

Vol. 76, Number 4 • Winter 2019



# **THE CANADIAN SOCIETY OF ENVIRONMENTAL BIOLOGISTS Bulletin**

## ***In this Issue:***

- **Science Tidbits**
- **Narrowing Choices in an Ecological Collapse**
- **Yukon Biophysical Ecological and Landscape Classification**
- **Ontario is Implementing Changes to the Re-Use of Local Excess Soils**



# CSEB Bulletin SCBE

VOLUME 76, ISSUE 4, WINTER, 2019

CSEB Website <http://www.cseb-scbe.org>

Webmaster: Brian Free • Email: [bfree@cseb-scbe.org](mailto:bfree@cseb-scbe.org)

## In this issue

National Executive & Regional Chapter Listings....	1	Saskatchewan News.....	12
CSEB Objectives/Objectifs de la SCBE.....	2	Manitoba News.....	12
<b>National News</b> .....	3	Ontario News.....	13
President's Report.....	3	Ontario is Implementing Changes to the Re-Use of Local Excess Soils .....	13
Science Tidbits.....	3	Atlantic News .....	13
Yukon Biophysical Ecological and Landscape Classification: What ELC Mapping Is and Why It Should Be Undertaken .....	4	New Biological Test Method from IGETG – Reference Method for Determining Acute Lethality Using <i>Acartia tonsa</i> .....	13
A New Fisheries Act (2019) .....	7	Highlights of the Recent GOM2050 International Symposium.....	14
<b>Regional News</b> .....	8	Territories News .....	16
British Columbia News		Evidence Call for Grey Literature.....	19
Narrowing Choices in an Ecological Collapse .....	8	Membership/Subscription Application .....	20
Alberta News .....	11		

Date of Issue - December 2019

Printed in Canada ISSN: 0318-5133

Front Cover: An RC BioSolutions Ltd. biologist chipping through thick ice in a western Alberta mountain stream in February to sample it's water quality.

Back Cover Top: RC BioSolutions biologist taking water quality samples at low winter flows. Back Cover Lower Left: RC BioSolutions biologist measuring in situ winter water quality parameters. Back Cover Lower Right: Mallard (*Anas platyrhynchos*) in a side pool of Frog Pond, Sir Sanford Fleming Park, Halifax, NS.

Photo Credits: Front Cover: Richard Carson; Back Top: Lynnette Allenmand; Back Lower Left: Blue Markwart, RC BioSolutions Ltd; Back Lower Right: Peter Wells, CSEB Atlantic Region Member.

### NATIONAL EXECUTIVE (2019)

#### President:

Curt Schroeder  
(Home) 306-531-3627 (Work) 306-775-7678  
(E-mail) [president@cseb-scbe.org](mailto:president@cseb-scbe.org)

#### 1<sup>st</sup> Vice-President:

Patrick Stewart  
(Work/Fax) 902-798-4022  
(E-mail) [enviroco@ns.sympatico.ca](mailto:enviroco@ns.sympatico.ca)

#### 2<sup>nd</sup> Vice-President:

Robert Stedwill  
(Home) 306-585-1854  
(E-mail) [rjstedwill@live.ca](mailto:rjstedwill@live.ca)

#### Secretary/Treasurer:

Anne Wilson  
(Home) 780-737-5522  
(Cell) 867-765-8480  
(E-mail) [anne.wilson2@canada.ca](mailto:anne.wilson2@canada.ca)

#### Past-President:

Anne Wilson  
(Home) 780-737-5522  
(Cell) 867-765-8480  
(E-mail) [anne.wilson2@canada.ca](mailto:anne.wilson2@canada.ca)

#### Newsletter Editor:

Gary Ash  
(Home) 780-472-0098  
(E-mail) [garyash@shaw.ca](mailto:garyash@shaw.ca)

#### Membership:

Gary Ash  
(Home) 780-472-0098  
(E-mail) [garyash@shaw.ca](mailto:garyash@shaw.ca)

### REGIONAL DIRECTORS

#### Atlantic:

Patrick Stewart  
(Work/Fax) 902-798-4022  
(E-mail) [enviroco@ns.sympatico.ca](mailto:enviroco@ns.sympatico.ca)

#### Québec:

Vacant

#### Ontario:

Barbara Hard  
(Work) 905-614-1978 Ext. 287  
(E-mail) [barbara.hard@arcadis.com](mailto:barbara.hard@arcadis.com)

Vacant

Manitoba: Vacant

#### Saskatchewan:

Robert Stedwill  
(Home) 306-585-1854  
(E-mail) [rjstedwill@live.ca](mailto:rjstedwill@live.ca)

#### Alberta:

Brian Free  
(E-mail) [bfree@cseb-scbe.org](mailto:bfree@cseb-scbe.org)

Joseph Hnatiuk  
(Work) 403-524-1147; (Fax) 403-524-1148  
(Cell) 403-332-1455  
(E-mail) [hna@shaw.ca](mailto:hna@shaw.ca)

#### British Columbia:

Loys Maingon  
(Work) 250-331-0143  
(E-mail) [BCDirector1@cseb-scbe.org](mailto:BCDirector1@cseb-scbe.org)

#### Sean Mitchell

(Home) 250-889-6195  
(E-mail) [BCDirector2@cseb-scbe.org](mailto:BCDirector2@cseb-scbe.org)

#### Territories:

Sharleen Hamm  
(Work) 604-996-1110  
(E-mail) [sharleen@sharleenhamm.com](mailto:sharleen@sharleenhamm.com)

#### Anne Wilson

(Work) 780-951-8856  
(Cell) 867-765-8480  
(E-mail) [anne.wilson2@canada.ca](mailto:anne.wilson2@canada.ca)

### REGIONAL CHAPTERS

#### Newfoundland & Labrador

Contact: Pat Ryan  
(Home) 709-334-2962  
(E-mail) [patrickr@mun.ca](mailto:patrickr@mun.ca)

#### Atlantic Chapter

Contact: Pat Stewart  
(Work/Fax) 902-798-4022  
(E-mail) [enviroco@ns.sympatico.ca](mailto:enviroco@ns.sympatico.ca)

#### Ontario

Contact: Barbara Hard  
(Work) 905-614-1978 Ext. 287  
(E-mail) [barbara.hard@arcadis.com](mailto:barbara.hard@arcadis.com)

Manitoba: Vacant

#### Saskatchewan

Chairperson: Robert Stedwill  
(Home) 306-585-1854  
(E-mail) [rjstedwill@live.ca](mailto:rjstedwill@live.ca)

#### Alberta

Contact: Brian Free  
(Work) 780-427-7765  
(E-mail) [bfree@cseb-scbe.org](mailto:bfree@cseb-scbe.org)

Contact: Joseph Hnatiuk  
(Work) 403-524-1147; (Fax) 403-524-1148  
(Cell) 403-332-1455  
(E-mail) [hna@shaw.ca](mailto:hna@shaw.ca)

#### British Columbia:

Contact: Loys Maingon  
(Work) 250-331-0143  
(E-mail) [aardscanltd@gmail.com](mailto:aardscanltd@gmail.com)

#### Territories

Contact: Anne Wilson  
(Work) 780-951-8856  
(Cell) 867-765-8480  
(E-mail) [anne.wilson2@canada.ca](mailto:anne.wilson2@canada.ca)

#### Sharleen Hamm

(Work) 604-996-1110  
(E-mail) [sharleen@sharleenhamm.com](mailto:sharleen@sharleenhamm.com)



**CSEB BULLETIN 2019**

Vol. 76, Number 4, Winter 2019

The Canadian Society of Environmental Biologists Bulletin is a quarterly publication. The Bulletin keeps members informed of the Society's activities and updates members on the current affairs and advances in the field of environmental biology. This publication draws together the widely diverse group of Canadian environmental biologists through a national exchange of ideas. Members are invited to contribute papers, photos or announcements that are of a national biological and environmental interest. Letters to the editor are welcome. This is a volunteer non-profit organization and we rely on your participation to make the Bulletin a productive forum for ideas and discussion.

**All business correspondence, changes of address, undeliverable copies and membership applications should be sent to:** CSEB National Office, P.O. Box 962, Station F, Toronto, ON., M4Y 2N9. **Editorial correspondence:** Gary Ash, Editor, e-mail: [garyash@shaw.ca](mailto:garyash@shaw.ca).  
**Editor:** Gary Ash  
**Layout:** Gary Ash  
**Printing:** Lasertext Digital Print & Copy Centre, Edmonton, AB.

All original text in the Bulletin may be reprinted without permission with a citation to the Canadian Society of Environmental Biologists.

**LE BULLETIN de la SCBE 2019**

Vol. 76, Numéro 4, Hiver 2019

Le Bulletin de la SCBE est une publication trimestriel de la Société Canadienne des Biologistes de l'Environnement. Le Bulletin informe les membres des activités de la Société sur événements courant ainsi que les progrès qui font en sciences de l'environnement. Par un échange d'idées au niveau national, cette publication intéresse un groupe très diversifié d'environnementalistes Canadien. Les membres sont invités à contribuer des articles, photos (noir et blanc) ou des messages qui sont d'intérêt nationale en sciences biologiques et environnementales. Les lettres à l'éditeur sont bienvenues.

**Tout la correspondance d'affaires, y compris les abonnements, les changements d'adresse, les exemplaires retournés et les formulaires:** CSEB National Office, P.O. Box 962, Station F, Toronto, ON, M4Y 2N9. **Les lettres à l'éditeur:** Gary Ash, Editor, Courriel: [garyash@shaw.ca](mailto:garyash@shaw.ca)  
**Rédacteur en chef:** Gary Ash

**Impression:** LaserText Digital Print & Copy Centre, Edmonton, AB.

Tout texte originale peut être reprimé sans permission; veuillez l'accréditer à La Société Canadienne des Biologistes de l'Environnement.

The views expressed herein are the writer's of the articles and are not necessarily endorsed by CSEB, which welcomes a broad range of viewpoints. To submit a piece for consideration, email [newslettereditor@cseb-scbe.org](mailto:newslettereditor@cseb-scbe.org).

**The Canadian Society of Environmental Biologists****CSEB OBJECTIVES**

The Canadian Society of Environmental Biologists (CSEB) is a national non-profit organization. Its primary objectives are:

- to further the conservation of Canadian natural resources.
- to ensure the prudent management of these resources to minimize environmental effects.
- to maintain high professional standards in education, research and management related to natural resources and the environment.

**OBJECTIFS de la SOCIÉTÉ**

La Société Canadienne des Biologistes de l'Environnement (SCBE) est une organisation nationale sans but lucratif. Ses objectifs premiers sont:

- de conserver les ressources naturelles canadiennes.
- d'assurer l'aménagement rationnel de ces ressources tout en minimisant les effets sur l'environnement.
- de maintenir des normes professionnels élevés en enseignement, recherche, et aménagement en relation avec la notion de durabilité des ressources naturelles et de l'environnement, et cela pour le bénéfice de la communauté.

