

Vol. 79, Number 2 • Summer 2022



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

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# CSEB Bulletin SCBE

VOLUME 79, ISSUE 2, SUMMER, 2022

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

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Front Cover: Red squirrel (*Tamiasciurus hudsonicus*), very common on mainland Nova Scotia, Summer, 2021

Back Cover Top: Monarch Butterfly (*Danaus plexippus*), taken beside a trail on the west side of Brier Island, Nova Scotia, late summer, 2021.

Bottom: Striped skunk (*Mephitis mephitis*) in Oakville, Ontario, April 2022.

Photo Credits: Peter Wells, CSEB Atlantic Region member.

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**CSEB BULLETIN**

Vol. 79, Number 2, Summer 2022

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).

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**Layout:** Gary Ash

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**LE BULLETIN de la SCBE**

Vol. 79, Numéro 2, Été 2022

Le Bulletin de la SCBE est une publication trimestrielle 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

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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

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# NATIONAL News

## CSEB 2021 AGM

### Canadian Society of Environmental Biologists

#### Minutes of the 2021 Annual General Meeting (Draft)

6 April 2022 at 11:00 pm MDT

1. Welcome – CSEB President Curt Schroeder (Quorum)  
The AGM was convened at 11:05 (MST) by Curt Schroeder.  
Attendance: Loys Maingon, Curt Schroeder, Anne Wilson, Barbara Hard and Brian Free.  
Regrets: Robert Stedwill, Sean Mitchell, Gary Ash.
2. Assigned duties: Moderator (Curt), Recording Secretary (Anne), Time Keeper (Loys), Parliamentarian (Brian)
3. Approval of Agenda – Motion to approve by Loys; seconded by Brian, carried.
4. Approval of Minutes from previous AGM (11 January 2021 AGM)  
Minutes were reviewed, and a motion to accept made by Anne, seconded by Loys, carried.
5. President's Report – Curt Schroeder
  - The past calendar year's activities have still been affected by the pandemic.
  - Bulletin submissions and reviews done.
  - Working on the web site with our consultant; still wrapping up that project.
  - Fielding email requests as needed.
6. 1st Vice President's Report - Patrick Stewart was not available.
7. 2nd Vice President's Report – Robert Stedwill was not available.
8. Secretary-Treasurer's Report – Anne Wilson  
The draft 2022 budget (See below) was presented with comparisons to 2021, and commentary on each line item. Motion to accept the draft budget for 2022 was made by Anne; seconded by Loys, carried.  
  
The 2021 finances were presented with summaries for 2021 on Accrual Basis and Cash Basis balance sheets showing costs and financial position (attached).  
  
The audit of 2020 finances was done by Gary Ash and Brian Free. Motion to accept 2020 audit as complete made by Anne, seconded by Loys, Carried.
9. Membership Report – Gary Ash not available; provided written report.
10. Bulletin Editor's Report – Gary Ash not available; provided written report.
11. Webinar Chair Report – Loys Maingon  
  
About 20 webinars in 2021; listed on the web site. More planned; climate change will likely dominate the topics.

Noted that all have been recorded, with the exception of the upcoming Apr. 11th one.

#### 12. CSEB Website Report – Brian Free

New webinar announcements and adding recorded webinars to archive pages.

About 35 job ads added to jobs page; not actively solicited – employers contact us. BC government departments are the main contributors. BC First Nations and Territories have also posted. May need to reach out for eastern Canada offerings – Directors could do that.

Gary has been posting the 2021 Bulletins on the web site, as well as handling online membership subscriptions. Our contractor, Aurooba, is maintaining website software.

Brian shared the updated web site page in development.

Curt – spoke with Gary about the idea of sending link to the Bulletin rather than a pdf file, if we can manage access of current issue. Would increase website traffic.

Brian provided monthly website visits, noting that peak traffic coincided with webinars. Year over year, we have increased slightly from 2019 to 2020 and 2021.

#### 13. Directors' Reports (Regional)

Ontario – Barbara Hard reported for ON, but is now in NB and changing over to the Atlantic Director.

Not a lot going on during Covid; Species at Risk Stewardship Program and the Great Lakes program reviewed. A summary was presented for these (attached).

BC report – Loys noted the lack of BC legislation on endangered species.

