiastrum umbratum*	a Feather Moss				S5	NNR	G5
Mosses	Mniaceae	*Rhizomnium punctatum*	Dotted Leafy Moss				S5	NNR	G5
Mosses	Mniaceae	*Rhizomnium appalachianum*	Appalachian Leafy Moss				S5	NNR	G5
Mosses	Mniaceae	*Cyrtomnium hymenophylloides*	Short-pointed Lantern Moss				S2?	NNR	G5?
Fungi and Lichens	Amanitaceae	*Amanita muscaria*	Fly Amanita				SU		G5
Fungi and Lichens	Discinaceae	*Gyromitra esculenta*	brain mushroom					N5	GNR
Fungi and Lichens	Ganodermataceae	*Ganoderma tsugae*	Cedar Lacquer Polypore						
Fungi and Lichens	Fomitopsidaceae	*Fomitopsis betulina*	Birch Polypore						
Fungi and Lichens	Amanitaceae	*Amanita flavoconia*	Yellow Patches				SU		G5
Fungi and Lichens	Cortinariaceae	*Inonotus obliquus*	Chaga Mushroom				SNR	N5	GNR
Fungi and Lichens	Cantharellaceae	*Cantharellus cibarius*	a Fungus						
Fungi and Lichens	Phallaceae	*Mutinus elegans*					SU		GNR
Fungi and Lichens	Lobariaceae	*Lobaria pulmonaria*	Lungwort Lichen				S5	NNR	G5
Fungi and Lichens	Lobariaceae	*Lobaria quercizans*	Smooth Lung Lichen				S5	NNR	G5
Fungi and Lichens	Lobariaceae	*Lobaria scrobiculata*	Textured Lungwort Lichen				S5	N4	G5

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Fungi and Lichens	Nephromataceae	*Nephroma helveticum*	Fringed Kidney Lichen				S4S5	NNR	G5
Fungi and Lichens	Pannariaceae	*Pannaria rubiginosa*	Brown-eyed Shingle Lichen				S4	NNR	G4G5
Fungi and Lichens	Peltigeraceae	*Peltigera aphthosa*	Common Freckle Pelt Lichen				S5		G5
Fungi and Lichens	Lobariaceae	*Pseudocyphellaria holarctica*	Yellow Specklebelly Lichen				S5	NNR	GNR
Fungi and Lichens	Ramalinaceae	*Ramalina farinacea*	Hyphenated Ramalina Lichen				S5		G5
Fungi and Lichens	Collemataceae	*Collema tenax*	Soil Tarpaper Lichen				S3		G5
Fungi and Lichens	Collemataceae	*Collema bachmanianum*	Bachman's Tarpaper Lichen				S1S2		GNR
Fungi and Lichens	Lobariaceae	*Sticta fuliginosa*	Peppered Moon Lichen				S3	NNR	G3G5
Fungi and Lichens	Parmeliaceae	*Usnea longissima*	Methuselah's Beard Lichen				S4		G5
Fungi and Lichens	Parmeliaceae	*Usnea trichodea*	Bony Beard Lichen				S5		G5
Fungi and Lichens	Parmeliaceae	*Hypogymnia vittata*	Slender Monk's Hood Lichen				S3S4		G5
Fungi and Lichens	Collemataceae	*Leptogium acadiense*	Acadian Jellyskin Lichen				S3S4		GNR
Fungi and Lichens	Parmeliaceae	*Imshaugia aleurites*	Salted Starburst Lichen				S4		G5
Fungi and Lichens	Parmeliaceae	*Parmeliopsis capitata*	Powder-tipped Starburst Lichen				S5		G5
Fungi and Lichens		*Normandina pulchella*	Rimmed Elf-ear Lichen				S4		G4G5
Fungi and Lichens	Cladoniaceae	*Cladonia cristatella*	British Soldiers Lichen				S5		G5
Fungi and Lichens	Cladoniaceae	*Cladonia floerkeana*	Gritty British Soldiers Lichen				S3S4		G5?
Fungi and Lichens	Cladoniaceae	*Cladonia ochrochlora*	Smooth-footed Powderhorn Lichen				S5		G5
Fungi and Lichens	Collemataceae	*Collema cristatum*	Fingered Tarpaper Lichen				S1	NU	G3G5
Fungi and Lichens	Collemataceae	*Collema subflaccidum*	Tree Tarpaper Lichen				S5	NNR	G5
Fungi and Lichens	Pannariaceae	*Pectenia plumbea*	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	N3	GNR
Fungi and Lichens	Baeomycetaceae	*Dibaeis baeomyces*	Pink Earth Lichen				S5		G5
Fungi and Lichens	Pannariaceae	*Fuscopannaria ahlneri*	Corrugated Shingles Lichen				S3	NNR	G4G5

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Fungi and Lichens	Pannariaceae	*Fuscopannaria leucosticta*	White-rimmed Shingle Lichen	Threatened			S2S3	NNA	G3G5
Fungi and Lichens	Parmeliaceae	*Hypogymnia physodes*	Monk's Hood Lichen				S5		G5
Fungi and Lichens	Parmeliaceae	*Hypogymnia tubulosa*	Powder-headed Tube Lichen				S5		G5
Fungi and Lichens	Baeomycetaceae	*Icmadophila ericetorum*	a lichen				SU		G5
Fungi and Lichens	Collemataceae	*Leptogium cyanescens*	Blue Jellyskin Lichen				S5	NNR	G5
Fungi and Lichens	Collemataceae	*Leptogium lichenoides*	Tattered Jellyskin Lichen				S3		G5
Fungi and Lichens	Collemataceae	*Leptogium tenuissimum*	Birdnest Jellyskin Lichen				S2S3		GNR
Fungi and Lichens	Haematommataceae	*Loxospora ochrophaea*	a Lichen				SNR		G3G5
Fungi and Lichens	Parmeliaceae	*Melanelixia subaurifera*	Abrading Camouflage Lichen				S5	N5	G5
Fungi and Lichens	Nephromataceae	*Nephroma arcticum*	Arctic Kidney Lichen				S2?		G5
Fungi and Lichens	Nephromataceae	*Nephroma bellum*	Naked Kidney Lichen				S3	N5	G5
Fungi and Lichens	Nephromataceae	*Nephroma laevigatum*	Mustard Kidney Lichen				S5	NNR	G5
Fungi and Lichens	Nephromataceae	*Nephroma parile*	Powdery Kidney Lichen				S4	NNR	G5
Fungi and Lichens	Pannariaceae	*Protopannaria pezizoides*	Brown-gray Moss-shingle Lichen				S5	NNR	G5
Fungi and Lichens	Parmeliaceae	*Parmelia sulcata*	Hammered Shield Lichen				S5		G5
Fungi and Lichens	Pannariaceae	*Parmeliella triptophylla*	Black-bordered Shingles Lichen				S5	NNR	G5
Fungi and Lichens	Parmeliaceae	*Parmotrema crinitum*	Salted Ruffle Lichen				S5		G5
Fungi and Lichens	Peltigeraceae	*Peltigera elisabethae*	Concentric Pelt Lichen				S4S5		G5
Fungi and Lichens	Pertusariaceae	*Lepra amara*	a lichen				SNR		G5?
Fungi and Lichens	Parmeliaceae	*Platismatia norvegica*	Oldgrowth Rag Lichen				S3		G4G5
Fungi and Lichens	Parmeliaceae	*Platismatia tuckermanii*	Crumpled Rag Lichen				S5		G5
Fungi and Lichens	Parmeliaceae	*Punctelia rudecta*	Rough Speckleback Lichen				S5		G5
Fungi and Lichens	Physciaceae	*Pyxine sorediata*	Mustard Lichen				S5		G5
Fungi and Lichens	Ramalinaceae	*Ramalina roesleri*	Frayed Ramalina Lichen				S5		G5
Fungi and Lichens	Physciaceae	*Rinodina ascociscana*	a Lichen				SNR		G4G5
Fungi and Lichens		*Thelotrema lepadinum*	a Lichen				SNR		G4G5

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Fungi and Lichens	Pertusariaceae	*Pertusaria multipuncta*	a Lichen				SNA		
Fungi and Lichens	Parmeliaceae	*Usnea mutabilis*	Bloody Beard Lichen				S2S3		G5
Fungi and Lichens	Parmeliaceae	*Usnea strigosa*	Bushy Beard Lichen				S5		G5
Fungi and Lichens	Parmeliaceae	*Vulpicida pinastri*	Powdered Sunshine Lichen				S5		G5
Fungi and Lichens		*Xanthoria parietina*	Maritime Sunburst Lichen				S5		G5
Fungi and Lichens	Coccocarpiaceae	*Coccocarpia palmicola*	Salted Shell Lichen				S3S4	NNR	G5
Fungi and Lichens	Pannariaceae	*Pannaria conoplea*	Mealy-rimmed Shingle Lichen				S4	NNR	G4G5
Fungi and Lichens	Physciaceae	*Phaeophyscia pusilloides*	Pompom-tipped Shadow Lichen				S3?		G5
Fungi and Lichens	Physciaceae	*Phaeophyscia rubropulchra*	Orange-cored Shadow Lichen				S5		G5
Fungi and Lichens	Physciaceae	*Anaptychia palmulata*	Shaggy Fringed Lichen				S3S4		G3G5
Fungi and Lichens	Pannariaceae	*Erioderma pedicellatum (Atlantic pop.)*	Boreal Felt Lichen - Atlantic pop.	Endangered	Endangered	Endangered	S1	N1N2	G2G3TNR
Fungi and Lichens	Graphidaceae	*Graphis scripta*	a Lichen				SNR		G5
Fungi and Lichens	Collemataceae	*Leptogium laceroides*	Short-bearded Jellyskin Lichen				S4	NNR	G5
Fungi and Lichens	Sphaerophoraceae	*Sphaerophorus globosus*	Northern Coral Lichen				S4		G4G5
Fungi and Lichens	Parmeliaceae	*Parmelia squarrosa*	Bottlebrush Shield Lichen				S5		G5
Fungi and Lichens	Peltigeraceae	*Peltigera canina*	Dog Lichen				S5		G5
Fungi and Lichens	Peltigeraceae	*Peltigera collina*	Tree Pelt Lichen				S2?		G4G5
Fungi and Lichens	Peltigeraceae	*Peltigera horizontalis*	Flat-fruited Pelt Lichen				S5		G5
Fungi and Lichens	Peltigeraceae	*Peltigera lepidophora*	Scaly Pelt Lichen				S1		G5
Fungi and Lichens	Peltigeraceae	*Peltigera membranacea*	Membranous Pelt Lichen				S5		G5
Fungi and Lichens	Peltigeraceae	*Peltigera neopolydactyla*	Undulating Pelt Lichen				S4S5		G5
Fungi and Lichens	Parmeliaceae	*Bryoria furcellata*	Burred Horsehair Lichen				S5		G5
Fungi and Lichens	Parmeliaceae	*Cetraria islandica*	True Icelandmoss Lichen				S4?		G5
Fungi and Lichens	Parmeliaceae	*Cetraria islandica ssp. crispiformis*	Speckled Icelandmoss Lichen				S4?		G5T5
Fungi and Lichens	Cladoniaceae	*Cladonia cariosa*	Lesser Ribbed Pixie Lichen				S4S5		G5

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Fungi and Lichens	Cladoniaceae	*Cladonia cervicornis ssp. verticillata*	Ladder Lichen				S5		G5
Fungi and Lichens	Cladoniaceae	*Cladonia chlorophaea*	Mealy Pixie-cup Lichen				S5		G5
Fungi and Lichens	Cladoniaceae	*Cladonia furcata*	Forking Lichen				S5		G5
Fungi and Lichens	Cladoniaceae	*Cladonia pocillum*	Rosette Pixie-cup Lichen				S3?		G5
Fungi and Lichens	Cladoniaceae	*Cladonia squamosa*	Dragon Lichen				S5		G5
Fungi and Lichens	Cladoniaceae	*Cladonia rangiferina*	Gray Reindeer Lichen				S5		G5
Fungi and Lichens	Cladoniaceae	*Cladonia stellaris*	Star-tipped Reindeer Lichen				S5		G5
Fungi and Lichens	Parmeliaceae	*Platismatia glauca*	Varied Rag Lichen				S5		G5
Fungi and Lichens	Collemataceae	*Collema furfuraceum*	Blistered Tarpaper Lichen				S4S5	NNR	G5
Fungi and Lichens		*Menegazzia subsimilis*	Tree Flute Lichen				S4		G5
Fungi and Lichens	Physciaceae	*Heterodermia neglecta*	Fringe Lichen				S3S4		GNR
Vascular Plants	Aceraceae	*Acer negundo*	Manitoba Maple				SNA	N5	G5
Vascular Plants	Aceraceae	*Acer pensylvanicum*	Striped Maple				S5	N5	G5
Vascular Plants	Aceraceae	*Acer platanoides*	Norway Maple				SNA	NNA	GNR
Vascular Plants	Aceraceae	*Acer pseudoplatanus*	Sycamore Maple				SNA	NNA	GNR
Vascular Plants	Aceraceae	*Acer rubrum*	Red Maple				S5	NNR	G5
Vascular Plants	Aceraceae	*Acer saccharum*	Sugar Maple				S4S5	N5	G5
Vascular Plants	Aceraceae	*Acer spicatum*	Mountain Maple				S5	NNR	G5
Vascular Plants	Anacardiaceae	*Toxicodendron radicans*	Poison Ivy				S5	N5	G5
Vascular Plants	Anacardiaceae	*Toxicodendron radicans var. rydbergii*	Western Poison Ivy				S5	N5	G5
Vascular Plants	Apiaceae	*Aegopodium podagraria*	Bishop's Goutweed				SNA	NNA	GNR
Vascular Plants	Apiaceae	*Angelica lucida*	Seaside Angelica				S4	NNR	G5
Vascular Plants	Apiaceae	*Angelica sylvestris*	Woodland Angelica				SNA	NNA	G5?
Vascular Plants	Apiaceae	*Carum carvi*	Wild Caraway				SNA	NNA	GNR
Vascular Plants	Apiaceae	*Cicuta bulbifera*	Bulbous Water-hemlock				S5	NNR	G5
Vascular Plants	Apiaceae	*Cicuta maculata*	Spotted Water-Hemlock				S5	NNR	G5
Vascular Plants	Apiaceae	*Daucus carota*	Queen Anne's Lace				SNA	NNA	GNR
Vascular Plants	Apiaceae	*Heracleum mantegazzianum*	Giant Cow Parsnip				SNA	NNA	GNR
Vascular Plants	Apiaceae	*Heracleum maximum*	Common Cow Parsnip				S5	NNR	G5
Vascular Plants	Apiaceae	*Hydrocotyle americana*	American Marsh Pennywort				S5	NNR	G5
Vascular Plants	Apiaceae	*Ligusticum scoticum*	Scotch Lovage				S5	NNR	G5

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Vascular Plants	Apiaceae	*Osmorhiza berteroi*	Mountain Sweet Cicely				S4	NNR	G5
Vascular Plants	Apiaceae	*Osmorhiza claytonii*	Hairy Sweet Cicely				S4	NNR	G5
Vascular Plants	Apiaceae	*Osmorhiza longistylis*	Smooth Sweet Cicely				S2	NNR	G5
Vascular Plants	Apiaceae	*Pastinaca sativa*	Wild Parsnip				SNA	NNA	GNR
Vascular Plants	Apiaceae	*Sanicula marilandica*	Maryland Sanicle				S4	NNR	G5
Vascular Plants	Apiaceae	*Sanicula odorata*	Clustered Sanicle				S1	N5	G5
Vascular Plants	Apiaceae	*Sium suave*	Common Water Parsnip				S5	N5	G5
Vascular Plants	Apocynaceae	*Apocynum androsaemifolium*	Spreading Dogbane				S5	NNR	G5
Vascular Plants	Apocynaceae	*Apocynum cannabinum*	Hemp Dogbane				S4	NNR	G5
Vascular Plants	Apocynaceae	*Vinca minor*	Lesser Periwinkle				SNA	NNA	GNR
Vascular Plants	Aquifoliaceae	*Ilex verticillata*	Common Winterberry				S5	NNR	G5
Vascular Plants	Aquifoliaceae	*Ilex mucronata*	Mountain Holly				S5	N5	G5
Vascular Plants	Araliaceae	*Aralia nudicaulis*	Wild Sarsaparilla				S5	N5	G5
Vascular Plants	Araliaceae	*Aralia racemosa*	American Spikenard				S4	NNR	G5
Vascular Plants	Asclepiadaceae	*Asclepias incarnata*	Swamp Milkweed				S4	NNR	G5
Vascular Plants	Asclepiadaceae	*Asclepias incarnata ssp. pulchra*	Swamp Milkweed				SU	NNR	G5T5
Vascular Plants	Asclepiadaceae	*Asclepias syriaca*	Common Milkweed				SU	N5	G5
Vascular Plants	Asteraceae	*Achillea millefolium*	Common Yarrow				SNA	NNA	G5T5?
Vascular Plants	Asteraceae	*Achillea borealis*	Northern Yarrow				S5	N5	G5T5
Vascular Plants	Asteraceae	*Ambrosia artemisiifolia*	Common Ragweed				S5	N5	G5
Vascular Plants	Asteraceae	*Ambrosia trifida*	Great Ragweed				SNA	N5	G5
Vascular Plants	Asteraceae	*Anaphalis margaritacea*	Pearly Everlasting				S5	N3N5	G5
Vascular Plants	Asteraceae	*Antennaria howellii*	Howell's Pussytoes				S4	N5	G5
Vascular Plants	Asteraceae	*Arctium lappa*	Great Burdock				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Arctium minus*	Common Burdock				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Artemisia stelleriana*	Beach Wormwood				SNA	NNA	G4?
Vascular Plants	Asteraceae	*Bellis perennis*	English Daisy				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Bidens cernua*	Nodding Beggarticks				S5	NNR	G5
Vascular Plants	Asteraceae	*Bidens connata*	Purple-stemmed Beggarticks				S4	NNR	G5
Vascular Plants	Asteraceae	*Bidens frondosa*	Devil's Beggarticks				S5	N5	G5
Vascular Plants	Asteraceae	*Centaurea montana*	Mountain Cornflower				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Centaurea nigra*	Black Knapweed				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Centaurea stoebe ssp. micranthos*	Spotted Knapweed				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Centaurea x moncktonii*	meadow knapweed				SNA		GNRTNR
Vascular Plants	Asteraceae	*Cichorium intybus*	Wild Chicory				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Cirsium arvense*	Canada Thistle				SNA	NNA	G5

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Vascular Plants	Asteraceae	*Cirsium muticum*	Swamp Thistle				S4S5	N5?	G5
Vascular Plants	Asteraceae	*Cirsium palustre*	Marsh Thistle				SNA	NNA	G5
Vascular Plants	Asteraceae	*Cirsium vulgare*	Bull Thistle				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Erigeron canadensis*	Canada Horseweed				S5	N5	G5
Vascular Plants	Asteraceae	*Erechtites hieraciifolius*	Eastern Burnweed				S5	N5	G5
Vascular Plants	Asteraceae	*Erigeron annuus*	Annual Fleabane				S4S5	N5	G5
Vascular Plants	Asteraceae	*Erigeron hyssopifolius*	Hyssop-leaved Fleabane				S3	N5	G5
Vascular Plants	Asteraceae	*Erigeron philadelphicus*	Philadelphia Fleabane				S2	N5	G5
Vascular Plants	Asteraceae	*Erigeron strigosus*	Rough Fleabane				S5	N5	G5
Vascular Plants	Asteraceae	*Eutrochium maculatum*	Spotted Joe Pye Weed				S5	N5	G5
Vascular Plants	Asteraceae	*Eupatorium perfoliatum*	Common Boneset				S5	N5	G5
Vascular Plants	Asteraceae	*Euthamia graminifolia*	Grass-leaved Goldenrod				S5	NNR	G5
Vascular Plants	Asteraceae	*Euthamia caroliniana*	Slender Fragrant Goldenrod				S4	NNR	G5
Vascular Plants	Asteraceae	*Gnaphalium uliginosum*	Marsh Cudweed				SNA	NNR	G5
Vascular Plants	Asteraceae	*Helianthus annuus*	Common Sunflower				SNA	N5?	G5
Vascular Plants	Asteraceae	*Helianthus tuberosus*	Jerusalem Artichoke				SNA	N5	G5
Vascular Plants	Asteraceae	*Pilosella aurantiaca*	Orange Hawkweed				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Pilosella caespitosa*	Meadow Hawkweed				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Hieracium lachenalii*	Common Hawkweed				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Hieracium lachenalii ssp. cruentifolium*	Common Hawkweed				SNA		
Vascular Plants	Asteraceae	*Hieracium murorum*	Wall Hawkweed				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Pilosella officinarum*	Mouse-ear Hawkweed				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Pilosella piloselloides*	Tall Hawkweed				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Hieracium scabrum*	Rough Hawkweed				S5	NNR	G5
Vascular Plants	Asteraceae	*Hieracium laevigatum ssp. tridentatum*	Three-toothed Hawkweed				SNA		GNR
Vascular Plants	Asteraceae	*Pilosella flagellaris*	Whiplash Hawkweed				SNA	NNA	GNA
Vascular Plants	Asteraceae	*Pilosella x floribunda*	king devil hawkweed				SNA		GNA
Vascular Plants	Asteraceae	*Hieracium umbellatum*	Umbellate Hawkweed				SNR	N5	G5
Vascular Plants	Asteraceae	*Inula helenium*	Elecampane				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Lactuca biennis*	Tall Blue Lettuce				S5	NNR	G5
Vascular Plants	Asteraceae	*Lactuca canadensis*	Canada Lettuce				S5	NNR	G5
Vascular Plants	Asteraceae	*Lactuca serriola*	Prickly Lettuce				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Scorzoneroides autumnalis*	Autumn Hawkbit				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Leucanthemum vulgare*	Oxeye Daisy				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Matricaria discoidea*	Pineapple Weed				SNA	NNR	G5

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Vascular Plants	Asteraceae	*Petasites frigidus var. palmatus*	Northern Sweet Coltsfoot				S4	N5	G5T5
Vascular Plants	Asteraceae	*Nabalus altissimus*	Tall Rattlesnakeroot				S5	N5	G5
Vascular Plants	Asteraceae	*Nabalus trifoliolatus*	Three-leaved Rattlesnakeroot				S5	N5	G5
Vascular Plants	Asteraceae	*Rudbeckia hirta var. pulcherrima*	Black-Eyed Susan				SNA	N5	G5T5
Vascular Plants	Asteraceae	*Packera aurea*	Golden Groundsel				S4	NNR	G5
Vascular Plants	Asteraceae	*Jacobaea vulgaris*	Tansy Ragwort				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Senecio pseudoarnica*	Seabeach Ragwort				S2S3	NNR	G5
Vascular Plants	Asteraceae	*Packera schweinitziana*	Schweinitz's Groundsel				S4	NNR	G5?
Vascular Plants	Asteraceae	*Senecio viscosus*	Sticky Ragwort				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Solidago bicolor*	White Goldenrod				S5	NNR	G5
Vascular Plants	Asteraceae	*Solidago flexicaulis*	Zigzag Goldenrod				S5	NNR	G5
Vascular Plants	Asteraceae	*Solidago gigantea*	Giant Goldenrod				S5	NNR	G5
Vascular Plants	Asteraceae	*Solidago juncea*	Early Goldenrod				S5	NNR	G5
Vascular Plants	Asteraceae	*Solidago macrophylla*	Large-leaved Goldenrod				S4	NNR	G5
Vascular Plants	Asteraceae	*Solidago puberula*	Downy Goldenrod				S5	NNR	G5
Vascular Plants	Asteraceae	*Solidago rugosa*	Rough-stemmed Goldenrod				S5	N5	G5
Vascular Plants	Asteraceae	*Solidago sempervirens*	Seaside Goldenrod				S5	N3N5	G5
Vascular Plants	Asteraceae	*Solidago uliginosa*	Northern Bog Goldenrod				S5	NNR	G5
Vascular Plants	Asteraceae	*Solidago canadensis*	Canada Goldenrod				S4S5	N5	G5
Vascular Plants	Asteraceae	*Sonchus arvensis*	Field Sow Thistle				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Sonchus asper*	Prickly Sow Thistle				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Sonchus oleraceus*	Common Sow Thistle				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Tanacetum vulgare*	Common Tansy				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Taraxacum officinale*	Common Dandelion				SNA	N5	G5T5
Vascular Plants	Asteraceae	*Tragopogon pratensis*	Meadow Goatsbeard				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Tussilago farfara*	Coltsfoot				SNA	NNA	GNR
Vascular Plants	Asteraceae	*Xanthium strumarium*	Rough Cocklebur				S4	N5	G5
Vascular Plants	Asteraceae	*Dittrichia graveolens*	Stinkwort				SNA		GNR
Vascular Plants	Asteraceae	*Omalotheca sylvatica*	Woodland Cudweed				S4S5	N4	G4G5
Vascular Plants	Asteraceae	*Packera aurea x schweinitziana*	a hybrid Groundsel				SNA		
Vascular Plants	Asteraceae	*Packera paupercula*	Balsam Groundsel				S3	NNR	G5
Vascular Plants	Asteraceae	*Symphyotrichum boreale*	Boreal Aster				S2?	N5	G5
Vascular Plants	Asteraceae	*Symphyotrichum cordifolium*	Heart-leaved Aster				S4S5	N5	G5
Vascular Plants	Asteraceae	*Symphyotrichum puniceum*	Purple-stemmed Aster				S5	NNR	G5

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Vascular Plants	Asteraceae	*Symphyotrichum lateriflorum*	Calico Aster				S5	NNR	G5
Vascular Plants	Asteraceae	*Symphyotrichum lateriflorum var. lateriflorum*	Calico Aster				S5	N5	G5T5
Vascular Plants	Asteraceae	*Symphyotrichum novi-belgii*	New York Aster				S5	N3N5	G5
Vascular Plants	Asteraceae	*Symphyotrichum novi-belgii var. novi-belgii*	New Belgium American-Aster				S5	N5	G5T5
Vascular Plants	Asteraceae	*Symphyotrichum lanceolatum*	Lance-leaved Aster				S4S5	NNR	G5
Vascular Plants	Asteraceae	*Oclemena acuminata*	Whorled Wood Aster				S5	NNR	G5
Vascular Plants	Asteraceae	*Oclemena nemoralis*	Bog Aster				S5	NNR	G5
Vascular Plants	Asteraceae	*Oclemena x blakei*	a hybrid White Panicled American-Aster				S5	NNR	GNA
Vascular Plants	Asteraceae	*Eurybia macrophylla*	Large-leaved Aster				S5	NNR	G5
Vascular Plants	Asteraceae	*Eurybia radula*	Low Rough Aster				S5	NNR	G5
Vascular Plants	Asteraceae	*Doellingeria umbellata*	Hairy Flat-top White Aster				S5	NNR	G5
Vascular Plants	Balsaminaceae	*Impatiens capensis*	Spotted Jewelweed				S5	N5	G5
Vascular Plants	Balsaminaceae	*Impatiens pallida*	Pale Jewelweed				S2	N5	G5
Vascular Plants	Berberidaceae	*Berberis thunbergii*	Japanese Barberry				SNA	NNA	GNR
Vascular Plants	Berberidaceae	*Berberis vulgaris*	Common Barberry				SNA	NNA	GNR
Vascular Plants	Berberidaceae	*Caulophyllum thalictroides*	Blue Cohosh				S2	N4N5	G5
Vascular Plants	Betulaceae	*Alnus incana ssp. rugosa*	Speckled Alder				S5	NNR	G5T5
Vascular Plants	Betulaceae	*Alnus alnobetula ssp. crispa*	Mountain Alder				S5		G5T5
Vascular Plants	Betulaceae	*Betula alleghaniensis*	Yellow Birch				S5	NNR	G5
Vascular Plants	Betulaceae	*Betula papyrifera*	Paper Birch				S5	N5	G5
Vascular Plants	Betulaceae	*Betula cordifolia*	Heart-leaved Birch				S5	N5	G5T5
Vascular Plants	Betulaceae	*Betula populifolia*	Gray Birch				S5	NNR	G5
Vascular Plants	Betulaceae	*Betula x caerulea-grandis*	blue birch				SNA		GNA
Vascular Plants	Betulaceae	*Betula pumila*	Bog Birch				S3	N5	G5
Vascular Plants	Betulaceae	*Corylus cornuta*	Beaked Hazel				S5	NNR	G5
Vascular Plants	Betulaceae	*Ostrya virginiana*	Ironwood				S5	NNR	G5T5
Vascular Plants	Boraginaceae	*Mertensia maritima*	Sea Lungwort				S4	NNR	G5
Vascular Plants	Boraginaceae	*Myosotis arvensis*	Field Forget-me-not				SNA	NNA	GNR
Vascular Plants	Boraginaceae	*Myosotis laxa*	Small Forget-Me-Not				S5	N5	G5
Vascular Plants	Boraginaceae	*Myosotis scorpioides*	True Forget-Me-Not				SNA	NNA	G5
Vascular Plants	Boraginaceae	*Myosotis sylvatica*	Woodland Forget-Me-Not				SNA	NNA	G5
Vascular Plants	Boraginaceae	*Symphytum officinale*	Common Comfrey				SNA	NNA	GNR