**Advertising Rates:****CSEB National Newsletter/Bulletin**

<b>DISPLAY ADS• ( 4 issues)</b>	<b>Rate Per Issue</b>	<b>Annual Rate</b>
Business Card Size (3.5" x 2")	\$ 25.00	\$ 85.00
1/4 Page (4"x 5")	\$ 55.00	\$ 190.00
1/2 Page (7"x 5")	\$ 100.00	\$ 375.00
Full Page	\$ 175.00	\$ 650.00

• prices are for camera-ready ads

• ads are subject to our approval for acceptance

• all ads are in black and white print

• payment due upon receipt of notice

**Further Information Available Upon Request:**

- sample of publication
- rates for preferred location
- special rates for repeat ads

**Please Forward Submissions and Requests to:**

Gary Ash  
 8108 155 Avenue NW, Edmonton, Alberta T5Z 2S9  
 Phone: 780-472-0098 • E-mail: [garyash@shaw.ca](mailto:garyash@shaw.ca)

## NATIONAL News

### PRESIDENT'S Report

*By Curt Schroeder, CSEB President*

It's a big deal in Saskatchewan, New Brunswick, and Ontario. Small nuclear reactors may be a reality in Canada as early as 2026. Three provincial premiers announced a plan to work together to advance small scale nuclear power generation to fight climate change and drive economic growth. They are designed to work on the waste of larger reactors and can be as small as a gymnasium. With smaller upfront capital costs and the ability to be manufactured in modular form and transported where needed, they offer some appealing operational advantages compared to larger-scale commercial units. For small and remote communities, they could offer a source of stable power generation.

Inevitably, this development will open up renewed dialogue on the environmental pros and cons of nuclear energy versus other alternative energy sources. For Saskatchewan, this allows the dependence on coal generation to drop considerably, if not completely. There are no emissions, either CO<sub>2</sub> or particulates. Small nuclear reactors, however, do produce radioactive waste, which must be stored. No doubt this development, if it occurs, will need to engage communities and further public dialogue on its safety, social, economic, and environmental impacts. This is a dialogue that the CSEB needs to engage in.

If you have comments regarding small nuclear reactors, please contact Curt Schroeder at [president@cseb-scbe.org](mailto:president@cseb-scbe.org).

### SCIENCE TIDBITS

*Submitted by John Retallack, CSEB Alberta Member*

#### Mammals and General Biology

##### Wombats are cute, but did you know they produce cubic scat!

Wombats produce droppings that are cubic, roughly the size and shape of dice! Apparently, it is all in the design of their intestines.

Sometimes you just need to ask...why? Well, apparently, the shape helps wombats mark their territory by keeping the scat in tall piles in a confined area; a useful skill in their steep terrain habitat.

The researcher, Dr. P. Yang (Georgia Institute of Technology), normally studies fluid dynamics within the human body but was intrigued by the oddity of square scat. She obtained sample wombat digestive tracts from wombats killed by cars. In the course of her examinations, she determined that wombat food is carried along the bulk of the intestine in a semi-liquid state, and only solidifies in the final eight percent of the intestine. This is where alternating rigid

and flexible sections of the walls of the intestine help to mould the corners and edges and ultimately produce the dice-shaped product.

As indicated in the original article, one can only guess, "...how painful it is for wombats to be constantly shitting (small) bricks."

##### Why Does This Seal Have An Eel Up Its Nose?

In early December, 2018, the Hawaiian Monk Seal Research Program (HMSRP—part of NOAA) shared a photo of a Hawaiian monk seal with an eel stuck in its nose...and it is apparently not the first time monk seals have had this problem.

Researchers at HMSRP suggest two potential theories. Either the seal ate the eel, needed to regurgitate it, and it ended up coming out the wrong way; or, in the course of feeding, the seal caused the eel to make a run for it into the nearest hidey-hole and it made a dreadful error! I go with option two since the seals tend to forage by shoving their faces into small openings in the reefs to try to corner fish and other animals.

The good news is the researchers at HMSRP have a bit of experience and were able to extricate the eel. The seal apparently survived the extraction uninjured but the eel did not.

There are about 1400 Monk seals left in the wild, and they are listed as Endangered on the IUCN Red List.

##### The Demise of Unique Species

It is not surprising that as the human population continues to grow and land is modified for farming and building of urban areas, local species with more specific habitat requirements are lost and replaced with more ubiquitous species like domestic pigeons, rats, mice, and English sparrows.

In PLOS Biology, Prof T. Newbold and A. Purvis (University College London and Natural History Museum, London) have noted that modification of land for farming and building cities is favouring the same species, everywhere.

They looked at 20,000 animals and plants in 81 countries and found animals like rats and pigeons are taking over from less common ones. Species common over a large area tend to increase in places where humans use the land...and more unique species that tend to rely on and/or occupy small areas of land are lost.

##### Ivory Poaching – Evolution in action?

##### Elephants are apparently reacting, evolutionarily, to poaching!

Ninety percent of the elephants in Gorongosa National Park in Mozambique were killed during the 15-year civil war between 1977 and 1992. The ivory from those elephants was apparently used by various factions to finance the war.

Observations in Mozambique, post-civil war, have indicated that nearly 1/3 of the elephants born since the war have not developed tusks. Normally, less than four percent of a population of elephants are born without tusks. Researchers speculate that poachers ignored elephants without tusks since they had no monetary value and those surviving, tusk-less elephants have been able to pass the gene on to their offspring.

## Yukon Biophysical Ecological and Landscape Classification: What ELC Mapping Is and Why It Should Be Undertaken

By: *Rachelle Robitaille<sup>1</sup>, B.Sc., R.P.Bio, P.Bio Terrestrial Ecologist, EDI Environmental Dynamics Inc.*

### What is ELC Mapping and Why Do It?

If you google ELC mapping, your search will send you to sites that provide information on Ecological Land Classification. This is a term that has been used by the Canadian Federal Government since the early 1970s. But in the Yukon, the ELC acronym is for Ecological and Landscape Classification (ELC). This article will briefly describe the Federal ELC program, the Yukon ELC program, some of the uses of ELC mapping, and how I have used ELC mapping in the Yukon. ELC is considered a common hierarchical framework for classifying ecological distinctive land areas.

The Federal ELC program started with the creation of the Canada Committee on Ecological Land Classification (CCELC). CCELC was created in 1976 with the purpose of delineating and classifying ecologically distinct areas of the earth's surface and to provide a consistent national spatial context for better monitoring and reporting of the landbase (Statistics Canada 2017). In 1986, a map and report describing terrestrial ecoregions was published. By extending the approach used to create the terrestrial ecoregions map, a provisional ecoregion map of Canada was produced in 1987. This 1987 map included the first national approximation of ecoregions, ecoprovinces, and ecoregions (Wiken et al. 1993).

The work completed by the CCELC was considered conceptually sound, but the spatial units that had been proposed needed updating to reflect new information developed since the program was initiated. To achieve these updates, a collaborative project was initiated in late 1991 and the Ecological Stratification Working Group was created. In 1995, the Ecological Stratification Working Group released *A National Ecological Framework for Canada* report, which describes the methods used to construct the ecological framework maps, the concepts of the hierarchical levels of generalization, and a narrative description of each ecoregion and ecoregion. In 1999, a second report was published by the working group, which added the ecoprovince level. In 2014, the Canadian Council on Ecological Areas (CCEA) released an update to the first digital version of the National Ecological Framework (NEF).

NEF identifies and describes the biophysical properties of large land units based on ecological similarity. This framework subdivides Canada into ecologically similar areas, based on the integration of climate, physiography, landform, and vegetation. The NEF provides three levels that are used in the Yukon: ecoregions, ecoprovinces, and ecodistricts.

Similar to the federal program, the Yukon's ELC program was initiated in the 1970s with the purpose of creating a standardized ecosystem classification and mapping framework. The purpose of the program was to help facilitate land and resource management decisions and foster coordination between Yukon resource sectors and land managers. The Yukon's ELC program identifies and

describes landscape patterns into ecosystem base units. These units are based on similar climate, landscape, vegetation, and soil conditions.

Yukon's ELC program uses two hierarchical ecological frameworks that guide ecosystem classification and mapping: the Yukon Biophysical Ecosystem Classification (YBEC) and NEF. Although these two frameworks have different ecological concepts and applications, they are intended to be used together in a complementary manner (Environment Yukon 2016). The NEF is well-developed, and it is used since it supports many Yukon land and resource management activities. But "Ecoregions of the Yukon Territory" (Smith et al. 2004) should be referenced as the primary source of ecoregion descriptions (Environment Yukon 2016). The NEF does not support detailed site-level mapping, which is why the YBEC system was developed.

YBEC uses similar concepts to the Biogeoclimatic Ecosystem Classification (BEC) System of British Columbia. The BC BEC System considers vegetation, soils, and topography to infer regional climate and to identify geographic areas that have relatively uniform climate. YBEC has climate and site-level classification but considers climate to be the primary influence on ecosystem development and distribution (Environment Yukon 2016).

The YBEC framework groups similar segments of the landscape into ecosites. YBEC generally characterizes an ecosystem as a particular plant community and its associated topography, soil, and climate (Environment Yukon 2016). The Yukon classification system differs from the BC classification system as Yukon ecosystems can transition from one to another abruptly or gradually, depending on environmental factors that influence the system. The BC ecosystem classification is defined by climax vegetation communities and infers the combined ecological effects of climate and soil (Environment Yukon 2016). Typically, a BC ecosite does not transition into another ecosite. Efforts to develop detailed site-level units are ongoing in the Yukon.

The YBEC program currently identifies nine bioclimate zones within the Yukon as follows:

- Boreal Low
- Boreal High
- Boreal Subalpine
- Subarctic Woodland
- Subarctic Subalpine
- Boreal/Subarctic Alpine Tundra
- Pacific Maritime Glacierized
- Arctic Low Shrub Tundra
- Arctic Dwarf Shrub Tundra

The YBEC program is currently working on providing field guides to ecosite identification for these bioclimate zones and associated subzones. The field guides to ecosite identification can be used to complete ELC mapping for areas located within each bioclimate zone and subzone. As of 2019, only two field guides to ecosite identification are available for use: *Southern Lakes Boreal Low Subzone (BOLs)* and *Klondike Plateau Boreal Low*

Author contact: [rrobitaille@edynamics.com](mailto:rrobitaille@edynamics.com)





*Yukon site visit form used to collect ELC plot data near Eagle Plains, YT (photo taken by Brodie Smith).*

*Subzone (BOLkp).* Other field guides are under development. The current challenge is to complete ELC mapping in areas that do not have any ecosites identified by the Yukon program. To assist with meeting this challenge, the Yukon Government has developed and made available the *Yukon Ecological and Landscape Classification and Mapping Guidelines* (Environment Yukon 2016). But why spend so much time and funding to complete ELC mapping?

Ecosystem mapping, such as ELC, is often used to provide baseline information on existing vegetation. This baseline information can help identify ecological values to assist with resource management and environmental impact assessments. ELC data can form the foundation for various analyses, including abundance and patterns of wildlife habitat, the amount and location of ecosystem connectivity and migration corridors, and patch sizes and distribution. These can all be used to help quantify and track ecosystems over time to aid in the preservation and enhancement of biodiversity across a landscape.

The process of completing ELC involves collecting information on important ecological attributes such as landscape position, soil moisture and nutrient levels, and vegetation structural stages. These are all important in defining the values associated with ecosystems and they collectively help to form a baseline of current conditions against which future states can be compared. Also, by identifying the amount and distribution of ecological communities within an area or region, managers can adjust strategies to ensure a robust representation of ecosystem types within their resource area.

Ecological classification can identify suitable habitat for plant and animal species. Plant species depend on ecological conditions

to provide suitable habitat for growth. For example, many rare species are found in areas with atypical ecological conditions, including wet, dry, rich, or poor sites. ELC can thus be used in combination with knowledge of a species' habitat requirements to identify areas of higher probability of its occurrence. ELC can also form a base for mapping or modeling of suitable habitat for wildlife species through the identification of ecological conditions that are suitable for their growth or reproduction.