#### 14. Loys moved that we accept all reports as presented; Brian seconded, Carried.

#### 15. Elections

Call for nominations from the floor – no nominations – Anne moved that nominations cease; Brian seconded, carried. Board is re-elected by acclamation. Barbara will be appointed as an Atlantic regional director by the region. Curt will confirm the process for this.

#### 16. Other Business – None raised.

#### 17. Resolutions/advocacy – Loys will draft a letter for Roberts Bank and the herring fishery.

#### 18. Adjournment at 12:02. Loys moved to adjourn, carried.

#### 19. Next meeting May 9th at 7:00 PST

Recorded by Anne Wilson April 6, 2022

2022 Proposed Budget

Category	Draft 2022 Budget	2021 Budget	2021 Actual to Dec. 31	2021 Variance
<b>INCOME</b>				
Advertising Revenue	\$375.00	\$375.00	\$375.00	\$0.00
Bank Interest	\$0.00	\$0.00	\$0.00	\$0.00
Conference Proceeds (incl sponsorship)	\$0.00	\$0.00	\$0.00	\$0.00
Journal Orders	\$1,000.00	\$1,400.00	\$1,359.66	-\$40.34
Membership fees	\$3,000.00	\$2,900.00	\$3,351.02	\$451.02
Other Income - Misc	\$0.00	\$0.00	\$0.00	\$0.00
Newsletter Subscription	\$115.00	\$200.00	\$116.74	-\$83.26
Publication Sales	\$0.00	\$0.00		\$0.00
Donations	\$0.00	\$0.00		\$0.00
<b>TOTAL INCOME</b>	<b>\$4,490.00</b>	<b>\$4,875.00</b>	<b>\$5,202.42</b>	<b>\$327.42</b>
<b>EXPENSES</b>				
Admin and office (eg copying)	\$20.00	\$20.00	\$0.00	\$20.00
Banking	\$0.00	\$0.00	\$0.00	\$0.00
Chapter Rebates	\$0.00	\$0.00	\$0.00	\$0.00
Contingency	\$0.00	\$0.00	\$0.00	\$0.00
Corporate Registration	\$15.00	\$12.00	\$0.00	\$12.00
Journal Order Payments	\$1,300.00	\$1,300.00	\$1,325.47	-\$25.47
Membership Renewal costs	\$0.00	\$0.00	\$0.00	\$0.00
Miscellaneous	\$0.00	\$0.00	\$0.00	\$0.00
Newsletter Production	\$1,500.00	\$1,000.00	\$1,227.96	-\$227.96
Newsletter Mailing	\$290.00	\$290.00	\$285.77	\$4.23
Postal box rental	\$280.00	\$275.00	\$271.20	\$3.80
Postal box redirect mail	\$350.00	\$375.00	\$347.66	\$27.34
Sponsorship	\$0.00	\$200.00	\$0.00	\$200.00
Web site	\$1,955.00	\$1,100.00	\$1,722.13	-\$622.13
Webinar Platform	\$0.00	\$300.00	\$0.00	\$300.00
<b>TOTAL Expenses</b>	<b>\$5,710.00</b>	<b>\$4,872.00</b>	<b>\$5,180.19</b>	<b>-\$308.19</b>
Difference:	-\$1,220.00		\$22.23	

2021 Balance Sheet – Accrual Basis2021 Income:

2021 income collected and banked in 2020:	\$1,925.66
Total income deposited in 2021:	<b>\$4,690.96</b>
Less 2022 Income Banked in 2021	<b>\$1,414.20</b>
<b>Total 2021 Income:</b>	<b>\$5,202.42</b>

2021 Expenses

2021 Expenses paid in 2020	\$336.83
Expenses paid through bank account in 2021:	<b>\$5,152.21</b>
Less 2022 Expense paid in 2021*	<b>\$308.85</b>
<b>Total 2021 Expenses:</b>	<b>\$5,180.19</b>

<b>Actual Income over expenses for 2021 activities:</b>	<b>\$22.23</b>
<b>2021 bank deposits less expenses:</b>	<b>-\$461.25</b>
	<b>-\$483.48</b>

\*Canada Post 276.85 + website costs of \$65.63 paid in 2020

Total Assets:

Cash in hand at Dec. 31, 2021	<b>\$15,470.59</b>
2022 Membership payments received in 2021	-\$927.88
2022 Journal payments received in 2021	-\$412.68
2022 Newsletter subscription received in 2021	-\$73.64
2022 web site payment made in 2021	\$32.00
2022 Canada Post payment made in 2021	\$276.85
GIC	<b>\$1,691.49</b>
<b>Assets as at Dec. 31, 2021</b>	<b>\$16,056.73</b>
<b>Assets as at Dec. 31, 2020</b>	<b>\$15,780.26</b>
	<b>\$276.47</b>

2021 Balance Sheet (Cash Accounting Basis)

Opening Checking Account Balance (Jan. 1, 2021)	\$16,262.85	
GIC Value (Jan 12, 2020)	\$1,691.49	
<b>Total (Jan 1, 2020):</b>		<b>\$17,954.34</b>
<b>2020 Receipts Deposited</b>		
Total income deposited in 2020 <sup>a</sup>	\$4,690.96	
<b>2020 Expenses Paid</b>		
Expenses paid through bank account in 2021 <sup>b</sup>	\$5,152.21	
<b>2020 Net Income (Loss)</b>		<b>-\$461.25</b>
Closing Checking Account Balance (Dec 31, 2021)	\$15,470.59	
GIC Value (Dec 31, 2020)	\$1,691.49	
<b>Total (Dec. 31, 2020):</b>		<b>\$17,162.08</b>
<b>Notes:</b>		
<sup>a</sup> Does not include \$1925.66 prepaid 2021 membership dues and journal orders collected in 2020.		
Includes \$1414.20 membership dues and journal orders for 2022 collected in 2021		
<sup>b</sup> Includes 2022 expense paid in 2021 of \$308.85 for postal box rental and web licences.		
Does not include 2021 expenses of \$336.83 paid in 2020		

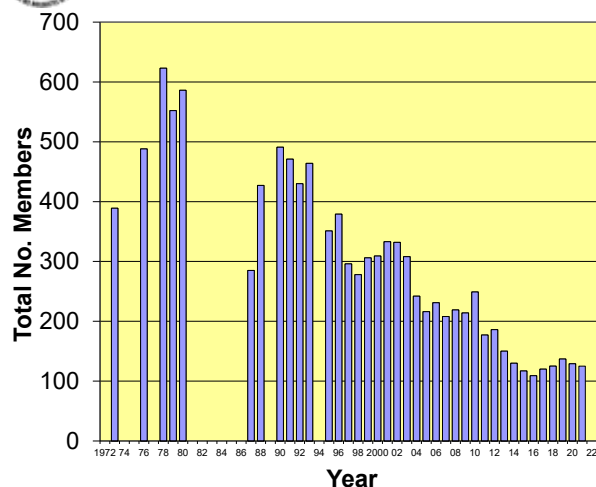


## 2021 CSEB Membership by Region and Membership Category as of 31 December 2021

Region	Complimentary	Honourary	Associate	Library	Regular	Student	Total	Change
1 Atlantic		1	1	1	4	3	<b>10</b>	-3
2 Quebec					1	3	<b>4</b>	1
3 Ontario	1		1	1	21	7	<b>31</b>	-5
4 Manitoba					4	2	<b>6</b>	1
5 Sask.					9	4	<b>13</b>	1
6 Alberta		1		2	23	5	<b>31</b>	1
7 BC			1		19	5	<b>25</b>	-2
8 Territories					2		<b>2</b>	0
9 USA				1			<b>1</b>	0
0 Foreign					1	1	<b>2</b>	2
<b>Totals</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>84</b>	<b>30</b>	<b>125</b>	-4
Change	-1	-1	-1	0	-2	1	-4	



## CSEB MEMBERSHIP BY YEAR (1973 to 31 December 2021)



## Bulletin Editor's Report



- 2021 – Four issues published
- Looking for guest editors for 2022
- Need contributions from membership & Directors
- Bulletin distribution format:
  - Electronic = 94
  - Hard copy = 32 (includes two copies to National Library)
- Looking for photos of Biologists-in-Action for upcoming Bulletin covers
- 2022 Deadlines: 15 Feb, 15 May, 15 Sep, 15 Nov
- Thanks to everyone who submitted content during 2021