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Vascular Plants	Brassicaceae	*Boechera stricta*	Drummond's Rockcress				S2	N5	G5
Vascular Plants	Brassicaceae	*Arabis pycnocarpa*	Cream-flowered Rockcress				S1S2	N5	G5T5
Vascular Plants	Brassicaceae	*Barbarea vulgaris*	Yellow Rocket				SNA	NNA	GNR
Vascular Plants	Brassicaceae	*Cakile edentula*	American Searocket				S5	NNR	G5
Vascular Plants	Brassicaceae	*Cardamine pensylvanica*	Pennsylvania Bittercress				S5	NNR	G5
Vascular Plants	Brassicaceae	*Cardamine pratensis*	Cuckoo Flower				SNA	N5	G5TU
Vascular Plants	Brassicaceae	*Cardamine diphylla*	Two-leaved Toothwort				S4	NNR	G5
Vascular Plants	Brassicaceae	*Cardamine dentata*	Toothed Bittercress				S1	N5	G5
Vascular Plants	Brassicaceae	*Draba arabisans*	Rock Whitlow-Grass				S2	NNR	G4G5
Vascular Plants	Brassicaceae	*Erucastrum gallicum*	Common Dog Mustard				SNA	NNA	G5
Vascular Plants	Brassicaceae	*Erysimum cheiranthoides*	Worm-seeded Wallflower				S5	N5	G5
Vascular Plants	Brassicaceae	*Hesperis matronalis*	Dame's Rocket				SNA	NNA	G4G5
Vascular Plants	Brassicaceae	*Lepidium campestre*	Field Pepperwort				SNA	NNA	GNR
Vascular Plants	Brassicaceae	*Lepidium densiflorum*	Dense-flowered Pepperwort				SNA	N5	G5
Vascular Plants	Brassicaceae	*Raphanus raphanistrum*	Wild Radish				SNA	NNA	GNR
Vascular Plants	Brassicaceae	*Rorippa palustris*	Bog Yellowcress				S4	N5	G5
Vascular Plants	Brassicaceae	*Rorippa sylvestris*	Creeping Yellowcress				SNA	NNA	G5
Vascular Plants	Brassicaceae	*Thlaspi arvense*	Field Pennycress				SNA	NNA	GNR
Vascular Plants	Campanulaceae	*Campanula aparinoides*	Marsh Bellflower				S3	NNR	G5
Vascular Plants	Campanulaceae	*Campanula intercedens*	Intermediate Bellflower				S4	N5	G5
Vascular Plants	Campanulaceae	*Lobelia dortmanna*	Water Lobelia				S5	NNR	G5
Vascular Plants	Campanulaceae	*Lobelia inflata*	Inflated Lobelia				S5	N5	G5
Vascular Plants	Campanulaceae	*Lobelia kalmii*	Brook Lobelia				S2	N5	G5
Vascular Plants	Caryophyllaceae	*Cerastium fontanum ssp. vulgare*	Common Chickweed				SNA	NNA	GNRTNR
Vascular Plants	Caryophyllaceae	*Cerastium arvense*	Mouse-Ear Chickweed				SU	N5	G5
Vascular Plants	Caryophyllaceae	*Dianthus armeria*	Deptford Pink				SNA	NNA	GNR
Vascular Plants	Caryophyllaceae	*Dianthus barbatus*	Sweet William				SNA	NNA	GNR
Vascular Plants	Caryophyllaceae	*Dianthus deltoides*	Maiden Pink				SNA	NNA	GNR
Vascular Plants	Caryophyllaceae	*Honckenya peploides*	Seabeach Sandwort				S5	NNR	G5
Vascular Plants	Caryophyllaceae	*Honckenya peploides ssp. robusta*	Seabeach Sandwort				S5	NNR	G5T5
Vascular Plants	Caryophyllaceae	*Moehringia lateriflora*	Blunt-leaved Sandwort				S5	NNR	G5

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Vascular Plants	Caryophyllaceae	*Sagina procumbens*	Procumbent Pearlwort				S5	NNA	G5
Vascular Plants	Caryophyllaceae	*Saponaria officinalis*	Bouncing-Bet				SNA	NNA	GNR
Vascular Plants	Caryophyllaceae	*Silene vulgaris*	Bladder Campion				SNA	NNA	GNR
Vascular Plants	Caryophyllaceae	*Spergularia canadensis*	Canada Sandspurrey				S4	NNR	G5
Vascular Plants	Caryophyllaceae	*Spergularia rubra*	Ruby Sandspurrey				SNA	NNA	G5
Vascular Plants	Caryophyllaceae	*Spergularia salina*	Saltmarsh Sandspurrey				S5	N5?	G5
Vascular Plants	Caryophyllaceae	*Stellaria crassifolia*	Fleshy Stitchwort				S1	N5	G5
Vascular Plants	Caryophyllaceae	*Stellaria graminea*	Little Starwort				SNA	NNA	GNR
Vascular Plants	Caryophyllaceae	*Stellaria media*	Common Starwort				SNA	NNA	GNRTNR
Vascular Plants	Caryophyllaceae	*Stellaria borealis*	Boreal Stitchwort				S4	NNR	G5
Vascular Plants	Celastraceae	*Celastrus orbiculatus*	Oriental Bittersweet				SNA	NNA	GNR
Vascular Plants	Chenopodiaceae	*Atriplex glabriuscula var. acadiensis*	Acadian Saltbush				SU	N4?	G4?
Vascular Plants	Chenopodiaceae	*Atriplex glabriuscula var. franktonii*	Frankton's Saltbush				S3S4	N3N4	G3G4
Vascular Plants	Chenopodiaceae	*Atriplex patula*	Spreading Orache				SNA	NNR	G5
Vascular Plants	Chenopodiaceae	*Atriplex prostrata*	Thin-leaved Orache				S5	N5	G5
Vascular Plants	Chenopodiaceae	*Atriplex dioica*	Saline Saltbush				S5	N5	G5
Vascular Plants	Chenopodiaceae	*Oxybasis rubra*	Red Goosefoot				S2	N5	G5
Vascular Plants	Chenopodiaceae	*Chenopodium album*	Common Lamb's Quarters				SNA	N1N3	G5
Vascular Plants	Chenopodiaceae	*Salicornia maritima*	Sea Glasswort				S5	N3N5	G5
Vascular Plants	Chenopodiaceae	*Suaeda maritima*	White Sea-blite				S5	NNR	G5
Vascular Plants	Callitrichaceae	*Callitriche heterophylla*	Large Water-Starwort				S4	NNR	G5
Vascular Plants	Callitrichaceae	*Callitriche palustris*	Marsh Water-starwort				S5	NNR	G5
Vascular Plants	Clusiaceae	*Hypericum canadense*	Canada St John's-wort				S5	NNR	G5
Vascular Plants	Clusiaceae	*Hypericum majus*	Large St John's-wort				S2	NNR	G5
Vascular Plants	Clusiaceae	*Hypericum mutilum*	Dwarf St John's-wort				S4S5	N5	G5
Vascular Plants	Clusiaceae	*Hypericum boreale*	Northern St John's-Wort				S5	N5	G5
Vascular Plants	Clusiaceae	*Hypericum x dissimulatum*	Disguised St. John's-wort				S2S3	NNA	G5
Vascular Plants	Clusiaceae	*Hypericum perforatum*	Common St. John's-wort				SNA	NNA	GNR
Vascular Plants	Clusiaceae	*Hypericum fraseri*	Fraser's St. John's-wort				S5	N5	G5
Vascular Plants	Clusiaceae	*Hypericum virginicum*	Virginia St. John's-wort				S5	N5	G5

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Vascular Plants	Cannabaceae	*Humulus lupulus*	Common Hop				SU	N5	G5
Vascular Plants	Cannabaceae	*Humulus lupulus var. lupulus*	Common Hop				SNA	NNA	G5TNR
Vascular Plants	Convolvulaceae	*Calystegia sepium*	Hedge False Bindweed				S5	N5	G5
Vascular Plants	Cornaceae	*Cornus alternifolia*	Alternate-leaved Dogwood				S5	NNR	G5
Vascular Plants	Cornaceae	*Cornus canadensis*	Bunchberry				S5	N5	G5
Vascular Plants	Cornaceae	*Cornus rugosa*	Round-leaved Dogwood				S4	NNR	G5
Vascular Plants	Cornaceae	*Cornus sericea*	Red Osier Dogwood				S5	NNR	G5T5
Vascular Plants	Cornaceae	*Cornus x slavinii*	a Hybrid Dogwood				SNA	NNA	GNA
Vascular Plants	Caprifoliaceae	*Diervilla lonicera*	Northern Bush Honeysuckle				S5	NNR	G5
Vascular Plants	Caprifoliaceae	*Linnaea borealis*	Twinflower				S5	NNR	G5
Vascular Plants	Caprifoliaceae	*Linnaea borealis ssp. longiflora*	Twinflower				S5	N5	G5T5
Vascular Plants	Caprifoliaceae	*Lonicera canadensis*	Canada Fly Honeysuckle				S5	NNR	G5
Vascular Plants	Caprifoliaceae	*Lonicera tatarica*	Tartarian Honeysuckle				SNA	NNA	GNR
Vascular Plants	Caprifoliaceae	*Lonicera villosa*	Mountain Fly Honeysuckle				S4S5	NNR	G5
Vascular Plants	Caprifoliaceae	*Sambucus racemosa*	Red Elderberry				S5	N5	G5
Vascular Plants	Caprifoliaceae	*Sambucus racemosa var. pubens*	Red Elderberry				S5	N5	G5T5
Vascular Plants	Caprifoliaceae	*Sambucus canadensis*	Common Elderberry				S5	N5	G5T5
Vascular Plants	Caprifoliaceae	*Symphoricarpos albus*	Thin-leaved Snowberry				SNA	N5	G5
Vascular Plants	Caprifoliaceae	*Symphoricarpos albus var. laevigatus*	Thin-leaved Snowberry				SNA	N5	G5T5
Vascular Plants	Caprifoliaceae	*Triosteum aurantiacum*	Orange-fruited Tinker's Weed				S2S3	NNR	G5
Vascular Plants	Caprifoliaceae	*Viburnum lantana*	Wayfaring Viburnum				SNA	NNA	GNR
Vascular Plants	Caprifoliaceae	*Viburnum lantanoides*	Hobblebush				S4S5	NNR	G5
Vascular Plants	Caprifoliaceae	*Viburnum nudum var. cassinoides*	Northern Wild Raisin				S5	NNR	G5T5
Vascular Plants	Caprifoliaceae	*Viburnum opulus*	Highbush Cranberry				S4	N5	G5
Vascular Plants	Caprifoliaceae	*Viburnum opulus var. americanum*	Highbush Cranberry				S4	N5	G5T5
Vascular Plants	Caprifoliaceae	*Viburnum opulus ssp. opulus*	cranberry viburnum				SNA		G5TNR
Vascular Plants	Crassulaceae	*Rhodiola rosea*	Roseroot				S4	NNR	G5

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Vascular Plants	Droseraceae	*Drosera intermedia*	Spoon-Leaved Sundew				S5	NNR	G5
Vascular Plants	Droseraceae	*Drosera rotundifolia*	Round-leaved Sundew				S5	N5	G5
Vascular Plants	Elaeagnaceae	*Shepherdia canadensis*	Soapberry				S2S3	NNR	G5
Vascular Plants	Empetraceae	*Empetrum nigrum*	Black Crowberry				S5	NNR	G5
Vascular Plants	Ericaceae	*Andromeda polifolia*	Bog Rosemary				S5	NNR	G5
Vascular Plants	Ericaceae	*Andromeda polifolia var. latifolia*	Glaucous-leaved Bog Rosemary				S5	N5	G5T5
Vascular Plants	Ericaceae	*Chamaedaphne calyculata*	Leatherleaf				S5	N5	G5
Vascular Plants	Ericaceae	*Epigaea repens*	Trailing Arbutus				S5	NNR	G5
Vascular Plants	Ericaceae	*Gaultheria hispidula*	Creeping Snowberry				S5	NNR	G5
Vascular Plants	Ericaceae	*Gaultheria procumbens*	Eastern Teaberry				S5	N5	G5
Vascular Plants	Ericaceae	*Gaylussacia baccata*	Black Huckleberry				S5	NNR	G5
Vascular Plants	Ericaceae	*Gaylussacia bigeloviana*	Dwarf Huckleberry				S5	NNR	G5T4T5
Vascular Plants	Ericaceae	*Kalmia angustifolia*	Sheep Laurel				S5	NNR	G5
Vascular Plants	Ericaceae	*Kalmia polifolia*	Pale Bog Laurel				S5	NNR	G5
Vascular Plants	Ericaceae	*Rhododendron groenlandicum*	Common Labrador Tea				S5	N5	G5
Vascular Plants	Ericaceae	*Rhododendron canadense*	Rhodora				S5	NNR	G5
Vascular Plants	Ericaceae	*Vaccinium angustifolium*	Late Lowbush Blueberry				S5	N5	G5
Vascular Plants	Ericaceae	*Vaccinium boreale*	Northern Blueberry				S3	N4	G4G5
Vascular Plants	Ericaceae	*Vaccinium cespitosum*	dwarf bilberry				S3		G5
Vascular Plants	Ericaceae	*Vaccinium macrocarpon*	Large Cranberry				S5	N4?	G5
Vascular Plants	Ericaceae	*Vaccinium myrtilloides*	Velvet-leaved Blueberry				S5	N5	G5
Vascular Plants	Ericaceae	*Vaccinium oxycoccos*	Small Cranberry				S5	N5	G5
Vascular Plants	Ericaceae	*Vaccinium vitis-idaea*	Mountain Cranberry				S5	NNR	G5
Vascular Plants	Euphorbiaceae	*Euphorbia polygonifolia*	Seaside Spurge				S2S3	N4	G5?
Vascular Plants	Euphorbiaceae	*Euphorbia vermiculata*	Wormseed Spurge				SNA	N5	G5
Vascular Plants	Fabaceae	*Securigera varia*	Purple Crown-vetch				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Cytisus scoparius*	Scotch Broom				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Genista tinctoria*	Dyer's Greenweed				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Lathyrus japonicus*	Beach Pea				S5	NNR	G5
Vascular Plants	Fabaceae	*Lathyrus latifolius*	Everlasting Pea				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Lathyrus palustris*	Marsh Vetchling				S5	NNR	G5
Vascular Plants	Fabaceae	*Lotus corniculatus*	Garden Bird's-foot Trefoil				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Lupinus polyphyllus*	Large-Leaved Lupine				SNA	N4	G5
Vascular Plants	Fabaceae	*Medicago lupulina*	Black Medick				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Medicago sativa*	Alfalfa				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Melilotus albus*	White Sweet-clover				SNA	NNA	G5

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Vascular Plants	Fabaceae	*Melilotus officinalis*	Yellow Sweet-clover				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Robinia pseudoacacia*	Black Locust				SNA	NNA	G5
Vascular Plants	Fabaceae	*Trifolium arvense*	Rabbit's-foot Clover				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Trifolium aureum*	Yellow Clover				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Trifolium campestre*	Low Hop Clover				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Trifolium dubium*	Small Hop Clover				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Trifolium hybridum*	Alsike Clover				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Trifolium pratense*	Red Clover				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Trifolium repens*	White Clover				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Vicia cracca*	Tufted Vetch				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Vicia sepium*	Bush Vetch				SNA	NNA	GNR
Vascular Plants	Fabaceae	*Vicia villosa*	Shaggy Vetch				SNA	NNA	G5
Vascular Plants	Fagaceae	*Fagus grandifolia*	American Beech				S5	NNR	G5
Vascular Plants	Fagaceae	*Quercus robur*	English Oak				SNA	NNA	GNR
Vascular Plants	Fagaceae	*Quercus rubra*	Northern Red Oak				S5	NNR	G5
Vascular Plants	Fumariaceae	*Dicentra cucullaria*	Dutchman's Breeches				S4	NNR	G5
Vascular Plants	Gentianaceae	*Bartonia paniculata*	Branched Bartonia				S4S5	NNR	G5
Vascular Plants	Gentianaceae	*Bartonia paniculata ssp. iodandra*	Branched Bartonia				S4S5	NNR	G5T3T5
Vascular Plants	Gentianaceae	*Bartonia virginica*	Yellow Bartonia				S3	N3	G5
Vascular Plants	Gentianaceae	*Centaurium erythraea*	Common Centaury				SNA	NNA	GNR
Vascular Plants	Gentianaceae	*Centaurium pulchellum*	Branched Centaury				SNA	NNA	GNR
Vascular Plants	Gentianaceae	*Halenia deflexa*	Spurred Gentian				S2S3	N5	G5
Vascular Plants	Geraniaceae	*Geranium robertianum*	Herb Robert				S4	N4	G5
Vascular Plants	Grossulariaceae	*Ribes glandulosum*	Skunk Currant				S5	N5	G5
Vascular Plants	Grossulariaceae	*Ribes hirtellum*	Smooth Gooseberry				S5	NNR	G5
Vascular Plants	Grossulariaceae	*Ribes lacustre*	Bristly Black Currant				S5	NNR	G5
Vascular Plants	Grossulariaceae	*Ribes rubrum*	European Red Currant				SNA	NNA	G4G5
Vascular Plants	Grossulariaceae	*Ribes triste*	Swamp Red Currant				S4	NNR	G5
Vascular Plants	Haloragaceae	*Myriophyllum verticillatum*	Whorled Water Milfoil				S2	NNR	G5
Vascular Plants	Haloragaceae	*Myriophyllum sibiricum*	Siberian Water Milfoil				S3S4	NNR	G5
Vascular Plants	Haloragaceae	*Proserpinaca palustris*	Marsh Mermaidweed				S3	NNR	G5
Vascular Plants	Hamamelidaceae	*Hamamelis virginiana*	American Witch-Hazel				S5	N5	G5
Vascular Plants	Hippocastanaceae	*Aesculus hippocastanum*	Common Horse Chestnut				SNA	NNA	GNR
Vascular Plants	Lamiaceae	*Ajuga reptans*	Creeping Bugleweed				SNA	NNA	GNR
Vascular Plants	Lamiaceae	*Clinopodium vulgare*	Wild Basil				S5	N5	G5
Vascular Plants	Lamiaceae	*Galeopsis bifida*	Bifid Hemp-nettle				SNA	NNA	G5

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Vascular Plants	Lamiaceae	*Galeopsis tetrahit*	Common Hemp-nettle				SNA	NNA	GNR
Vascular Plants	Lamiaceae	*Glechoma hederacea*	Ground Ivy				SNA	NNA	GNR
Vascular Plants	Lamiaceae	*Lycopus americanus*	American Water Horehound				S5	NNR	G5
Vascular Plants	Lamiaceae	*Lycopus uniflorus*	Northern Water Horehound				S5	NNR	G5
Vascular Plants	Lamiaceae	*Mentha arvensis*	Wild Mint				SNA		G5
Vascular Plants	Lamiaceae	*Mentha spicata*	Spearmint				SNA	NNA	GNR
Vascular Plants	Lamiaceae	*Mentha x piperita*	Peppermint				SNA	NNA	GNA
Vascular Plants	Lamiaceae	*Mentha canadensis*	Canadian Mint				S5	N5	G5
Vascular Plants	Lamiaceae	*Prunella vulgaris*	Common Self-heal				S5	N5	G5
Vascular Plants	Lamiaceae	*Prunella vulgaris ssp. lanceolata*	Common Self-heal				S5	N5	G5T5
Vascular Plants	Lamiaceae	*Scutellaria galericulata*	Marsh Skullcap				S5	NNR	G5
Vascular Plants	Lamiaceae	*Scutellaria galericulata var. pubescens*	Marsh Skullcap				S5	N5	G5T5
Vascular Plants	Lamiaceae	*Scutellaria lateriflora*	Mad-dog Skullcap				S5	NNR	G5
Vascular Plants	Lamiaceae	*Teucrium canadense*	Canada Germander				S3	N5	G5
Vascular Plants	Limnanthaceae	*Floerkea proserpinacoides*	False Mermaidweed	Not At Risk			S2	NNR	G5
Vascular Plants	Linaceae	*Linum catharticum*	Fairy Flax				SNA	NNA	G5
Vascular Plants	Linaceae	*Radiola linoides*	Tiny Allseed				SNA	NNA	GNR
Vascular Plants	Lentibulariaceae	*Utricularia cornuta*	Horned Bladderwort				S5	NNR	G5
Vascular Plants	Lentibulariaceae	*Utricularia geminiscapa*	Twin-stemmed Bladderwort				S4	NNR	G4G5
Vascular Plants	Lentibulariaceae	*Utricularia intermedia*	Flat-leaved Bladderwort				S5	NNR	G5
Vascular Plants	Lentibulariaceae	*Utricularia vulgaris ssp. macrorhiza*	Greater Bladderwort				S5	N5	G5
Vascular Plants	Lentibulariaceae	*Utricularia minor*	Lesser Bladderwort				S4	NNR	G5
Vascular Plants	Lentibulariaceae	*Utricularia purpurea*	Eastern Purple Bladderwort				S5	NNR	G5
Vascular Plants	Lythraceae	*Decodon verticillatus*	Swamp Loosestrife				S3	NNR	G5
Vascular Plants	Lythraceae	*Lythrum salicaria*	Purple Loosestrife				SNA	NNA	G5
Vascular Plants	Malvaceae	*Malva moschata*	Musk Mallow				SNA	NNA	GNR
Vascular Plants	Myricaceae	*Myrica gale*	Sweet Gale				S5	NNR	G5
Vascular Plants	Myricaceae	*Morella pensylvanica*	Northern Bayberry				S5	NNR	G5
Vascular Plants	Menyanthaceae	*Menyanthes trifoliata*	Bog Buckbean				S5	NNR	G5
Vascular Plants	Menyanthaceae	*Nymphoides cordata*	Little Floatingheart				S5	NNR	G5
Vascular Plants	Molluginaceae	*Mollugo verticillata*	Green Carpetweed				SNA	NNR	G5
Vascular Plants	Monotropaceae	*Hypopitys monotropa*	Pinesap				S4	N5	G5
Vascular Plants	Monotropaceae	*Monotropa uniflora*	Convulsion-Root				S5	N5	G5
Vascular Plants	Nymphaeaceae	*Nuphar variegata*	Variegated Pond-lily				S5	N5	G5T5

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Vascular Plants	Nymphaeaceae	*Nuphar x rubrodisca*	Red-disk Yellow Pond-lily				S4	N4	G5T4T5
Vascular Plants	Nymphaeaceae	*Nymphaea odorata*	Fragrant Water-lily				S5	N5	G5
Vascular Plants	Oleaceae	*Fraxinus americana*	White Ash				S5	NNR	G5
Vascular Plants	Oleaceae	*Fraxinus nigra*	Black Ash	Threatened		Threatened	S1S2	NNR	G5
Vascular Plants	Oleaceae	*Fraxinus pennsylvanica*	Red Ash				S1	N5	G5
Vascular Plants	Onagraceae	*Circaea alpina*	Small Enchanter's Nightshade				S5	NNR	G5
Vascular Plants	Onagraceae	*Circaea canadensis*	Broad-leaved Enchanter's Nightshade				S5	N5	G5
Vascular Plants	Onagraceae	*Circaea x sterilis*	Intermediate Enchanter's Nightshade				SNA	NNA	GNA
Vascular Plants	Onagraceae	*Chamaenerion angustifolium*	Fireweed				S5	N5	G5
Vascular Plants	Onagraceae	*Epilobium ciliatum*	Northern Willowherb				S5	NNR	G5
Vascular Plants	Onagraceae	*Epilobium ciliatum ssp. glandulosum*	Northern Willowherb				S4S5	N5?	G5T5
Vascular Plants	Onagraceae	*Epilobium ciliatum var. ciliatum*	Northern Willowherb				S5	N5	G5T5
Vascular Plants	Onagraceae	*Epilobium hirsutum*	Hairy Willowherb				SNA	NNA	GNR
Vascular Plants	Onagraceae	*Epilobium leptophyllum*	Bog Willowherb				S5	NNR	G5
Vascular Plants	Onagraceae	*Epilobium palustre*	Marsh Willowherb				S5	NNR	G5
Vascular Plants	Onagraceae	*Epilobium parviflorum*	Small-flowered Willowherb				SNA	NE	GNR
Vascular Plants	Onagraceae	*Epilobium strictum*	Downy Willowherb				S3	NNR	G5
Vascular Plants	Onagraceae	*Ludwigia palustris*	Marsh Seedbox				S5	NNR	G5
Vascular Plants	Onagraceae	*Oenothera biennis*	Common Evening Primrose				S5	N5	G5
Vascular Plants	Onagraceae	*Oenothera parviflora*	Small-flowered Evening Primrose				S4S5	N4?	G5
Vascular Plants	Onagraceae	*Oenothera perennis*	Perennial Evening Primrose				S5	N4N5	G5
Vascular Plants	Orobanchaceae	*Epifagus virginiana*	Beechdrops				S4	NNR	G5
Vascular Plants	Oxalidaceae	*Oxalis stricta*	European Wood Sorrel				S5	N5	G5
Vascular Plants	Oxalidaceae	*Oxalis montana*	Common Wood Sorrel				S5	NNR	G5
Vascular Plants	Papaveraceae	*Sanguinaria canadensis*	Bloodroot				S3S4	NNR	G5
Vascular Plants	Polygonaceae	*Persicaria amphibia*	Water Smartweed				S4S5	N5	G5
Vascular Plants	Polygonaceae	*Persicaria amphibia var. stipulacea*	Flanged Smartweed				S4S5	N5	G5T5

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Vascular Plants	Polygonaceae	*Fallopia cilinodis*	Fringed Black Bindweed				S5	N5	G5
Vascular Plants	Polygonaceae	*Reynoutria japonica*	Japanese Knotweed				SNA	NNA	GNR
Vascular Plants	Polygonaceae	*Persicaria hydropiper*	Marshpepper Smartweed				SNA	NNA	GNR
Vascular Plants	Polygonaceae	*Persicaria hydropiperoides*	False Waterpepper				S5	N5	G5
Vascular Plants	Polygonaceae	*Persicaria lapathifolia*	Pale Smartweed				S5	N5	G5
Vascular Plants	Polygonaceae	*Persicaria pensylvanica*	Pennsylvania Smartweed				S3	N5	G5
Vascular Plants	Polygonaceae	*Persicaria maculosa*	Spotted Lady's-thumb				SNA	NNA	G3G5
Vascular Plants	Polygonaceae	*Persicaria punctata*	Dotted Smartweed				S5	N5	G5
Vascular Plants	Polygonaceae	*Reynoutria sachalinensis*	Giant Knotweed				SNA	NNA	GNR
Vascular Plants	Polygonaceae	*Persicaria sagittata*	Arrow-leaved Smartweed				S5	N5	G5
Vascular Plants	Polygonaceae	*Polygonum oxyspermum ssp. raii*	Ray's Knotweed				S2S3	N2N3	G3G5
Vascular Plants	Polygonaceae	*Polygonum aviculare*	Prostrate Knotweed				S5	NNA	GNR
Vascular Plants	Polygonaceae	*Reynoutria x bohemica*	Bohemian Knotweed				SNA	NNA	GNA
Vascular Plants	Polygonaceae	*Rheum rhabarbarum*	Rhubarb				SNA	NNA	GNR
Vascular Plants	Polygonaceae	*Rumex acetosella*	Sheep Sorrel				SNA	NNA	GNR
Vascular Plants	Polygonaceae	*Rumex crispus*	Curled Dock				SNA	NNA	GNR
Vascular Plants	Polygonaceae	*Rumex persicarioides*	Peach-leaved Dock				S2?	N4	G4G5
Vascular Plants	Polygonaceae	*Rumex obtusifolius*	Bitter Dock				SNA	NNA	GNR
Vascular Plants	Polygonaceae	*Rumex britannica*	Greater Water Dock				S5	N5	G5
Vascular Plants	Polygonaceae	*Rumex triangulivalvis*	Triangular-valve Dock				S2	N5	G5T5
Vascular Plants	Polygonaceae	*Rumex acetosa*	Garden Sorrel				SNA	N4N5	G5
Vascular Plants	Scrophulariaceae	*Erythranthe moschata*	Musk Monkeyflower				SNA	N5	G5
Vascular Plants	Polemoniaceae	*Phlox subulata*	Moss Phlox				SNA	N1N3	G5
Vascular Plants	Plantaginaceae	*Plantago lanceolata*	English Plantain				SNA	NNA	G5
Vascular Plants	Plantaginaceae	*Plantago major*	Common Plantain				SNA	NNA	G5
Vascular Plants	Plantaginaceae	*Plantago maritima*	Seaside Plantain				S5	NNR	G5
Vascular Plants	Plantaginaceae	*Plantago rugelii*	Rugel's Plantain				S3	N5	G5
Vascular Plants	Portulacaceae	*Claytonia caroliniana*	Carolina Spring Beauty				S4	NNR	G5
Vascular Plants	Primulaceae	*Lysimachia maritima*	Sea Milkwort				S5	N5	G5
Vascular Plants	Primulaceae	*Lysimachia nummularia*	Creeping Yellow Loosestrife				SNA	NNA	GNR
Vascular Plants	Primulaceae	*Lysimachia punctata*	Spotted Yellow Loosestrife				SNA	NNA	GNR
Vascular Plants	Primulaceae	*Lysimachia terrestris*	Swamp Yellow Loosestrife				S5	N5	G5

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Vascular Plants	Primulaceae	*Lysimachia thyrsiflora*	Tufted Yellow Loosestrife				S4	NNR	G5
Vascular Plants	Primulaceae	*Lysimachia x commixta*	Loosestrife				SNA	NNR	GNA
Vascular Plants	Primulaceae	*Primula laurentiana*	Laurentian Primrose				S3	NNR	G5
Vascular Plants	Primulaceae	*Samolus parviflorus*	Seaside Brookweed				S3	N4	G5T5
Vascular Plants	Primulaceae	*Lysimachia borealis*	Northern Starflower				S5	N5	G5
Vascular Plants	Pyrolaceae	*Chimaphila umbellata*	Common Pipsissewa				S4	N5	G5
Vascular Plants	Pyrolaceae	*Chimaphila umbellata ssp. umbellata*	Common Pipsissewa				S4	N5	G5T5
Vascular Plants	Pyrolaceae	*Moneses uniflora*	One-flowered Wintergreen				S4S5	NNR	G5
Vascular Plants	Pyrolaceae	*Orthilia secunda*	One-sided Wintergreen				S5	NNR	G5
Vascular Plants	Pyrolaceae	*Pyrola americana*	Round-leaved Pyrola				S5	NNR	G5
Vascular Plants	Pyrolaceae	*Pyrola asarifolia*	Pink Pyrola				S3	NNR	G5
Vascular Plants	Pyrolaceae	*Pyrola chlorantha*	Green-flowered Pyrola				S4	N5?	G5
Vascular Plants	Pyrolaceae	*Pyrola elliptica*	Shinleaf				S5	NNR	G5
Vascular Plants	Pyrolaceae	*Pyrola minor*	Lesser Pyrola				S3	NNR	G5
Vascular Plants	Ranunculaceae	*Actaea pachypoda*	White Baneberry				S4	NNR	G5
Vascular Plants	Ranunculaceae	*Actaea rubra*	Red Baneberry				S5	NNR	G5
Vascular Plants	Ranunculaceae	*Actaea x ludovici*	Hybrid Baneberry				SNA	NNR	GNA
Vascular Plants	Ranunculaceae	*Anemone quinquefolia*	Wood Anemone				S2	NNR	G5
Vascular Plants	Ranunculaceae	*Anemone virginiana var. alba*	Virginia Anemone				S1S2	NNR	G5T4T5
Vascular Plants	Ranunculaceae	*Aquilegia vulgaris*	European Columbine				SNA	NNA	GNR
Vascular Plants	Ranunculaceae	*Caltha palustris*	Yellow Marsh Marigold				S2	NNR	G5
Vascular Plants	Ranunculaceae	*Clematis virginiana*	Virginia Clematis				S5	NNR	G5
Vascular Plants	Ranunculaceae	*Coptis trifolia*	Goldthread				S5	N5	G5
Vascular Plants	Ranunculaceae	*Ranunculus abortivus*	Kidney-Leaved Buttercup				S4S5	NNR	G5
Vascular Plants	Ranunculaceae	*Ranunculus acris*	Common Buttercup				SNA	NNA	G5
Vascular Plants	Ranunculaceae	*Halerpestes cymbalaria*	Seaside Buttercup				S5	N5	G5
Vascular Plants	Ranunculaceae	*Ranunculus flammula var. reptans*	Creeping Spearwort				S5	N5	G5T5
Vascular Plants	Ranunculaceae	*Ranunculus gmelinii*	Gmelin's Water Buttercup				S3	NNR	G5
Vascular Plants	Ranunculaceae	*Ranunculus recurvatus*	Hooked Buttercup				S4	NNR	G5
Vascular Plants	Ranunculaceae	*Ranunculus repens*	Creeping Buttercup				SNA	NNA	GNR
Vascular Plants	Ranunculaceae	*Ranunculus trichophyllus*	White Water Buttercup				S4	NNR	G5
Vascular Plants	Ranunculaceae	*Thalictrum pubescens*	Tall Meadow-Rue				S5	NNR	G5