Ecosystem mapping can assist in completing various analyses for various parameters such as habitat patterns, habitat abundance, the amount of ecosystem connectivity and wildlife movement corridors available, wildlife habitat assessments, and edge calculations between habitat types. For example, the edge or ecotone—where two ecosystems come together—often supports a high diversity of wildlife species. Some animals and plants require the special environment of an edge whereas other species are primarily associated with one of the two ecosystems that comprise the edge. By determining the size, shape, and arrangement of ecological communities, managers can assess the amount of edge habitat that is located within a specific area. Currently many regulators, resource managers, and environmental consulting companies use ecosystem mapping to assist with quantifying the potential effects of a proposed development on certain ecological values such as vegetation or wildlife habitat.

As a terrestrial ecologist for EDI Environmental Dynamics Inc, I have been part of a team that has successfully completed and delivered numerous ecological mapping service projects within the Yukon and other parts of western Canada. The goal of the Yukon ELC mapping projects that I have been involved with was to provide baseline vegetation data as part of the Yukon Environmental and Socio-economic Assessment process. The challenge on these projects was that site-level ecosystem units (ecosites, ecological communities) did not exist for the proposed development areas. We implemented the guidelines associated with the YBEC system methodology (Environment Yukon 2016) to develop project-specific ecosites. Often the Yukon Environment and Socio-economic Assessment Board (YESAB) requires proponents to provide information on land cover types, forest cover, and site quality, to describe vegetation and vegetation assemblages, and to identify any wetlands found within the development area. The development of ecosite maps provided the required data to meet the YESAB vegetation objectives. For one project, the maps were used to identify the location of potential rare plant habitat and to assist with quantifying the potential project-related effects on traditional and medicinal plants. My wildlife colleagues at EDI have used the ELC maps as the foundation for their wildlife habitat models for species of concern. ELC products can provide a method of measuring the abundance of various wildlife habitat characteristics such as ecosystem representation, patch size, fragmentation, and connectivity, and amount of edge habitat.

Moving forward, the ELC system should be used to recognize and identify different ecosystems and to plan sound ecological management decisions across the Yukon. The creation of a field verified ELC map and associated database with current structural stages provides a valuable tool in helping with meeting regulator objectives and with maintaining and protecting biodiversity across a landscape.





*Establishing ELC plot in Eagle Plains ecoregion, YT (photo taken by Brodie Smith).*

## References

- Environment Yukon. 2016. Flynn, N. and Francis S., editors. Yukon Ecological and Landscape Classification and Mapping Guidelines. Version 1.0. Whitehorse (YT): Department of Environment, Government of Yukon. 71 p.
- Smith, C.A.S., Meikle, J.C., and Roots, C.F. (editors). 2004. Ecoregions of the Yukon Territory: Biophysical properties of Yukon landscapes. Agriculture and Agri-Food Canada. PARC Technical Bulletin No. 04-01, Summerland, British Columbia. 313 p.
- Statistics Canada. 2017. Introduction to the Ecological Land Classification (ELC) 2017. Accessed November 1st, 2019 <https://www.statcan.gc.ca/eng/subjects/standard/environment/elc/2017-1>
- Wiken, E.B., Rubec, C.D.A., Ironside, C. 1993. Canada terrestrial ecoregions. National Atlas of Canada. 5th edition. (MCR 4164). Canada Centre for Mapping, Energy, Mines and Resources Canada, and State of the Environment Reporting. Environment Canada, Ottawa, Ont. Map at 1:7.5 million scale.



*ELC plot soil pit near Eagle Plains, YT (photo taken by Brodie Smith).*



## A New Fisheries Act (2019)

By: Sean Mitchell, PhD, RP Bio (BC), CSEB BC Director

In late August of this year, Canada's *Fisheries Act* was revised. This was the second time in a short six years that the legislation has been significantly revamped. In 2013, the Stephen Harper government made dramatic changes to the then-current Act—changes that were vociferously decried in conservation and impact assessment circles. These changes included:

1. replacing the concept of Harmful Alteration, Disruption, or Destruction of habitat (HADD) with an ambiguous measure of productivity, and
2. redefining fish to be protected from all pisces (including 'coarse' fish) to only those species involved in Commercial, Recreational, or Aboriginal (CRA) fisheries, or those species that support those fisheries.

To the working fisheries biologist, this made determining impacts and scale of impact much less rigorous and more challenging. Do sticklebacks count as fish now? Always? Only when they can be shown to be a food item to a CRA species? How do we measure productivity and the change in it due to an anthropogenic source? How do we account for seasonal fluctuation and yearly changes? Mr. Harper's stated intent was to 'streamline' the regulatory process. After six years, fisheries biologists had finally achieved a level of comfort with the new paradigm and DFO was applying it consistently across the country. And then the politicians changed it. For the better.

As of August 28, 2019, productivity as a measure of fish use of a waterway has been largely done away with and is now referred only once in the Act, in the context of which the Minister may take it into account when assessing impacts to habitat. Instead, HADD has returned, and DFO is to be congratulated for a return to a measurable and easily understandable—intuitive even—gauge of impact. There are several advantages to the HADD approach. First, it has a history with regulators and fisheries biologists; therefore, most of the uncertainties and challenges for interpretation have been worked out. Second, it provides certainty as impacts are measured as an areal extent (empirical) that is altered, disrupted, or destroyed. This is a consequential starting point from which to discuss compensation or offsetting. Third, it is intuitive and straightforward; clients can understand consequences of altering an area of impact just as easily as lawyers.

The HADD approach is based on habitat rather than effects on individual fish or specific species. This makes it powerful as we don't need to demonstrate deleterious effects on fish (difficult to do in a quantitative and compelling manner), but rather only that the habitat has been impacted. It is also more conservative in the sense that usually habitat for one group of fish (e.g., salmonids) is used as well by others (e.g., sculpins, minnows), and so protection or offsetting of the habitat affects multiple species in addition to the target one. Thus HADD is both conservative and empirical.

In the Spring 2018 CSEB Bulletin (*Proposed amendments to Canada's Fisheries Act – a step back*. Volume 75(1)), I provided an update on the proposed amendments to the *Fisheries Act*. In

that article I argued that HADD was a good step forward, but also that DFO needed to move away from the CRA concept and define a fish as all fish. This is less well done within the new Act (at least by my reading of it). The definition of fish remains problematic. While the new Act appears to broaden what they consider to be fish beyond CRA species, their efforts at defining fish are clumsy and, for me at least, raise concern that not all life stages of all species are included in the legislation. Fish are defined in the Act as (a) *parts of a fish*, (b) *shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals*, and (c) *the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans, and marine animals*. There are two issues with such a convoluted definition. First, definition (a) is a circular reference. It says a fish is a part of a fish. This does not help our understanding. What is required is a clear definition of a finfish to accompany the use of crustacean and shellfish. I am not sure if the Act actually does protect the whole body of a finfish as it does not explicitly state so. Secondly, if I assume finfish are indeed included, to my interpretation some life stages are now not protected. For example, repeat spawning steelhead or Atlantic salmon, or post-spawned adults of other freshwater species fall outside these lists. They contain neither eggs nor sperm, are not larvae nor juveniles, and could not be considered marine animals. Adult fish in freshwater, when not bearing gametes, are not specifically considered a fish by this definition.

So, is the new *Fisheries Act* trumpeted by the Minister a fundamental improvement over the Harper version? For the most part, I would suggest 'yes'. Return of HADD will, I believe, improve not only habitat protection, but also simplify measurement of impact for prosecution or compensation and offsetting. Returning to considering all fish as worthy of protection provides certainty not only to regulators and biologists but also, importantly, to proponents. I do have concerns that it may be challenged on the definition of fish; however, as I see scope for legal arguments that some life stages (particularly those that we are most often concerned about, for example, overwintering adults) are not included in the legislation.

The *Fisheries Act* of Canada has long been considered a strong piece of legislation; the new Act returns some of that strength to it which had previously been weakened.

### CSEB Regional Directors Needed

CSEB has Regional Director vacancies as follows:

- Territories
- Ontario
- Saskatchewan
- Quebec
- Manitoba
- Alberta
- Atlantic

If you are interested in taking on one of these positions, please contact Curt Schroeder at [President@cseb-scbe.org](mailto:President@cseb-scbe.org). It is not an onerous task, and will greatly help strengthen the organization. Your help would be greatly appreciated.



## REGIONAL News

## BRITISH COLUMBIA News

Submitted by Loys Maingon, CSEB BC Director

### Narrowing Choices in an Ecological Collapse

It may be unsettling to consider that, increasingly, there is a yawning gap between the apparent growing prosperity and abundance that we experience daily and the ecological collapse around us that is hardly noticed, and only discussed in arcane circles of environmental scientists and First Nations. In BC, a provincial fisheries collapse and the consequent news that fishermen will need to be economically bailed out are reported by news outlets only to fall on deaf ears.<sup>1</sup> Letters in *Science* with what might once have been considered “alarmist” titles, such as “Salmon in clear and present danger” note laconically that: “Habitat destruction has driven the collapse of wild salmon fisheries from California to Washington, where 93% of wild salmon abundance has been lost.”<sup>2</sup> Assuming that somehow the reality of the ongoing salmon collapse is different in BC, those now banal data only draw a yawn.

News of a fisheries collapse in no way stops or slows down fish consumption or sales in food stores and restaurants. Mismanagement of sockeye stock in BC by the Department of Fisheries and Oceans is simply masked by a continued supply from Alaska.<sup>3</sup> Of course that may be short-lived since the Alaskan success and better management comes to a great extent from decades of careful conservation and the unspoiled character of the Bristol Bay watersheds, which are now at the centre of the Trump administration’s drive to develop the Pebble Mine and natural gas pipelines, against the petitions of six resident tribes and local fishermen.<sup>4</sup> The reality behind this is that, this year, the DFO could not even meet the low bar of fisheries sustainability. It has had to forgo the Marine Stewardship Council’s certification, and with it, the lucrative European market sales.<sup>5</sup> In BC, it is as though factual news are just bad background music in a supermarket to spur shoppers to buy in order to forget what is really going on in the marketplace’s support system, the environment.

It is, however, a global cultural problem, as we see science increasingly marginalized in public planning and decision making.<sup>6</sup> As Dr. Tom Beers found out as fires rage around Sydney, Australia, the public and politicians are impervious to science. When he published in 1987 some of the first studies on the probable impact of climate change on future Australian fire seasons, the science did not seem to matter very much then, any more than today, even when the reality of it is at our doorsteps.<sup>7</sup>

There appears to be a large dissonance between what is actually happening to the state of the environment around us, our material expectations, and the assumptions we make on the stability of the “resource environment”. We treat a rapidly changing and deteriorating environment as though it remains the cornucopia of infinite resources that it was at the time of contact. It is as

though the drivers of change have had no significant long-term or cumulative impacts.

A recent study notes that the future of biodiversity is becoming increasingly precarious.<sup>8</sup> Global biodiversity is not simply shrinking in numbers of individuals within populations and percentages of species. This is beyond regional observations of general species changes and declines. It is not just that insect numbers have collapsed by 75% over the past 25 years, or bird populations in North America have declined by 25% since 1970, or that 75% of wetlands have been drained and eradicated over the past century. The authors suggest that biodiversity is undergoing a massive global reorganization in response to land-use, harvesting intensity, and climate change. On the surface of it, the raw numbers of local species extinctions are not yet sufficient to catalyse public or political concern.