## Atlantic Report

It has been another quiet year under COVID here. As Vice-President I've participated in online executive meetings and have assisted whenever possible. An article I wrote on the crisis in the environment, which I represented CSEB, was published prominently locally coinciding in timing with the COP 26 forum last November, so there was some 'mileage' gained out of that. Peter Wells, a local member, has been active in contributing material to the CSEB Bulletin. I haven't received inquiries of a local nature from individuals interested in becoming members, although the website is a good one, and should attract that kind of interest. Nova Scotia biologists are active on a wide front, particularly in conservation and wildlife management, but with the Atlantic Ocean and Gulf of St. Lawrence surrounding us, there is a lot happening on the marine front. But how to capture some of that for the enlightenment of CSEB members and achieving our environmental advocacy role is a good question. We need to identify some of the active individuals to get on board and embrace CSEB. Hopefully that will happen sooner than later.

Respectfully

Patrick Stewart, Vice-President

## Ontario Regional Report 2021

April 6, 2022

by Barbara Hard

### Species at Risk Stewardship Program

There are currently 258 species of plants and animals listed as endangered, threatened, special concern or extirpated in Ontario. Ontario has pledged up to \$4.5 million as part of its ongoing commitment to protect and recover Species at Risk and their habitats by funding research and recovery projects conducted by non-profit organizations, Indigenous communities and other expert groups across the province.

The Species at Risk Stewardship Program provides support to communities, organizations, landowners, Indigenous communities/groups, industry and academics across Ontario to implement on-the-ground activities that benefit Species at Risk and/or their habitats.

Since 2018, the Species at Risk Stewardship Program has supported over 200 projects which have contributed to the restoration of over 5,500 hectares of habitat for Species at Risk.

In 2021 over 80 ongoing and new projects were approved, including:

- Protecting and recovering at-risk turtles, including Blanding's turtle, through rehabilitation of adult turtles, education, field research, and disease surveillance, led by the Ontario Turtle Conservation Centre.
- Outreach and habitat management for 21 species at risk, including the monarch, Eastern ribbonsnake and dwarf lake iris, in the Point Grondine area and on Manitoulin Island, led by the Wiikwemkoong Unceded Indian Reserve.
- Restoration of up to 50 hectares of tallgrass prairie, oak savanna and oak woodland habitat for Species at Risk, including the red-headed woodpecker and Eastern hog-nosed snake, led by the Long Point Basin Land Trust.

## Protection of the Great Lakes

Under the [Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health Agreement](#), Ontario is investing more than \$2.8 million in 24 projects to protect the health of the Great Lakes as part of its commitment in the agreement.

The projects that are being funded focus on improving fish and wildlife health and habitats and rehabilitate [historically degraded areas](#) by studying and restoring streams, wetlands and aquatic habitats and completing environmental remediation efforts to rehabilitate these areas.

Part of the agreement is to reduce the introduction and spread of aquatic invasive species which pose a significant threat to biodiversity. These invasive species continue to outcompete native species, alter food webs and degrade critical habitats for fish and wildlife populations. They can also degrade water quality by increasing suspended solids, concentrating toxins, encouraging the growth of harmful algae blooms, and altering nutrient and energy flows within the food web. Invasive species include Asian carp, sea lamprey and zebra mussel.

Canada and Ontario are collaborating with the US government to reduce the spread invasive species through the introduction of protocols and regulations, e.g., with regards to discharges from shipping vessels.

## 2022 Canadian Ecotoxicity Workshop (CEW)

CEW will take place in Winnipeg, MB, October 2-5, 2022.

For information, see <http://ecotoxcan.ca/>

## Check out the CSEB Video at

<http://youtu.be/J7cOuDbBf9c> or  
<https://www.youtube.com/watch?v=J7cOuDbBf9c>

## SCIENCE TIDBITS

Submitted by John Retallack, CSEB Alberta Member

### DOGS AND CATS

#### Dogs Know When You Are Lying to Them

If you have a dog, you already know that they are incredibly adept at sensing human emotions and are shrewd assessors of your friends. But did you know, unlike apes and human children, dogs can also tell when you are lying to them!

Using food as a motivator, the study published in *Proceedings of the Royal Society* assessed how dogs could use clues to gauge the truthfulness of humans.