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Vascular Plants	Rhamnaceae	*Endotropis alnifolia*	alder-leaved buckthorn				S3		G5
Vascular Plants	Rosaceae	*Agrimonia gryposepala*	Hooked Agrimony				S3	NNR	G5
Vascular Plants	Rosaceae	*Agrimonia striata*	Woodland Agrimony				S5	NNR	G5
Vascular Plants	Rosaceae	*Amelanchier arborea*	Downy Serviceberry				S4S5	NNR	G5
Vascular Plants	Rosaceae	*Amelanchier bartramiana*	Bartram's Serviceberry				S5	NNR	G5
Vascular Plants	Rosaceae	*Amelanchier fernaldii*	Fernald's Serviceberry				S2S3	NNR	G3?
Vascular Plants	Rosaceae	*Amelanchier laevis*	Smooth Serviceberry				S5	NNR	G5
Vascular Plants	Rosaceae	*Amelanchier x neglecta*	Running Serviceberry				SNA	NNA	GNA
Vascular Plants	Rosaceae	*Amelanchier spicata*	Running Serviceberry				S3	N5	G5
Vascular Plants	Rosaceae	*Aronia arbutifolia*	Red Chokeberry				S4	N4N5	G5
Vascular Plants	Rosaceae	*Aronia melanocarpa*	Black Chokeberry				S5	N5	G5
Vascular Plants	Rosaceae	*Aronia x prunifolia*	Purple Chokeberry				S5	NNA	GNA
Vascular Plants	Rosaceae	*Crataegus monogyna*	English Hawthorn				SNA	NNA	G5
Vascular Plants	Rosaceae	*Crataegus chrysocarpa*	Fireberry Hawthorn				S4S5	NNR	G5
Vascular Plants	Rosaceae	*Filipendula ulmaria*	Queen-of-the-Meadow				SNA	NNA	G5
Vascular Plants	Rosaceae	*Fragaria vesca ssp. americana*	Woodland Strawberry				S3S4	N5	G5T5
Vascular Plants	Rosaceae	*Fragaria virginiana*	Wild Strawberry				S5	NNR	G5
Vascular Plants	Rosaceae	*Geum aleppicum*	Yellow Avens				S5	NNR	G5
Vascular Plants	Rosaceae	*Geum canadense*	White Avens				S4S5	NNR	G5
Vascular Plants	Rosaceae	*Geum laciniatum*	Rough Avens				S5	NNR	G5
Vascular Plants	Rosaceae	*Geum macrophyllum*	Large-Leaved Avens				S5	N5	G5
Vascular Plants	Rosaceae	*Geum rivale*	Water Avens				S5	NNR	G5
Vascular Plants	Rosaceae	*Malus pumila*	Common Apple				SNA	NNA	G5
Vascular Plants	Rosaceae	*Potentilla anglica*	English Cinquefoil				SNA	NNA	G5
Vascular Plants	Rosaceae	*Potentilla argentea*	Silvery Cinquefoil				SNA	NNA	GNR
Vascular Plants	Rosaceae	*Potentilla erecta*	Erect Cinquefoil				SNA	NNA	G5
Vascular Plants	Rosaceae	*Potentilla norvegica*	Rough Cinquefoil				S5	NNR	G5
Vascular Plants	Rosaceae	*Potentilla recta*	Sulphur Cinquefoil				SNA	NNA	GNR
Vascular Plants	Rosaceae	*Potentilla simplex*	Old Field Cinquefoil				S5	N5	G5
Vascular Plants	Rosaceae	*Potentilla anserina*	Common Silverweed				S5	N5	
Vascular Plants	Rosaceae	*Potentilla anserina ssp. pacifica*	Pacific Silverweed				S5	N5	G5T5
Vascular Plants	Rosaceae	*Prunus pensylvanica*	Pin Cherry				S5	NNR	G5
Vascular Plants	Rosaceae	*Prunus virginiana*	Chokecherry				S5	NNR	G5
Vascular Plants	Rosaceae	*Prunus serotina*	Black Cherry				S5	N5	G5
Vascular Plants	Rosaceae	*Rosa carolina*	Carolina Rose				S4S5	N4N5	G5T5

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Vascular Plants	Rosaceae	*Rosa multiflora*	Multiflora Rose				SNA	NNA	GNR
Vascular Plants	Rosaceae	*Rosa nitida*	Shining Rose				S4S5	N4N5	G5
Vascular Plants	Rosaceae	*Rosa rugosa*	Rugosa Rose				SNA	NNA	GNR
Vascular Plants	Rosaceae	*Rosa virginiana*	Virginia Rose				S5	NNR	G5
Vascular Plants	Rosaceae	*Rosa rubiginosa*	Sweetbriar Rose				SNA	NNA	GNR
Vascular Plants	Rosaceae	*Rosa palustris*	Swamp Rose				S4	NNR	G5
Vascular Plants	Rosaceae	*Rubus chamaemorus*	Cloudberry				S4	NNR	G5
Vascular Plants	Rosaceae	*Rubus odoratus*	Purple-flowering Raspberry				SU	N5	G5
Vascular Plants	Rosaceae	*Rubus pubescens*	Dwarf Red Raspberry				S5	NNR	G5
Vascular Plants	Rosaceae	*Rubus allegheniensis*	Alleghaney Blackberry				S5	N5	G5
Vascular Plants	Rosaceae	*Rubus setosus*	Bristly Blackberry				S4	NNR	G5
Vascular Plants	Rosaceae	*Rubus canadensis*	Smooth Blackberry				S5	NNR	G5
Vascular Plants	Rosaceae	*Rubus hispidus*	Bristly Dewberry				S5	NNR	G5
Vascular Plants	Rosaceae	*Rubus idaeus*	Red Raspberry				S5	N5	G5
Vascular Plants	Rosaceae	*Rubus idaeus ssp. strigosus*	Red Raspberry				S5	N5	G5T5
Vascular Plants	Rosaceae	*Sanguisorba canadensis*	Canada Burnet				S4	NNR	G5
Vascular Plants	Rosaceae	*Sorbus americana*	American Mountain Ash				S5	NNR	G5
Vascular Plants	Rosaceae	*Sorbus aucuparia*	European Mountain Ash				SNA	NNA	G5
Vascular Plants	Rosaceae	*Sorbus decora*	Showy Mountain Ash				S4	NNR	G5
Vascular Plants	Rosaceae	*Spiraea alba var. latifolia*	White Meadowsweet				S5	N4N5	G5T5
Vascular Plants	Rosaceae	*Sibbaldia tridentata*	Three-toothed Cinquefoil				S5	N5	G5
Vascular Plants	Rosaceae	*Comarum palustre*	Marsh Cinquefoil				S5	NNR	G5
Vascular Plants	Rosaceae	*Dasiphora fruticosa*	Shrubby Cinquefoil				S4	NNR	G5
Vascular Plants	Rubiaceae	*Galium asprellum*	Rough Bedstraw				S5	NNR	G5
Vascular Plants	Rubiaceae	*Galium kamtschaticum*	Northern Wild Licorice				S3	N3?	G5
Vascular Plants	Rubiaceae	*Galium labradoricum*	Labrador Bedstraw				S2	NNR	G5
Vascular Plants	Rubiaceae	*Galium mollugo*	Smooth Bedstraw				SNA	NNA	GNR
Vascular Plants	Rubiaceae	*Galium palustre*	Common Marsh Bedstraw				S5	NNR	G5
Vascular Plants	Rubiaceae	*Galium tinctorium*	Dyer's Bedstraw				S5	NNR	G5
Vascular Plants	Rubiaceae	*Galium trifidum*	Three-petaled Bedstraw				S5	NNR	G5
Vascular Plants	Rubiaceae	*Galium trifidum ssp. trifidum*	Three-petaled Bedstraw				S5	N5	G5T5

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Vascular Plants	Rubiaceae	*Galium trifidum ssp. halophilum*	Three-petaled Bedstraw				SNR	NNR	G5T3T5
Vascular Plants	Rubiaceae	*Galium triflorum*	Three-flowered Bedstraw				S5	NNR	G5
Vascular Plants	Rubiaceae	*Mitchella repens*	Partridgeberry				S5	NNR	G5
Vascular Plants	Rubiaceae	*Houstonia caerulea*	Azure Bluet				S5	NNR	G5
Vascular Plants	Salicaceae	*Populus alba*	White Poplar				SNA	NNA	G5
Vascular Plants	Salicaceae	*Populus balsamifera*	Balsam Poplar				S4	N5	G5T5
Vascular Plants	Salicaceae	*Populus grandidentata*	Large-toothed Aspen				S5	NNR	G5
Vascular Plants	Salicaceae	*Populus tremuloides*	Trembling Aspen				S5	NNR	G5
Vascular Plants	Salicaceae	*Populus x canescens*	Grey Poplar				SNA	NNA	GNA
Vascular Plants	Salicaceae	*Salix bebbiana*	Bebb's Willow				S5	NNR	G5
Vascular Plants	Salicaceae	*Salix discolor*	Pussy Willow				S5	NNR	G5
Vascular Plants	Salicaceae	*Salix eriocephala*	Cottony Willow				S5	N5	G5
Vascular Plants	Salicaceae	*Salix humilis*	Upland Willow				S5	NNR	G5
Vascular Plants	Salicaceae	*Salix lucida*	Shining Willow				S5	NNR	G5T5
Vascular Plants	Salicaceae	*Salix pedicellaris*	Bog Willow				S2	NNR	G5
Vascular Plants	Salicaceae	*Salix petiolaris*	Meadow Willow				S3S4	N5	G5
Vascular Plants	Salicaceae	*Salix purpurea*	Purple Willow				SNA	NNA	G5
Vascular Plants	Salicaceae	*Salix pyrifolia*	Balsam Willow				S5	NNR	G5
Vascular Plants	Salicaceae	*Salix viminalis*	Basket Willow				SNA	NNA	GNR
Vascular Plants	Salicaceae	*Salix x smithiana*	a Willow				SNA	NNA	GNA
Vascular Plants	Salicaceae	*Salix x fragilis*	Hybrid White Willow				SNA	NNA	GNRQ
Vascular Plants	Santalaceae	*Comandra umbellata*	Bastard's Toadflax				S2	NNR	G5
Vascular Plants	Sarraceniaceae	*Sarracenia purpurea*	Northern Pitcher Plant				S5	N5	G5
Vascular Plants	Saxifragaceae	*Chrysosplenium americanum*	American Golden Saxifrage				S5	NNR	G5
Vascular Plants	Saxifragaceae	*Mitella nuda*	Naked Bishop's-Cap				S4S5	NNR	G5
Vascular Plants	Saxifragaceae	*Parnassia parviflora*	Small-flowered Grass-of-Parnassus				S1S2	N4N5	G5T4
Vascular Plants	Saxifragaceae	*Saxifraga paniculata ssp. laestadii*	Laestadius' Saxifrage				S2	N5?	G5T5?
Vascular Plants	Scrophulariaceae	*Agalinis tenuifolia*	Slender Agalinis				SNA	NNR	G5
Vascular Plants	Scrophulariaceae	*Agalinis purpurea var. parviflora*	Small-flowered Purple False Foxglove				S1	NNR	GNRTNR
Vascular Plants	Scrophulariaceae	*Chelone glabra*	White Turtlehead				S5	NNR	G5
Vascular Plants	Scrophulariaceae	*Digitalis purpurea*	Purple Foxglove				SNA	NNA	GNR
Vascular Plants	Scrophulariaceae	*Euphrasia nemorosa*	Common Eyebright				S5	N5?	G5
Vascular Plants	Scrophulariaceae	*Linaria vulgaris*	Butter-and-Eggs				SNA	NNA	GNR
Vascular Plants	Scrophulariaceae	*Melampyrum lineare*	American Cow Wheat				S5	N5	G5

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Vascular Plants	Scrophulariaceae	*Mimulus ringens*	Square-stemmed Monkeyflower				S4S5	NNR	G5
Vascular Plants	Scrophulariaceae	*Odontites vulgaris*	Red Bartsia				SNA	NNA	GNRTNR
Vascular Plants	Scrophulariaceae	*Rhinanthus minor*	Little Yellow Rattle				SNA	N5	G5
Vascular Plants	Scrophulariaceae	*Scrophularia lanceolata*	Lance-leaved Figwort				S1	N4N5	G5
Vascular Plants	Scrophulariaceae	*Verbascum thapsus*	Common Mullein				SNA	NNA	GNR
Vascular Plants	Scrophulariaceae	*Veronica americana*	American Speedwell				S5	NNR	G5
Vascular Plants	Scrophulariaceae	*Veronica officinalis*	Common Speedwell				SNA	NNR	G5
Vascular Plants	Scrophulariaceae	*Veronica serpyllifolia*	Thyme-Leaved Speedwell				SNA	N5	G5
Vascular Plants	Solanaceae	*Solanum lycopersicum*	Garden Tomato				SNA	NNA	GNR
Vascular Plants	Solanaceae	*Solanum dulcamara*	Bittersweet Nightshade				SNA	NNA	GNR
Vascular Plants	Ulmaceae	*Ulmus americana*	White Elm				S4	NNR	G5
Vascular Plants	Urticaceae	*Urtica dioica*	Stinging Nettle				S4	NNR	G5
Vascular Plants	Valerianaceae	*Valeriana officinalis*	Common Valerian				SNA	NNA	GNR
Vascular Plants	Verbenaceae	*Verbena hastata*	Blue Vervain				S3	NNR	G5
Vascular Plants	Violaceae	*Viola macloskeyi*	Small White Violet				S5	NNR	G5
Vascular Plants	Violaceae	*Viola nephrophylla*	Northern Bog Violet				S2	NNR	G5
Vascular Plants	Violaceae	*Viola cucullata*	Marsh Blue Violet				S5	NNR	G5
Vascular Plants	Violaceae	*Viola renifolia*	Kidney-leaved White Violet				S4	NNR	G5
Vascular Plants	Violaceae	*Viola blanda*	Sweet White Violet				S5	NNR	G5
Vascular Plants	Violaceae	*Viola labradorica*	Labrador Violet				S5	NNR	G5
Vascular Plants	Violaceae	*Viola sororia*	Woolly Blue Violet				S5	NNR	G5
Vascular Plants	Viscaceae	*Arceuthobium pusillum*	Eastern Dwarf Mistletoe				S5	NNR	G5
Vascular Plants	Vitaceae	*Parthenocissus quinquefolia*	Virginia Creeper				SNA	N4N5	G5
Vascular Plants	Cupressaceae	*Juniperus communis*	Common Juniper				S5	N5	G5
Vascular Plants	Cupressaceae	*Juniperus communis var. depressa*	Common Juniper				S5	N5	G5T5
Vascular Plants	Cupressaceae	*Juniperus horizontalis*	Creeping Juniper				S4	N5	G5
Vascular Plants	Cupressaceae	*Thuja occidentalis*	Eastern White Cedar			Vulnerable	S1	N5	G5
Vascular Plants	Pinaceae	*Abies balsamea*	Balsam Fir				S5	N5	G5
Vascular Plants	Pinaceae	*Larix laricina*	Tamarack				S5	N5	G5
Vascular Plants	Pinaceae	*Picea abies*	Norway Spruce				SNA	NNA	G5
Vascular Plants	Pinaceae	*Picea glauca*	White Spruce				S5	N5	G5
Vascular Plants	Pinaceae	*Picea mariana*	Black Spruce				S5	N5	G5
Vascular Plants	Pinaceae	*Picea rubens*	Red Spruce				S5	N5	G5
Vascular Plants	Pinaceae	*Pinus banksiana*	Jack Pine				S4	N5	G5
Vascular Plants	Pinaceae	*Pinus resinosa*	Red Pine				S4S5	N5	G5

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Vascular Plants	Pinaceae	*Pinus strobus*	Eastern White Pine				S5	N5	G5
Vascular Plants	Pinaceae	*Pinus sylvestris*	Scotch Pine				SNA	NNA	GNR
Vascular Plants	Pinaceae	*Tsuga canadensis*	Eastern Hemlock				S4S5	N5	G5
Vascular Plants	Taxaceae	*Taxus canadensis*	Canada Yew				S4S5	N5	G5
Vascular Plants	Acoraceae	*Acorus americanus*	American Sweetflag				S4	N5	G5
Vascular Plants	Alismataceae	*Alisma triviale*	Northern Water Plantain				S5	NNR	G5
Vascular Plants	Alismataceae	*Sagittaria cuneata*	Northern Arrowhead				S5	NNR	G5
Vascular Plants	Alismataceae	*Sagittaria latifolia*	Broad-leaved Arrowhead				S5	NNR	G5
Vascular Plants	Araceae	*Arisaema triphyllum*	Jack-in-the-pulpit				S4S5	NNR	G5
Vascular Plants	Araceae	*Calla palustris*	Wild Calla				S4	NNR	G5
Vascular Plants	Cyperaceae	*Bulbostylis capillaris*	Dense-tufted Hair Sedge				SNA	N3N5	G5
Vascular Plants	Cyperaceae	*Carex aquatilis*	Water Sedge				S4S5	N5	G5
Vascular Plants	Cyperaceae	*Carex arctata*	Black Sedge				S5	N5	G5
Vascular Plants	Cyperaceae	*Carex argyrantha*	Silvery-flowered Sedge				S3S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex atlantica ssp. atlantica*	Atlantic Sedge				S4	NNR	G5T5
Vascular Plants	Cyperaceae	*Carex atlantica ssp. capillacea*	Atlantic Sedge				S4	N2?	G5T5?
Vascular Plants	Cyperaceae	*Carex aurea*	Golden Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex bebbii*	Bebb's Sedge				S2	NNR	G5
Vascular Plants	Cyperaceae	*Carex bromoides*	Bromelike Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex brunnescens*	Brownish Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex brunnescens ssp. sphaerostachya*	Brownish Sedge				S5	NNR	G5T5
Vascular Plants	Cyperaceae	*Carex buxbaumii*	Buxbaum's Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex canescens*	Silvery Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex castanea*	Chestnut Sedge				S2	NNR	G5
Vascular Plants	Cyperaceae	*Carex communis*	Fibrous-Root Sedge				S5	N5	G5
Vascular Plants	Cyperaceae	*Carex conoidea*	Field Sedge				S4?	N5?	G5
Vascular Plants	Cyperaceae	*Carex crawfordii*	Crawford's Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex crinita*	Fringed Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex cryptolepis*	Hidden-scaled Sedge				S3	NNR	G4G5
Vascular Plants	Cyperaceae	*Carex debilis var. rudgei*	White-edged Sedge				S5	NNR	G5T5
Vascular Plants	Cyperaceae	*Carex deflexa*	Northern Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex deweyana*	Dewey's Sedge				S5	N5	G5
Vascular Plants	Cyperaceae	*Carex diandra*	Lesser Panicled Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex disperma*	Two-seeded Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex eburnea*	Bristle-leaved Sedge				S3	NNR	G5

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Vascular Plants	Cyperaceae	*Carex echinata*	Star Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex exilis*	Coastal Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex flava*	Yellow Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex folliculata*	Northern Long Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex gracillima*	Graceful Sedge				S4S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex granularis*	Limestone Meadow Sedge				S1	NNR	G5
Vascular Plants	Cyperaceae	*Carex gynandra*	Nodding Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex gynocrates*	Northern Bog Sedge				S1	NNR	G5
Vascular Plants	Cyperaceae	*Carex haydenii*	Hayden's Sedge				S1	NNR	G5
Vascular Plants	Cyperaceae	*Carex hirta*	Hammer Sedge				SNA	NNA	GNR
Vascular Plants	Cyperaceae	*Carex hirtifolia*	Pubescent Sedge				S2S3	NNR	G5
Vascular Plants	Cyperaceae	*Carex hormathodes*	Marsh Straw Sedge				S4S5	NNR	G4G5
Vascular Plants	Cyperaceae	*Carex hystericina*	Porcupine Sedge				S2	NNR	G5
Vascular Plants	Cyperaceae	*Carex interior*	Inland Sedge				S4S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex intumescens*	Bladder Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex lacustris*	Lake Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex lasiocarpa ssp. americana*	American woolly-fruit sedge				S5		G5T5
Vascular Plants	Cyperaceae	*Carex leptalea*	Bristly-stalked Sedge				S5	N5	G5
Vascular Plants	Cyperaceae	*Carex leptonervia*	Finely-Nerved Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex lurida*	Sallow Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex michauxiana*	Michaux's Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex nigra*	Smooth Black Sedge				S5	N5	G5
Vascular Plants	Cyperaceae	*Carex novae-angliae*	New England Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex oligosperma*	Few-Seeded Sedge				S5	N5	G5
Vascular Plants	Cyperaceae	*Carex paleacea*	Chaffy Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex pallescens*	Pale Sedge				S5	N5	G5
Vascular Plants	Cyperaceae	*Carex pauciflora*	Few-Flowered Sedge				S4S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex pedunculata*	Long-stalked Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex projecta*	Necklace Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex pseudocyperus*	Cyperuslike Sedge				S4S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex radiata*	Eastern Star Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex retrorsa*	Retrorse Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex rosea*	Rosy Sedge				S3	NNR	G5
Vascular Plants	Cyperaceae	*Carex scabrata*	Rough Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex scoparia*	Broom Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex stipata*	Awl-fruited Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex stricta*	Tussock Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex torta*	Twisted Sedge				S5	NNR	G5

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Vascular Plants	Cyperaceae	*Carex tribuloides*	Blunt Broom Sedge				S3	N4N5	G5
Vascular Plants	Cyperaceae	*Carex billingsii*	Billings' Sedge				S4	N4N5	G5T4T5
Vascular Plants	Cyperaceae	*Carex trisperma*	Three-seeded Sedge				S5	NNR	G5T5
Vascular Plants	Cyperaceae	*Carex tuckermanii*	Tuckerman's Sedge				S2	NNR	G5
Vascular Plants	Cyperaceae	*Carex vesicaria*	Inflated Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Carex viridula*	Greenish Sedge				S4	N5	G5
Vascular Plants	Cyperaceae	*Carex viridula ssp. oedocarpa*	Greenish Sedge				SNA	NNR	G5T3T5
Vascular Plants	Cyperaceae	*Carex viridula var. elatior*	Greenish Sedge				S1	NNR	G5T3
Vascular Plants	Cyperaceae	*Carex wiegandii*	Wiegand's Sedge				S3	N3N4	G4G5
Vascular Plants	Cyperaceae	*Carex recta*	Estuary Sedge				S4?	NNR	G4G5
Vascular Plants	Cyperaceae	*Carex magellanica*	Boreal Bog Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex magellanica ssp. irrigua*	Boreal Bog Sedge				S5	N5	G5T5
Vascular Plants	Cyperaceae	*Carex utriculata*	Northern Beaked Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Carex atratiformis*	Scabrous Black Sedge				S2	NNR	G5
Vascular Plants	Cyperaceae	*Carex vulpinoidea*	Fox Sedge				S4	NNR	G5
Vascular Plants	Cyperaceae	*Cladium mariscoides*	Smooth Twigrush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Dulichium arundinaceum*	Three-Way Sedge				S5	NNR	G5
Vascular Plants	Cyperaceae	*Eleocharis acicularis*	Needle Spikerush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Eleocharis elliptica*	Elliptic Spikerush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Eleocharis erythropoda*	Red-stemmed Spikerush				S1	NNR	G5
Vascular Plants	Cyperaceae	*Eleocharis obtusa*	Blunt Spikerush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Eleocharis parvula*	Dwarf Spikerush				S4	N3N5	G5
Vascular Plants	Cyperaceae	*Eleocharis quinqueflora*	Few-flowered Spikerush				S2	NNR	G5
Vascular Plants	Cyperaceae	*Eleocharis tenuis*	Slender Spikerush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Eleocharis uniglumis*	Single-glumed Spikerush				S4S5	NNR	G5?Q
Vascular Plants	Cyperaceae	*Eleocharis palustris*	Common Spikerush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Trichophorum alpinum*	Alpine Clubrush				S4	NNR	G5
Vascular Plants	Cyperaceae	*Eriophorum angustifolium*	Narrow-leaved Cottongrass				S5	N5	G5
Vascular Plants	Cyperaceae	*Eriophorum gracile*	Slender Cottongrass				S2S3	NNR	G5
Vascular Plants	Cyperaceae	*Eriophorum russeolum*	Russet Cottongrass				S3S4	NNR	G5
Vascular Plants	Cyperaceae	*Eriophorum tenellum*	Rough Cottongrass				S4S5	NNR	G5
Vascular Plants	Cyperaceae	*Eriophorum vaginatum ssp. spissum*	Dense Cottongrass				S5	N5	G5T5
Vascular Plants	Cyperaceae	*Eriophorum virginicum*	Tawny Cottongrass				S5	N5	G5

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Vascular Plants	Cyperaceae	*Eriophorum viridicarinatum*	Green-keeled Cottongrass				S4	NNR	G5
Vascular Plants	Cyperaceae	*Rhynchospora alba*	White Beakrush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Rhynchospora capillacea*	Slender Beakrush				S1	NNR	G4G5
Vascular Plants	Cyperaceae	*Rhynchospora fusca*	Brown Beakrush				S4	NNR	G4G5
Vascular Plants	Cyperaceae	*Schoenoplectus acutus*	Hardstem Bulrush				S4	NNR	G5
Vascular Plants	Cyperaceae	*Scirpus atrocinctus*	Black-girdled Bulrush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Trichophorum cespitosum*	Tufted Clubrush				S5	N5	G5
Vascular Plants	Cyperaceae	*Scirpus cyperinus*	Common Woolly Bulrush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Scirpus hattorianus*	Mosquito Bulrush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Bolboschoenus maritimus*	Saltmarsh Bulrush				S4S5	N5	G5
Vascular Plants	Cyperaceae	*Scirpus microcarpus*	Small-fruited Bulrush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Schoenoplectus pungens*	Three-square Bulrush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Bolboschoenus robustus*	Sturdy Bulrush				S1?	N1?	G5
Vascular Plants	Cyperaceae	*Schoenoplectus subterminalis*	Water Bulrush				S5	NNR	G5
Vascular Plants	Cyperaceae	*Schoenoplectus tabernaemontani*	Softstem Bulrush				S5	N5	G5
Vascular Plants	Eriocaulaceae	*Eriocaulon aquaticum*	White Buttons				S5	NNR	G5
Vascular Plants	Iridaceae	*Iris versicolor*	Harlequin Blue Flag				S5	N5	G5
Vascular Plants	Iridaceae	*Sisyrinchium angustifolium*	Narrow-leaved Blue-eyed-grass				S4	N4?	G5
Vascular Plants	Iridaceae	*Sisyrinchium montanum*	Mountain Blue-eyed-grass				S5	N5	G5
Vascular Plants	Juncaginaceae	*Triglochin gaspensis*	Gaspé Arrowgrass				S3S4	N3	G4G5
Vascular Plants	Juncaginaceae	*Triglochin palustris*	Marsh Arrowgrass				S4	NNR	G5
Vascular Plants	Juncaginaceae	*Triglochin maritima*	Seaside Arrowgrass				S5	NNR	G5
Vascular Plants	Juncaceae	*Juncus acuminatus*	Sharp-Fruit Rush				S3S4	NNR	G5
Vascular Plants	Juncaceae	*Juncus articulatus*	Jointed Rush				S5	NNR	G5
Vascular Plants	Juncaceae	*Juncus balticus ssp. littoralis*	Shoreline Rush				S5	N5	G5T5
Vascular Plants	Juncaceae	*Juncus bufonius*	Toad Rush				S5	NNR	G5
Vascular Plants	Juncaceae	*Juncus canadensis*	Canada Rush				S5	N5	G5
Vascular Plants	Juncaceae	*Juncus effusus*	Soft Rush				S5	N5	G5
Vascular Plants	Juncaceae	*Juncus conglomeratus*	compact rush				SNA	N5	G5T5?
Vascular Plants	Juncaceae	*Juncus filiformis*	Thread Rush				S5	NNR	G5
Vascular Plants	Juncaceae	*Juncus gerardii*	Black-Grass Rush				S5	N5	G5
Vascular Plants	Juncaceae	*Juncus militaris*	Bayonet Rush				S5	N4	G5
Vascular Plants	Juncaceae	*Juncus nodosus*	Knotted Rush				S4	NNR	G5
Vascular Plants	Juncaceae	*Juncus pelocarpus*	Brown-Fruited Rush				S5	N5	G5
Vascular Plants	Juncaceae	*Juncus tenuis*	Slender Rush				S5	NNR	G5

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Vascular Plants	Juncaceae	*Oreojuncus trifidus*	Highland Rush				S2S3	N4N5	G5
Vascular Plants	Juncaceae	*Juncus alpinoarticulatus ssp. americanus*	Northern Green Rush				S1S2	N5	G5T5
Vascular Plants	Juncaceae	*Juncus dudleyi*	Dudley's Rush				S3	NNR	G5
Vascular Plants	Juncaceae	*Juncus brevicaudatus*	Narrow-Panicled Rush				S5	N5	G5
Vascular Plants	Juncaceae	*Juncus x fulvescens*	a Hybrid Rush				SNA	NNR	GNA
Vascular Plants	Juncaceae	*Luzula acuminata*	Hairy Woodrush				S5	NNR	G5
Vascular Plants	Juncaceae	*Luzula multiflora*	Common Woodrush				S5	N5	G5
Vascular Plants	Juncaceae	*Luzula luzuloides*	Forest Woodrush				SNA	NNA	G5
Vascular Plants	Juncaceae	*Luzula parviflora*	Small-flowered Woodrush				S3S4	NNR	G5
Vascular Plants	Lemnaceae	*Lemna trisulca*	Star Duckweed				S4	NNR	G5
Vascular Plants	Lemnaceae	*Lemna turionifera*	Turion Duckweed				S5	NNR	G5
Vascular Plants	Lemnaceae	*Spirodela polyrhiza*	great duckweed				S4?		G5
Vascular Plants	Liliaceae	*Asparagus officinalis*	Garden Asparagus				SNA	NNA	G5?
Vascular Plants	Liliaceae	*Clintonia borealis*	Yellow Bluebead Lily				S5	NNR	G5
Vascular Plants	Liliaceae	*Lilium canadense*	Canada Lily				S2	NNR	G5
Vascular Plants	Liliaceae	*Maianthemum canadense*	Wild Lily-of-The-Valley				S5	NNR	G5
Vascular Plants	Liliaceae	*Maianthemum racemosum*	Large False Solomon's Seal				S4S5	NNR	G5
Vascular Plants	Liliaceae	*Maianthemum stellatum*	Starry False Solomon's Seal				S4	NNR	G5
Vascular Plants	Liliaceae	*Maianthemum trifolium*	Three-leaved False Soloman's Seal				S5	NNR	G5
Vascular Plants	Liliaceae	*Medeola virginiana*	Cucumber Root				S5	NNR	G5
Vascular Plants	Liliaceae	*Polygonatum pubescens*	Hairy Soloman's Seal				S4S5	NNR	G5
Vascular Plants	Liliaceae	*Streptopus amplexifolius*	Clasping-leaved Twisted-stalk				S4S5	NNR	G5
Vascular Plants	Liliaceae	*Streptopus lanceolatus*	Rose Twisted-stalk				S5	NNR	G5
Vascular Plants	Liliaceae	*Trillium cernuum*	Nodding Trillium				S4	NNR	G5
Vascular Plants	Liliaceae	*Trillium undulatum*	Painted Trillium				S5	NNR	G5
Vascular Plants	Najadaceae	*Najas flexilis*	Slender Naiad				S5	N5	G5
Vascular Plants	Orchidaceae	*Arethusa bulbosa*	Arethusa				S4	N4?	G5
Vascular Plants	Orchidaceae	*Calopogon tuberosus*	Tuberous Grass Pink				S4	NNR	G5
Vascular Plants	Orchidaceae	*Calopogon tuberosus var. tuberosus*	Tuberous Grass Pink				S4	NNR	G5T5
Vascular Plants	Orchidaceae	*Corallorhiza maculata*	Spotted Coralroot				S4	NNR	G5
Vascular Plants	Orchidaceae	*Corallorhiza maculata var. maculata*	Spotted Coralroot				S4	NNR	G5T5
Vascular Plants	Orchidaceae	*Corallorhiza trifida*	Early Coralroot				S4	NNR	G5