The main point of concern that the Bowles et al. study brings out is that, while government policy in response to observable climate change increasingly talks about “resilience” at a local scale in an isolated space and context, globally biodiversity seems to be playing out its own endgame as it becomes increasingly unstable and setting the stage for a collapse.<sup>9</sup> As pointed out by Eriksson and Hillebrand, increased local species richness driven by species turnover may itself correlate with declines in ecosystem resilience. We may talk about structural resilience in a civic context, which amounts to making our urban and rural infrastructure resistant to climate change, but the real concern should be with anthropogenic interference in natural processes, which are losing the ability to be resilient as we contribute to their biological homogenization. It is what is currently happening to overarching processes that should concern us:

*These findings raise questions about species homogenization and adaptability, as well as an expectation of precarious ecosystem services in the future when a large reorganization of local species assemblages affects the temporal stability of ecosystem functions. Human-mediated introduction of new species might increase local species richness by increasing immigration rates, but at the same time it promotes biological homogenization.... Homogeneity in local species leads to erosion of biodiversity over larger regions and can limit the ability of species communities to adapt to future environmental changes if immigration rates decline.*

Even local increases in species richness, which give the misleading illusion of increasing biodiversity, can set the stage for a decline in local resilience. Therefore, what we appear to be witnessing, particularly in ocean ecosystems, is a human-driven instability in biodiversity, which is a prelude to ecosystem collapse.

The point that most people seem to miss is that it is not just the species composition that is changing. It is the matrix or envelope of that composition that we are rapidly changing, with foreseeable

consequences. The publication in September of a report on the transmission of phocine distemper virus (PDV), which was previously confined to the North Atlantic, to Northern Pacific seal populations, Steller sea-lions (*Eutmetopias jubatus*), and northern sea otters (*Enhydra lutis kenyoni*), points to the greater impact of climate change on disease transmission, to the point that it can completely re-structure entire ecosystems.<sup>10</sup> Although what was thought to be cases of possible canine virus distemper were first reported in the Pacific in incidental cases between 1994 and 1999 of Kuril harbour seals (*Phoca vitulina stejnegeri*), Steller sea lions, and spotted seals (*Phoca largha*), it was only in 2004 that PDV was positively identified in northern sea otters, Steller sea-lions and northern fur seals in the wake of two epidemics among harbour seals (*Phoca vitulina*) around Alaska.<sup>11</sup> It is now very clear that PDV has crossed the Northwest Passage from the Atlantic and is spreading to western and sub-arctic marine mammal populations.

The rapid melting of Arctic waters has removed natural barriers to viral transmission from Atlantic ecosystems to Pacific ecosystems. The introduction of PDV is likely just a beginning. The implications of this, if they are not already clear to most biologists, were succinctly laid out in a 2003 paper on the previous historical demise of mid-level predators in the North Pacific. The paper by Alan Springer et al., entitled: “*Sequential megafaunal collapse in the North Pacific Ocean: An ongoing legacy of industrial whaling?*”<sup>12</sup> hypothesized that intensive nineteenth and early twentieth century whaling had caused orcas (*Orcinus orca*) to switch from easy large bodied prey such as whales to mid-size prey such as Steller sea-lions, seals, and otters. As we know, unlike northern and southern residents who feed mainly on large bodied fish, pelagic Bigg's and transient killer whales feed on pinnipeds and otters. The potential spread of PDV would result in a further collapse of pinnipeds and otters throughout the Pacific Coast. As indicated by Springer et al., the removal of the great whales had ecosystem level effects that entirely re-organized entire ecological chains: “beginning in the open ocean >50 years ago and leading to altered interactions between sea urchins and kelp on shallow coastal reefs.”<sup>13</sup>

The introduction of PDV comes at a particularly sensitive time for coastal BC's ecosystems. Kelp forests are currently subjected not only to the ravages of warmer waters, which are said to act as wild fires in terrestrial forests from California to Oregon, and moving north, but to an explosion of sea urchins and unchecked predation that is moving north with warmer ocean currents.<sup>14</sup> In BC's Salish Sea, a similar problem has been developing with the demise of the starfish due to “starfish wasting syndrome”<sup>15</sup> from California to Alaska and the consequent explosion of sea urchins that make up the starfish's main prey. Simultaneously, large areas of the eastern Pacific coast are experiencing an explosion of sea urchins, which are literally devouring coastal kelp forests.<sup>16</sup> In BC, the return of the sea otter, after its virtual extirpation through hunting and indiscriminate culling, has kept the urchins largely in check and helped kelp forests return on the outer coast and Haida Gwaii.<sup>17</sup> The renewed extirpation of the sea otter either directly by PDV or indirectly by increased killer whale predation would leave kelp forests completely open to a sea urchin explosion as witnessed in Northern California and Oregon. In the Salish Sea, kelp forests are still recovering from failed attempts at industrial harvesting.<sup>18</sup> Ultimately, the twin impact of urchin herbivory

and pinniped/otter extirpation by PDV would entail not just the eventual collapse of all killer whale populations, but of entire foodchains.

These foodchains are already under severe stresses. It is not just the southern resident orcas, and their main prey, the Chinook Salmon (*Oncorhynchus tshawytscha*), that are threatened with extinction. The very foundation of the entire chain, the Chinook's main prey the Pacific Herring (*Clupea pallasii*), which officially collapsed from overfishing in 1965, then in 1993, has never re-bounded to historic highs. There is considerable controversy as to whether current numbers warrant re-opening a fishery in the Salish Sea. Of particular note, the DFO numbers used in modelling are based on the total biomass of an assumed annual return of an off-shore population, using the total catch for 1953 onwards as the benchmark (1953 apparently happens to have been the year of a massive population collapse). The stock has consequently been routinely grossly over-estimated based on a flawed short-term database, and for the last 40 years, the allowable quota has been set at an unsustainable 20%, resulting in the successive collapse of herring spawning sites.

How this failed management approach translates in practical terms can be illustrated from the DFO's own numbers for last year's fishery in Lambert Channel, which was opposed by conservationists and most First Nations:

*“According to Victoria Postlethwaite, DFO's Regional Herring Officer, the 2019 quota was set based on a predicted return of 122,291 tonnes, but only 85,700 tonnes returned. Fisheries ended up catching 25% of the population—exceeding the 20% harvest quota once again. The four other herring populations in B.C. have already collapsed in recent years due to overfishing.”*<sup>19</sup>

In simple terms, the return was over estimated by 30% and the take was exceeded by 20%, a regular practice that explains the collapse of all other previous herring spawns.

Against the DFO's broad assumption that the biomass is equivalent to “historic highs,”<sup>20</sup> it can be difficult for the uninitiated and the public to understand why 122,291 tonnes in no way approximates the abundance of herring at contact and at the turn of the century. Stephen Hume puts this into perspective from a historical anecdote that was frequently corroborated by early settlers: “*In June of 1893, a small steam tug thumped past Nanaimo. Abruptly, the sea began to seethe. It was a herring school so vast it took three hours to traverse. The school was 70 kilometres across.*”<sup>21</sup> The actual magnitude of the decline of herring in the Salish Sea before contact has been reconstructed archaeologically by McKenie et al.<sup>22</sup> As the following map indicates, herring consumption was prevalent from Puget Sound to Alaska, but it was highest around the Salish Sea. It amounted to between 80 to 100% of the fish consumed by the native population, and therefore had to correspond to fishing from extremely abundant year-round herring populations.

By this measure, the now unique Lambert Channel fishery constitutes an anomalous vestige of a pre-contact ecosystem, which flourished for millennia until about 1953. And even as a vestige, it has its own problem with local kelp reproduction, which is essential for herring reproduction. It, therefore, should come as no surprise that the Salish Sea is increasingly considered by many to be a “broken ecosystem” on the verge of collapse.<sup>23</sup> Not included in the DFO estimates are the losses of some 21 resident



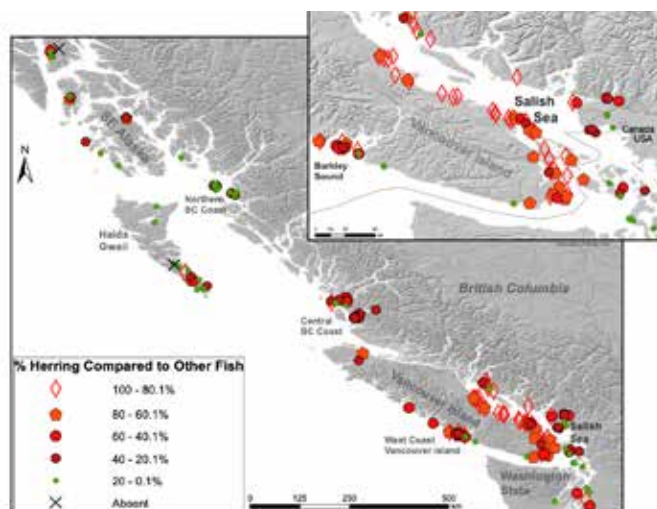


Figure 1: Map of herring archaeological sites indicating the density of herring presence and use compared to other available fish species (McKenie et al.).

populations unique to the Salish Sea, which are known by local First Nations and commercial fishermen to have been fished year-round. Many of these resident herring populations have been extirpated, as is to be expected from a fishery that intercepts an iteroparous species and removes from its life cycle both reproductive adults and eggs.

There is growing concern over the collapse of the herring fishery throughout BC's coast. It is felt that this collapse is a product of the DFO's over-estimation and questionable mismanagement of the stock.<sup>24</sup> After decades of opposition to the DFO's management of herring, in 2016 the Supreme Court enabled the Heiltsuk Nation to enter into a joint-management agreement with the DFO.<sup>25</sup> Notwithstanding teething disagreements, the Heiltsuk management protocols have now returned to traditional management practices, which do not target adult fish and limit roe fishery.

The success of this agreement has motivated First Nations around the Salish Sea to advocate for a similar arrangement to control the fishery at Lambert Channel and throughout the Salish Sea. In November, Saanich Nation WSÁNEC Leadership Council (WLC) of Tsartlip, Tseycum and Tsawout First Nations invited 25 local First Nations and 50 community organizations to HELIT TTE SLON,ET (Let the Herring Live) to develop the groundwork for a traditional management agreement based on science, similar to the Heiltsuk joint management agreement.

Fundamental to this effort is the question of "social license." The DFO's decades of mismanagement and the interests that have benefited from this have largely lost the support of both fishing communities and the public. Unlike fisheries from previous decades, the BC commercial fleet is no longer a quiltwork of small boat owners. The commercial fleet is now concentrated in the ownership of BC's richest billionaire, and, therefore, the benefits of a destructive fishery are only accrued by one billionaire. It is no secret to First Nations and a growing public that:

*"... the benefits need diversifying. The herring industry is controlled by one man, Jimmy Pattison, and all profits flow to his private empire that, according to BC Business, earned \$10.6 billion in*

*2018, padded out by fuel subsidies for his seine boats. Pattison is counting on a reallocation of tonnage from the spring to the winter fishery, which is supposed to start November 21.*

*The social licence doesn't appear to be on Pattison's side. Ocean Modelling Forum researchers have identified the variety of factors having impacts on herring, which range from pollution to climate change, but the unique threat, which only exists on the Canadian side of the Salish Sea (and is easily remedied), is the fishery; a fishery that is now proven to cause local extirpations."*<sup>26</sup>

Whether these changes will be enough to forestall the impacts of greater ecological processes associated with climate change, or to confer enough resilience on coastal ecosystems, is an open question that depends largely on the extent to which restoration efforts may also change social practices and expectations. However, whichever way we look at it, it is a necessary and timely change away from an unsustainable regime.

The discussion raised by the WSÁNEC Leadership Council comes at a very opportune moment in BC's history. BC has become the first province in Canada to move to endorse as part of its laws UNDRIP (the United Nations Declaration on the Rights of Indigenous People). This is a matter of momentous importance for environmental biologists working around BC. In BC, this is a particularly significant piece of legislation since, apart from Treaty 8 First Nations in Northern BC, no First Nations have signed treaties until the 1998 Nisga'a Treaty Agreement. Most of BC is still on unceded territory, and, therefore, in principle, the environment is to be managed at the very least through joint management agreements with the rightful owners. Although a consent is not a veto, there is now an obligation to act in good faith and to work jointly.<sup>27</sup>

As one commentator pointed out:

*"But for this province, with its vast base of land and resources, mostly unceded by First Nations, the most critical is Article 32.*

*"Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources," it reads in part.*

*"States shall consult and cooperate in good faith with the Indigenous peoples in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources."*<sup>28</sup>

The open question remains that of "good faith" in an environment and history that has done little to build trust, since all gains have had to be acquired in court.

At least UNDRIP is the new mantra in BC. Reality may be different—as with fish quotas. In Canada, it may be bewilderingly different. After the affirmation of the "obligation to consult" in *Tsilhqot'in Nation v British Columbia* (2014), the Supreme Court has recently ruled that the federal government, which also claimed to recognize the need for reconciliation and respect for UNDRIP, is under no obligation when it draws up omnibus bills to consult with First Nations on matters that may affect First Nations. Apparently, First Nations are expected, like the rest of this prosperous nation, to incur the costs of seeking legal remedy after unjust laws are drafted that may affect their territories.<sup>29</sup> That is probably why 'Namgis First Nation is back in court once again suing the DFO for not protecting wild salmon,<sup>30</sup> and the Ministry of Fisheries is now regularly taken to court for breaking its own laws.<sup>31</sup>

UNDRIP may be presented as a “game changer,” however one notices that around the world, it is disregarded when powerful interests are at play, as in Australia’s Adani mine expansion that saw Queensland extinguish Indigenous title.<sup>32</sup> In Canada, things are not radically different from Queensland. There still seems to be an inequality in the law for First Nations. Although we claim to respect and recognize the rights inherent in Section 35 of the *Charter of Rights and Freedoms*, and now in UNDRIP, a recent study showed that in practice there is still one law for First Nations, and another very different one that grants far more authority and rights to the interests of corporations and government:

*“The team at Yellowhead Institute, an Indigenous-led think tank, reviewed nearly 100 injunction cases. They found corporations succeeded in 76 per cent of injunctions filed against First Nations, while First Nations were denied in 81 per cent of injunctions against corporations.*

*Similarly, First Nations were denied in 82 per cent of injunctions filed against the government.”<sup>33</sup>*

So, while UNDRIP may be a move in the right direction, not just for First Nations’ rights, but for sustainable environmental management practices that affect all of us, there is a long way to go, and very little time to get there.

## References

- 1 <https://www.cbc.ca/news/canada/british-columbia/bc-fishing-season-salmon-1.5276995>
- 2 [https://www.sciencemagazinedigital.org/sciencemagazine/01\\_november\\_2019/MobilePagedArticle.action?articleId=1534456&app=false#articleId1534456](https://www.sciencemagazinedigital.org/sciencemagazine/01_november_2019/MobilePagedArticle.action?articleId=1534456&app=false#articleId1534456)
- 3 <https://www.citynews1130.com/2019/09/09/worst-year-for-salmon/>
- 4 <https://earthjustice.org/features/alaska-s-bristol-bay-the-pebble-mine>
- 5 <https://www.mycomoxvalleynow.com/59059/dfo-criticized-after-pacific-salmon-fishery-loses-msc-eco-certification/?fbclid=IwAR2ZXWfFcvNV5V4DdQ0auwbT-tK7XHRZlNMgmK0XneswmBoDFYyEayMir0U4>
- 6 [https://www.theguardian.com/science/2019/nov/03/naomi-oreskes-interview-why-trust-science-climate-donald-trump-vaccine?CMP=share\\_btn\\_fb&fbclid=IwAR12krWR9KV3QfWnNimFWX5Z4kDbGZy43Qq2rOauWIG8Fd7m3nrq\\_-md2ZM](https://www.theguardian.com/science/2019/nov/03/naomi-oreskes-interview-why-trust-science-climate-donald-trump-vaccine?CMP=share_btn_fb&fbclid=IwAR12krWR9KV3QfWnNimFWX5Z4kDbGZy43Qq2rOauWIG8Fd7m3nrq_-md2ZM)
- 7 [https://www.theguardian.com/australia-news/2019/nov/17/what-could-i-have-done-the-scientist-who-predicted-the-bushfire-emergency-four-decades-ago?CMP=share\\_btn\\_fb&fbclid=IwAR3LiXqUVDQbI0KSy3-HIm4Y5U3avlsSQ9NmpRLdKGJ3S0i6-flnxDBiBc](https://www.theguardian.com/australia-news/2019/nov/17/what-could-i-have-done-the-scientist-who-predicted-the-bushfire-emergency-four-decades-ago?CMP=share_btn_fb&fbclid=IwAR3LiXqUVDQbI0KSy3-HIm4Y5U3avlsSQ9NmpRLdKGJ3S0i6-flnxDBiBc)
- 8 Shane A. Blowes et al.. (2019). “The geography of biodiversity change in marine and terrestrial assemblages.” *Science* 366: 339-345.
- 9 Britas Klemens Eriksson and Helmut Hillebrand (2019). “Rapid reorganization of global diversity.” *Science* 366:308-309.
- 10 <https://www.nature.com/articles/s41598-019-51699-4.pdf>
- 11 [https://www.researchgate.net/publication/26289115\\_Phocine\\_Distemper\\_Virus\\_in\\_Northern\\_Sea\\_Otters\\_in\\_the\\_Pacific\\_Ocean\\_Alaska\\_USA](https://www.researchgate.net/publication/26289115_Phocine_Distemper_Virus_in_Northern_Sea_Otters_in_the_Pacific_Ocean_Alaska_USA)
- 12 <https://www.pnas.org/content/pnas/100/21/12223.full.pdf>
- 13 <https://www.pnas.org/content/pnas/100/21/12223.full.pdf>, 12227
- 14 <https://www.theguardian.com/environment/2019/mar/04/heatwaves-sweeping-oceans-like-wildfires-scientists-reveal>
- 15 <https://marine.ucsc.edu/data-products/sea-star-wasting/>; <https://www.ucdavis.edu/news/survey-shows-impact-sea-star-wasting-disease-salish-sea>
- 16 <https://www.cbc.ca/news/technology/sea-urchin-explosion-1.5333232>
- 17 <https://www.theglobeandmail.com/news/british-columbia/the-remarkable-comeback-of-sea-otters-to-the-bc-coast/article19681665/>
- 18 <https://cedar.wvu.edu/ssec/2014ssec/Day1/18/>
- 19 <https://seashepherd.org/2019/10/29/strait-of-georgia-herring-in-steep-decline/>
- 20 <https://www.pacificherring.org/news/assessment-and-management-salish-sea-herring>
- 21 <https://www.focusonvictoria.ca/focus-magazine-march-april-2019/the-case-for-ending-the-herring-fishery-r9/>
- 22 <https://www.pnas.org/content/pnas/111/9/E807.full.pdf>
- 23 <https://vancouver.sun.com/news/staff-blogs/health-of-fishery-based-on-assessment-of-a-broken-ecosystem-sfu-study-finds>
- 24 <https://www.focusonvictoria.ca/focus-magazine-march-april-2019/the-case-for-ending-the-herring-fishery-r9/>
- 25 <http://www.heiltsuknation.ca/tag/herring/>
- 26 <https://www.focusonvictoria.ca/focus-magazine-nov-dec-2019/let-the-herring-live-r11/?fbclid=IwAR1DeODEIjV6IGbF0eGRb41eqG8tXSIVJLBxR46ohbTy5iNpActeoGvOkk>
- 27 [https://www.nationalobserver.com/2019/11/08/opinion/bcs-declaration-act-explained?utm\\_source=National+Observer&utm\\_campaign=0d416a0558-WEEKLY\\_Nov092019\\_PS&utm\\_medium=email&utm\\_term=0\\_cacd0f141f-0d416a0558-276983897&mc\\_cid=0d416a0558&mc\\_eid=90f484eb39&fbclid=IwAR0LyIZHEXjKkRJ-FLT70ZqSU7e7T6i7JK-dF-s7J1vfn01lDsJZgh3exbc](https://www.nationalobserver.com/2019/11/08/opinion/bcs-declaration-act-explained?utm_source=National+Observer&utm_campaign=0d416a0558-WEEKLY_Nov092019_PS&utm_medium=email&utm_term=0_cacd0f141f-0d416a0558-276983897&mc_cid=0d416a0558&mc_eid=90f484eb39&fbclid=IwAR0LyIZHEXjKkRJ-FLT70ZqSU7e7T6i7JK-dF-s7J1vfn01lDsJZgh3exbc)
- 28 [https://vancouver.sun.com/opinion/columnists/vaughn-palmer-b-c-ndp-ready-to-adopt-un-resolution-on-indigenous-rights-but-will-it-mean-a-veto?fbclid=IwAR3-fiKhZFAKE0Xk2SpidqsDWw4tMXFEPI\\_kkibZjL9kaSpX14o1O87D\\_A](https://vancouver.sun.com/opinion/columnists/vaughn-palmer-b-c-ndp-ready-to-adopt-un-resolution-on-indigenous-rights-but-will-it-mean-a-veto?fbclid=IwAR3-fiKhZFAKE0Xk2SpidqsDWw4tMXFEPI_kkibZjL9kaSpX14o1O87D_A)
- 29 <https://www.cbc.ca/news/politics/tasker-indigenous-rights-consultation-parliament-1.4858321>
- 30 [https://www.northislandgazette.com/news/namgis-first-nation-sues-dfo-again-says-they-arent-protecting-wild-salmon/?fbclid=IwAR1fg6DBTfB96K3Y4RtNnhIFoVaaNPkTLjUhaAsOK14Jd8HluWzhVzL\\_cbY](https://www.northislandgazette.com/news/namgis-first-nation-sues-dfo-again-says-they-arent-protecting-wild-salmon/?fbclid=IwAR1fg6DBTfB96K3Y4RtNnhIFoVaaNPkTLjUhaAsOK14Jd8HluWzhVzL_cbY)
- 31 <https://www.ecojustice.ca/pressrelease/minister-of-fisheries-and-oceans-sued-for-putting-wild-salmon-at-risk/>; <https://www.lexology.com/library/detail.aspx?g=99faaa7f-dca5-4b3e-8c28-fe7a1cdded6c>
- 32 <https://www.abc.net.au/news/2019-01-25/adani-mine-should-be-suspended-un-traditional-owners/10686132>; <https://www.theguardian.com/business/2019/aug/31/queensland-extinguishes-native-title-over-indigenous-land-to-make-way-for-adani-coalmine>
- 33 [https://www.nationalobserver.com/2019/11/08/features/courts-deny-most-first-nations-injunctions?fbclid=IwAR0ze6qmQnHKQcVap9YenXQNVYJn9x7dY-ALTiPhc\\_kgiInid9aCarlyIA3c](https://www.nationalobserver.com/2019/11/08/features/courts-deny-most-first-nations-injunctions?fbclid=IwAR0ze6qmQnHKQcVap9YenXQNVYJn9x7dY-ALTiPhc_kgiInid9aCarlyIA3c)

## ALBERTA News

Submitted by Brian Free, CSEB Alberta Regional Director



Greta Thunberg at the Alberta Legislature

Alberta had a visitor in October.... Greta Thunberg, the young Swedish climate activist who has attracted international attention for her stern warnings about climate change. She spent several days visiting Calgary, Edmonton, Fort McMurray, and the Athabasca glacier in Jasper National Park. I was able to



attend part of the Climate Action rally in Edmonton, but I missed her speech... bad planning on my part. Nevertheless, the large crowd and strong support for her message was inspiring. I did observe some counter-protestors in the crowd, quietly holding up their signs supporting Alberta's oil industry. I could also hear the honking of horns in the distance from the truckers who had driven to Edmonton to remind everyone that "this is oil country"! Nevertheless, there did not seem to be any uncivil posturing by the two sides, something our politicians can learn from.