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Vascular Plants	Orchidaceae	*Cypripedium acaule*	Pink Lady's-Slipper				S5	N5	G5
Vascular Plants	Orchidaceae	*Cypripedium parviflorum*	Yellow Lady's-slipper				S2S3	N5	G5
Vascular Plants	Orchidaceae	*Cypripedium parviflorum var. pubescens*	Yellow Lady's-slipper				S2	N5	G5T5
Vascular Plants	Orchidaceae	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	N4N5	G5T4T5
Vascular Plants	Orchidaceae	*Cypripedium reginae*	Showy Lady's-Slipper				S2	NNR	G4G5
Vascular Plants	Orchidaceae	*Epipactis helleborine*	Helleborine				SNA	NNA	GNR
Vascular Plants	Orchidaceae	*Goodyera repens*	Lesser Rattlesnake-plantain				S3	NNR	G5
Vascular Plants	Orchidaceae	*Goodyera tesselata*	Checkered Rattlesnake-Plantain				S4	NNR	G5
Vascular Plants	Orchidaceae	*Liparis loeselii*	Loesel's Twayblade				S3S4	NNR	G5
Vascular Plants	Orchidaceae	*Neottia bifolia*	Southern Twayblade				S3	N3	G4
Vascular Plants	Orchidaceae	*Neottia convallarioides*	Broad-Lip Twayblade				S4	N5	G5
Vascular Plants	Orchidaceae	*Neottia cordata*	Heart-leaved Twayblade				S4	N5	G5
Vascular Plants	Orchidaceae	*Malaxis unifolia*	Green Adder's-Mouth				S4S5	N5	G5
Vascular Plants	Orchidaceae	*Platanthera blephariglottis*	White Fringed Orchid				S4	NNR	G5
Vascular Plants	Orchidaceae	*Platanthera clavellata*	Club Spur Orchid				S5	NNR	G5
Vascular Plants	Orchidaceae	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	NNR	G5
Vascular Plants	Orchidaceae	*Platanthera hookeri*	Hooker's Orchid				S3	NNR	G4
Vascular Plants	Orchidaceae	*Platanthera huronensis*	Fragrant Green Orchid				S1S2	NNR	G5T5?
Vascular Plants	Orchidaceae	*Platanthera lacera*	Ragged Fringed Orchid				S4S5	NNR	G5
Vascular Plants	Orchidaceae	*Platanthera obtusata*	Blunt-leaved Orchid				S4	NNR	G5
Vascular Plants	Orchidaceae	*Platanthera orbiculata*	Small Round-leaved Orchid				S3	NNR	G5
Vascular Plants	Orchidaceae	*Platanthera psycodes*	Small Purple Fringed Orchid				S4	NNR	G5
Vascular Plants	Orchidaceae	*Platanthera x andrewsii*	a hybrid Orchis				SNA	NNR	GNA
Vascular Plants	Orchidaceae	*Platanthera grandiflora x lacera*	Keenan's Hybrid Orchis				SNA		GNA
Vascular Plants	Orchidaceae	*Platanthera aquilonis*	Tall Northern Green Orchid				S4	N5	G5
Vascular Plants	Orchidaceae	*Platanthera dilatata*	White Bog Orchid				S4S5	NNR	G5
Vascular Plants	Orchidaceae	*Pogonia ophioglossoides*	Rose Pogonia				S4	NNR	G5

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Vascular Plants	Orchidaceae	*Spiranthes cernua*	Nodding Ladies'-Tresses				S5	NNR	G5
Vascular Plants	Orchidaceae	*Spiranthes lacera*	Slender Ladies'-tresses				S5	NNR	G5
Vascular Plants	Orchidaceae	*Spiranthes lacera var. lacera*	Slender Ladies'-tresses				S5	NNR	G5T5
Vascular Plants	Orchidaceae	*Spiranthes ochroleuca*	Yellow Ladies'-tresses				S3	N2	G4
Vascular Plants	Orchidaceae	*Spiranthes romanzoffiana*	Hooded Ladies'-Tresses				S4	NNR	G5
Vascular Plants	Poaceae	*Agrostis capillaris*	Colonial Bent Grass				SNA	NNA	GNR
Vascular Plants	Poaceae	*Agrostis gigantea*	Redtop				SNA	NNA	G4G5
Vascular Plants	Poaceae	*Agrostis perennans*	Upland Bent Grass				S4S5	NNR	G5
Vascular Plants	Poaceae	*Agrostis stolonifera*	Creeping Bent Grass				S5	N5	G5
Vascular Plants	Poaceae	*Agrostis scabra*	Rough Bent Grass				S5	NNR	G5
Vascular Plants	Poaceae	*Alopecurus aequalis*	Short-awned Foxtail				S3	NNR	G5
Vascular Plants	Poaceae	*Alopecurus pratensis*	Meadow Foxtail				SNA	NNA	GNR
Vascular Plants	Poaceae	*Ammophila breviligulata*	American Beach Grass				S5	N5	G5
Vascular Plants	Poaceae	*Anthoxanthum odoratum*	Large Sweet Vernal Grass				SNA	NNA	GNR
Vascular Plants	Poaceae	*Brachyelytrum erectum*	Bearded Shorthusk				SNA	NNR	G5
Vascular Plants	Poaceae	*Brachyelytrum aristosum*	Northern Shorthusk				S5	N5	G5
Vascular Plants	Poaceae	*Bromus inermis*	Smooth Brome				SNA	N5	G5T5
Vascular Plants	Poaceae	*Bromus ciliatus*	Fringed Brome				S5	NNR	G5T5
Vascular Plants	Poaceae	*Calamagrostis canadensis*	Bluejoint Reed Grass				S5	N5	G5
Vascular Plants	Poaceae	*Calamagrostis pickeringii*	Pickering's Reed Grass				S4S5	NNR	G5
Vascular Plants	Poaceae	*Calamagrostis stricta ssp. stricta*	Slim-stemmed Reed Grass				S1S2	NNR	G5T5
Vascular Plants	Poaceae	*Cinna latifolia*	Drooping Wood Reed Grass				S5	NNR	G5
Vascular Plants	Poaceae	*Cynosurus cristatus*	Crested Dog's-tail Grass				SNA	NNA	GNR
Vascular Plants	Poaceae	*Dactylis glomerata*	Orchard Grass				SNA	NNA	GNR
Vascular Plants	Poaceae	*Danthonia compressa*	Flattened Oat Grass				S5	NNR	G5
Vascular Plants	Poaceae	*Danthonia spicata*	Poverty Oat Grass				S5	NNR	G5
Vascular Plants	Poaceae	*Avenella flexuosa*	Wavy Hairgrass				S5	N5	G5
Vascular Plants	Poaceae	*Deschampsia cespitosa*	Tufted Hair Grass				S4	N5	G5
Vascular Plants	Poaceae	*Dichanthelium boreale*	Northern Panic Grass				S5	N5	G5
Vascular Plants	Poaceae	*Dichanthelium lanuginosum*	Woolly Panicgrass				S5	N5	G5T5
Vascular Plants	Poaceae	*Digitaria ischaemum*	Smooth Crab Grass				SNA	NNA	GNR

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Vascular Plants	Poaceae	*Distichlis spicata*	Salt Grass				S4	N5	G5
Vascular Plants	Poaceae	*Echinochloa crus-galli*	Large Barnyard Grass				SNA	NNA	GNR
Vascular Plants	Poaceae	*Elymus trachycaulus*	Slender Wild Rye				S4	N3N5	G5
Vascular Plants	Poaceae	*Elymus virginicus*	Virginia Wild Rye				S5	NNR	G5
Vascular Plants	Poaceae	*Festuca filiformis*	Hair Fescue				SNA	NNA	G5
Vascular Plants	Poaceae	*Festuca trachyphylla*	Hard Fescue				SNA	NNA	GNR
Vascular Plants	Poaceae	*Festuca rubra*	Red Fescue				S5	NNR	G5
Vascular Plants	Poaceae	*Festuca rubra ssp. fallax*	Flat-leaved Red Fescue				SNA	NNA	GNR
Vascular Plants	Poaceae	*Glyceria borealis*	Northern Manna Grass				S5	NNR	G5
Vascular Plants	Poaceae	*Glyceria canadensis*	Canada Manna Grass				S5	N4N5	G5
Vascular Plants	Poaceae	*Glyceria canadensis var. laxa*	Limp Mannagrass				S4?	NH	G5
Vascular Plants	Poaceae	*Glyceria fluitans*	Water Manna Grass				SNA	NNA	GNR
Vascular Plants	Poaceae	*Glyceria grandis*	Common Tall Manna Grass				S4S5	NNR	G5
Vascular Plants	Poaceae	*Glyceria melicaria*	Slender Manna Grass				S4	NNR	G5
Vascular Plants	Poaceae	*Glyceria striata*	Fowl Manna Grass				S5	NNR	G5
Vascular Plants	Poaceae	*Anthoxanthum nitens*	vanilla sweetgrass				S4	N5	G5
Vascular Plants	Poaceae	*Leersia oryzoides*	Rice Cut Grass				S5	NNR	G5
Vascular Plants	Poaceae	*Lolium perenne*	Perennial Rye Grass				SNA	NNA	GNRTNR
Vascular Plants	Poaceae	*Lolium arundinaceum*	Tall Fescue				SNA	NNA	GNR
Vascular Plants	Poaceae	*Lolium pratense*	Meadow Fescue				SNA	NNA	G5
Vascular Plants	Poaceae	*Milium effusum var. cisatlanticum*	Tall Millet Grass				S4	NNR	G5T5
Vascular Plants	Poaceae	*Muhlenbergia glomerata*	Spiked Muhly				S4	N5	G5
Vascular Plants	Poaceae	*Muhlenbergia mexicana*	Mexican Muhly				S4	NNR	G5
Vascular Plants	Poaceae	*Muhlenbergia uniflora*	Bog Muhly				S5	NNR	G5
Vascular Plants	Poaceae	*Oryzopsis asperifolia*	White-grained Mountain Rice				S5	NNR	G5
Vascular Plants	Poaceae	*Panicum dichotomiflorum*	Fall Panic Grass				S5	NNR	G5
Vascular Plants	Poaceae	*Panicum dichotomiflorum ssp. dichotomiflorum*	Fall Panicgrass				S5	N5	G5T5
Vascular Plants	Poaceae	*Panicum philadelphicum*	Philadelphia Panicgrass				S3S4	N4N5	
Vascular Plants	Poaceae	*Panicum capillare*	Common Witch Grass				SNA	N5	G5
Vascular Plants	Poaceae	*Phalaris arundinacea*	Reed Canary Grass				S5	N5	G5
Vascular Plants	Poaceae	*Phleum pratense*	Common Timothy				SNA	NNA	GNR
Vascular Plants	Poaceae	*Poa alsodes*	Grove Blue Grass				S4	N4?	G4G5

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Vascular Plants	Poaceae	*Poa annua*	Annual Blue Grass				SNA	NNA	GNR
Vascular Plants	Poaceae	*Poa compressa*	Canada Blue Grass				SNA	NNR	GNR
Vascular Plants	Poaceae	*Poa glauca*	Glaucous Blue Grass				S2S3	NNR	G5
Vascular Plants	Poaceae	*Poa palustris*	Fowl Blue Grass				S5	N5	G5
Vascular Plants	Poaceae	*Poa pratensis*	Kentucky Blue Grass				S5	N5	G5
Vascular Plants	Poaceae	*Poa pratensis ssp. pratensis*	Kentucky Blue Grass				S5	N5	G5T5
Vascular Plants	Poaceae	*Poa saltuensis*	Weak Blue Grass				S5	N4?	G5
Vascular Plants	Poaceae	*Poa trivialis*	Rough Blue Grass				SNA	NNA	GNR
Vascular Plants	Poaceae	*Puccinellia maritima*	Seaside Alkali Grass				S4S5	NNA	GNR
Vascular Plants	Poaceae	*Puccinellia distans*	Spreading Alkali Grass				SNA	NNR	G5
Vascular Plants	Poaceae	*Schizachne purpurascens*	Purple Oat Grass				S4	NNR	G5
Vascular Plants	Poaceae	*Sporobolus alterniflorus*	smooth cordgrass				S5		G5
Vascular Plants	Poaceae	*Sporobolus pumilus*	Saltmeadow Cordgrass				S5	N5	G5
Vascular Plants	Poaceae	*Sporobolus michauxianus*	Prairie Cordgrass				S5	N5	G5
Vascular Plants	Poaceae	*Sphenopholis intermedia*	Slender Wedge Grass				S4	NNR	G5
Vascular Plants	Poaceae	*Sporobolus vaginiflorus*	Sheathed Dropseed				SNA	N4N5	G5
Vascular Plants	Poaceae	*Torreyochloa pallida var. fernaldii*	Pale False Manna Grass				S4S5	NNR	G5T4Q
Vascular Plants	Poaceae	*Trisetum spicatum*	Narrow False Oats				S3S4	NNR	G5
Vascular Plants	Poaceae	*Leymus mollis*	Sea Lyme Grass				S5	NNR	G5
Vascular Plants	Poaceae	*Elymus repens*	Quack Grass				SNA	NNA	GNR
Vascular Plants	Poaceae	*Thinopyrum pycnanthum*	Tick Quack Grass				SNA	NNA	GNR
Vascular Plants	Potamogetonaceae	*Potamogeton alpinus*	Alpine Pondweed				S4	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton amplifolius*	Large-leaved Pondweed				S4	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton epihydrus*	Ribbon-leaved Pondweed				S5	NNR	G5
Vascular Plants	Potamogetonaceae	*Stuckenia filiformis*	Thread-leaved Pondweed				S2S3	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton foliosus ssp. foliosus*	Leafy Pondweed				S4S5	NNR	G5T5
Vascular Plants	Potamogetonaceae	*Potamogeton gramineus*	Variable-leaved Pondweed				S5	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton natans*	Floating-leaved Pondweed				S5	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton oakesianus*	Oakes' Pondweed				S4S5	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton obtusifolius*	Blunt-leaved Pondweed				S3	NNR	G5

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Vascular Plants	Potamogetonaceae	*Stuckenia pectinata*	Sago Pondweed				S4S5	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton perfoliatus*	Clasping-leaved Pondweed				S5	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton praelongus*	White-stemmed Pondweed				S3	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton pusillus*	Small Pondweed				S5	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton berchtoldii ssp. berchtoldii*	narrow-leaved small pondweed				S4?		G5T5
Vascular Plants	Potamogetonaceae	*Potamogeton richardsonii*	Richardson's Pondweed				S2	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton spirillus*	Spiral Pondweed				S5	NNR	G5
Vascular Plants	Potamogetonaceae	*Potamogeton x nitens*	a Hybrid Pondweed				SNA	NNR	GNA
Vascular Plants	Ruppiaceae	*Ruppia maritima*	Sea Ditchgrass				S5	N3N5	G5
Vascular Plants	Scheuchzeriaceae	*Scheuchzeria palustris*	Marsh Scheuchzeria				S5	NNR	G5
Vascular Plants	Sparganiaceae	*Sparganium americanum*	American Burreed				S5	NNR	G5
Vascular Plants	Sparganiaceae	*Sparganium androcladum*	Branching Bur-Reed				S1	N3	G4G5
Vascular Plants	Sparganiaceae	*Sparganium eurycarpum*	Broad-fruited Burreed				S4	NNR	G5
Vascular Plants	Sparganiaceae	*Sparganium natans*	Small Burreed				S3	NNR	G5
Vascular Plants	Sparganiaceae	*Sparganium emersum*	Green-fruited Burreed				S5	N5	G5
Vascular Plants	Sparganiaceae	*Sparganium angustifolium*	Narrow-leaved Burreed				S5	NNR	G5
Vascular Plants	Typhaceae	*Typha angustifolia*	Narrow-Leaved Cattail				S5	N5	G5
Vascular Plants	Typhaceae	*Typha latifolia*	Broad-leaved Cattail				S5	N5	G5
Vascular Plants	Typhaceae	*Typha x glauca*	Blue Cattail				SNA	NNR	GNA
Vascular Plants	Xyridaceae	*Xyris montana*	Northern Yellow-Eyed-Grass				S4	NNR	G5
Vascular Plants	Zannichelliaceae	*Zannichellia palustris*	Horned Pondweed				S4	NNR	G5
Vascular Plants	Zosteraceae	*Zostera marina*	Common Eelgrass				S5	NNR	G5
Vascular Plants	Pteridaceae	*Cryptogramma stelleri*	Steller's Rockbrake				S1S2	NNR	G5
Vascular Plants	Aspleniaceae	*Asplenium trichomanes*	Maidenhair Spleenwort				S3	NNR	G5
Vascular Plants	Aspleniaceae	*Asplenium viride*	Green Spleenwort				S3	N5	G5
Vascular Plants	Dennstaedtiaceae	*Dennstaedtia punctilobula*	Eastern Hay-Scented Fern				S5	NNR	G5
Vascular Plants	Dennstaedtiaceae	*Pteridium aquilinum*	Bracken Fern				S5	N5	G5
Vascular Plants	Dennstaedtiaceae	*Pteridium aquilinum var. latiusculum*	Bracken Fern				S5	N5	G5T5
Vascular Plants	Dryopteridaceae	*Athyrium filix-femina*	Common Lady Fern				S5	NNR	G5
Vascular Plants	Dryopteridaceae	*Athyrium filix-femina var. angustum*	Northeastern Lady Fern				S5	N5	G5T5
Vascular Plants	Dryopteridaceae	*Cystopteris bulbifera*	Bulblet Bladder Fern				S3S4	N5	G5

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Vascular Plants	Dryopteridaceae	*Cystopteris fragilis*	Fragile Fern				S4	NNR	G5
Vascular Plants	Dryopteridaceae	*Cystopteris laurentiana*	Laurentian Bladder Fern				S2	N3?	G3
Vascular Plants	Dryopteridaceae	*Cystopteris tenuis*	A Bladderfern				S4	N5	G5
Vascular Plants	Dryopteridaceae	*Deparia acrostichoides*	Silvery Glade Fern				S4	NNR	G5
Vascular Plants	Dryopteridaceae	*Dryopteris campyloptera*	Mountain Wood Fern				S5	NNR	G5
Vascular Plants	Dryopteridaceae	*Dryopteris carthusiana*	Spinulose Wood Fern				S5	NNR	G5
Vascular Plants	Dryopteridaceae	*Dryopteris cristata*	Crested Wood Fern				S5	NNR	G5
Vascular Plants	Dryopteridaceae	*Dryopteris filix-mas*	Male Fern				S4	N4N5	G5
Vascular Plants	Dryopteridaceae	*Dryopteris filix-mas ssp. brittonii*	Britton's Male Fern				S4	N4	G5T4?
Vascular Plants	Dryopteridaceae	*Dryopteris intermedia*	Evergreen Wood Fern				S5	NNR	G5
Vascular Plants	Dryopteridaceae	*Dryopteris marginalis*	Marginal Wood Fern				S5	NNR	G5
Vascular Plants	Dryopteridaceae	*Dryopteris x boottii*	a Hybrid Wood-fern				SNA	NNR	GNA
Vascular Plants	Dryopteridaceae	*Dryopteris x triploidea*	a Hybrid Wood-fern				SNA	NNR	GNA
Vascular Plants	Dryopteridaceae	*Dryopteris x uliginosa*	Bog Wood Fern				SNA	NNA	GNA
Vascular Plants	Dryopteridaceae	*Gymnocarpium dryopteris*	Common Oak Fern				S5	N5	G5
Vascular Plants	Dryopteridaceae	*Matteuccia struthiopteris*	Ostrich Fern				S5	N5	G5
Vascular Plants	Dryopteridaceae	*Matteuccia struthiopteris var. pensylvanica*	Ostrich Fern				S5	N5	G5T5
Vascular Plants	Dryopteridaceae	*Onoclea sensibilis*	Sensitive Fern				S5	NNR	G5
Vascular Plants	Dryopteridaceae	*Polystichum acrostichoides*	Christmas Fern				S5	NNR	G5
Vascular Plants	Dryopteridaceae	*Polystichum braunii*	Braun's Holly Fern				S4	NNR	G5
Vascular Plants	Dryopteridaceae	*Polystichum lonchitis*	Northern Holly Fern				S2	NNR	G5
Vascular Plants	Dryopteridaceae	*Polystichum x potteri*	Northern Holly-Fern				SNA	NNR	GNA
Vascular Plants	Dryopteridaceae	*Woodsia glabella*	Smooth Cliff Fern				S2	NNR	G5
Vascular Plants	Dryopteridaceae	*Woodsia ilvensis*	Rusty Cliff Fern				S4	NNR	G5
Vascular Plants	Dryopteridaceae	*Dryopteris campyloptera x intermedia*	a hybrid wood fern				SNA		
Vascular Plants	Equisetaceae	*Equisetum arvense*	Field Horsetail				S5	NNR	G5
Vascular Plants	Equisetaceae	*Equisetum fluviatile*	Water Horsetail				S5	NNR	G5
Vascular Plants	Equisetaceae	*Equisetum hyemale*	Common Scouring-rush				S3S4	NNR	G5
Vascular Plants	Equisetaceae	*Equisetum hyemale ssp. affine*	Common Scouring-rush				S3S4		G5T5
Vascular Plants	Equisetaceae	*Equisetum pratense*	Meadow Horsetail				S3	NNR	G5
Vascular Plants	Equisetaceae	*Equisetum scirpoides*	Dwarf Scouring-Rush				S3S4	NNR	G5
Vascular Plants	Equisetaceae	*Equisetum sylvaticum*	Woodland Horsetail				S5	NNR	G5

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Vascular Plants	Equisetaceae	*Equisetum variegatum*	Variegated Horsetail				S3	NNR	G5
Vascular Plants	Isoetaceae	*Isoetes echinospora*	Spiny-Spored Quillwort				S5	N5	G5
Vascular Plants	Isoetaceae	*Isoetes tuckermanii ssp. tuckermanii*	Tuckerman's Quillwort				S4S5	N4N5	G4G5
Vascular Plants	Isoetaceae	*Isoetes lacustris*	Lake Quillwort				S4	NNR	G5
Vascular Plants	Isoetaceae	*Isoetes x harveyi*	a Hybrid Quillwort				SNA	NNR	GNA
Vascular Plants	Lycopodiaceae	*Lycopodium annotinum*	Stiff Clubmoss				S5	N5	G5
Vascular Plants	Lycopodiaceae	*Lycopodium clavatum*	Running Clubmoss				S5	N5	G5
Vascular Plants	Lycopodiaceae	*Diphasiastrum complanatum*	Northern Ground-cedar				S3S4	N5	G5
Vascular Plants	Lycopodiaceae	*Dendrolycopodium dendroideum*	Round-branched Tree-clubmoss				S5	N5	G5
Vascular Plants	Lycopodiaceae	*Diphasiastrum digitatum*	Southern Ground-cedar				S5	N5	G5
Vascular Plants	Lycopodiaceae	*Dendrolycopodium obscurum*	Flat-branched Tree-clubmoss				S4S5	N5	G5
Vascular Plants	Lycopodiaceae	*Diphasiastrum x sabinifolium*	Savin-leaved Ground-cedar				S3?	NNA	G4
Vascular Plants	Lycopodiaceae	*Diphasiastrum sitchense*	Sitka Ground-cedar				S3	N5	G5
Vascular Plants	Lycopodiaceae	*Diphasiastrum tristachyum*	Blue Ground-cedar				S4	N5	G5
Vascular Plants	Lycopodiaceae	*Dendrolycopodium hickeyi*	Hickey's Tree-clubmoss				S4	N5	G5
Vascular Plants	Lycopodiaceae	*Lycopodium lagopus*	One-cone clubmoss				S4	N5	G5
Vascular Plants	Lycopodiaceae	*Huperzia lucidula*	Shining Firmoss				S5	NNR	G5
Vascular Plants	Lycopodiaceae	*Lycopodiella appressa*	Southern Bog Clubmoss				S4	NNR	G5
Vascular Plants	Lycopodiaceae	*Lycopodiella inundata*	Northern Bog Clubmoss				S5	NNR	G5
Vascular Plants	Ophioglossaceae	*Sceptridium dissectum*	Dissected Moonwort				S3	N5	G5
Vascular Plants	Ophioglossaceae	*Botrychium lanceolatum ssp. angustisegmentum*	Narrow Triangle Moonwort				S2S3	N3N4	G5T4
Vascular Plants	Ophioglossaceae	*Sceptridium multifidum*	Leathery Moonwort				S4	N5	G5
Vascular Plants	Ophioglossaceae	*Botrypus virginianus*	Rattlesnake Fern				S4	N5	G5
Vascular Plants	Ophioglossaceae	*Ophioglossum pusillum*	Northern Adder's-tongue				S2S3	NNR	G5
Vascular Plants	Osmundaceae	*Osmundastrum cinnamomeum*	Cinnamon Fern				S5	N5	G5
Vascular Plants	Osmundaceae	*Claytosmunda claytoniana*	Interrupted Fern				S5	NNR	G5
Vascular Plants	Osmundaceae	*Osmunda regalis var. spectabilis*	Royal Fern				S5	NNR	G5T5
Vascular Plants	Polypodiaceae	*Polypodium virginianum*	Rock Polypody				S5	NNR	G5
Vascular Plants	Polypodiaceae	*Polypodium appalachianum*	Appalachian Polypody				S3	NNR	G4G5

Brs d'Or Lake Biosphere
Full List of Species (2020)

Table 1: Full list of species documented in the BLBR (Sources: ACCDC, 2020; OBIS, 2020; iNaturalist, 2020)

Higher Taxon	Family	Scientific Name	Common Name	COSEWIC Assessment	SARA Listing	NSESA Listing	Provincial Rank	National Rank	Global Rank
Vascular Plants	Schizaeaceae	*Schizaea pusilla*	Little Curlygrass Fern				S3S4	N3	G3G4
Vascular Plants	Selaginellaceae	*Selaginella selaginoides*	Low Spikemoss				S1S2	NNR	G5
Vascular Plants	Thelypteridaceae	*Phegopteris connectilis*	Northern Beech Fern				S5	NNR	G5
Vascular Plants	Thelypteridaceae	*Parathelypteris noveboracensis*	New York Fern				S5	NNR	G5
Vascular Plants	Thelypteridaceae	*Thelypteris palustris var. pubescens*	Eastern Marsh Fern				S5	N5	G5T5
Charophyta	Zygnemataceae	*Mougeotia*							
Chlorophyta	Bolbocoleonaceae	*Bolbocoleon piliferum*							
Chlorophyta	Bryopsidaceae	*Bryopsis hypnoides*							
Chlorophyta	Cladophoraceae	*Chaetomorpha aerea*							
Chlorophyta	Cladophoraceae	*Chaetomorpha linum*							
Chlorophyta	Cladophoraceae	*Chaetomorpha melagonium*							
Chlorophyta	Cladophoraceae	*Cladophora*							
Chlorophyta	Cladophoraceae	*Cladophora rupestris*							
Chlorophyta	Cladophoraceae	*Cladophora sericea*							
Chlorophyta	Gayraliaceae	*Gayralia oxysperma*							
Chlorophyta	Prasiolaceae	*Stichococcus marinus*							
Chlorophyta	Ulvaceae	*Ulva clathrata*							
Chlorophyta	Ulvaceae	*Ulva compressa*							
Chlorophyta	Ulvaceae	*Ulva flexuosa subsp. paradoxa*							
Chlorophyta	Ulvaceae	*Ulva intestinalis*							
Chlorophyta	Ulvaceae	*Ulva linza*							
Chlorophyta	Ulvaceae	*Ulva prolifera*							
Chlorophyta	Ulvellaceae	*Ulvella cladophorae*							
Chlorophyta	Ulvellaceae	*Ulvella scutata*							
Rhodophyta	Acrochaetiaceae	*Acrochaetium*							
Rhodophyta	Acrochaetiaceae	*Acrochaetium collopodum*							
Rhodophyta	Ahnfeltiaceae	*Ahnfeltia plicata*							
Rhodophyta	Bangiaceae	*Porphyra umbilicalis*							
Rhodophyta	Bonnemaisoniaceae	*Bonnemaisonia hamifera*							
Rhodophyta	Callithamniaceae	*Aglaothamnion tenuissimum*							
Rhodophyta	Callithamniaceae	*Callithamnion*							
Rhodophyta	Ceramiaceae	*Ceramium arborescens*							
Rhodophyta	Ceramiaceae	*Ceramium cimbricum*							
Rhodophyta	Ceramiaceae	*Scagelia americana*							
Rhodophyta	Colaconemataceae	*Colaconema dasyae*							
Rhodophyta	Cystocloniaceae	*Cystoclonium purpureum*							
Rhodophyta	Dasyaceae	*Dasya baillouviana*							
Rhodophyta	Erythrotrichiaceae	*Erythrotrichia carnea*							

Brs d'Or Lake Biosphere
Full List of Species (2020)