In related news, the Alberta government released a key component of its climate strategy in the form of the Technology Innovation and Emissions Reduction system (TIER). In a nutshell, it requires large industrial emitters to reduce their emissions by 10 percent in 2020 or use emission credits from other high performing facilities. They can also pay \$30 per tonne of carbon dioxide to support innovative technologies and help reduce the provincial deficit. Whether this meets the federal equivalency regarding a carbon tax remains to be seen. It's all so very political.

## SASKATCHEWAN News

*Submitted by Robert Stedwill, CSEB Saskatchewan Member*

On November 6th, the Saskatchewan Ministry of Environment introduced legislation that hopefully will improve the ability of the province to respond to threats posed by aquatic invasive species, such as zebra mussels (*Dreissena polymorpha*) and others prohibited by law, and provide additional protection to aquatic species at risk.

This new act, known as *The Fisheries Act* (Saskatchewan), 2019, will modernize and clarify the language currently used, and maintain the current intent of the Act. There will also be consistency with other relative acts, such as the *The Environmental Management and Protection Act* of 2010, and *The Wildlife Act* enacted in 1998.

Under the previous legislation, there were specific gaps and limitations, and the new Act addresses those challenges.

Enhancements in the new Act include the authority to respond quickly and efficiently to prohibited and aquatic invasive species threats; the authority to enable the development of chapters within the Saskatchewan Environmental Code with respect to prohibited and invasive species and species at risk; providing the Minister with the authority to appoint members to the Fisheries Advisory Committee of Saskatchewan; and adding provisions to protect aquatic species at risk within the province and not currently protected under federal law.

The new Act will allow the application of administrative penalties for non fishery incidents, such as failing to abide by conditions imposed by permit.

During development of the new Act, the ministry engaged with First Nations and Métis communities, the Saskatchewan Fisheries Advisory Committee, and stakeholders.

*The Fisheries Act* (Saskatchewan), 1994, had not been subjected to a full review since its inception. The new legislation is expected to be in place by spring 2020.

## MANITOBA News

*Submitted by Robert Stedwill, CSEB Member*

With the death of our former president, Bill Paton, who was a professor at Brandon University, I have endeavoured to fill his shoes (very difficult) from afar here in Saskatchewan, and have utilized government websites and newspaper clippings to try and ascertain what's happening in Manitoba from an environmental perspective. I have resorted to using Manitoba friends who are in the know and have been most helpful in directing me to other possibilities.

One such possibility is the information that will likely be coming from the proposed Churchill Marine Laboratory in Churchill, Manitoba, on the shores of Hudson Bay. This laboratory is under the auspices of the Centre for Earth Observational Sciences at the University of Manitoba.

"The proposed Churchill Marine Observatory (CMO) is envisaged as an innovative Arctic marine observatory and technology incubation centre, allowing direct, comprehensive observation of a complex natural ecosystem and delivering cutting edge research of environmental variability. CMO is designed to build upon the exceedingly successful execution of the Sea-ice Environmental Research Facility (SERF) on the U of M campus. This new laboratory facility will use ambient Arctic conditions and natural seawater to grow and test sea ice that has been impacted by oil, liquefied natural gas, or other contaminants. CMO will be the only fully integrated facility of its kind in the Arctic. It will incorporate simultaneous ocean, estuary, and atmospheric observation and contaminant platforms designed to study the Ocean-Sea Ice-Mesocosm (OSIM)." More to come on this project as it matures.

Manitoba is embarking on a two year research initiative to assess ungulate movement on the west side of the province and looking at hot spot areas for the potential/inevitable arrival of chronic wasting disease (CWD) in the province. More on this as I contact some of the lead investigators and as results become available.

And finally, since I last reported that a zebra mussel (*Dreissena polymorpha*) veliger had been found in Shoal Lake (which is the water supply for the City of Winnipeg), which is a component body of water for Lake of the Woods, which straddles the Canada/U.S. border, the Minnesota Department of Natural Resources (DNR) has found zebra mussel larvae.

The DNR found no juvenile or adult mussels in three water samples tested on the Minnesota side of Lake of the Woods. Veligers ranged from 4-185 in the three samples.

Minnesota has designated Lake of the Woods waters as infested.

### CSEB Research Webinars

Check the CSEB Website at

[www.cseb-scbe.org](http://www.cseb-scbe.org)

for upcoming webinars and registration information.

## ONTARIO News

Submitted by Barbara Hard, CSEB Ontario Director

### Ontario is Implementing Changes to the Re-Use of Local Excess Soils

The Ontario Ministry of the Environment, Conservation and Parks (MECP) has announced that it is implementing regulatory changes under the *Environmental Protection Act* (EPA) that will make it safer and easier for industry to re-use more excess soil locally and to redevelop brownfield properties. This will include

- a new *On-Site and Excess Soil Management Regulation*;
- complementary and burden reduction amendments to Ontario Regulation (*O. Reg.*) 153/04 (Records of Site Condition);
- complementary amendments to *O. Reg.* 347 (General: Waste Management);
- complementary amendments to *O. Reg.* 351/12 (Registrations under Part II.2 of the Act - Waste Management Systems); and
- a document adopted by reference in the *On-Site and Excess Soil Management Regulation* titled "Rules for Soil Management and Excess Soil Quality Standards".

The changes clarify rules that will reduce construction costs associated with managing and transporting excess soil, limiting the amount of soil being sent to landfill, and lowering greenhouse gas emissions from the sector, while continuing to ensure strong protection of human health and the environment.

This regulation supports delivery of actions in Ontario's "Made-In-Ontario" Environment Plan including reduced barriers to redevelop brownfields, clear soil reuse rules, and improved enforcement of illegal dumping of excess soil. It will

- recognize excess soil as a resource;
- set clear rules to increase reuse opportunities and reduce soil relocation costs, including reuse standards;
- reduce clean excess soil going to landfill as waste;
- lower greenhouse gas emissions associated with excess soil movement;
- protect human health and the environment;
- ensure compliance related to soil management and reuse; and
- remove specific brownfields redevelopment barriers.

The regulatory changes are meant to achieve the following:

- Reuse of soil: The *On-Site and Excess Soil Management Regulation* will clarify requirements for the reuse and management of excess soil, including risk-based standards for safe reuse. The regulation also clarifies when the waste designation applies to the movement and disposal of excess soil and replaces or simplifies waste-related approvals with regulatory rules for low risk soil management activities. These provisions will come into effect on July 1, 2020.
- Excess Soil Planning Actions: Subject to exceptions, project leaders of certain projects generating or receiving excess soil will be required, starting January 1, 2022, to conduct excess

soil management actions before any excess soil leaves the project area, including in some cases characterizing the soil to determine the concentrations of contaminants in the soil. It would also include identifying appropriate reuse sites and tracking excess soil movements. Key information would be required to be registered on a public registry.

- Landfilling of excess soil: The *On-site and Excess Soil Management Regulation* will restrict the deposit of clean soil at landfill sites, unless the soil is needed for cover or functions beneficial to the functioning of the landfill. This requirement will come into effect on January 1, 2025.
- Brownfields redevelopment: Brownfield properties that are vacant or underutilized lands previously used for industrial or commercial activities and that typically require the filing of a Record of Site Condition before being redeveloped. The amendments to *O. Reg.* 153/04 include reduced requirements associated with filing a Record of Site Condition. This includes a reduced need to fully delineate contaminants for properties going through the Risk Assessment process, flexibility on meeting standards in specific circumstances, and removing the requirement for a Record of Site Condition for specific low risk redevelopment situations.

This regulatory package will come into effect on the following timing:

- Brownfields redevelopment amendments: upon filing.
- Excess soil provisions related to more flexible reuse rules, waste designation and approvals and the new excess soil standards would come into effect in July 2020.
- Aspects of the excess soil regulation related to sound soil management planning (e.g., sampling, tracking, and registration) and the requirement related to carrying a hauling record, would come into effect in January 2022.
- Restrictions on landfilling would come into effect in January 2025 allowing time to ensure alternate reuse approaches are available, as needed.

The final Decision Notice is contained in the Environmental Registry, EBR# 013-5000. (Source: MECP).

## ATLANTIC News

Submitted by Peter Wells, CSEB Atlantic Member

### New Biological Test Method from IGETG – Reference Method for Determining Acute Lethality Using *Acartia tonsa*

The Inter-Governmental Ecotoxicology Testing Group or IGETG is a technical group established by Environment Canada in 1976 for the purpose of developing generic (universal) biological test methods and reference methods "for measuring and assessing the toxic effect(s) on single species of aquatic or terrestrial organisms caused by their exposure to samples of effluent and chemicals under controlled and defined laboratory conditions" (ECCC 2019). The group's work was described by Taylor et al. (2013). The group includes aquatic



and eco-toxicologists from federal and provincial laboratories, consulting firms, academia, and industry. They meet once a year at the annual Canadian Ecotoxicity Workshop, but work collaboratively throughout the year on specific methods. To date, 18 generic methods and 7 reference methods have been written, under the guidance of the Biological Assessment and Standardization Section of Environment and Climate Change Canada (ECCC), Ottawa; PDFs of the methods are available at [www.ec.gc.ca/faunescience-wildlifescience/default.asp?lang=En&n=OBB8OE7B-1](http://www.ec.gc.ca/faunescience-wildlifescience/default.asp?lang=En&n=OBB8OE7B-1).

The most recent and just published test method is for determining acute lethality using the copepod *Acartia tonsa* (ECCC 2019). As described by Rick Scroggins, Chief, Biological Assessment and Standardization Section, ECCC (R. Scroggins, pers. comm., Sept 2019), "*Acartia tonsa* is a marine calanoid copepod and this method will primarily be applied in the assessment of the acute lethality of saline effluent. This method is anticipated to be incorporated into the *Metal and Diamond Mining Effluent Regulations* under Canada's *Fisheries Act*. The test methodology focuses on effluent compliance testing but also includes instructions for the testing of individual substances". The methods document is comprehensive and covers test organisms, facilities, general procedure for determining acute lethality of effluent, procedure for a single-concentration test to determine percent mortality at 48 hours, procedure for a multi-concentration test to determine the 48-h LC<sub>50</sub>, procedure for testing a reference toxicant, procedure for testing chemicals, reporting requirements, and references.

Due to their importance in freshwater and marine food webs and ecosystems, copepods have been studied extensively in pollution studies over many years (Wells 1984; Ward 1995) and are considered by other methods organizations (e.g., ASTM, APHA). It is gratifying to see this test method with *Acartia* developed by IGETG and ECCC for use in protecting Canada's marine waters from industrial effluents and toxic chemicals.

## References

- Environment and Climate Change Canada (ECCC). 2019. Biological Test Method: Reference Method for Determining Acute Lethality Using *Acartia tonsa*. Reference Method STB 1/RM/60, June 2019. 48p.
- Taylor, L.N., K.G. Doe, R.P. Scroggins and P.G. Wells. 2013. Regulatory ecotoxicology testing in Canada – activities and influence of the Inter-Governmental Ecotoxicology Testing Group. *Water Quality Research Journal of Canada* Vol 48(1):14-29.
- Ward, G.S. 1995. Saltwater tests. Ch. 3 in *Fundamentals of Aquatic Toxicology*, Second Edition. G.M.Rand, Ed. Taylor and Francis, Wash., DC. P. 103-133.
- Wells, P.G. 1984. Marine ecotoxicological tests with zooplankton. Pages 215-256 in *Ecotoxicological Testing for the Marine Environment*, G. Persoone, E. Jaspers, C. Claus, editors, State University of Ghent, Ghent, and Inst. Mar. Scient. Res., Bredene, Belgium. Vol. I. 798 p.

## Highlights of the Recent GOM2050 International Symposium

The Gulf of Maine International Symposium was held in Portland, ME, Nov. 4-8th, 2019, organized by the Gulf of Maine Research Institute, The Maine Coastal Program (State of Maine), the Gulf of Maine Council on the Marine Environment, and the

Huntsman Marine Science Centre, St. Andrews, NB, Canada. The primary theme and topic under discussion was climate change and the changing climate in the Gulf of Maine (GOM). Hence, talks focused on sea level rise and precipitation, ocean acidification, and warming waters, three of the major changes occurring in local coastal waters attributed to overall climate change. Working group sessions each afternoon focused on gap analysis to determine what we are prepared for or not, and to identify the most important policy and management action items and research priorities moving forward. Posters were given on a very wide range of marine, coastal and fisheries topics relevant to the GOM and Bay of Fundy. I was a co-author of three posters – one on chemical contaminants on the GOM, one on BoFEP (Bay of Fundy Ecosystem Partnership), and one on the EIUI (Environmental Information – Use and Influence) research program at Dalhousie University and results of its studies relevant to the GOM. Proceedings of the Symposium are in preparation. The full program, core background papers, and abstracts of talks and posters are available on the website ([www.gulfofmaine2050.org](http://www.gulfofmaine2050.org)). Highlights of messages from the symposium included:

1. **Importance of information** — “tailored information in regional contexts is crucial to informing priority actions” (Ko Barrett, IPCC/NOAA).
2. **Importance of collaboration** — to resolve a problem as complex as climate change, one must collaborate, breaking down silos (the barriers between disciplines) and embracing trans-disciplinarity (especially by working in teams) (Rob Stephenson, DFO).
3. **Indicators of Climate change (CC)**
  - a. There are various physical drivers of change; they interact amongst themselves and with other environmental changes. It is crucial to understand these interactions.
  - b. For the GOM, one can expect higher water temperatures, significant SLR (sea level rise), a highly variable climate, more extreme rain events, an increase in wind events, and a general increase in storminess over the next few decades. Think about the implications of more storms and more rain, e.g., flooding in the watersheds.
  - c. Salt marshes around the GOM perform important ecosystem services related to controlling the effects of and increasing the resilience to SLR, and the trapping of carbon, metals, and nitrogen important to the restoration and function of salt marshes in overall adaptation to CC.
  - d. There are a number of coastal resiliency programs around the GOM, with a lot of information being produced. One of the big challenges is getting people to use this information in the course of making decisions re mitigation and adaptation to CC, e.g., transitioning fisheries, considering property insurance, consideration of local SLR, considering the cost of inaction, recognizing the importance of trust in the whole process of knowledge transfer.
  - e. Ocean acidification (OA) is a scientifically complex subject. Given the predictions of reduced pH (increased acidification) for the GOM, important fisheries such as lobster, clam, and scallops, and aquaculture of oysters, will be impacted, with social implications. Coastal water pH also varies with season, temperature, and location, with

lots of potential biogeochemical feedback loops. OA can/ should be monitored using an enhanced “integrated sentinel monitoring network” using buoyed OA instruments to measure pH but also predictors of pH (temperature, salinity, oxygen, nitrates) via modelling. Given the complexity of understanding the processes and implications of OA, there is a need to understand the multiple stressors and their interactions, as well as having collaborative monitoring utilizing citizen scientists and sharing information through various networks, e.g., the Ocean Acidification Information Exchange ([OAinfoExchange.org](http://OAinfoExchange.org)).

- f. The anticipated impacts of warming waters (increased surface and bottom temperatures) is a major concern, as GOM waters are warming faster than 99% of the world's waters. This has implications for the distribution of plankton (e.g., zooplankton such as *Calanus*) and other species (e.g. whales), as well as for the spread of invasive species and diseases. Considerable effort is going into modelling temperatures, salinity, and stratification, in the context of IPCC scenarios. Temperature changes have affected kelp forests in the southern GOM, an economic and ecological resource, and consequently the shallow subtidal ecology. Seabirds, right whales, and fisheries (hence fishing communities) have been or will be affected by the changing water temperatures, due to the shifting distribution of species affected by temperature change.

4. The **important role of data collection and information sharing** was emphasized throughout the meeting. Besides formal scientific approaches, fishermen could be employed collecting temperature data, given the concerns about lobster and crab fisheries under higher temperatures. There is an effort called “coastal environmental baseline data collection” (DFO). Citizen science efforts in monitoring the coastal environment should be supported, and the linkages between scientists and coastal communities should be strengthened. Information on CC should be communicated to different audiences, as well as listening to the concerns of communities.
5. **A final reflection on the Symposium and the CC topic** – speed up the response to the CC issue, learn more about the various interacting variables of CC effects in coastal waters, and communicate out to various audiences, across the sectors, with understandable information (condense scientific reports for the various users). Prepare for collaborative research and for the greater sharing of information. It is especially important, and mentioned by numerous speakers, to get the information into the schools, so that the next generation of active citizens are well informed and interested in acting on the issue at the local level. Finally, continue the discussion in other fora, such as at the upcoming BoFEP Bay of Fundy Science Workshop (May 2020).



## Wide Range of Research Microscopes for all Applications

- Bright and Uniform LED Eco-Illumination
- Ergonomic, Flexible & Adjustable Design
- Effortless Image Capturing
- Versatile Observation Techniques
- Technical Solution Expertise
- Proven Onsite Maintenance & Service



**[www.hoskin.ca](http://www.hoskin.ca) | [sales@hoskin.ca](mailto:sales@hoskin.ca)**  
Vancouver | Oakville | Montréal





## TERRITORIES News

Submitted by Sharleen Hamm, RPBio, CSEB Territories Director

September 2019 saw the Ministerial acknowledgement of Receipt by Crown Indigenous and Northern Affairs Canada (CIRNAC) of the Nunavut Impact Review Board's (NIRB) final report on the strategic environmental assessment (SEA) of Baffin Bay and Davis Strait in the Qikiqtani Region of Nunavut. In 2016, the federal government put in place a five year moratorium on oil and gas exploration in Arctic waters; the purpose of the SEA was to develop an improved understanding of potential oil and gas exploration opportunities, their related effects, benefits and management, and thereafter make recommendations to the Government of Canada for their consideration in the 2021 review and reconsideration of the moratorium on oil and gas development in the Arctic waters in Baffin Bay and Davis Strait. This was the first SEA of its kind in Nunavut.

SEA is a procedure to “analyse and communicate environmental and health considerations related to development strategies, plans and programmes prepared by governments” (UNECE 2016). SEAs differ from environmental impact assessments (EIAs) in a few ways, namely that EIAs are typically enshrined in legislation (such as the *Nunavut Project and Planning Assessment Act*) and are usually project-specific.

In Canada, a SEA of a policy, plan, or program may be triggered when a proposal is submitted to an individual minister or Cabinet for approval and when implementation of the proposal may result in important environmental effects (GOC 2010). In the case of the Baffin Bay and Davis Strait SEA, and in response to requests from the Qikiqtani Inuit Association (QIA) and Nunavut Tunngavik Inc. (NTI), the Government of Canada agreed to undertake the SEA and initiated the process with the NIRB in February 2017. The NIRB conducted the SEA and was supported by a working group consisting of representatives from the NIRB, CIRNAC, NTI, QIA, and the Government of Nunavut (GN).

The NIRB designed the SEA to

- “Collect background information regarding conditions in Baffin Bay and Davis Strait (the Area of Focus);
- Describe potential challenges, obstacles, and other factors relevant to possible oil and gas development in the Area of Focus;
- Describe possible oil and gas development scenarios;
- Assess the potential for impacts and benefits associated with oil and gas development if this type of development would be allowed to proceed in the Area of Focus;
- Identify knowledge and data gaps, and areas of concern;
- Facilitate extensive public engagement and participation of Inuit knowledge and rights holders from the Area of Focus;
- Facilitate the gathering and sharing of Inuit Qaujimaqatungit and Inuit Qaujimaningit; and
- Deliver the Board's Final Report” (NIRB 2019).

The NIRB undertook scoping, including several public meetings in each of 10 interested communities, and with the support of an independent consultant, examined possible development scenarios, engaged with the public on these scenarios, and issued a final report to CIRNAC.

A number of valued ecosystem components were identified in the SEA. Of interest to the CSEB membership may be the NIRB's recommendations regarding baseline research and impact assessment, and recommendations pertaining to mitigation, monitoring modelling and prediction. Regarding baseline research and impact assessment (see volume 3 of the Final SEA report, NIRB 2019), the NIRB recommends, among other things, that

- baseline research and effects assessments include consultations with Inuit knowledge and rights holders and consideration of Inuit Qaujimaqatungit and Inuit Qaujimaningit;
- research is conducted to improve the understanding of
  - marine plankton;
  - benthic flora and fauna;
  - fish and fish habitat;
  - water birds;
  - marine mammals;
  - oceanographic processes;
  - coastal habitat features;
  - water and sediment quality;
  - sensitive or critical habitat;
  - cumulative effects.

The NIRB concluded “Given the importance of the marine environment to the well-being of Nunavummiut, significant gaps in knowledge of the environment necessary to support impact assessment, and an overall lack of regulatory, industry and infrastructure readiness in Nunavut, the 2016 moratorium on oil and gas development in the Canadian Arctic should remain in place for Baffin Bay and Davis Strait until such time as the key issues set out in this Report can be addressed. The Board expects that it will take at least a decade to complete the research, planning, and consultation identified as necessary prior to undertaking a re-assessment by the Minister to determine if the moratorium should be lifted” (NIRB 2019). Efforts to fill knowledge gaps and reduce uncertainty, support community readiness, enhance marine planning, understand alternatives, and ensure Inuit knowledge and rights are considered throughout are key themes that emerged through the SEA process and underpinned the NIRB's recommendation (NIRB 2019).

Through the review process, a tremendous amount of literature was reviewed, a summary of which is far beyond the capacity of this Bulletin. I encourage interested readers to access the NIRB public registry at <https://www.nirb.ca>, plug in the NIRB file # 17SN034, click on the Documents tab and then refer to the Literature Review: GENERAL tab on the left of the screen. Here you will find 588 documents on everything from movements of female polar bears to ringed seal ecology to lipid storage in marine zooplankton; a tremendous compendium of Arctic research. Happy reading!

**Figure 1: Strategic Environmental Assessment  
Oil and Gas Development  
Scenarios**



**Figure 2: Strategic Environmental Assessment  
Area of Focus in Baffin Bay and  
Davis Strait**



## References

- Government of Canada. 2010. Strategic Environmental Assessment: The Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals. Guidelines for Implementing the Cabinet Directive. Published jointly by the Privy Council Office and the Canadian Environmental Assessment Agency. Ottawa.
- Nunavut Impact Review Board. 2018. Final Scope List for the NIRB's Strategic Environmental Assessment in Baffin Bay and Davis Strait. Letter to distribution, March 9, 2019. NIRB File No. 17SN034.
- Nunavut Impact Review Board. 2019. Final Report for the Strategic Environmental Assessment in Baffin Bay and Davis Strait. NIRB File No. 17SN034.
- United Nations Economic Commission for Europe. 2016. Protocol on Strategic Environmental Assessment: Facts and Benefits. Retrieved from: <http://www.unece.org/index.php?id=42853&L=0>

## Other Territories News

*Submitted by Anne Wilson, CSEB Territories Director*

As the period of daylight grows shorter, I tend to look ahead and wonder what is in store for us for winter weather. This year the Nunavut forecast for Baffin Island and the high Arctic is unequivocal – it will be warmer than normal. The rest of the

areas north of 60 will get anything from norms to a chance of a colder winter, with above normal precipitation levels – noting that the “historical percent correct” percentage for the 1-3 month forecasts is about the same odds as flipping a coin for an answer!