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Higher Taxon	Family	Scientific Name	Common Name	COSEWIC Assessment	SARA Listing	NSESA Listing	Provincial Rank	National Rank	Global Rank
Rhodophyta	Gigartinaceae	*Chondrus crispus*							
Rhodophyta	Gracilariaceae	*Gracilaria foliifera*							
Rhodophyta	Hildenbrandiaceae	*Hildenbrandia rubra*							
Rhodophyta	Meiodiscaceae	*Meiodiscus spetsbergensis*							
Rhodophyta	Nemaliaceae	*Nemalion elminthoides*							
Rhodophyta	Phyllophoraceae	*Coccotylus brodiei*							
Rhodophyta	Phyllophoraceae	*Phyllophora pseudoceranoÃ¯des*							
Rhodophyta	Polyidaceae	*Polyides rotunda*							
Rhodophyta	Rhodomelaceae	*Melanothamnus harveyi*							
Rhodophyta	Rhodomelaceae	*Polysiphonia stricta*							
Rhodophyta	Rhodomelaceae	*Polysiphonia subtilissima*							
Rhodophyta	Rhodomelaceae	*Rhodomela confervoides*							
Rhodophyta	Rhodomelaceae	*Vertebrata fucoides*							
Rhodophyta	Stylonemataceae	*Stylonema alsidii*							
Rhodophyta		*Corallinales*							
Tracheophyta	Zosteraceae	*Zostera subg. Zostera marina*							
Cyanobacteria	Merismopediaceae	*Aphanocapsa marina*							
Cyanobacteria	Oscillatoriaceae	*Lyngbya*							
Cyanobacteria	Rivulariaceae	*Calothrix confervicola*							
Cyanobacteria	Rivulariaceae	*Isactis plana*							
Cyanobacteria	Rivulariaceae	*Rivularia atra*							
Cyanobacteria	Spirulinaceae	*Spirulina subsalsa*							
Foraminifera	Ammodiscidae	*Arenoturrispirillina catinus*							
Foraminifera	Ammodiscidae	*Glomospira gordialis*							
Foraminifera	Ammodiscidae	*Turritellella shoneana*							
Foraminifera	Ammoniidae	*Ammonia beccarii*							
Foraminifera	Asterigerinatidae	*Eoeponidella pulchella*							
Foraminifera	Cibicididae	*Cibicidoides lobatulus*							
Foraminifera	Crithioninidae	*Crithionina pisum*							
Foraminifera	Ellipsolagenidae	*Favulina melo*							
Foraminifera	Ellipsolagenidae	*Oolina borealis*							
Foraminifera	Elphidiidae	*Cribroelphidium incertum*							
Foraminifera	Elphidiidae	*Cribroelphidium subarcticum*							
Foraminifera	Elphidiidae	*Elphidium bartletti*							
Foraminifera	Elphidiidae	*Elphidium margaritaceum*							
Foraminifera	Glabratellidae	*Glabratella wrightii*							
Foraminifera	Hauerinidae	*Miliolinella subrotunda*							
Foraminifera	Hauerinidae	*Pyrgo subsphaerica*							
Foraminifera	Hauerinidae	*Quinqueloculina seminula*							
Foraminifera	Hauerinidae	*Quinqueloculina stalkeri*							
Foraminifera	Haynesinidae	*Haynesina orbicularis*							

Brs d'Or Lake Biosphere
Full List of Species (2020)

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Higher Taxon	Family	Scientific Name	Common Name	COSEWIC Assessment	SARA Listing	NSESA Listing	Provincial Rank	National Rank	Global Rank
Foraminifera	Hormosinidae	*Cuneata arctica*							
Foraminifera	Hormosinidae	*Pseudonodosinella nodulosa*							
Foraminifera	Lituolidae	*Ammotium cassis*							
Foraminifera	Lituolidae	*Ammotium morenoi*							
Foraminifera	Miliamminidae	*Miliammina fusca*							
Foraminifera	Patellinidae	*Patellina corrugata*							
Foraminifera	Polymorphinidae	*Pseudopolymorphina novangliae*							
Foraminifera	Polymorphinidae	*Sigmomorphina undulosa*							
Foraminifera	Prolixoplectidae	*Eggerelloides advenus*							
Foraminifera	Reophacidae	*Reophax curtus*							
Foraminifera	Reophacidae	*Reophax pilulifer*							
Foraminifera	Rosalinidae	*Rosalina columbiensis*							
Foraminifera	Saccamminidae	*Lagenammina atlantica*							
Foraminifera	Saccamminidae	*Saccammina lagenaria*							
Foraminifera	Saccamminidae	*Saccammina sphaerica*							
Foraminifera	Textulariidae	*Textularia torquata*							
Foraminifera	Trichohyalidae	*Buccella frigida*							
Foraminifera	Trochamminidae	*Entzia macrescens*							
Foraminifera	Trochamminidae	*Trochammina lobata*							
Foraminifera	Trochamminidae	*Trochammina squamata*							
Ochrophyta	Acinetosporaceae	*Hincksia*							
Ochrophyta	Chordaceae	*Chorda filum*							
Ochrophyta	Chordariaceae	*Chordaria flagelliformis*							
Ochrophyta	Chordariaceae	*Dictyosiphon foeniculaceus*							
Ochrophyta	Chordariaceae	*Elachista fucicola*							
Ochrophyta	Chordariaceae	*Hummia onusta*							
Ochrophyta	Chordariaceae	*Leathesia marina*							
Ochrophyta	Chordariaceae	*Litosiphon laminariae*							
Ochrophyta	Chordariaceae	*Myriotrichia clavaeformis*							
Ochrophyta	Chordariaceae	*Punctaria plantaginea*							
Ochrophyta	Chordariaceae	*Punctaria tenuissima*							
Ochrophyta	Chordariaceae	*Sphaerotrichia divaricata*							
Ochrophyta	Chordariaceae	*Stilophora tenella*							
Ochrophyta	Desmarestiaceae	*Desmarestia aculeata*							
Ochrophyta	Ectocarpaceae	*Ectocarpus*							
Ochrophyta	Ectocarpaceae	*Ectocarpus siliculosus*							
Ochrophyta	Ectocarpaceae	*Ectocarpus siliculosus var. hiemalis*							
Ochrophyta	Ectocarpaceae	*Phaeostroma pustulosum*							
Ochrophyta	Fucaceae	*Ascophyllum nodosum*							
Ochrophyta	Fucaceae	*Fucus*							

Brs d'Or Lake Biosphere
Full List of Species (2020)

Table 1: Full list of species documented in the BLBR (Sources: ACCDC, 2020; OBIS, 2020; iNaturalist, 2020)

Higher Taxon	Family	Scientific Name	Common Name	COSEWIC Assessment	SARA Listing	NSESA Listing	Provincial Rank	National Rank	Global Rank
Ochrophyta	Fucaceae	*Fucus distichus subsp. evanescens*							
Ochrophyta	Fucaceae	*Fucus serratus*							
Ochrophyta	Fucaceae	*Fucus vesiculosus*							
Ochrophyta	Laminariaceae	*Saccharina latissima*							
Ochrophyta	Ralfsiaceae	*Petroderma maculiforme*							
Ochrophyta	Scytosiphonaceae	*Scytosiphon lomentaria*							
Ochrophyta	Sphacelariaceae	*Chaetopteris plumosa*							
Ochrophyta	Sphacelariaceae	*Sphacelaria cirrosa*							

Atlantic Canada Conservation Data Centre

PO Box 6416, Sackville NB, E4L 1G6 www.accdc.com

Assembling and providing knowledge about species and ecological communities of conservation concern in Atlantic Canada, and undertaking fieldwork in support of decision-making, research, and education

Eileen Crosby, Chair
Bras d'Or Lake Biosphere Reserve Association (BLBRA)
PO Box 404, East Bay Main PO
East Bay, NS B1J 2E2

November 13, 2020

Re: Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review

To Eileen Crosby,

This letter is to acknowledge our past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We understand that our Biosphere is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. For the past decade we have contributed to efforts of the Bras d'Or Lake Biosphere Reserve Association as a partner in the Biosphere, helping to implement good practices relative to biodiversity conservation and to support sustainable economic development.

Our contribution is through research and data management on the biodiversity of the Biosphere that is made available to land managers, government agencies and those pursuing economic development activities. The knowledge and data that we provide enables the effects of human activities on ecologically significant species and places to be avoided or mitigated.

Specifically, we maintained a database of all wild species of vertebrates, vascular plants, bryophytes, lichens and many groups of invertebrates and fungi that occur within Nova Scotia and potentially within the Biosphere Reserve. The conservation status of each species is scientifically assessed by our organization in cooperation with regional experts. For those species considered to be of conservation concern, we maintain a geographically-linked database of known sites of occurrence and we distribute information from that database in response to data requests from developers, protected area managers, Species at Risk biologists and many others. Additionally, we conduct field research to further the understanding of rare species and significant areas within the Biosphere. Over the past decade, we have discovered and databased many new species at risk and provincially rare species within the Biosphere.

We intend to continue all these activities over the coming decade, further expanding the knowledge of the ecological significance of the Bras d'Or Lake Biosphere Reserve and enabling protection of many of its most important places.

On behalf of the Atlantic Canada Conservation Data Centre, I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,



Sean Blaney

Executive Director & Senior Scientist
Atlantic Canada Conservation Data Centre

Organization Name: Atlantic Canada Conservation Data Centre

Contact Name: Sean Blaney, Executive Director & Senior Scientist

Email: sean.blaney@accdc.ca

Website Page: www.accdc.com

Facebook Page: https://www.facebook.com/AtlanticCanadaCDC/

The Atlantic Canada Conservation Data Centre's activities in the Bras d'Or Lakes Biosphere Reserve support conservation, foster ecologically sustainable development and provide logistic support to research and monitoring of Species at Risk and other rare species.

CONSERVATION – *Activities and contributions to, or benefits derived from the preservation of landscapes, ecosystems, biological communities, species, habitats and genetic variation; or the conservation of exploited resources*

In the past decade:
We have added 34,128 species occurrence records to the AC CDC's data holdings from within the Biosphere area. These records include:

- 6,306 records of species of conservation concern
- 1,029 are records of legally protected Species at Risk
- 16,414 records collected during AC CDC fieldwork
- 2,429 records of species of conservation concern collected during AC CDC fieldwork
- Records of 16 legally protected Species at Risk that were not documented in Biosphere reserve within the AC CDC database prior to 2010. Several of these species were first discovered by AC CDC fieldwork, including the Endangered Boreal Felt Lichen (*Erioderma pedicellatum*)
- New species for Nova Scotia, such as the very rare Goldie's Fern (*Dryopteris goldiana*), discovered in October 2020

The AC CDC database for the Bras d'Or Lakes Biosphere Reserve now includes 38,405 species occurrence records (not including 2020 fieldwork still being processed). These records include:

- 7,038 records of species of conservation concern
- 1,149 are records of legally protected Species at Risk
- 17,346 records collected during AC CDC fieldwork
- 2,567 records of species of conservation concern collected during AC CDC fieldwork

We have also contributed our data to the Nova Scotia Department of Environment Protected Areas program, who have used it extensively in determining where new protected areas in the Biosphere region will be designated. Our data is used similarly by the private land conservation organizations Nature Conservancy of Canada and Nova Scotia Nature Trust, both of whom are active in the Biosphere area.

In the next decade:
AC CDC will continue to maintain and enhance the dataset of species occurrence records in the Biosphere Reserve and will continue to conduct field research on the biodiversity of the Biosphere area, discovering and documenting new species and new areas of ecological

significance. We will also continue to contribute critical information that helps direct land conservation activities.

DEVELOPMENT – *Activities and contributions fostering of economic and human development that is socio-culturally and ecologically sustainable.*

In the past decade:
We have provided rare species occurrence data to all federal and provincial Environmental Impact Assessments associated with development within the Biosphere area, enabling impacts on significant species to be mitigated. We have also provided rare species data to the provincial government, who utilize it extensively in managing Crown land forest harvesting to minimize impacts on rare species.

In the next decade:
We will continue to provide rare species occurrence data to all federal and provincial Environmental Impact Assessments within the Biosphere area, and to provide data to the provincial government to enable forest management decisions that are better for biodiversity.

LOGISTIC SUPPORT - *Support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development.*

In the past decade:
- We have maintained the dataset of records that is used to direct management and document monitoring activities for Species at Risk in the Biosphere area.
- We have contributed to Species at Risk recovery teams for several species occurring in the Biosphere area.
- We have contributed extensively to the Bras d'Or Lakes Community Nominated Priority Place cooperating group through Species at Risk modelling, fieldwork, data provision and expert advice.
- We have worked in partnership with researchers at Cape Breton University, especially Dave McCorquodale, on Species at Risk activities

In the next decade:
We will continue to support monitoring of Species at Risk and other rare species and will continue to develop new partnerships with conservation professionals, interested amateurs and others within the Biosphere area.

Atlantic Canada Opportunities Agency
Agence de promotion économique du Canada atlantique

Cape Breton Office
70 Crescent Street
Sydney, N.S.
B1S 2Z7

Bureau du Cap-Breton
70, rue Crescent
Sydney (N.-É.)
B1S 2Z7

October 21, 2020

Via email

Bras d'Or Lake Biosphere Reserve Association

Attn: Eileen Crosby, Chair

Re: Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review

Dear Ms. Crosby:

This letter acknowledges the Atlantic Canada Opportunities Agency's support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We understand that our Biosphere is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary, and that it is of immense interest to many people around the world.

To this end, the Agency worked with your group to implement the recommendations of the Bras d'Or Lake Biosphere Reserve Master Signage Plan wherein signs were created and installed in twelve locations across Cape Breton Island maximizing public awareness of the existence and importance of this UNESCO designated site.

I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,

Lauri Gallaway
Account Manager
Atlantic Canada Opportunities Agency

Re: Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review

To: Eileen Crosby, Chair
Bras d'Or Lake Biosphere Reserve Association (BLBRA)

The Cape Breton Naturalists' Society wishes to acknowledge our past and continued cooperation with the Bras d'Or Lake Biosphere Reserve, and we heartily support its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves by way of this letter.

Our organizations' shared goals of fostering an appreciation of our natural surroundings have long been demonstrated through public outreach and shared promotion of our events and activities. For example, we have been fortunate enough to host at least one presentation by the Bras d'Or Lake Biosphere Reserve per year at our monthly society meetings; topics have included academic research and citizen science initiatives within the Biosphere such as Bras d'Or Watch field day and Forest Watch. Further, many of our members have participated in Bras d'Or Watch as science advisors.

Over the coming decade, the Cape Breton Naturalists' Society looks forward to continued cooperation with the BLBRA in promoting appreciation for, and good stewardship of, Cape Breton's beautiful natural places. On behalf of the Cape Breton Naturalists' Society, I offer best wishes for a successful periodic review.

Sincerely,

Allan MacMillan

Chair, Cape Breton Naturalists' Society

CAPE BRETON UNIVERSITY

David C. Dingwall
President & Vice-Chancellor

August 26, 2020

Mr. Bruce Hatcher
Chair
Bras d'Or Lake Biosphere Reserve Association
c/o Bras d'Or Institute
Cape Breton University
PO Box 5300
Sydney, NS B1P 6L2

Dear Mr. Hatcher,

As you well know, protecting our environment is a priority for countries around the globe, as it plays a crucial role in having a healthy future for generations to come. In Cape Breton, we are so fortunate to have a UNESCO dedicated site in the Bras d'Or Lake Biosphere Reserve. The Bras d'Or Lake Biosphere Reserve Association ensures this important asset to our environmental landscape is taken care of and maintained.

Cape Breton University is happy to have been part of the Association's efforts over the years. We are pleased to offer our support to you on the occasion of the UNESCO 10th Anniversary Review of the Bras d'Or Lake Biosphere Reserve. The Association's work is important for the future of the Bras d'Or Lake, and our Island environment.

Yours very truly,

David C. Dingwall

902 563.1120 | david_dingwall@cbu.ca | 1250 Grand Lake Road, Sydney, Nova Scotia, Canada B1M 1A2

Fisheries and Oceans Canada | Pêches et Océans Canada

PO Box 1006
Dartmouth, NS
B2Y 4A2

OCT 15 2020

Dr. Bruce Hatcher
Chairman Board of Directors
Bras d'Or Lake Biosphere Reserve Association
c/o Bras d'Or Institute
Cape Breton University, PO Box 5300
Sydney, NS B1P 6L2

Dear Dr. Hatcher:

Re: UNESCO's 10th Anniversary Review of the Bras d'Or Lake Biosphere Reserve

I write to express the support of Fisheries and Oceans Canada (DFO) Maritimes Region for the 10-Year Periodic Review of the Bras d'Or Lake Biosphere Reserve. Congratulations again on reaching this significant milestone, and for the initial and ongoing efforts of your Association to recognize this special area.

Over the past 10 years, DFO Maritimes Region has undertaken activities in support of all three of the Biosphere Reserve objectives regarding biodiversity conservation, sustainable economic development, and logistic functions. For example, we supported the Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI) through dedicated participation and financial contributions, including involvement in the Aquaculture and Recreational Fisheries Task Team; funded several projects conducted by Indigenous organizations under the Recreational Fisheries Conservation Partnership Program (RFCPP); collaborated with the Province, Indigenous organizations, and recreational and commercial stakeholders in the management of fisheries, including Atlantic salmon, trout, striped bass, eels and smelt; conducted regular patrols of the Biosphere Reserve to ensure compliance with the *Fisheries Act*, and to educate harvesters about species conservation; and conducted and/or supported numerous scientific research, data collection, assessment, and monitoring activities.

Additional details on these and several other actions and initiatives that DFO Maritimes Region has conducted or participated in over the past decade in the Biosphere Reserve are outlined in Annex A to this correspondence.

.../2

Canada

Over the next decade, and with the caveat that DFO Maritimes Region's contributions will be focused on actions that align with the Department's priorities and available resources at the time, we intend to continue ongoing work in the Bras d'Or Lake Biosphere Reserve including participation in CEPI committees and task teams, annual salmon population assessment data collection, and support for our Long Term Temperature Monitoring Program, which at present includes temperature pressure gauges around the Bras d'Or Lake. We will continue to work through established processes with the Province of Nova Scotia, Indigenous organizations, and stakeholders to deliver sustainably managed fisheries taking into account relevant Science advice, Indigenous Knowledge, applicable Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessments, and any *Species at Risk Act* (SARA) listing decisions.

In addition, we are exploring ways that our Marine Spatial Planning program can support needs identified through our key partners in the Biosphere Reserve area, and will continue discussions with the Mi'kmaq on potential conservation opportunities in the Bras d'Or Lake.

There will continue to be an opportunity for applicants to apply for funding under the Atlantic Fisheries Fund to support eligible activities throughout Atlantic Canada, including the Biosphere Reserve, until the program closes March 31, 2024.

If you require further information or would like to discuss any of these activities in more detail, please contact Lindsey Weber and she will put you in touch with the relevant contacts. She can be reached at (902) 401-1478 or by email at Lindsey.Weber@dfo-mpo.gc.ca.

We look forward to continung to collaborate in support of the unique Bras d'Or Lake ecosystem.

Sincerely,

For Mary-Ellen Valkenier
Regional Director General
Maritimes Region

c.c. Kerri Graham, Regional Director, Policy and Economics
Alain Vezina, Regional Director, Science
Rhea King, Regional Director, Aquatic Ecosytems
Jacinta Berthier, Regional Director, Fisheries Management
Robert McDonald, Director, Atlantic Fisheries Fund
Paul Gentile, Area Director, Eastern Nova Scotia

Annex A: Summary of actions and initiatives conducted and/or supported over the past decade in the Bras d'Or Lake Biosphere Reserve

Annex A: UNESCO's 10th Anniversary Review of the Bras d'Or Lake Biosphere Reserve

As part of the 10-Year Periodic Review of the Bras d'Or Lake Biosphere Reserve, DFO Maritimes Region would like to offer the following summary of actions and initiatives conducted and/or supported over the past decade in the Biosphere Reserve across the three objectives of biodiversity conservation, sustainable economic development, and logistic functions.

Conservation

- DFO Maritimes Region was involved in, and supported, the Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI) as follows:
  - Participated in the Development Standards Task Team aimed at supporting land use policy and practices to reduce impacts to the Bras d'Or Lake, and to address impacts from climate change and sea-level rise;
  - Participated in the State of the Environment Task Team aimed at identifying and quantifying key indicators related to the health of the Bras d'Or Lake and watershed lands;
  - Provided financial support for research aimed at mapping key habitat features in nearshore areas of the Lake;
  - Supported the Barachois Pond Study aimed at developing an inventory and assessing key traits of the Barachois Ponds around the Lake; and
  - Shared information with CEPI regarding DFO's Marine Protected Areas (MPA) program and fostered discussion amongst partners.

- DFO Maritimes Region's Fish and Fish Habitat Protection Program (FFHPP) and Species at Risk Management Division funded three projects in the Bras d'Or Lake conducted by Indigenous organizations under the Recreational Fisheries Conservation Partnership Program (RFCPP):
  - The Unama'ki Institute of Natural Resources (UINR) funded two projects to address suggested activities in an existing collaborative salmon stewardship framework document developed in 2010 with First Nations, as well as non-government, government, and community groups. The projects applied a holistic approach to improving productivity of brook trout and Atlantic salmon in the Middle River watershed, and to improving habitat in Middle River for these species and their food sources. Activities included restoration of access to fish habitats in Moose River, Bryden Brook, two Middle River tributaries, and Baddeck River, and the restoration of riparian vegetation along the main branch of Middle River. Another project focussed on improvements to Brook trout and Atlantic salmon productivity, and the reduction of illegal catches of Atlantic salmon, by repairing the fish way in the Grand River watershed, Richmond County; and
  - The Eskasoni Fish and Wildlife Commission conducted a project to address four areas within Eskasoni First Nation that required habitat restoration or rehabilitation.

- DFO Maritimes Region collaborated with the Province of Nova Scotia, Indigenous organizations, and recreational and commercial stakeholders in the management of fisheries found within the Bras d'Or Lake Biosphere Reserve, including Atlantic salmon, trout, striped bass, eels, and smelt.

- As a partner in conservation, DFO's Conservation and Protection program has conducted regular patrols of the Biosphere Reserve to ensure compliance with the *Fisheries Act*, and to educate harvesters about species conservation.

Development

- DFO Maritimes Region participated in the 2016 Sustainable Development Conference that aimed to identify key areas for sustainable development based on natural resource sectors in the Bras d'Or Lake.

- DFO Maritimes Region was a member of the Aquaculture and Recreational Fisheries Task Team in 2018 that aimed to identify additional opportunities for aquaculture and recreational fisheries in the Lake.

Logistic Support

- DFO Maritimes Region was involved in, and provided support to, CEPI as follows:
  - Provided annual financial support to UINR to deliver secretariat services for CEPI;
  - Was a longstanding member of the CEPI Senior Council and Steering Committee, and participated in various CEPI Task Teams, including Development Standards, State of the Environment, Communications, and Aquaculture and Recreational Fisheries; and
  - Engaged the Department of National Defence (DND) to address a longstanding Unexploded Ordinance issue in the Bras d'Or Lake.

- DFO Maritimes Region Science Branch has a long history of conducting research activities throughout the waters of Cape Breton, including in the Bras d'Or Lake:
  - The Salmon Section in the Science Branch's Population Ecology Division (PED) conducted annual salmon population assessment data on several rivers in eastern Cape Breton (Middle River, Baddeck River, and North River). Information from these rivers is used to support decisions related to fisheries management, consultations with Indigenous communities, habitat management, area management, compliance and enforcement, *Species at Risk Act* processes, stakeholder requests, and International Council for the Exploration of the Sea (ICES) working group input for international advice. Some of this work was conducted with the assistance of UINR;
  - Beginning in 2009, the Science Branch's Coastal Ecosystem Science Division (CESD) supported temperature, salinity, ocean colour, and mooring monitoring and data collection in the Bras d'Or Lake, resulting in a 2014 publication from which a working Finite Volume Community Ocean Model (FVCOM) model was developed to support possible Tidal in-Stream Energy Conversion (TISEC) installations in the Lake and to answer longer term ecosystem questions;
  - In 2016-17, the Science Branch's Ocean and Ecosystem Sciences Division (OESD) worked on chemical oceanography, specifically carbon, oxygen, and nutrient dynamics in the Whycocomagh area of the Bras d'Or Lake, in collaboration with Cape Breton University (CBU);
  - In 2017, CESD provided funding for monitoring instrumentation to support a partnership proposal with CBU and Eskasoni First Nations Fish and Wildlife, and provided training for collaborative monitoring activities in the Bras d'Or Lake;

- In 2018 and 2019, CESD participated in a number of research initiatives under several aquaculture monitoring program projects, including benthic survey coring initiatives, sediment grain size, geochemistry, and ATP levels, in collaboration with CBU, Dalhousie University, the Ocean Frontier Institute (OFI), and the Nova Scotia Department of Fisheries and Aquaculture;
- For the past 10 years, CESD has maintained a group of temperature-pressure gauges around the Bras d'Or Lake as part of the Long Term Temperature Monitoring Program, and supported the conductivity, temperature, and depth (CTD) sampling conducted by CBU.

- The Canadian Hydrographic Service (CHS) conducted surveys in the Bras d'Or Lake in the late 1990's to early 2000's in support of the Science for the Integrated Management of the Bras d'Or Lake (SIMBOL) initiative.

Re: **Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review**

To Eileen Crosby,
Chair - Bras d'Or Lake Biosphere Reserve Association (BLBRA)

This letter is to acknowledge Lynn and my past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We understand that our Biosphere is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. The Biosphere has experienced different levels of human intervention and involvement by public authorities, local communities and private interests since the end of the last glaciation. For the past decade, similar to the Bras d'Or Lake Biosphere Reserve Association itself, we have endeavoured to learn, follow or implement good practices relative to biodiversity conservation, sustainable economic development and/or logistic functions on our property within the watershed in Johnstown.

To this end we have also been carrying out research/monitoring of the fresh water resources of the Bras d'Or watershed for over 25 years. This to answer the questions of how the flow, chemistry and sedimentological aspects of the waterscape works and to look for impacts associated with changing climate. One of the outcomes of the research will be to identify "Best Available Practical Management strategies (BAPMs)" that could be employed within the watershed.

We offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,



Fred Baechler
EXP | Senior Hydrogeologist
t : +1.902.562.2394, 6233 | e : fred.baechler@exp.com

exp.com | legal disclaimer
keep it green, read from the screen

Baile nan Gàidheal
Highland Village

MADE OF STORIES

October 28, 2020

Eileen Crosby, Chair
Bras d'Or Lake Biosphere Reserve Association (BLBRA)
PO Box 404
East Bay, NS, B1J 2E2

Re: Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review

Dear Eileen,

I am writing to acknowledge our continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of re-designation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We understand that our Bras d'Or Lake Biosphere is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. The Biosphere has experienced different levels of human intervention and involvement by public authorities, local communities and private interests since the end of the last glaciation. For the past decade, similar to the Bras d'Or Lake Biosphere Reserve Association itself, we have endeavoured to learn, follow or implement good practices relative to biodiversity conservation, sustainable economic development and/or logistic functions as a partner in the Biosphere.

Over the past decade, we have introduced operational measures designed to decrease our ecological foot print, such as improving the energy efficiency of our buildings, upgrading our on-site sewage systems, and reducing use and single use consumables. As a folklife museum, we also endeavour to promote the story of the Bras d'Or Lake Biosphere and sustainable living in our interpretation and programming.

Going forward, we are in the midst of a multi-year site development program which will result in significant enhancements to the Highland Village site. The centre-piece of the project will be a new 7,700 sq ft welcome centre that will be designed and built using the Passive House energy efficiency program. Passive House focuses on the design and construction of the building envelope to maintain internal heat and cooling, reducing reliance on mechanical systems. We are also going to construct an out-door interpretive kiosk on the Bras d'Or Lake watershed, its biosphere, and connection with the Gaels.

On behalf of the Nova Scotia Highland Village Society (which operates Baile nan Gàidheal | Highland Village, in partnership with the Nova Scotia Museum), I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Tapadh leat. Thank you.

Sincerely,

Rodney Chaisson, Director

4119 *Rathad* | Highway 223, *Rubha Eachainn* | Iona, *Alba Nuadh* | Nova Scotia B2C 1A3
highlandvillage@novascotia.ca
HighlandVillage.ca
Telephone 902-725-2272 (1-866-442-3542)
Fax 902-725-2227

Ga chuir an gnìomh an co roinn le Comunn Baile Ghàidheal nan h Albann Nuaidh
Operated in partnership with the Nova Scotia Highland Village Society

Gmail **Bras d'Or Lake Biosphere <brasdorlakebiosphere@gmail.com>**

Support letter

1 message

Jim Morrow <jhmorrow3@gmail.com> Thu, Oct 22, 2020 at 11:35 AM
To: brasdorlakebiosphere@gmail.com
Cc: Bruce MacDonald <midrivca@outlook.com>, Jonathan Saul <saulbags@msn.com>

Re: **Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review**

To Eileen Crosby,
Chair - Bras d'Or Lake Biosphere Reserve Association (BLBRA)

This letter is to acknowledge our past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of re-designation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We understand that our Biosphere is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. The Biosphere has experienced different levels of human intervention and involvement by public authorities, local communities and private interests since the end of the last glaciation. For the past decade, similar to the Bras d'Or Lake Biosphere Reserve Association itself, we have endeavoured to learn, follow or implement good practices relative to biodiversity conservation, sustainable economic development and/or logistic functions as a partner in the Biosphere.

To this end we have sought to promote and manage expectations of human use and activities in the Biosphere, develop or implement policies and plans for the area; carry out research, monitoring, education and training; or held meetings and conferences where applicable.

Specifically, the Middle River Watershed Society (MRWS) has monitored the influences of agricultural and industrial use of land on the watershed, documented inappropriate activity and promoted stream-bed integrity.

The MRWS supported the smolt and salmon studies on Middle River. These projects were led by Unama'ki Institute of Natural Resources (UINR), Cape Breton University and Dalhousie University's Ocean Tracking Network with the approval of Department if Fisheries and Oceans.

MRWS constructed and maintains a handicapped fishing platform on Grants Pond in Middle River to allow wheelchair fishers access to a Nova Scotia Inland Fisheries trout stocked pond.

MRWS has also had representatives involved with the Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI) which addresses environmental management issues of the Bras d'Or Lakes and its watershed.

The MRWS assisted a local business to connect with and help fund UINR's smolt research on Middle River.

Going forward we plan to identify, evaluate and put in place more initiatives incorporating these types of impactful actions directly related to the Biosphere. We hope to continue encouraging residents, local businesses and services to respect the integrity of our watershed and look forward to continuing in any partnerships which will promote and enhance this pristine system.

*On behalf of Middle River Watershed Societ**y** I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.*

Sincerely,

Jim Morrow
Vice President

NATURE CONSERVANCY CANADA | CONSERVATION DE LA NATURE

Re: **Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review**

To Eileen Crosby,
Chair - Bras d'Or Lake Biosphere Reserve Association (BLBRA)

This letter is to acknowledge our past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We understand that our Biosphere is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. The Biosphere has experienced different levels of human intervention and involvement by public authorities, local communities and private interests since the end of the last glaciation. For the past decade, similar to the Bras d'Or Lake Biosphere Reserve Association itself, we have endeavoured to learn, follow or implement good practices relative to biodiversity conservation, sustainable economic development and/or logistic functions as a partner in the Biosphere.