There continues to be a focus on the effects of climate change on Canada's Arctic. Recent work on marine mammal disease transmission draws a link between Arctic sea ice reduction and outbreaks of a viral disease (Phocine distemper virus, or PDV) affecting marine mammals in the North Pacific. The premise is that reductions in sea ice could increase contact between Arctic and sub-Arctic marine mammals and lead to viral transmission across the Arctic Ocean. (see VanWormer, E., Mazet, J.A.K., Hall, A. et al. Viral emergence in marine mammals in the North Pacific may be linked to Arctic sea ice reduction). Arctic sea ice has declined at an average rate of 12.8% each decade between 1979 and 2018, according to the Intergovernmental Panel on Climate Change (IPCC). The article can be found at Sci Rep 9, 15569 (2019) <https://www.nature.com/articles/s41598-019-51699-4>.

Caribou conservation is top-of-mind in the North. The World Wildlife Fund recently reported on the results of a poll of Nunavut, Yukon, and the Northwest Territories for legislation to prevent mining or oil and gas development that could threaten barren-ground caribou. With barren-ground caribou populations in steep decline



(down by as much as 98% from hundreds of thousands), there is strong support to develop legislation to establish protected areas.

*"According to an Environics Research poll that was commissioned by WWF-Canada, 87 per cent of residents in Nunavut, Yukon, Northwest Territories, Nunavik and Nunatsiavut want caribou calving grounds to be declared fully protected areas that do not allow industrial development such as oil and gas or mining projects. In Nunavut, 74 per cent of respondents "strongly support" this safeguard, and 12 per cent somewhat support it." (See <http://www.wwf.ca/newsroom/?31021/northerners-want-caribou-calving-grounds-protected>)*

However, mining is one of the main economic drivers in the North; in 2017 mining production was valued at \$2.07 billion dollars in the NWT (almost half of the GDP), \$844 million in NU (about a third of the GDP), and \$301 million in YT (about one-eighth of the GDP). There will need to be an approach that balances strong protection and economic factors. At every public hearing for a proposed mining development, the desire for benefits, skills, and jobs for youth is emphasized by both elders and working-age community members.

Mining has been a part of the economic fabric of the North since the early twentieth century, in many cases leaving legacy contaminated sites that are being remediated many decades later. Examples include the Giant gold mine and Rayrock uranium mine (NWT), Faro Mine and United Keno Hill Mines (YT), and the Jericho diamond mine (NU), and there are also numerous smaller-scale historic mine sites needing remediation across the territories. A listing of the sites currently under federal assessment and/or remediation can be found on the Federal Contaminated Sites Action Program web site (see [http://publications.gc.ca/collections/collection\\_2019/eccc/En1-43-2017-eng.pdf](http://publications.gc.ca/collections/collection_2019/eccc/En1-43-2017-eng.pdf)).

Lessons have been learned from the past practices that led to such huge environmental liabilities. All new projects in the North are scrutinized closely, and proposed developments must include a conceptual closure and reclamation plan—cradle to grave planning, or as Steven Covey put it, "begin with the end in mind". Regulatory processes currently underway in the NWT provide examples of the evolution of better practices and the cost of dealing with legacy contaminants.

On the historic end of the spectrum lies the remediation of the Giant Mine site, which operated from 1948 to 1999 when its operator declared bankruptcy. Cleanup is projected to cost nearly one billion dollars, and the site will require active management in perpetuity. This site is managed by a federal custodian, and is currently in the water licensing process for permitting of the proposed closure activities.

The Con Mine site presents a hybrid closure situation; it is also a historic mine that was in operation from 1938 to 2003, and has legacy areas of contamination to deal with associated with early practices. This site has a valid water licence and active closure planning has been done by the responsible owner. Approved remedial measures are substantially completed for much of the mine site; however, there are areas just outside of the mine's lease that are highly contaminated due to historic releases. A plan for remediation of these areas will have to be developed, and is expected to be a collaborative (and complicated) process.

A contemporary example is presented by the Snap Lake Diamond Mine, which was in operation from 2008 to 2015. A Final Closure Plan was submitted in 2019, and is being reviewed in conjunction with the renewal of the site's water licence. This site is fully the

responsibility of the company (De Beers), and the final closure of the site will have to meet standards that are protective of the environment and that are acceptable to stakeholders and approved by the regulatory board.

When we know better, we do better. I am curious to see what further lessons will be learned over the next decades!

Other development activities in the North include the following:

- The Environmental Assessment process for Baffinland Iron Mine's proposed Phase 2 expansion has been extended to allow for more information to be provided to affected communities. The November public hearings were adjourned before being completed, and will be delayed up to a year. Water licence amendment processes have been paused as well.
- Agnico Eagle's proposed expansion of the Whale Tail gold project is still underway. Nunavut Impact Review Board public hearings were held at the end of August for the amendment of the Project Certificate, and water licence technical meetings were held at the end of October. Following the release of the NIRB decision, water licence hearings will be upcoming.
- Public hearings for the Giant Mine water licence are scheduled for January 2020.
- The Lupin Mine closure water licence renewal will be discussed in public hearings during January 2020. There are some concerns with the implementation of the approved closure plan, in light of climate change and potential ARD issues.

Mineral exploration has slowed down significantly in the North, and there are fewer potential developments in the wings as a result. One of the more interesting ones is De Beer's proposed Chidliak diamond project in Nunavut, which is to be proposed to have 100% renewable energy use. This project is still in the feasibility stage, with some further exploration underway.

I would like to wish each of us a relaxing and fun Christmas season, and all the very best for 2020!

### John Lilley Undergraduate Scholarship in Environmental Science

In 2008, the John Lilley Environmental Scholarship was established in memory of our past President and long-time supporter and friend, John Lilley. The \$600 (current value) scholarship is at the University of Alberta and is awarded to a student with superior academic achievement entering the second year of study for a Bachelor of Science in Environmental and Conservation Sciences in the Faculty of Agricultural, Life and Environmental Sciences. Selection is based on demonstrated involvement with a not-for-profit environmental organization and academic standing.

The two recipients for 2019 were as follows:

Abigail Rehlau and Jessica Hermay.

Congratulations!

CANADIAN CENTRE FOR  
EVIDENCE-BASED  
CONSERVATION



Carleton  
UNIVERSITY

## Evidence Call for Grey Literature

The Canadian Centre for Evidenced-Based Conservation (CEBC) at Carleton University, in collaboration with Fisheries and Oceans Canada, needs your help with an ongoing systematic review:

### **How do changes in flow magnitude due to hydro-electric power production affect fish abundance and diversity in temperate regions?**

#### **Aim:**

The primary aim of this systematic review is to clarify, from the existing literature, how fish abundance and diversity are impacted by alterations in flow magnitude due to hydropower production in order to better inform decisions in water resource and fisheries management.

#### **What are we looking for:**

The review team is sourcing studies on this topic in the form of:

- Academic research and theses
- Reports (e.g., government, NGO, consultant, community)
- Conference papers
- Workshop summaries
- White papers
- All other literature “that is produced on all levels of government, academics, business, and industry in print and electronic formats, but which is not controlled by commercial publishers” (*4<sup>th</sup> International Conference on Grey Literature, 1999*).

\*Please note - to be eligible for inclusion in our review, literature should include written methodology and results at a minimum (i.e., not only a dataset)

#### **Get in touch:**

If you can provide any grey literature (or relevant published material) on this subject, please send any information to [MeaganHarper@cmail.carleton.ca](mailto:MeaganHarper@cmail.carleton.ca) by January 31<sup>st</sup> 2020.

Thank you!



# CANADIAN SOCIETY OF ENVIRONMENTAL BIOLOGISTS

## LA SOCIÉTÉ CANADIENNE DES BIOLOGISTES DE L'ENVIRONNEMENT

### FORMULAIRE D'ABONNEMENT

### MEMBERSHIP AND NEWSLETTER/SUBSCRIPTION APPLICATION

**Regular Members:** persons who have graduated from a college or university in a discipline of biological sciences, and who are or have been professionally engaged in teaching, management, or research related to natural resources and environment.

**Student Members:** persons who are enrolled in an accredited college or university in a discipline of the biological sciences, and who are preparing themselves for professional work in teaching, management, or research related to natural resources and to the application of sound ecological principles to management of the environment.

**Associate Members:** persons who support the purposes and activities of the Society but who do not qualify for Regular or Student membership.

*Complete this form and return with cheque payable to:  
The Canadian Society of Environmental Biologists*

**Membres Réguliers:** les personnes ayant un degré ou diplôme d'un collège ou une université dans une discipline des sciences biologiques et qui sont ou qui ont déjà été engagé professionnellement en aménagement, enseignement ou recherche tenant à l'environnement ainsi que ressources naturelles.

**Membres Étudiants:** les personnes qui étudient dans un collège ou une université reconnu dans une discipline des sciences biologiques, et qui se préparent à travailler comme professionnel soit en enseignement, aménagement ou recherche tenant aux ressources naturelles et à l'application de principes écologiques à l'aménagement de l'environnement.

**Membres Associés:** les personnes qui supportent les activités et les objectifs de la Société mais qui ne se qualifient pas comme membre régulier ou étudiant.

*Complétez cette formule et retournez avec un chèque payable à:  
La Société Canadienne des Biologistes de L'Environnement*

Name/Nom: \_\_\_\_\_

Address/Adresse: \_\_\_\_\_

Postal Code/Code Postal: \_\_\_\_\_

Phone:home/domicile: ( ) \_\_\_\_\_ business/travail: ( ) \_\_\_\_\_

Fax: ( ) \_\_\_\_\_ e-mail: \_\_\_\_\_

Degree/Diploma/ Degré/Diplôme: \_\_\_\_\_ University/College/ Université/Collège: \_\_\_\_\_

Year Grad./Ann. Gradué \_\_\_\_\_ Field of Biology/Spécialité de Biologie: \_\_\_\_\_

Occupation/Emploi: \_\_\_\_\_ Employer/ Employé par: \_\_\_\_\_

Responsibilities/Interests/Responsabilités/Intérêts d'emploi: \_\_\_\_\_

#### MEMBERSHIP/SUBSCRIPTION FEE/ FRAIS D'ABONNEMENT:

*(check one; all prices in \$ Canadian)*

Regular/Régulier **\$40** \_\_\_\_\_

*(cocher un; prix en \$ Canadiens)*

Associate/Associé **\$40** \_\_\_\_\_

Student/Étudiant **Free** \_\_\_\_\_ (electronic Bulletin only)

Library/Bibliothèque **\$50** \_\_\_\_\_

Foreign please add/Pour les commandes adressés à étranger, veuillez ajouter **\$10** \_\_\_\_\_

DATE: \_\_\_\_\_ SIGNATURE: \_\_\_\_\_

**RETURN TO: CANADIAN SOCIETY OF ENVIRONMENTAL BIOLOGISTS**

P.O. Box 962, Station F, Toronto, Ontario M4Y 2N9

*Membership applications & Newsletter subscription are also available online at <http://www.cseb-scbe.org>*