To this end we have sought to promote and manage expectations of human use and activities in the Biosphere, develop or implement policies and plans for the area; carry out research, monitoring, education and training; or held meetings and conferences where applicable. Specifically, we have:

- *established the Central Cape Breton Natural area: 417,671 ha of land prioritized for our conservation work.*
- *secured 711 ha (1758 ac) of important conservation lands including forests, wetlands, and shorelines.*
- *had one of our Cape Breton properties designated as provincial Nature Reserve*
- *carried out three outreach/volunteer events providing 50 participants with an opportunity to learn about the importance of Cape Breton biodiversity and NCC conservation activities.*
- *carried out an Active River Analysis that included all of the Cape Breton Natural Area*

Going forward we plan to identify, evaluate and put in place more initiatives incorporating these types of impactful actions directly related to the Biosphere. Under consideration is actively continuing our land securement, outreach, and identified research activities.

On behalf of Nature Conservancy of Canada, I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,

Jaimée Morozoff

Jaimee Dupont Morozoff
Nova Scotia Program Director

The Nature Conservancy of Canada – Atlantic Regional
7071 Bayers Road, Suite 337, Halifax, NS B3L 2C2
Tel: 902-405-4334 • Toll Free: 1-866-319-5985

La Société canadienne pour la conservation de la nature
7071 chemin Bayers, bureau 337, Halifax, N.E B3L 2C2
Tél : 902-405-4334•Appel gratuit: 1-866-319-5985

NOVA SCOTIA
Fisheries and Aquaculture
Minister

PO Box 2223, Halifax, Nova Scotia, Canada B3J 3C4 • Telephone 902 424-8953 Fax 902 428-3145 • novascotia.ca

September 16, 2020

F78-2020/21

Mr. Jim MacDonald
Bras d'Or Lake Biosphere Reserve Association
c/o Bras d'Or Institute
Cape Breton University
P.O. Box 5300
Sydney, NS B1P 6L2

Dear Mr. MacDonald:

Thank you for your letter of August 2, 2020, regarding UNESCO's 10th Anniversary Review of the Bras d'Or Lake Biosphere Reserve. The Department appreciates the opportunity to contribute to this periodic review. We are pleased to have contributed to all three objectives: Conservation, Development and Logistical Support.

CONSERVATION
The ongoing conservation and sustainability of fish populations is important to our Department. Specifically, the Bras d'Or Lake and surrounding rivers provide important recreational and food, social and ceremonial fisheries. Since 2006, our Department has contributed to the conservation of the Middle and Baddeck rivers through an Atlantic salmon enhancement program whereby more than 40,000 Atlantic salmon parr are released annually. The Frasers Mills and Margaree fish hatcheries also provide brook trout and rainbow trout to support stock enhancement and recreational fisheries for those species. Currently, we intend to continue to these activities. Additionally, we will continue to participate in the Collaborative Salmon Initiative (CSI) of Cape Breton. This forum provides an important opportunity for Mi'kmaq and nonaboriginal stakeholders, as well as provincial and federal governments to collectively address common issues surrounding Atlantic salmon conservation.

.../2

DEVELOPMENT
The economic development of the Bras d'Or Lake Biosphere Reserve in the context of socio-cultural and ecological sustainability is very important. Our Department strives to improve and expand the Aquaculture industry in Nova Scotia as well as within the reserve where feasible and ecologically viable. In 2016 we were pleased to contribute to the Bras d'Or Lakes Collaborative Environmental Planning Initiative (CEPI) sustainability conference in Wagmatcook and Baddeck, Nova Scotia.

We are currently engaged in a plan to grow the sportfishing industry in Nova Scotia. The Bras d'Or Lake offers a multitude of opportunities to promote freshwater and marine sportfishing. We have engaged professional fishing guides to build relationships with other ecotourism businesses in the Biosphere to promote ecologically sustainable tourism ventures.

LOGISTIC SUPPORT
Our Department is an active participant in CEPI with representation on the Senior Council, Management Committee, Steering Committee, and Fisheries and Aquaculture Task Team. We provide annual funding to CEPI to further the goals of the Bras d'Or Lake Biosphere Reserve.

Thank you again for the opportunity to contribute.

Yours sincerely,

Honourable Keith Colwell, E.C.N.S.

To the Oceans North

From the Bras d'Or Lake Biosphere Reserve Association (BLBRA) August 3, 2020

c/o Bras d'Or Institute
Cape Breton University
PO Box 5300
Sydney, NS B1P 6L2
E-mail: brasdorlakebiosphere@gmail.com

Re: UNESCO's 10th Anniversary Review of the Bras d'Or Lake Biosphere Reserve

Dear Ms. Susanna Fuller,

Cape Breton Island's Bras d'Or Lake Biosphere Reserve (the Biosphere) was designated in 2011. It is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. It has experienced different levels of human intervention and involvement by public authorities, local communities and private interests since the end of the last glaciation. For the past decade the BLBRA and you, among our partners and supporters, contributed to the creation and realization of the Biosphere Reserve by exploring and demonstrating biodiversity conservation, sustainable economic development and logistic functions.

On its 10th anniversary the BLBRA is engaged in a thorough self-study mandated by UNESCO, known as the *Periodic Review*. The UNESCO states that "The periodic review is an important event in the life of a biosphere reserve. **It enables a review, every ten years, of the functioning, zoning, and scale of the biosphere reserve, as well as the involvement of the populations living in the site. The periodic review represents an opportunity to carry out a qualitative survey of the actions implemented and their results.** It's a time to take stock of progress made by the biosphere reserve, especially as concerns the updating of knowledge, skills and expertise in resource and ecosystem management." Our full report is targeted for delivery at year end 2020.

Sharing Your Story

We thank you for your support of the Biosphere, and any actions taken during the past decade towards achieving its mandated objectives. Know that your story is important to us as we review our strengths, challenges, options, responses and impact over the last decade, and plan our path forward into the next.

At this significant milestone in our journey we would very much appreciate receiving a letter of support from you incorporating your comments regarding the Biosphere. Importantly for the Periodic Review, we will value any information you can provide on initiatives you carried out during the past decade that advanced outcomes for the Biosphere, or ones you plan to implement in the next decade. A sample of topics is attached for your considerations.

A response by the end of September this year would be very timely so we can plan a follow-up if required.

Sincerely,



Bruce Hatcher, Chairman Board of Directors
Bras d'Or Lake Biosphere Reserve Association (BLBRA)

www.blbra.ca

https://www.facebook.com/blbra/

Additional Activities Relative to the Bras d'Or Lake Biosphere Reserve Periodic Review

The success of the Biosphere is based on supportive partnerships among many different groups that are focused on creating, implementing or participating in activities that contribute to any or all of the three objectives common to all UNESCO Biosphere Reserves: Conservation, Development and Logistic Support.

These actions may include:
Promotion and Management of expectations of human use and activities in the Biosphere,
Development or Implementation of policies and plans for the area;
Creation or operation of Programmes for research, monitoring, education and training;
Meetings and Conferences

With that in mind it would be appreciated if you could copy and complete the section below to help us understand better what your group's activities and efforts may have been in the past 10 years regarding the Biosphere or the Bras d'Or Lake Biosphere Reserve Association, and what needs or plans you may have to further your involvement and impacts over the next decade.

Please email your responses to the brasdorlakebiosphere@gmail.com Attention: Jim MacDonald, before September 30, 2020. With your permission we plan to share this information in our documentation in various formats.
Thank you in advance.

Organization Name: Oceans North Conservation Society

Contact Name: Susanna Fuller, VP Operations and Projects

Email: Susannafuller@oceansnorth.ca

Website Page: www.oceansnorth.ca

Facebook Page:

CONSERVATION – Activities and contributions to, or benefits derived from the preservation of landscapes, ecosystems, biological communities, species, habitats and genetic variation; or the conservation of exploited resources

In the past decade: Oceans North is relatively new to working in the Bras D'or Lakes. Over the past year we have supported water quality monitoring projects with UINR in some of the watershed areas in efforts to improve forestry management practices. We have also worked with the Collaborative Ecosystem Partnership Initiative to promote awareness of species at risk and to sample microplastics in the lake.

In the next decade: Over the next several years, we are hoping to advance research, education and conservation together with local Mi'kmaw partners and non-Indigenous groups towards increasing the conservaton measures in the lake.

1. **DEVELOPMENT** – Activities and contributions fostering of economic and human development that is socio-culturally and ecologically sustainable.

In the past decade:

In the next decade: We are interested in partnering on eco-tourism opportunities and ensuring sustainable development in the lake and its surrounding watershed. We will look to local leadership for how we can be most helpful.

2. **LOGISTIC SUPPORT** - Support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development.

In the past decade: We have helped to support a project coordinator for UINR water quality monitoring project, sampled for microplastics and worked with CEPI youth on a number of environmental projects.

In the next decade: It is our intention to continue to bring capacity to monitoring activities in the lakes and support projects as they are deemed important by the local community.

Parcs Canada Parks Canada

259 Park Service Road
Louisbourg, Nova Scotia
B1C 2L2
August 4, 2020

TO WHOM IT MAY CONCERN

Re: Support for the Bras d'Or Lake Biosphere Reserve 10th Anniversary UNESCO Review

Parks Canada places in Cape Breton and Canso welcome 580,000 visitors to our special places in a typical year. Like all successful attractions, Parks Canada works with partners and stakeholders to deliver community-based facilities and services to create memorable experiences that are so important to ensuring sustainability and community growth.

Parks Canada's longstanding relationship with many organizations on Cape Breton Island has resulted in numerous successful collaborative events and activities that highlight a significant shift and growth in the shared mandate to engage the Cape Breton community and provide quality visitor experiences for residents and visitors alike.

As stewards of many national parks, marine conservation areas and historic sites, Parks Canada protects and presents nationally significant examples of Canada's natural and cultural heritage, and fosters public understanding, appreciation and enjoyment in ways that ensures the ecological and commemorative integrity of these places for present and future generations. Parks Canada's goal is to allow people to enjoy Canada's special places while protecting their integrity.

For the past number of years, Parks Canada has hosted a display created by the Bras d'Or Lake Biosphere Reserve Association at Alexander Graham Bell National Historic Site. This display complements the story of Alexander Graham Bell's concern for the environment and his own efforts toward sustainable use of resources, ecological systems, the watershed of the Bras d'Or and economic development. This display attracts much attention by visitors and educates people to the objectives of conservation, development and logistic support, while also supporting the mandate of Parks Canada.

We have had tremendous success in this co-operative activity, building upon each other's strengths and creating positive outcomes, which benefit Parks Canada, the Bras d'Or Lake Biosphere Reserve and Cape Breton Island as a whole. By continuing to work together, many great things can be achieved. To this end, we fully support the Bras d'Or Lake Biosphere Reserve on its 10th anniversary review.

We wish the Bras d'Or Lake Biosphere Reserve Association the greatest success with this report.

Regards,

A. Blair Pardy
Field Unit Superintendent
Parks Canada, Cape Breton

Canada

Organization Name: Parks Canada – Cape Breton Field Unit
Contact Name: Madeline Harvey
Email: madeline.harvey@canada.ca
Website Page: pc.gc.ca/bell, pc.gc.ca/capebreton, pc.gc.ca/stpeterscanal
Facebook Page: Alexander Graham Bell National Historic Site, Cape Breton Highlands National Park, St. Peters Canal National Historic Site

Conservation – As a leader in conservation, Parks Canada works collaboratively with the Bras d'Or Lake Biosphere Reserve Association to conserve, preserve and promote sustainability of the Bras d'Or Lakes through the Collaborative Environmental Planning Initiative (CEPI). This initiative addresses environmental management issues around the Bras d'Or Lakes. This important work began in 2003 and will continue throughout the next decade. Additionally, Parks Canada representatives participated in the Bras d'Or Lake Biosphere Reserve Association's Climate Change Adaption Forum in 2019, which focused on helping our communities adapt to climate change. Parks Canada recognizes that climate change is one of the greatest challenges of our generation – we must act collectively and act now. We recognize the Bras d'Or Lake Biosphere Reserve Association believes this as well. Going forward in the next decade, Parks Canada will continue its work done to date with the Association to support and provide expertise on Species at Risk and Community Nominated Place Nature Legacy Projects.

Development – Partnering with the Bras d'Or Lake Biosphere Reserve Association to foster economic and human development is a key component of the collaborative partnership for Parks Canada. This was demonstrated through work at St. Peters Canal National Historic Site. The new two-lane swing bridge at the canal, which was completed in 2017, was designed and constructed to protect the ecosystem of the Bras d'Or Lakes. In addition to the new bridge, Parks Canada worked with Mi'kmaq partners to present the story of the Mi'kmaw people to visitors and locals with the installation of new interpretative panels at the canal. These panels were created in consultation with the Mi'kmaq people to discover Indigenous traditions and customs and, in doing so, better understand the cultures and histories of Canada's Indigenous people and its connection to the Bras d'Or lakes. In the future, Parks Canada will continue to work with partners to nurture the development of the Bras d'Or Lakes and protect its ecological integrity.

Logistic Support – Parks Canada plays an important role in working with the Bras d'Or Lake Biosphere Reserve Association to provide environmental education and training as well as research and monitoring of conservation and sustainable development. This is evident through Parks Canada's support for many events including the Climate Change Adaption Forum, which Parks Canada provided monetary contribution and in-kind sponsorship through a presentation to delegates. Parks Canada students also participated in a youth delegation for this event. Parks Canada has been a partner in the World Oceans Day Festival, held annually in Iona, to celebrate the worldwide UNESCO designated event. Parks Canada has hosted *Nikani Awitiken* youth camps in Cape Breton Highlands National Park, in collaboration with Unama'ki Institute of Natural Resources (UINR) in the past, to teach youth about protecting the environment and becoming stewards of the water and land. Within the camp, students also perform ecological monitoring. In the next decade, Parks Canada will continue its work with partners such as Bras d'Or Lake Biosphere Reserve Association, CEPI and UINR, to provide support on these critical environmental initiatives including Species at Risk.

Attn: Eileen Crosby, Chair – Bras d'Or Lake Biosphere Reserve Association October 22, 2020

This letter is to conform that Richmond Adventure Planning, day-sailing charters, supports the continued designation of the Bras d'Or Lake watershed as a UNESCO Biosphere Reserve.

I have been offering day-sailing charters in the Biosphere since 2013 on my sailing vessel Cu Na Mara. The Biosphere Reserve and First Nation reconciliation are big parts of my narrative as I sail my clients out of the port of St. Peter's. I often sail them past the Chapel Island National Historic Site and discuss the history back to the 1600's when, arguably, the first European settlers arrived. My clients most often have not heard about Biosphere Reserves and often the ones that have become aware of the designation while reading my website. I get more business because of the designation and I am able to spread the word as well. It is a win-win association.

I wish you all success as you go through the periodic review next year.

Gordon Kerr



Owner/Operator
Richmond Adventure Planning
PO Box 423, St. Peter's, NS, B0E3B0
www.itsaRAP.ca
fun@itsaRAP.ca

August 13, 2020

Mr. Jim MacDonald
c/o Bras d'Or Institute
Cape Breton University
PO Box 5300
Sydney, NS B1P 6L2

Dear Mr. MacDonald,

The Great Trail of Canada (TGT) is the world's longest network of recreational trails, developed and promoted by a non-profit registered charity (Trans Canada Trail). The Trail stretches over 27,000 kilometres from the Atlantic to the Pacific and Arctic oceans, and links Canadians in 15,000 communities.

The land and water routes that connect Cape Breton are beautiful features of The Great Trail in Nova Scotia. A few highlights of the Trail across Cape Breton include: the Celtic Shores Coastal Hiking Trail, which runs from Port Hasting to Inverness and is ideal for off-road cycling and long-distance hiking: the Bealach Brèagh Lake Ainslie Trail, which overlooks Lake Ainslie, Nova Scotia's largest natural freshwater lake; and the Lewis Mountain Trail, the last stretch before connecting with Bras d'Or Lake. All of these trails feature picturesque wilderness and tranquil streams, and showcase the ecological beauty of Cape Breton.

A particular gem of The Great Trail is the Bras d'Or Lake Water Route, which encompasses over 300 kilometres around Bras d'Or Lake and includes 15 public staging areas or access points for canoe and kayak enthusiasts. These access points surround the shores of the lake and provide paddlers with the opportunity to experience the noteworthy culture, history, scenery and geographies of Cape Breton. The Bras d'Or Lake Water Route creates increased opportunity for economic growth, tourism, recreation, youth engagement and cultural preservation for the region. Seeing Cape Breton by water provides a unique means of exploring Bras d'Or Lake and its communities.

In particular, this water route has raised the profile of the UNESCO designated Bras d'Or Lake Biosphere Reserve; it connects the four municipalities and First Nations communities around the lake.

We are pleased to have been a part of developing the trails and water routes of Cape Breton and are committed to continuing to support the existing access points, as well as investigating further development opportunities in the future through our various funding and promotional programs.

Yours in conservation,

Mathieu Roy
Vice-President, Trail Development and Management

Trans Canada Trail
Sentier Transcanadien
321, de la Commune Ouest
Suite 300
Montréal, QC, H2Y 2E1

T: 514 485-3959
1 800 465-3636

Re: **Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review**

To Eileen Crosby,
Chair - Bras d'Or Lake Biosphere Reserve Association (BLBRA)

This letter is to acknowledge our past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We understand that our Biosphere is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. The Biosphere has experienced different levels of human intervention and involvement by public authorities, local communities and private interests since the end of the last glaciation. For the past decade, similar to the Bras d'Or Lake Biosphere Reserve Association itself, we have endeavoured to learn, follow or implement good practices relative to biodiversity conservation, sustainable economic development and/or logistic functions as a partner in the Biosphere.

To this end we have sought to promote and manage expectations of human use and activities in the Biosphere, develop or implement policies and plans for the area; carry out research, monitoring, education and training; or held meetings and conferences where applicable. Specifically, we have included Bras d'Or Lake Biosphere experiences in our Victoria County Tourism Strategy (2018) as well as utilizing the Biosphere logo for Victoria County tourism initiatives. The Municipality of the County of Victoria has provided letters of support in the Biosphere efforts and financial support for signage and the Forum on Climate Change.

Going forward we plan to identify, evaluate and put in place more initiatives incorporating these types of impactful actions directly related to the Biosphere. Under consideration are continued and on-going support for Bras d'Or Lake Biosphere initiatives.

On behalf of the council of the Municipality of the County of Victoria, I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,

Leanne MacEachen, CAO
Municipality of the County of Victoria

Post Office Box 370
495 Chebucto Street
Baddeck, Nova Scotia B0E 1B0

TELEPHONE (902) 295-3231
FACSIMILE (902) 295-3331
www.victoriacounty.com

Wallace MacAskill Yacht Club **October 27, 2020**

Re: **Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review**

To Eileen Crosby, Chair Bras d'Or Lake Biosphere Reserve Association,

This letter is to acknowledge our past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We understand that our Biosphere is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. The Biosphere has experienced different levels of human intervention and involvement by public authorities, local communities and private interests since the end of the last glaciation. For the past decade, similar to the Bras d'Or Lake Biosphere Reserve Association itself, we have endeavoured to learn, follow or implement good practices relative to biodiversity conservation, sustainable economic development and/or logistic functions as a partner in the Biosphere.

To this end we have sought to promote and manage expectations of human use and activities in the Biosphere, develop or implement policies and plans for the area; carry out research, monitoring, education and training; or held meetings and conferences where applicable. Specifically, we have provided training in sailboat race management and promoted recreational sailing as a way to get people outdoors. Three of our members have formed sailing charter/education companies to enhance the tourism industry

Going forward we plan to identify, evaluate and put in place more initiatives incorporating these types of impactful actions directly related to the Biosphere.

On behalf of the Wallace MacAskill Yacht Club I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,

Eva Landry.

Eva Landry,
Commodore, Wallace MacAskill Yacht Club

NOVA SCOTIA
HOUSE OF ASSEMBLY

Alana Paon, MLA
Cape Breton-Richmond

4 MacAskill Drive
PO Box 148
St. Peter's, NS
B0E 3B0

Phone: 1-902-535-3500
Fax: 1-902-535-3600
info@alanapaon.com

November 30, 2020

To whom it may concern,

As the MLA for Cape Breton-Richmond, I recognize the Bras d'Or Lake Biosphere Reserve is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. I commend the Bras d'Or Lake Biosphere Reserve on their efforts to instill environmental stewardship in us all, and their continued efforts to develop engaging programs that embolden people to have a positive impact on the environment.

I am pleased to support the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

I commit to continuing my support for their future initiatives pertinent to research, education, and responsible development.

I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,

Alana A. Paon; MLA
Cape Breton - Richmond

VERSCHUREN CENTRE
For Sustainability in Energy and the Environment

December 8, 2020

Eileen Crosby, Chair
Bras d'Or Lake Biosphere Reserve Association (BLBRA)
PO Box 404
East Bay, NS B1J 2E2

Re: Letter of Support for the Bras d'Or Lake Biosphere

Dear Eileen,

I am writing to reiterate our continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of re-designation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

Research and engagement with community through the work of the Verschuren Centre for Sustainability spans many initiatives common to the UNESCO Man and the Biosphere Programme including fostering the sustainable use of natural resources, mitigation of climate and environmental changes, facilitating sustainable development research, and the creation of vibrant communities.

As a technology acceleration and scale up centre, our focus is on advancing novel sustainable solutions through the development and deployment stages to enhance uptake of green technology. Over the last decade we have worked closely with industries in the Bras d'Or Biosphere Reserve on several projects related to sustainability in natural resource management. As we move into the next decade, we hope to continue to provide expertise to further advance local business and economic development, and help communities in the Biosphere to thrive

As a Centre, we have been host to numerous BLBRA committee meetings, as well as conferences and workshops directly related to conservation and sustainability goals outlined by the UNESCO MAB program, and have the privilege of publicly displaying the UNESCO MAB designation document which attracts attention by visitors to our facility and region. We are thrilled to support the vital environmental, cultural, and economic assets of the Bras d'Or watershed and feel it is critical this very unique ecosystem is preserved under the Biosphere umbrella.

On behalf of the Verschuren Centre, I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary and partner of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,



Dr. Beth Mason, President & CEO

The Verschuren Centre Inc. 902-563-1182. Beth_mason@cbu.ca

4102 Shore Road, Eskasoni, NS B1W 1M4
P 902 379 2163
F 902 379 2250
info@uinr.ca
www.uinr.ca
Unama'ki Institute of Natural Resources

December 8, 2020

Re: Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review

To Eileen Crosby,
Chair - Bras d'Or Lake Biosphere Reserve Association (BLBRA)

This letter is to acknowledge our past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

The Unama'ki Institute of Natural Resources (UINR) is Cape Breton's Mi'kmaw voice on natural resources and environmental concerns. UINR represents the five Mi'kmaw communities of Unama'ki –Eskasoni, Membertou, Potlotek, Wagmatcook, and We'koqma'q – and was formed to address concerns regarding natural resources and their sustainability. UINR has twenty years of experience conducting scientific research, stewardship programs, management plan development and traditional knowledge studies on behalf of the Unama'ki Mi'kmaq, all conducted with a Two-Eyed Seeing approach. The Mi'kmaq recognize that as part of this complex and delicate ecosystem that we have a responsibility to ensure that our actions do not jeopardizing the integrity, diversity, or productivity of our environment.
UINR's work includes:
•Supporting research and habitat enhancement activities;
•Habitat protection and Species at Risk;
•Facilitating Mi'kmaq representation in the Collaborative Environmental Planning Initiative (CEPI), Pitu'paq (municipal and First Nations government collaboration), Collaborative Salmon Initiative (CSI), Organizations Representing the Bras d'Or (ORB), and other Bras d'Or Lakes initiatives;
•Engaging Mi'kmaw Elders in programs to ensure all projects apply a Two-Eyed Seeing approach;
•Monitoring programs;
•Fisheries and Aquatic Resource Collaboration and Governance;
•Guardian Program support and development;
•Providing training opportunities for communities (on CAMP, invasive species, culvert assessment, brood stock collection, salmon tagging, oyster sanctuaries);
•Coordinating community harvests and data collection;
•and Communications and Outreach.

Going forward we plan to identify, evaluate and put in place more initiatives incorporating these types of impactful actions. UINR is currently engaging communities on the advancement of Indigenous led conservation and governance through the exploration of Indigenous Protected and Conserved Areas (IPCAs) in the Bras d'Or watershed.

On behalf of the UINR I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,

Lisa Young,
Executive Director, UINR

Amanda M. McDougall

MAYOR, CAPE BRETON REGIONAL MUNICIPALITY

December 1, 2020

Eileen Crosby, Chair
Bras d'Or Lake Biosphere Reserve Association (BLBRA)
c/o Bras d'Or Institute
Cape Breton University
PO Box 5300
Sydney, NS B1P 6L2
Email: brasdorlakebiosphere@gmail.com

Dear Ms. Crosby:

This letter is to acknowledge our past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of the UNESCO's World Network of Biosphere Reserves.

We understand that our Biosphere is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. The Biosphere has experienced different levels of human intervention and involvement by public authorities, local communities, and private interests since the end of the last glaciation. For the past decade, similar to the Bras d'Or Lake Biosphere Reserve Association itself, we have endeavored to learn, follow, or implement good practices relative to biodiversity conservation, sustainable economic development, and/or logistic functions as partner in the Biosphere.

To this end, we have sought to promote and manage expectations of human use and activities in the Biosphere; develop or implement policies and plans for the area; carry out research, monitoring, education and training; or held meetings and conferences where applicable.

Specifically, we have a strong eco-partnership with ACAP Cape Breton with whom we have developed meaningful environmental projects and resources that educate our residents and have impact on the natural world around us; in particular, our watersheds such as the Bras d'Or.

320 Esplanade - Suite 400
Sydney, NS, B1P 7B9
mayor@cbrm.ns.ca

(902) 574-0290
(902) 563-5585

Going forward, we plan to identify, evaluate, and put in place more initiatives incorporating these types of impactful actions directly related to the Biosphere.

On behalf of the Council of the Cape Breton Regional Municipality, I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,

E MacMillan
DEPUTY MAYOR

FOR Amanda M. McDougall

AMD/tfd

ESKASONI BAND COUNCIL

PO BOX 7040, ESKASONI, NS B1W 1A1

Phone: 902-379-2800 or 902-379-2801
Fax: 902-379-2172

December 14, 2020

Bras d'Or Lake Biosphere Reserve Association
PO Box 404
East Bay Main PO
East Bay, NS B1J 2E2

To Whom It May Concern,

The Bras d'Or Lake Biosphere has promoted biodiversity conservation, sustainable economic development, climate action and most recently, reconciliation with Indigenous Peoples around the Bras d'Or Lakes. The Eskasoni First Nation is generally supportive of organizations that promote these topics as they are essential to the future of the success of the First Nation Unama'ki communities.

Eskasoni Chief and Council have been informed that the Bras d'Or Lake Biosphere Association is going through the periodic review process and would like to confirm, with this letter, its support of this process. It is an important part of the process of reapplying for the Biosphere designation due to its commitment of promoting Indigenous tourism, Two-eyed seeing approach to projects of sustainability and conservation and reconciliation evolving into "reconciliation".

Sincerely,

Chief Leroy Denny
Eskasoni First Nation

ESKASONI FISH & WILDLIFE COMMISSION INC.

4115 Shore Rd., Eskasoni, NS, B1W 1M4

Tel 902-379-2024 • Fax 902-379-2159 • Email info@efwc.ca

December 14, 2020

Bras d'Or Lake Biosphere Reserve Association
PO Box 404
East Bay Main PO
East Bay, NS B1J 2E2

Dear Eileen,

The Bras d'Or Lake Biosphere Reserve Association has promoted biodiversity conservation, sustainable economic development, climate action and most recently, reconciliation with Indigenous Peoples around the Bras d'Or Lakes. The Eskasoni Fish & Wildlife Commission (EFWC) is supportive of the Bras d'Or Lake Biosphere Reserve Association because it promotes these topics as they are essential to the future of the success of the First Nations communities.

EFWC has been informed that the Bras d'Or Lake Biosphere Reserve Association is going through the periodic review process and would like to confirm, with this letter, its support of this process. It is an import part of the process of reapplying for the Biosphere designation due to its commitment of promoting Indigenous tourism, Two-eyed seeing approach to projects of sustainability and conservation and reconciliation evolving into "reconciliaction".

Sincerely,

Thomas Johnson,
Executive Director

December 14, 2020

Bras d'Or Lake Biosphere Reserve Association (BLBRA)
Eileen Crosby
Chair, Board of Directors
Bras d'Or Lake Biosphere Reserve Association
PO Box 404 East Bay Main PO
East Bay, NS, B1J 2E2
e.crosbyblb@gmail.com

Re: Support for BLBRA Periodic Review

Dear Mrs. Crosby,

The Collaborative Environmental Planning Initiative (CEPI) is pleased to support the BLBRA Periodic Review for 2021.

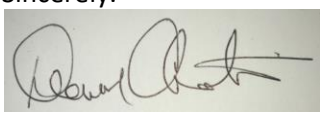
CEPI is an organization established in 2004 comprised of First Nations Chiefs, Municipal Wardens and senior representatives of empowered Municipal, Provincial and Federal agencies in the integrated management of the Pitupaq (Bras d'Or Lakes) and its watershed.

The Pitupaq Watershed which has been designated a UNESCO Man and the Biosphere in 2011 has always aligned with the vision and mandate of the Collaborative Environmental Planning Initiative and is shown in our Charter. This is evident in the co-hosting of the 2019 BLBRA Forum which was held in Cape Breton at Wagmatcook and Baddeck where we hosted Biospheres from across the country. This multi day event was hosted as a true two eyed seeing event where Mi'kmaq drummers, elders speaking with kind powerful words and smudging to start each day.

The CEPI Coordinator is now an active member of the BLBRA Board of Directors and the BLBRA still has an active member sitting on the CEPI Steering Committee, this allows communication to flow from CEPI and the BLBRA seamlessly.

We want to wish the best of luck to the BLBRA in their 10 year periodic review and their great work in promoting and enhancing the Pitupaq ecosystem as a place to be treasured and enjoyed by all.

Sincerely.



Dan Christmas
Chair CEPI



Paul MacNeil
Co-Chair CEPI

Membertou

50 Maillard Street
Third Floor
Membertou, N.S.
B1S 3W3

December 14, 2020

Bras d'Or Lake Biosphere Reserve Association (BLBRA)
Eileen Crosby
Chair, Board of Directors
Bras d'Or Lake Biosphere Reserve Association
PO Box 404 East Bay Main PO
East Bay, NS, B1J 2E2
e.crosbyblb@gmail.com

Re: UNESCO's 10th Anniversary Review of the Bras d'Or Lake Biosphere

Dear Mrs. Crosby

The Membertou First Nation is an urban and progressive Mi'kmaq community located in Unama'ki with a strong focus on community growth through economic development. The spirit of Membertou is driven by its close-knit and vibrant people and we strive on promoting biodiversity and sustainable development in Unama'ki and around the Bras d'Or Lakes.

For the past decade the BLBRA along with the CEPI and our other partners and supporters have contributed to the creation and realization of the Bras d'Or Lake Biosphere by promoting biodiversity conservation, sustainable economic development, climate action and most recently, reconciliation.

Recently the Membertou band council has learned that the BLBRA is undergoing a 10 year review process and we would like to acknowledge our support with this letter as for a successful review in 2021. It is important that we stay supportive of this designation process for the BLBRA and we all continue to promote indigenous tourism, sustainable development, two-eyed seeing and reconciliation that leads to "reconciliation".

Chief Terry Paul

WELCOMING THE WORLD!

WAGMATCOOK FIRST NATION

P.O. BOX 30001
WAGMATCOOK
NOVA SCOTIA
BOE 3NO

TEL: (902) 295-2598
TEL: (902) 295-3222
TEL: (902) 295-3332
FA X: (902) 295-3398

December 11, 2020

Eileen Crosby
Chair, Board of Directors
Bras d'or Lake Biosphere Reserve Association

Dear Eileen,

I am pleased to offer this letter of endorsement for the Bras d'or Lake Biosphere Reserve Association in its efforts to secure another ten- year UNESCO designation status.

Mi'kmaq people have shared the bras d'or lake biosphere with European people for hundreds of years. We have learned together the importance of protecting and respecting this unique space in our world community. Wagmatcook continues to do its part to ensure the bras d'or lake system and the natural environment are here for future generations of Mi'kmaq and all people.

I want to acknowledge the tremendous work the Bras D'or Lake Biosphere Association has accomplished over the last ten years by promoting and advancing the importance of the space we all live in.

On behalf of Wagmatcook First Nation, we completely support the efforts of the Bras d'or Lake Biosphere Reserve Association to seek an on-going UNESCO designation for our recognized biosphere.

Sincerely yours,

Chief Norman Bernard

CC Stan Johnson, Board Member
Brian Arbuthnot, CEO, Wagmatcook

CANADA'S MUSICAL coast
Inverness County

November 25, 2020

Via Email: brasdorlakebiosphere@gmail.com

Eileen Crosby
Chair - Bras d'Or Lake Biosphere Reserve Association
c/o Bras d'Or Institute
Cape Breton University
PO Box 5300
Sydney, NS B1P 6L2

Dear Ms. Crosby:

Re: Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review

I am writing on behalf of the Council for the Municipality of the County of Inverness to acknowledge our past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We understand that the Bras d'Or Lake Biosphere Reserve, (the "Biosphere"), is a mosaic of ecological systems including human communities within the watershed of a large, complex estuary. The Biosphere has experienced different levels of human intervention and involvement by public authorities, local communities, and private interests since the end of the last glaciation.

For the past decade, similar to the Bras d'Or Lake Biosphere Reserve Association itself, we have endeavoured to learn, follow or implement good practices related to biodiversity conservation, sustainable economic development and/or logistical functions as a partner in the Biosphere.

Going forward we plan to identify, evaluate, and put in place more initiatives incorporating these types of impactful actions directly related to the Biosphere.

On behalf of the Council for the Municipality of the County of Inverness I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Yours very truly,



Warden Laurie Cranton,
Municipality of the County of Inverness

375 Main Street, Port Hood, NS B0E 2W0
Telephone: 902-323-0019
Email: laurie.cranton@invernesscounty.ca

POTLOTEK FIRST NATION
12004 Highway 4, Chapel Island, NS B0E 3B0 Tel: 902-535-3317 Fax: 902-535-3004
www.potlotek.ca

December 14, 2020

Bras d'Or Lake Biosphere Reserve Association (BLBRA)
Eileen Crosby
Chair, Board of Directors
Bras d'Or Lake Biosphere Reserve Association
PO Box 404 East Bay Main PO
East Bay, NS, B1J 2E2
e.crosbyblb@gmail.com

Re: UNESCO's 10th Anniversary Review of the Bras d'Or Lake Biosphere

Dear Mrs. Crosby

The Potlotek First Nation is located on the shores of the Bras d'Or lakes and is home to Chapel Island which was designated a World Heritage Site in 2003. For many centuries, this site has been an important gathering place, a location for government and a site of spiritual significance to the Mi'kmaq.

For the past decade the BLBRA along with the CEPI and other partners and supporters have contributed to the creation and realization of the Bras d'Or Lake Biosphere by promoting biodiversity conservation, sustainable economic development, climate action and most recently, reconciliation.

Recently the Potlotek Band has learned that the BLBRA is undergoing a 10 year review process and we would like to acknowledge our support with this letter as for a successful review in 2021. It is important that we stay supportive of this designation process for the BLBRA and that we continue to promote indigenous tourism, sustainable development, two-eyed seeing and reconciliation that will lead to "reconcillaction".

Chief Wilbert Marshall

CAPE BRETON
REALTY

Re: **Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review**

To Eileen Crosby,
Chair - Bras d'Or Lake Biosphere Reserve Association (BLBRA)

This letter is to acknowledge support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of redesignation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

Cape Breton Realty does not track Biosphere related sales specifically but we commonly refer to the Biosphere in our marketing as it is a positive for sure. It is key words we often use in marketing.

We have learned that Americans and Europeans have a good understanding of the designation and definitely see it as a positive. In fact they often come to this area because of it.

This is a big influence on visitors, when deciding what areas to visit. I think that definitely affects people buying summer cottages as well.

I wish you the best for a successful periodic review and look forward to the next decade as a supporter of the Bras d'Or Lake Biosphere Reserve. We will be happy to continue to mention the Biosphere and its merits.

Sincerely,

Sherry MacLeod,
Cape Breton Realty
9978 Grenville Street,
St. Peter's, NS

Port Hawkesbury Paper LP, 120 Pulp Mill Road, PO Box 9500, Port Hawkesbury, Nova Scotia B9A

Eileen Crosby,
Chair
Bras d'Or Lake Biosphere Reserve Association
PO Box 404
East Bay Main PO
East Bay, NS B1J 2E2

Re: Letter of Support for the Bras d'Or Lake Biosphere regarding UNESCO's 10th Anniversary Review

To

This letter is to acknowledge our past and continued support for the Bras d'Or Lake Biosphere Reserve and its current pursuit of re-designation and inclusion as one of UNESCO's World Network of Biosphere Reserves.

We recognize the Bras d'Or Lakes Biosphere as a valuable and important set of complex ecosystems. Our forestry activities within these areas are predicated on managing for a variety of high-conservation values, including species at risk, unique ecological features, and areas of cultural significance.

Collaborating with the Bras d'Or Lake Biosphere Reserve Association has greatly aided our forest stewardship activities within the biosphere and beyond. Open communication and exchange of information between our organizations has provided immeasurable value.

On behalf of Port Hawkesbury Paper LP, I offer best wishes for a successful periodic review and look forward to another decade as a beneficiary of the Bras d'Or Lake Biosphere Reserve initiative.

Sincerely,

Sincerely,



Andrew Fedora CFT
Leader in Sustainability & Outreach
Port Hawkesbury Paper LP

P (866) 875.1869 F (902) 625.2388 www.porthawkesburypaper.com

Ministre de l'Environnement et
du Changement climatique

Minister of Environment
and Climate Change

Ottawa, Canada K1A 0H3

JAN 1 9 2021

Ms. Eileen Crosby
Chair of the Board of Directors
Bras d'Or Lake Biosphere Reserve Association
brasdorlakebiosphere@gmail.com

Dear Ms. Crosby:

Thank you for your correspondence of November 3, 2020, regarding the Bras d'Or Lake Biosphere Reserve 10th Anniversary UNESCO Review.

On August 3, 2020, Mr. Blair Pardy, Parks Canada's Field Unit Superintendent for Cape Breton, received a request from your predecessor, Mr. Bruce Hatcher, on the same subject. Please find a copy of his response letter for reference.

I would reiterate his support for the Bras d'Or Lake Biosphere Reserve on its 10th anniversary review and wish the Association success with this important work.

The Honourable Jonathan Wilkinson, P.C., M.P.

Enclosure

EcoLogo" Paper / Papier Éco-Logo"

Parcs Canada Parks Canada

259 Park Service Road
Louisbourg, Nova Scotia
B1C 2L2
August 4, 2020

TO WHOM IT MAY CONCERN

Re: Support for the Bras d'Or Lake Biosphere Reserve 10th Anniversary UNESCO Review

Parks Canada places in Cape Breton and Canso welcome 580,000 visitors to our special places in a typical year. Like all successful attractions, Parks Canada works with partners and stakeholders to deliver community-based facilities and services to create memorable experiences that are so important to ensuring sustainability and community growth.

Parks Canada's longstanding relationship with many organizations on Cape Breton Island has resulted in numerous successful collaborative events and activities that highlight a significant shift and growth in the shared mandate to engage the Cape Breton community and provide quality visitor experiences for residents and visitors alike.

As stewards of many national parks, marine conservation areas and historic sites, Parks Canada protects and presents nationally significant examples of Canada's natural and cultural heritage, and fosters public understanding, appreciation and enjoyment in ways that ensures the ecological and commemorative integrity of these places for present and future generations. Parks Canada's goal is to allow people to enjoy Canada's special places while protecting their integrity.

For the past number of years, Parks Canada has hosted a display created by the Bras d'Or Lake Biosphere Reserve Association at Alexander Graham Bell National Historic Site. This display complements the story of Alexander Graham Bell's concern for the environment and his own efforts toward sustainable use of resources, ecological systems, the watershed of the Bras d'Or and economic development. This display attracts much attention by visitors and educates people to the objectives of conservation, development and logistic support, while also supporting the mandate of Parks Canada.

We have had tremendous success in this co-operative activity, building upon each other's strengths and creating positive outcomes, which benefit Parks Canada, the Bras d'Or Lake Biosphere Reserve and Cape Breton Island as a whole. By continuing to work together, many great things can be achieved. To this end, we fully support the Bras d'Or Lake Biosphere Reserve on its 10th anniversary review.

We wish the Bras d'Or Lake Biosphere Reserve Association the greatest success with this report.

Regards,

A. Blair Pardy
Field Unit Superintendent
Parks Canada, Cape Breton

Canada

Organization Name: Parks Canada – Cape Breton Field Unit
Contact Name: Madeline Harvey
Email: madeline.harvey@canada.ca
Website Page: pc.gc.ca/bell, pc.gc.ca/capebreton, pc.gc.ca/stpeterscanal
Facebook Page: Alexander Graham Bell National Historic Site, Cape Breton Highlands National Park, St. Peters Canal National Historic Site

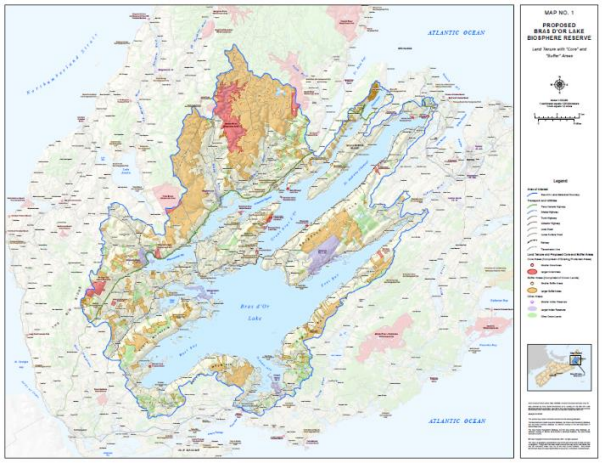
Conservation – As a leader in conservation, Parks Canada works collaboratively with the Bras d'Or Lake Biosphere Reserve Association to conserve, preserve and promote sustainability of the Bras d'Or Lakes through the Collaborative Environmental Planning Initiative (CEPI). This initiative addresses environmental management issues around the Bras d'Or Lakes. This important work began in 2003 and will continue throughout the next decade. Additionally, Parks Canada representatives participated in the Bras d'Or Lake Biosphere Reserve Association's Climate Change Adaption Forum in 2019, which focused on helping our communities adapt to climate change. Parks Canada recognizes that climate change is one of the greatest challenges of our generation – we must act collectively and act now. We recognize the Bras d'Or Lake Biosphere Reserve Association believes this as well. Going forward in the next decade, Parks Canada will continue its work done to date with the Association to support and provide expertise on Species at Risk and Community Nominated Place Nature Legacy Projects.

Development – Partnering with the Bras d'Or Lake Biosphere Reserve Association to foster economic and human development is a key component of the collaborative partnership for Parks Canada. This was demonstrated through work at St. Peters Canal National Historic Site. The new two-lane swing bridge at the canal, which was completed in 2017, was designed and constructed to protect the ecosystem of the Bras d'Or Lakes. In addition to the new bridge, Parks Canada worked with Mi'kmaq partners to present the story of the Mi'kmaw people to visitors and locals with the installation of new interpretative panels at the canal. These panels were created in consultation with the Mi'kmaq people to discover Indigenous traditions and customs and, in doing so, better understand the cultures and histories of Canada's Indigenous people and its connection to the Bras d'Or lakes. In the future, Parks Canada will continue to work with partners to nurture the development of the Bras d'Or Lakes and protect its ecological integrity.

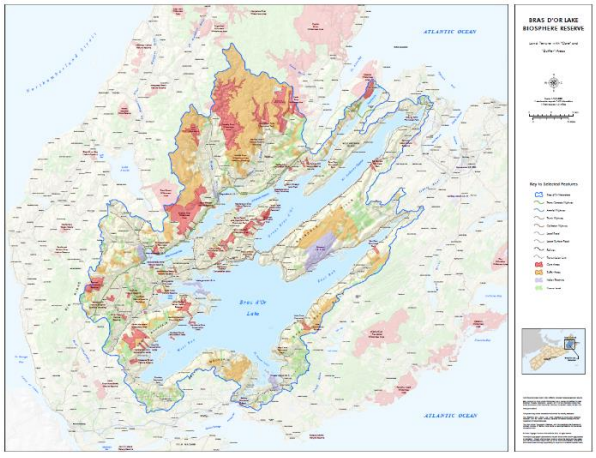
Logistic Support – Parks Canada plays an important role in working with the Bras d'Or Lake Biosphere Reserve Association to provide environmental education and training as well as research and monitoring of conservation and sustainable development. This is evident through Parks Canada's support for many events including the Climate Change Adaption Forum, which Parks Canada provided monetary contribution and in-kind sponsorship through a presentation to delegates. Parks Canada students also participated in a youth delegation for this event. Parks Canada has been a partner in the World Oceans Day Festival, held annually in Iona, to celebrate the worldwide UNESCO designated event. Parks Canada has hosted *Nikani Awitiken* youth camps in Cape Breton Highlands National Park, in collaboration with Unama'ki Institute of Natural Resources (UINR) in the past, to teach youth about protecting the environment and becoming stewards of the water and land. Within the camp, students also perform ecological monitoring. In the next decade, Parks Canada will continue its work with partners such as Bras d'Or Lake Biosphere Reserve Association, CEPI and UINR, to provide support on these critical environmental initiatives including Species at Risk.

Annex V to the Biosphere Reserve Periodic Review
Updated August 2021
Bras d'Or Lake Biosphere Reserve
Details of Changes to Zonation Areas – 2010 to 2020

The maps below show the relative zones in 2010 versus 2020.



Link: *Land Tenure Map 2010 PDF*



Link: *Land Tenure Map 2020 PDF*

Note: Data files for the 2020 maps are available online as follows:

1. data file '2020_cores.zip'

   https://blbra.ca/wp-content/uploads/2020_cores.zip

2. data file '2020_buffers.zip

   https://blbra.ca/wp-content/uploads/2020_buffers.zip

3. data file 'brasdor-watershed.zip'

   https://blbra.ca/wp-content/uploads/brasdor-watershed.zip

Please note that all the shapefiles provided are in the UTM NAD83 coordinate system which is virtually identical to the WGS 84. The data provided with the original 2010 designation application was also UTM.

See the **Listing of Core Areas - Comparison 2010 to 2020 (NOTES)** and the **Listing of Core Areas - Comparison 2010 to 2020 (Hectares)** spreadsheets on the next two pages for more detail.

Also see this interactive map of Nova Scotia Parks and Protected Areas zoomed into the Biosphere region.

Listing of "Core Areas" - Comparison 2010 to 2020 (NOTES)

Core Areas	*Notes*	*Reference Link*
WILDERNESS AREAS		
Middle River	More than 660 hectares of steep slopes overlooking Lake O'Law was added in 2019, extending the wilderness area to the Cabot Trail and into the Margaree River watershed.	Middle River
North River	Expanded in 2015, this wilderness area protects more than 5,000 hectares of highland plateau, uplands and rugged river valley. Only a portion of the wilderness area falls within the biosphere reserve.	North River
Trout Brook	Trout Brook Wilderness Area, first designated in 1998 and expanded in 2016, now contains 3,047 heactares of which a small portion (298 ha) lies within the biosphere reserve.	Trout Brook
North Mountain	Wilderness area designation of an additional 233 hectares in the headwaters of MacCuspics Brook, near Lime Hill, will take effect if overlapped mineral rights expire and no new rights are granted.	North Mountain
Cains Mountain	Near Iona. Wilderness area designation of an additional 89 hectares near MacKinnon Road will take effect if overlapped mineral rights expire and no new rights are granted. Home Topics Resources Department	Cains Mountain
Humes River	Designated under the Wilderness Areas Protection Act in 2015, the entire Humes River Wilderness Area lies within the biosphere reserve	Humes River
Kluscap	The 2,777 hectare Kluscap Wilderness Area was designated under the Wilderness Areas Protection Act in 2016. Only a 597 hectare portion of the wilderness area falls within the biosphere reserve.	Kluscap
Baddeck River	Designated under the Wilderness Areas Protection Act in 2015, the entire Baddeck River Wilderness Area lies within the biosphere reserve	Baddeck River
NATURE RESERVES		
Ashfield	Designated in 2019 under the Special Places Protection Act - an addition to the nature reserve is pending	Ashfield
Bornish Hill	Designated in 1993 under the Special Places Protection Act - an addition to the nature reserve is pending	Bornish Hill
Washabuck River	Designated in 2006 under the Special Places Protection Act - an addition to the nature reserve (islands) is	
River Denys	A 39-hectare portion of the reserve was acquired by the Province from NewPage / Port Hawkesbury Paper between 2010 and 2012. A 45-hectare portion of the reserve was transferred to the Province for protection by Georgia-Pacific Canada Inc. in 2016 to meet an environmental assessment condition from its Melford mine approval. An additional 18 hectares was added in 2020.	River Denys
Seal Cove	Designated in 2017 under the Special Places Protection Act	Seal Cove
MacLeod Brook	Designated in 2017 under the Special Places Protection Act	MacLeod Brook
MacDonalds Pond	Designated in 2017 under the Special Places Protection Act	MacDonalds Pond
MacRitchies Brook	Designated in 2017 under the Special Places Protection Act	MacRitchies Brook
Little Beaver Lakes	Designated in 2016 under the Special Places Protection Act	Little Beaver Lakes
Irish Cove	Designated in 2014 under the Special Places Protection Act	Irish Cove
Mary Harper	Designated in 2011 under the Special Places Protection Act	
Seven Falls	Designated in 2014 under the Special Places Protection Act	Seven Falls
MacAulays Hill	Designated in 2015 under the Special Places Protection Act	MacAulays Hill
Johnson Lake	Designated in 2017 under the Special Places Protection Act. Only a small portion of the 174 hectare nature reserve falls within the BLBR	Johnson Lake
PROVINCIAL PARKS		
Whycocomagh	Park was redeveloped in 2011	Whycocomagh
Barachois		Barachois
Ben Eoin		Ben Eoin
Barra Forest and MacNeils Vale	Designated in 2020	
Battery Point		Battery Point
Groves Point		Groves Point
PROTECTED BEACHES		
Iona		
Malcolm Cove		
Christies		
Shenacadie		
PRIVATE LAND CONSERVATION EASEMENTS		
Pony's Point Conservation Easement		
Boulaceet Farms Land Trust		
Beinn Bhreagh Land Trust		
River Denys Conservation Lands	Was designated as part of River Denys Nature Reserve in 2020	River Denys
Little Narrows Conservation Lands		
Marble Mountain Conservation Lands		
Baddeck Bay Conservation Lands		
McKinnons Harbour Conservation Lands		
MacRae's Island Conservation Lands		
MacKenzie Cove Conservation Lands		
Marble Mountain Conservation Lands		
Lime Hill Conservation Lands		
OTHER		
Spectacle Island Game Sanctuary		
Total for all Core Areas		

Listing of "Core Areas" - Comparison 2010 to 2020 (Hectares)

Core Areas	*Governance*	*Location*	*2010 size (ha)*	*2020 size (ha)*	*Area Change (ha)*
WILDERNESS AREAS					
Middle River	NS Environment	Inverness County	5,348	5,348	0
North River	NS Environment	Victoria County	554	762	208
Trout Brook	NS Environment	Inverness County	216	298	82
North Mountain	NS Environment	Inverness County		1,080	1,080
Cains Mountain	NS Environment	Victoria County		556	556
Humes River	NS Environment	Inv./Vic. Counties		3,625	3,625
Kluscap	NS Environment	Victoria County		597	597
Baddeck River	NS Environment	Victoria County		2,778	2,778
NATURE RESERVES					
Ashfield	NS Environment	Inverness County		40	40
Bornish Hill	NS Environment	Inverness County	833	833	0
Washabuck River	NS Environment	Victoria County	68	68	0
River Denys	NS Environment	Inverness County		181	181
Seal Cove	NS Environment	Inverness County		82	82
MacLeod Brook	NS Environment	Inverness County		121	121
MacDonalds Pond	NS Environment	Inverness County		37	37
MacRitchies Brook	NS Environment	Inverness County		50	50
Little Beaver Lakes	NS Environment	Inverness County		360	360
Irish Cove	NS Environment	Richmond County		159	159
Mary Harper	NS Environment	Victoria County		26	26
Seven Falls	NS Environment	Inv./Vic. Counties		693	693
MacAulays Hill	NS Environment	Victoria County		105	105
Johnson Lake	NS Environment	Cape Breton County		3	3
PROVINCIAL PARKS					
Whycocomagh	NS Lands & Forestry	Inverness County	192	196	4
Barachois	NS Lands & Forestry	Cape Breton County	118	118	0
Ben Eoin	NS Lands & Forestry	Cape Breton County	90	90	0
Barra Forest and MacNeils Vale	NS Lands & Forestry	Victoria County		733	733
Battery Point	NS Lands & Forestry	Richmond County	15	17	2
Groves Point	NS Lands & Forestry	Cape Breton County	5	5	0
PROTECTED BEACHES					
Iona	NS Lands & Forestry	Victoria County	4	4	0
Malcolm Cove	NS Lands & Forestry	Inverness County	1	1	0
Christies	NS Lands & Forestry	Cape Breton County	2	2	0
Shenacadie	NS Lands & Forestry	Cape Breton County	1	1	0
PRIVATE LAND CONSERVATION EASEMENTS					
Pony's Point Conservation Easement	Bras d'Or Preservation Nature Trust	Victoria County	142	142	0
Boulaceet Farms Land Trust	Bras d'Or Preservation Nature Trust	Victoria County	36	36	0
Beinn Bhreagh Land Trust	Bras d'Or Preservation Nature Trust	Victoria County	4	4	0
River Denys Conservation Lands	Nature Conservancy of Canada / NS Environment	Inverness County	70	70	0
Little Narrows Conservation Lands	Nature Conservancy of Canada	Victoria County		163	163
Marble Mountain Conservation Lands	Nature Conservancy of Canada	Inverness County		111	111
Baddeck Bay Conservation Lands	Bras d'Or Preservation Nature Trust	Victoria County		39	39
McKinnons Harbour Conservation Lands	Bras d'Or Preservation Nature Trust	Victoria County		18	18
MacRae's Island Conservation Lands	Nova Scotia Nature Trust	Inverness County		45	45
MacKenzie Cove Conservation Lands	Nova Scotia Nature Trust	Inverness County		80	80
Marble Mountain Conservation Lands	Nova Scotia Nature Trust	Inverness County		27	27
Lime Hill Conservation Lands	Nova Scotia Nature Trust	Inverness County		45	45
OTHER					
Spectacle Island Game Sanctuary	NS Lands & Forestry	Victoria County	13	13	0
Total for all Core Areas			**7,712**	**19,762**	**12,050**

Annex VI to the Biosphere Reserve Periodic Review, January 2021
Bras d'Or Lake Biosphere Reserve
Bibliography

680News.com (2012), *Former NewPage Port Hawkesbury paper mill in Nova Scotia sold to Vancouver firm* [pdf] Halifax, Available at: https://www.680news.com/2012/09/28/former-newpage-port-hawkesbury-paper-mill-in-nova-scotia-sold-to-vancouver-firm/ [Accessed 27 Dec 2020]

ACAP-CB, CEPI and UINR. (2013). Things You Can Do to Protect the Bras d'Or Lakes. Available at: https://362994a9-fe18-42e1-941d-26325f19a6ad.filesusr.com/ugd/c7bae4_c59ead71c3464b838c80186b22c750b9.pdf [Accessed 04 January 2021].

AECOM Ltd., 2013. *Marine Renewable Energy: Background Report to Support a Strategic Environmental Assessment (SEA) for the Cape Breton Coastal Region, inclusive of the Bras D'Or Lakes.* Offshore Energy Research Association of Nova Scotia, Halifax, NS. 233pp.

Alberstat J. (2015) *"Nova Scotia creates lean Department of Business"*. The Chronicle Herald, [online] pages Available at: http://thechronicleherald.ca/business/1279603-nova-scotia-creates-lean-department-of-business [Accessed 19 Nov. 2020].

Ayers, T. (2020). Cape Breton moose hunt to go ahead as population count increases. CBC News. Available at: https://www.cbc.ca/news/canada/nova-scotia/cape-breton-moose-hunt-to-go-ahead-as-population-count-increases-1.5561293 [Accessed 04 Dec 2020].

Barber EA, Hacker SD, Kennedy C, Koch EW, Stier AC, Silliman BR (2011) The Value of Estuarine and Coastal Ecosystem Services. *Ecological Monographs*, 81(2): 169-193.

BLBRA (2010) *Nomination Submission from Canada for the Bras d'Or Lake Biosphere Reserve*. Bras d'Or Lake Biosphere Reserve Association: Baddeck, Nova Scotia, 321pp.

BLBRA (2013), Strategic Plan 2013-2015. Available at: https://blbra.ca/wp-content/uploads/2018/06/PLAN.pdf. [Accessed 20 Jan. 2021]

BLBRA (2019) *Climate Change Adaptation Guidelines for Biosphere Reserves.* Available at: https://blbra.ca/initiatives_post/encourage-best-practices/ [Accessed 07 Jan. 2021].

BLBRA (2020), *BLBR Priorities 2021-2031* [pdf] Available at: https://blbra.ca/wp-content/uploads/BLBR-Priorities-2021-2031.pdf [Accessed 19 Jan 2021]

BLBRA (undated). *Perspectives on the Bras d'Or's Fresh Water*. Written by Fred Baechler. Available at: https://blbra.ca/wp-content/uploads/Perspectives-on-Fresh-Water-in-the-Bras-dOr-1.pdf [Accessed 22 Nov 2020]

BLBRA, (2019), *Constitution and By-Laws of the Bras d'Or Lake Biosphere Reserve Association.* 6th ed. [pdf] BLBRA. Available at: https://blbra.ca/wp-content/uploads/BLBRA-By-laws_Jun2019.pdf [Accessed 25 Nov. 2020].

Boisvert, N. (2019), *An Immersive Experience – the Bras d'Or Biosphere Reserve exhibit at the Alexander Graham Bell NHS,* [online] blbra.ca. Available at: https://my.matterport.com/show/?m=J4Ng3mUB2Yh&mls=1 [Accessed 26 Nov. 2020]

Bordeleau X, Hatcher BG, Denny S, Fast MD, Whoriskey FG, Patterson DA, Crossin GT. 2018. Consequences of captive breeding: Fitness implications for wild-origin, hatchery-spawned Atlantic salmon kelts upon their return to the wild. *Biological Conservation* 225: 144-153.

Bordeleau X, Hatcher BG, Denny S, Whoriskey FG, Patterson DA, Crossin GT (2019) Nutritional correlates of the overwintering behaviour, seaward migration timing, and longer-term survival of post-spawning Atlantic salmon. Submitted to *Conservation Physiology* 7(1): coz107; doi:10.1093/conphys/coz107.

Bras d'Or Institute

https://cbu-ca.academia.edu/Departments/Bras_d_Or_Institute_for_Ecosystem_Research/Documents

Bras d'Or Lake Biosphere Reserve: Reconciling with the land and with each other. CC UNESCO; https://www.youtube.com/watch?time_continue=6&v=PyeVC5ux-Kc&feature=emb_logo

BrasdorCEPI.ca, *About CEPI, [online] Available at:* https://brasdorcepi.ca/about-cepi/ [Accessed 23 Nov. 2020]

BrasdorCEPI.ca. *About CEPI Structure and Planning Cycle,* [online] Available at: https://brasdorcepi.ca/about-cepi/cepi-structure/ \

Cape Breton Partnership (2019) *Barriers to Success: _ https://capebretonpartnership.com/wp-content/uploads/2020/01/Barriers-to-Indigenous-Female-Entrepreneurs-in-Cape-Breton-Unamaki_2020-01.pdf* . [Accessed 11 Jan. 2021]

Castleton *et.al*. (2014) *A Shared Future*. http://asharedfuture.ca (accessed 12 Jan 2021)

CBC (2020) *How the animated film Chicken Run became a cult classic in the Mi'kmaw language* [online] Available at:

https://www.cbc.ca/news/canada/nova-scotia/eskasoni-mi-kmaw-language-overdubb-chicken-run-johnson-family-1.5871741 [Accessed 22Jan 2021]

CBC (Dec 26, 2020) *Potlotek one of first Atlantic Indigenous communities to launch garden initiative* Nova Scotia [online] Available at: https://www.cbc.ca/news/canada/nova-scotia/potlotek-first-nation-community-garden-1.5844756

Cbisland, (2020), *Cape Breton Island Tourism Industry Page*, 1 st ed. [online] Available at: https://www.cbisland.com/dcba-industry-page/ [Accessed 06 Dec 2020]

CBIsland.com (2019) *Cape Breton Island is the #1 Island in Canada, and now #8 in the world, by Travel+Leisure Magazine!* [online] Available at: https://youtu.be/TC9S4Ehgq1s [Accessed 14 Jan 2021]

CBP (2020) *A Profile of Strait-Western Cape Breton Region* [pdf], Sydney. Available at: https://blbra.ca/wp-content/uploads/CBP-2020-A-Profile-of-Strait-Western-Cape-Breton-Region.pdf [Accessed 15 Jan 2021]

CBP, (2020), *About page.* 1st ed. [online] Available at: https://capebretonpartnership.com/about/ [Accessed 01 12 2020]

CBRA (2020) *StrategicPlan 2020_2025*. Available at https://static1.squarespace.com/static/5735fdc137013b8eeb217d63/t/5e986ffc9e859f2ac28149b0/1587048448464/CBRA+StrategicPlan+2020_2025.pdf. [Accessed 24 Jan. 2021]

CBRM (2020). Actions taken of Climate Change Adaptation Plan (2013). Available at: https://drive.google.com/file/d/1KopG7q2N941y3E7acVkW7NdqXKwfzHAW/view?usp=sharing [Accessed 16 Jan. 2021]

CEPI (2011) *Spirit-of-the-Lake-speaks* Available at: https://brasdorcepi.ca/wp-content/uploads/2011/07/Spirit-of-the-Lake-speaks-June-23.pdf [Accessed 21 Jan 2021]

CEPI ToR (2018), *CEPI Terms of Reference (ToR)*[pdf] Available at: https://blbra.ca/wp-content/uploads/27-CEPI-ToR-Final-version-June-7-2018.pdf [Accessed 19 Jan 2021]

CEPI Youth (2020), *Species Watch*. Available on Facebook at https://www.facebook.com/UINRpage/photos/a.354972924535875/3900926213273844/ [Accessed 07 Jan. 2021].

CEPI Youth, 2018 *CEPI Youth Conference Report.* Available at: https://brasdorcepi.ca/report/cepi-youth-conference-changing-climates-changing-economies-final-report/. [Accessed 20 Jan. 2021]

CEPI, (2017). *CEPI - Final Conference Report The People of the Lakes Speak.* 1st ed. [pdf] Cape Breton: CEPI, pages 9-13. Available at https://brasdorcepi.ca/wp-content/uploads/2017/11/Conference-Report-The-People-of-the-Lakes-Speak-2016.pdf [Accessed 20 11 2020]

CEPI, (2020) - *Timeline of Significant events* [pdf] https://blbra.ca/wp-content/uploads/16-CEPI-timeline-of-significant-events-in-the-last-17-years.pdf][Accessed 17 Jan. 2021]

Christie C. et al (2017) Circumnavigating *the Bras d'Or Lake: A Comprehensive Walking Trail Implementation Toolkit* 1st ed. [pdf] Halifax: Dalhousie University. Available at: https://blbra.ca/wp-content/uploads/BLBRA_Cirumnavigating-the-Bras-dOr-Lake-Trail-Implementation-Toolkit.pdf [Accessed 20 11 2020]

Community Foundation of Nova Scotia (2019). *Strait Regions Vital Signs Report*, c.f. 5.10 https://cfns-fcne.ca/en/vitalsigns

Crossin GT, Hatcher BG, Denny S, Whoriskey K, Orr M, Penny A, Whoriskey FG (2016) Condition dependent migration behaviour of endangered Atlantic salmon smolts moving through an inland sea. *Conservation Physiology* 4: 1-12.

Cutler, C. (2013). Pesticides in Honey Bee Hives in the Maritime Provinces: Residue Levels and Interactions with Varroa mites and Nosema in Colony Stress. Available at: https://nsbeekeepers.ca/cmsAdmin/uploads/Final-Report_V2_CAAP-NSBA.pdf [Accessed 07 Dec 2020].

Davies,M., MacDonald,N.J., Daigle,R., Daigle,R.J., Young,L., Paul,P., (March 2016), Impacts of Climate Change and Sea Level Rise on the Mi'kmaq Communities of the Bras d'Or Lakes Phase Two Project Report AANDC Climate Change Adaptation Program. Available at: http://dev.uinr.ca/wp-content/uploads/2016/11/AANDC-Climate-Change_UINR-Final-Report-WEB.pdf [Accessed 17 Jan. 2021]

DCBA (2020) *Destination Cape Breton Strategy 2020-21* Sydney [pdf] Available at: https://www.cbisland.com/content/uploads/2020/03/DCBA-Strategy-2020-21-Final-low-res.pdf [Accessed 28 Dec 2020]

Denny S., (2012). Ji'kaw-Striped Bass in the Bras d'Or Lakes. Available at: http://dev.uinr.ca/wp-content/uploads/2015/02/Ji%E2%80%99kaw-Striped-BASS-in-the-Bras-d%E2%80%99Or-Lakes-1.pdf. [Accessed 17 Jan. 2021]

Denny S., (2015). *Community Aquatic Monitoring program (CAMP)*. Available at: http://dev.uinr.ca/wp-content/uploads/2015/02/CAMP-Community-Aquatic-Monitoring-Program-1.p [Accessed 17 Jan. 2021]

Denny,S., Denny,A., Garden,E., Paul,T., (2016), Mn'tmu'kMi'kmaq Ecological Knowledge Eastern Oysters in Unama'ki

http://dev.uinr.ca/wp-content/uploads/2016/11/Oyster-MEK-WEB-Spreads.pdf [Accessed 17 Jan. 2021]

Digital Mi'kmaq.com (2020) *Projects - Community Garden Food centres* Halifax [online] Available at: https://www.digitalmikmaq.com/projects [Accessed 27 Dec 2020]

ECCC. (2020). Canada Nature Fund website. Available at: https://www.canada.ca/en/environment-climate-change/services/nature-legacy/fund.html [Accessed 04 Jan 2020].

EDM (2008). Bras d'Or Lakes Development Standards: Final Report prepared for Bras d'Or Lakes CEPI. Available at: https://blbra.ca/wp-content/uploads/2008-03-CEPI-Bras-dOr-Development-Standards-Final-Report2.pdf [Accessed 08 January 2021].

EFWC. (2021). Eskasoni Fish & Wildlife Commission website. Available at: https://efwc.ca/ [Accessed 08 January 2021].

Energy Nova Scotia (2021), *Maritime Link/Lower Churchill Hydroelectric Project* [online] Available at: https://energy.novascotia.ca/renewables/programs-and-projects/maritime-linklower-churchill [Accessed 9 Jan 2021]

Explorations in the Bras d'Or Lake Biosphere: An Integrated, Multidisciplinary, Inter-Cultural Curriculum Resource for Elementary Classrooms. https://blbra.ca/educational-resources/

Facebook/ccunesco, (19 Oct. 2020). '*The Canadian Commission for UNESCO would like to express its deepest concern'*. [Facebook] CCUNESCO. Available at: https://www.facebook.com/ccunesco/photos/pcb.1608433082671995/1608432926005344 [Accessed 25 Nov. 2020]

Federal sustainable development strategy 2019, Pg. 29-060. Available at: https://www.canada.ca/en/services/environment/conservation/sustainability/federal-sustainable-development-strategy.html [Accessed 07 Jan. 2021]

Gardner (2017) *Commercial Benefits of Nova Scotia's Protected Areas* Halifax Available at: https://novascotia.ca/nse/protectedareas/docs/NS_Protected_Areas_Commercial_Benefits_Final_Report.pdf [Accessed 27 Dec 2020]

GC (Governmen2010t of Canada). (2020c). Species at Risk Act. Available at: https://laws.justice.gc.ca/eng/acts/S-15.3/ [Accessed 18 Jan 2021].

GC (Government of Canada). (2017a). Canada Wildlife Act. Available at: https://laws-lois.justice.gc.ca/eng/acts/W-9/ [Accessed 18 Jan 2021].

GC (Government of Canada). (2017b). Migratory Birds Convention Act. Available at: https://laws.justice.gc.ca/eng/acts/M-7.01/ [Accessed 18 Jan 2021].

GC (Government of Canada). (2019a). Fisheries Act. Available at: https://www.canada.ca/en/environment-climate-change/services/managing-pollution/effluent-regulations-fisheries-act.html [Accessed 18 Jan 2021].

GC (Government of Canada). (2019b). Impact Assessment Act. Available at: https://laws-lois.justice.gc.ca/eng/acts/I-2.75/index.html [Accessed 18 Jan 2021].

GC (Government of Canada). (2020a). Canadian Environmental Protection Act. Available at: https://laws-lois.justice.gc.ca/eng/acts/C-15.31/index.html [Accessed 18 Jan 2021].

GC (Government of Canada). (2020b). Environmental Enforcement Act. Available at: https://www.canada.ca/en/environment-climate-change/services/environmental-enforcement/acts-regulations/about-act.html [Accessed 18 Jan 2021].

GNS (Government of Nova Scotia). (2010a). Endangered Species Act (amended 2010). Available at: https://nslegislature.ca/sites/default/files/legc/statutes/endspec.htm [Accessed 06 Dec 2020].

GNS (Government of Nova Scotia). (2010b). Forests Act (amended 2010). Available at: https://nslegislature.ca/sites/default/files/legc/statutes/forests.htm [Accessed 06 Dec 2020]

GNS (Government of Nova Scotia). (2010c). Provincial Parks Act (amended 2010). Available at: https://nslegislature.ca/sites/default/files/legc/statutes/provpark.htm [Accessed 06 Dec 2020]

GNS (Government of Nova Scotia). (2010d). Wildlife Act (amended 2010). Available at: https://nslegislature.ca/sites/default/files/legc/statutes/wildlife.pdf [Accessed 06 Dec 2020]

GNS (Government of Nova Scotia). (2010e). Special Places Protection Act. Available at: https://nslegislature.ca/sites/default/files/legc/statutes/specplac.htm [Accessed 25 Jan 2020]

GNS (Government of Nova Scotia). (2012a). Environmental Goals and Sustainable Prosperity Act (amended 2012). Available at: https://nslegislature.ca/sites/default/files/legc/statutes/environmental%20goals%20and%20sustainable%20prosperity.pdf [Accessed 06 Dec 2020]

GNS (Government of Nova Scotia). (2012b). Crown Land Act. Available at: https://nslegislature.ca/sites/default/files/legc/statutes/crownlan.htm [Accessed 25 Jan 2020]

GNS (Government of Nova Scotia). (2012c). Conservation Easements Act. Available at: https://nslegislature.ca/sites/default/files/legc/statutes/conservation%20easements.pdf [Accessed 25 Jan 2020]

GNS (Government of Nova Scotia). (2017). Environment Act (amended 2017). Available at: https://nslegislature.ca/sites/default/files/legc/statutes/environment.pdf [Accessed 06 Dec 2020].prote

GNS (Government of Nova Scotia). (2019a). Coastal Protection Act (Bill 106), passed April 2019. Available at: https://nslegislature.ca/sites/default/files/legc/PDFs/annual%20statutes/2019%20Spring/c003.pdf [Accessed 06 Dec 2020].

GNS (Government of Nova Scotia). (2019b). Wilderness Areas Protection Act. Available at: https://nslegislature.ca/legc/bills/57th_1st/1st_read/b024.htm [Accessed 25 Jan 2020]

Government of Canada (2019), *Canada's Federal Tourism Strategy 2019*. Available at: https://www.ic.gc.ca/eic/site/134.nsf/eng/00003.html [Accessed 07 Jan. 2021].

Government of Canada (2019), *Federal sustainable development strategy 2019* Available at: https://www.canada.ca/en/services/environment/conservation/sustainability/federal-sustainable-development-strategy.html [Accessed 07 Jan. 2021]

Government of Nova Scotia. 2015. An Act Respecting the Generation of Electricity from Marine Renewable-energy Resources. BILL NO. 110. CHAPTER 32, ACTS OF 2015. 2nd Session, 62nd General Assembly, Nova Scotia, 64 Elizabeth II, 2015.[online] Available at: https://nslegislature.ca/legc/bills/62nd_2nd/3rd_read/b110.htm [Accessed Dec 2021]

Grant, T. (2020). Court orders N.S. government to better protect endangered species. CBC News. Available at: https://www.cbc.ca/news/canada/nova-scotia/nova-scotia-supreme-court-endangered-species-1.5592216 [Accessed 04 Dec 2020].

Hatcher AI & Kelly-Landry B (2021) The Settlers of Cape Breton – Nova Scotia's Hiastory Stitched in Stockings. *Spin Off* , Winter 2018: 24-26.

Hatcher AI (2012) Building cultural bridges with Aboriginal learners and their 'classmates' for transformative environmental education. *Journal of Environmental Studies and Sciences* 1(1): DOI 10.1007/s13412-012-0088-6

Hatcher AI (2016) My Past is my Present is my Future: Indigenous Ways of Knowing and the Climate Change Discourse. Chapter 10 in: Fretz, E. (ed), 2016. *Climate Change Across the Curriculum*. Lexington Books, Maryland, pp. 167 – 182.

Hatcher AI (2018) Scottish Spinning Traditions in Cape Breton. *Spin Off* , Winter 2021: 45-53.

Hatcher BG Leguizamon-Velez ME, Jordan Carlson J, Adams M. 2018. The Case for Small Tidal Energy Conversion in the Bras d'Or Lake UNESCO Biosphere Reserve, Cape Breton, Nova Scotia. *Proc. Environmental Interactions with Marine Renewables Conf.*, Univ. Highlands & Islands, Kirkwall, Scotland

Hatcher, A., (2018). Inquiry-based Ecological Explorations in the Bras d'Or Lake Biosphere. Introduction to the Acadian Forest: An Integrated, Multidisciplinary, InterCultural Curriculum Resource for Elementary Classrooms. https://blbra.ca/educational-resources/

Hatcher, A., (July, 2018). *The Bras d'Or Lake Biosphere Reserve: A celebration of natural and cultural ecology. A reflection paper for UNESCO*. [Online] Available at: https://static1.squarespace.com/static/5735fdc137013b8eeb217d63/t/5b6b3c3203ce64f1293aa1f0/1533754422875/Hatcher_BrasdOr_ReflectionPaper_ENG_July24.pdf [Accessed 25 Jan 2021]

Hatcher, Dr. A (2020) *Newspaper Articles and other publications by Dr. Annamarie Hatcher*, Available at: https://blbra.ca/wp-content/uploads/Annamariesummary-of-contributions.pdf [Accessed 19 Dec 2021]

Hatcher, S. (2019) *Climate Change Adaptation Forum Guidelines* 44pp [online] Available at: https://blbra.ca/initiatives_post/encourage-best-practices/ [Accessed 20 Jan 2021]

Inverness and Victoria Counties Municipal Climate Change Adaptation Plans (2013). Available at: https://drive.google.com/file/d/1t46CpPDAdc-7fNYfA-lCi-UdIJZoWbVG/view?usp=sharing [Accessed 16 Jan 2021]

Ivany, R. (2014). *Now-or-Never Nova Scotia - The Report of the Nova Scotia Commission on Building Our New Economy.* [pdf] Available at: https://www.onens.ca/sites/default/files/editor-uploads/now-or-never.pdf [Accessed 20 Jan 2021]

Lahey, W. (2018). *An Independent Review of Forest Practices in Nova Scotia: Executive Summary, Conclusions and Recommendations*. Available at: https://novascotia.ca/natr/forestry/Forest_Review/Lahey_FP_Review_Report_ExecSummary.pdf [Accessed 15 Dec 2020]

LaRochelle, P. (2021) *BLBRA Population and Census Data 2021*. 1st ed. [pdf] St. Peter's. Available at https://blbra.ca/wp-content/uploads/BLBRA-Population-and-Census-Data-2021-Review.pdf [Accessed 26 Jan 2021]

Lipdata.ca, (2019), *Economic Profile Series: Cape Breton, Nova Scotia*, [online] Available at: https://lipdata.ca/wp-content/uploads/sites/28/2020/02/Cape-Breton-Economic-Profile-2019.pdf [Accessed 25 Nov. 2020].

MacLeod, E. (2016). *Food Discourses in Cape Breton: Community, Economy, and Ecological Food Practices. Canadian Food Studies. Vol. 3, No. 1*, pp. 20-45. Available at: https://canadianfoodstudies.uwaterloo.ca/index.php/cfs/article/view/119/154 [Accessed 19 Dec 2020]

McGrath, T. (2017). Pre-Treatment Assessment (PTA) Methods and tools. Forestry Division, Nova Scotia Dept. of Natural Resources, Truro, Nova Scotia. Draft Report. 20 pp. Available at: http://novascotia.ca/natr/forestry/programs/timberman/pdf/PTA5_Methods.pdf [Accessed 22 Dec 2020].

McGrath, T. (2018). *Nova Scotia's Forest Management Guide.* Forestry Division, Nova Scotia Dept. of Natural Resources, Truro, Nova Scotia. Forestry Research Report #100; FOR 2018-001. Available at: https://novascotia.ca/natr/forestry/programs/timberman/pdf/FMG.pdf [Accessed 22 Dec 2020].

McMillan J, Trowse G, Schillinger D, Hay A, Hatcher, BG. 2012**.** Cape Breton Resource Assessment. *Offshore Energy Research Association of Nova Scotia*, Halifax NS. 31pp.

MIT, (2017) *A systematic MIT Approach for assessing 'innovation-driven entrepreneurship' in ecosystems* [pdf], Boston. Available at: https://innovation.mit.edu/assets/BuddenMurray_Assessing-iEcosystems-Working-Paper_FINAL.pdf [Accessed 23 Dec 2020]

Neily, P. and G. Parsons. (2017). *A field guide to Forest Biodiversity Stewardship*. Nova Scotia Dept of Natural Resources, Renewable Resources Branch. Report 2017-1. 131 pp. Available at: https://novascotia.ca/natr/library/forestry/reports/Biodiversity-Stewardship-Guide.pdf [Accessed 19 Dec 20211]

Nova Scotia (2018), *Response to Lahey Report*). Available at: https://novascotia.ca/natr/forestry/forest_review/Government-Response-to-Independent-Forestry-Report.pdf [Accessed 13 Jan 2021]

Nova Scotia Tourism (2010) *2010 NOVA SCOTIA VISITOR EXIT SURVEY* (page 60) Available at: https://tourismns.ca/sites/default/files/2010%20Nova%20Scotia%20Visitor%20Exit%20Survey%20Final%20Report-REVISED%20May%2025-2016.pdf [Accessed 14 Jan 2021]

Nova Scotia Tourism (2015) *2015 NOVA SCOTIA VISITOR EXIT SURVEY* (page 51) Available at: https://tourismns.ca/sites/default/files/2015%20VES%20Full%20Year%20report%20FINAL%20-%20Dated%20June%205%2C%202017.pdf [Accessed 14 Jan 2021]

Nova Scotia Tourism (2017) *2017 NOVA SCOTIA VISITOR EXIT SURVEY* (page 56) Available at: https://tourismns.ca/sites/default/files/2017%20VES%20Full%20Year%20report.pdf [Accessed 14 Jan 2021]

NovaScotia.ca, (2020) *Community Services*[online] Halifax. Available at: (https://novascotia.ca/coms/families) [Accesses 23Dec 2020]

Novascotia.ca, (2020), *Nova Scotia Mineral Resources Development Fund (MRDF),* 1 st ed. [online] Available at: https://novascotia.ca/natr/meb/mrdp.asp [Accessed 07 Dec 2020]

NovaScotia.ca. *Department of Business.* [online] Available at: https://beta.novascotia.ca/government/business [Accessed 19 Nov 2020].

NSDEM. (2020) *Mineral Production in 2018 and Exploration in 2019*. Technical Report 2020-01. Geoscience and Mines Branch, Nova Scotia Department of Energy and Mining. Available at: https://novascotia.ca/natr/meb/data/pubs/20re01/20re01.pdf [Accessed 15 Dec 2020].

NSDLF (2013) Parks and Protected Areas Plan. Available at: https://novascotia.ca/parksandprotectedareas/plan/ [Accessed 20 Jan. 2021]

NSDLF (2013). Mainland Moose Frequently Asked Questions. Available at: https://novascotia.ca/natr/wildlife/sustainable/mmoosefaq.asp#mm3 [Accessed 04 Dec 2020].

NSDLF (2016). Eastern Spruce Budworm fact sheet. Available at: https://novascotia.ca/natr/forestprotection/foresthealth/sheets/SpruceBudworm.pdf [Accessed 04 Dec 2020].

NSDLF (2018). Special Management Practices. Available at: https://novascotia.ca/natr/wildlife/habitats/terrestrial [Accessed 05 January 2021].

NSDLF (2020). Winter 2020 Cape Breton Moose Survey. Available at: https://novascotia.ca/natr/wildlife/sustainable/pdf/moose-survey-summary-winter-2020.pdf [Accessed 04 Dec 2020].

NSDNR (2017). Ecological Land Classification for Nova Scotia. Prepared by the Nova Scotia Department of Natural Resources Renewable Resources Branch. Report 2017-13/ Available at: https://novascotia.ca/natr/forestry/ecological/pdf/Ecological-Land-Classification-guide.pdf [Accessed 11 Dec 2020].

NSDNR. 2011. The Path We Share – *A Natural Resources Strategy for Nova Scotia 2011-2020*. Nova Scotia Dept. of Natural Resources, Halifax, Nova Scotia. 79 pp. Available at: http://novascotia.ca/natr/strategy/pdf/Strategy_Strategy.pdf [Accessed 22 Dec 2020].

NSDNR. 2012. *Nova Scotia's Code of Forest Practice, A Framework for the Implementation of Sustainable Forest Management, Guidelines for Crown Land*. Nova Scotia Dept. of Natural Resources, Halifax, Nova Scotia. Report FOR 2012-3. Available at: http://novascotia.ca/natr/forestry/reports/Code-of-ForestPractice.pdf [Accessed 22 Dec 2020].

NSE (2020). Environment Policy Documents. Available at: https://novascotia.ca/nse/dept/nse.policies.asp [Accessed 08 Dec 2020]

NSFM (2017) *Tourist Accommodation Needs Assessment: Final Report* [online], Group ATN Consulting Inc, Available at:https://www.nsfm.ca/members-only-content/1146-tourist-accommodation-needs-assessment-final-report/file.html [Accessed 30 Dec 2020]

NSNT (2021). Nova Scotia Nature Trust website. Available at: https://nsnt.ca/ [Accessed 08 Jan 2021].

NSPI (2020) *Our Electricity Future - Nova Scotia's Electricity Plan 2015-2040* [pdf] Available at: https://energy.novascotia.ca/sites/default/files/Our-Electricity-Future.pdf [Accesses 9 Jan 2021]

NSPI (2021), *BIOMASS* [online] Available at: https://www.nspower.ca/clean-energy/renewable-energy-sources/biomass [Accessed 9 Jan 2021]

NSWOOA (2018). Letter of support for the Independent Review of Forest Practices in Nova Scotia. Available at: https://www.nswooa.ca/uploads/5/9/6/9/59690537/letter_of_support_for_lahey_review.pdf [Accessed 08 Jan 2021].

Parks Canada (2020) *Alexander Graham Bell National Historic Site of Canada Management Plan* [online] Available at: https://www.pc.gc.ca/en/lhn-nhs/ns/grahambell/info/plan [Accessed 20 Jan 2021]

Parks Canada (2020) *MOU with BLBRA (co-signed) AGBNHS Exhibit, Baddeck*. Available at: https://blbra.ca/wp-content/uploads/Parks-Canada-2020-MOU-with-BLBRA-co-signed-AGBNHS-Exhibit-1.pdf [Accessed 07 Jan. 2021]

Pascual, U. & 47 co-authors (2017) Valuing nature's contributions to people: the IPEBES approach. *Current Opinion in Environmental Sustainability* 26: 7–16. [see also: Diaz, S., Pascual, U. *et al.* (2018). Assessing nature's contributions to people. *Science* 359: 270-272]

Paul,T., (2012). *Peju - Cod in the Bras d'Or Lakes,* Available at: http://dev.uinr.ca/wp-content/uploads/2015/02/Peju-COD-in-the-Bras-d%E2%80%99Or-Lakes-1.pdf [Accessed 17 Jan. 2021]

PHP (2019) *Annual Monitoring Report - Woodlands Port Hawkesbury Paper* Port Hawkesbury 2019 [pdf] Available at: https://www.porthawkesburypaper.com/sustainability.html [Accessed 07 Jan. 2021]

PHP. (2018). High Conservation Value Forest Assessment Report, 2015 – 2020 FSC Certification Period - Port Hawkesbury Paper LP, updated January 2018. Available at:

https://www.porthawkesburypaper.com/documents/HCVF%20Assessment%20Update%202015-2020%20IFL%20SAR%20Updates%2011_2018%20reduced.pdf [Accessed 06 Dec 2020]

Pollinator Partnership Canada. (Undated.) Selecting Plants for Pollinators: A Guide for Gardeners, Farmers, and Land Managers in the Nova Scotia Highlands. Available at: https://pollinatorpartnership.ca/assets/generalFiles/NS.Highlands.pdf [Accessed 06 Dec 2020]

Port Hawkesbury Paper (2019) -2019 Annual Monitoring Report for SFM Indicators and High Conservation Values. Available at: https://www.porthawkesburypaper.com/documents/2019%20Annual%20Monitoring%20Report.pdf

[Accessed 18 Jan. 2021]

Prosser DJ, Jordan TE, Nagel J, Seitz RD (2017). Impacts of Coastal Land Use and Shoreline Armoring on Estuarine Ecosystems: an Introduction to a Special Issue. *Estuaries & Coasts* 41(S1): 1-17.

Reynolds, A., & Lake, A. (15 May 2013). *Overview of Previous Sessions. Establishing a Food Network for CBRM* (unpublished PowerPoint Presentation).

Richmond County (2013)., *Climate Change Adaptation Plan 2013*. [online] http://www.richmondcounty.ca/mccap.html [Accessed 11 Jan. 2021]

Richmond County (2018). Actions taken on Climate Change Adaptation Plan (2013). [online] Available at: https://blbra.ca/wp-content/uploads/Richmond-County-CCA-Plan-outcomes-2019.pdf [Accessed 19 Jan 2021]

Richmond County (2020). *Central Richmond Plan Area - Land Use By-Law* [online] Available at:http://www.edpc.ca/plandocs/central_ri/CR_LUB.pdf [Accessed 25 Jan 2021]

Robin, J. (2014). A handbook for professional learning: research, resources, and strategies for implementation. 1st ed. [pdf] New York: NYC Department of Education. Available at http://schools.nyc.gov/ [Accessed 14 Apr. 2015].

Simpson, J. (2018) UINR Forest Products Report, Available at: http://dev.uinr.ca/wp-content/uploads/2018/05/UINR-Forest-Product-Report-FINAL-copy.pdf [Accessed 17 Jan. 2021]

Strople LC, Filgueira R, Hatcher BG, Denny S, Bordeleau X, Whoriskey FG, Crossin GT (2018) The effect of environmental conditions on Atlantic salmon smolts' (Salmo salar) bioenergetic requirements and migration through an inland sea. *Environmental Biology of Fishes* 101: 1467-1482.

TEEB (2010) *The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations*. Edited by Pushpam Kumar. Earthscan: London and Washington.

The Sobey School of Business (2014), *Impact Assessment Lab*. Available at: https://www.smu.ca/centres-and-institutes/Impactlab.html [Accessed 07 Jan. 2021].

Thyagrissen Consulting Limited, (2013). *Strategic Plan (2013-2015)* 1st ed. [pdf] Bible Hill: Thyagrissen Consulting Limited. Available at https://blbra.ca/wp-content/uploads/BLBR-Strategic-Plan-FINAL-2013.pdf [Accessed 23 Nov. 2020]

Tourism HR Canada, (2018) *Seasonality and Labour Challenges in Rural Cape Breton,* [pdf] Halifax. Available at: https://tourismhrc.com/wp-content/uploads/2019/03/Seasonality-and-Labour-Challenges-in-Rural-Cape-Breton.pdf [Accessed 18 Dec 2020]

Tourism NS (2019) *Community Report 2019 Visitor Exit Survey* [Pdf Available at: https://blbra.ca/wp-content/uploads/Tourism-NS-Community-Report-2019-VES-Statistics.pdf [Accessed 30 Dec 2020]

Tourism NS (2020) *Historic 2009-18 Tourism Indicators* [xls sheet] Halifax. Available at: https://tourismns.ca/sites/default/files/2019-10/historic2009-18_keyTourismIndicators_2019.xls [Accessed 29 Dec 2020]

Tourism NS (2020) *Tourism Statistics* [online] Halifax Available at: https://tourismns.ca/research/tourism-statistics [Accessed 29 Dec 2020]

Trans Canada Trail (2019) Great Trail Water Route around the Bras d'Or Lake. Available at: https://map.thegreattrail.ca/explore-the-map/?center=-73.5605401,45.499897999999995&level=15&extent=-6872076.6004,5724471.703,-6637262.0496,5832400.787,102100. [Accessed 21 Jan. 2021].

UINR (2014). Tiam, Mi'kmaq Ecological Knowledge: Moose in Unama'ki. Unama'ki Institute of Natural Resources 2014. Available at: https://www.uinr.ca/wp-content/uploads/2014/05/Moose-MEK-web.pdf [Accessed 06 Dec 2020].

UINR (2018), Library of publications 2010 - 2018. Available at: http://dev.uinr.ca/library/publications/ [Accessed 14 Jan. 2021]

UINR (2020) Netukulimk (Project progress reports) Available at: https://www.uinr.ca/programs/netukulimk/ [Accessed21 Jan 2021].

UINR (2020). Unama'ki Institute of Natural Resources website. Available at: https://www.uinr.ca/ [Accessed 08 Jan 2021].

UNESCO (2010) Nomination Submission Document, Bras d'Or Lake Biosphere Reserve, page 203 [pdf] Available at: https://blbra.ca/wp-content/uploads/BLBRA_Submission_Print.pdf [Accessed 26 Jan 2021]

Vasseur, L.& SIRON, R. March 2019, ''Assessing ecosystem services in UNESCO biosphere reserves'', the Canadian Commission for UNESCO, Ottawa, March 2019. [online] https://www.biospherecanada.ca/s/Assessing-Ecosystem-Services-in-UNESCO-Biosphere-Reserves_EN.pdf [last assessed 07 Jan 2021]

Vercaemer B., J. Ouellette-Plante, J. T. Johnson and A. McIsaac, 2011. Assessment of Green Crab (*Carcinus maenas*) abundance in the Bras d'Or Lake of Cape Breton, N.S. Can. Tech. Rep. Fish. Aquat. Sci. 2965: vi +42 p.[online] https://docplayer.fr/139247323-Assessment-of-green-crab-carcinus-maenas-abundance-in-the-bras-d-or-lake-of-cape-breton-n-s.html [Accessed 19 Jan 2021]

Vercaemer B., P. St-Onge, K. Spence, S. Gould and A. McIsaac, (2010). Assessment of biodiversity of American oyster (*Crassostrea virginica*) populations of Cape Breton, N.S. and the Maritimes. Can. Tech. Rep. Fish. Aquat. Sci. 2872: vi + 32 p. [online] Available at: https://www.researchgate.net/publication/259753781_Assessment_of_Biodiversity_of_American_Oyster_Crassostrea_virginica_populations_of_Cape_Breton_NS_and_the_Maritimes [Accessed 19 Dec 2021]

Vibe Creative Group (2019), *Gender based analysis and study enhancing entrepreneurial support for women living and working in Cape Breton*. Available at: https://capebretonpartnership.com/wp-content/uploads/2020/01/Enhancing-Entrepreneurial-Supports-for-Women-Living-and-Working-in-Cape-Breton_2020-01.pdf. [Accessed 07 Jan. 2021].