Using 260 dog subjects (various species), researchers from the University of Vienna presented the test subjects with two opaque buckets and were taught to use the advice from unknown humans to find food hidden in the buckets — the human would tap the bucket while looking at the dog and using encouraging words to indicate the presence of food.

Then the dogs watched as a second unknown human switched the bucket the treat was in. Sometimes a second person was in the room when the switch took place and sometimes only one person was in the room. Two-thirds of the dogs ignored the advice of the human when they pointed to the wrong bucket. Half the dogs ignored the advice of any humans who had not been in the room when the switch was made.

The authors concluded the dogs were aware of the intended manipulation and relied on their own knowledge to make choices.

Cats on the other hand assume you will be deceptive, remain sceptical of any meaningful human contact, and, as long as you continue to feed them, will gladly allow you to share their space.

#### Cat Curfews in Australia

In Australia, statistics have shown each pet cat predated more than 180 native animals per year (including reptiles, birds and small mammals). In addition, each feral cat is thought to be responsible for killing up to 1000 native animals per year. In total, it is thought that domestic and feral cats kill as many as 75 million native Australian animals per day. Cats have been implicated in the extinction of at least 20 native mammal species and appear to be adapting their hunting strategies to be even more effective.

Since 2015, the government has been funding grassroots culling initiatives, as part of a plan to kill two million feral cats across the nation.

Probably not surprisingly, municipalities across Australia are instituting cat curfews and bans in an attempt to make cat owners more responsible for the actions of their pets. The curfews range from 24-hour or night-time home-confinement of cats, to wholesale bans of cat ownership in suburbs near sensitive wildlife areas. There is even some growing interest in totally banning the ownership of cats in some new development areas. The fines for transgression can be steep and in some areas the fines for people

who let their cats outside are as high as \$1,500 AUD. The initiative has carried over to New Zealand.

Also, in early July of 2021, the President and CEO of the Ottawa Humane Society, also called for a 24-hour cat curfew, at least partly to protect birds and other small animals.

#### Border Collies Are Smart — At Least Some Of Them

The good news from a study conducted at Eötvös Loránd University in Budapest, Hungary and published in *Scientific Reports* (11, Article 14070, July, 2021), was that all strong dog learners were border collies. The bad news is (apologies to owners of border collies)...not all border collies were judged to be strong learners.

The researchers recruited six dogs that already had a degree of word knowledge training (WK dogs) and 47 dogs that had no specific word knowledge training (Naïve dogs). All WK dogs completed the program but only 32 Naïve dogs finished the three-month study.

All of the WK dogs, all border collies, were able to learn object names during the study but only one dog from the Naïve group, also a border collie, excelled at word knowledge. Eighteen other border collies in the Naïve group did not show substantive evidence of learning object names. Equally, the remaining non-border collies in the Naïve group did not graduate!

### FISH

#### Antarctic Sea Yields Massive Icefish Colony

As soon as the remotely operated camera glimpsed the bottom of the Weddell Sea, more than 1,000 feet below the icy ceiling at the surface, Lillian Boehringer, a student researcher at the Alfred Wegener Institute in Germany, saw the icefish nests. The sandy craters dimpled the seafloor, each the size of a hula hoop and less than a foot apart. Each crater held a single, stolid icefish, dark pectoral fins outspread like bat wings over a clutch of eggs.

Aptly named icefishes thrive in waters just above freezing with enormous hearts and blood that runs clear as vodka. Their blood is transparent because they lack red blood cells and hemoglobin to transport oxygen throughout the body. Icefishes' loss of hemoglobin genes was less an evolutionary adaptation than a happy accident, one that has allowed them to absorb the oxygen-rich Antarctic waters through their skin.

The sighting occurred in February 2021 in the camera room aboard a research ship, the *Polarstern*, that had come to the Weddell Sea to study other things, not icefish. It was 3 a.m. near Antarctica, meaning the sun was out but most of the ship was asleep. To Boehringer's surprise, the camera kept transmitting pictures as it moved with the ship, revealing an uninterrupted horizon of icefish nests every 20 seconds.

"It just didn't stop," Boehringer said. "They were everywhere."

Half an hour later, Autun Purser, a deep-sea biologist at the same institute, joined Boehringer. On the camera feed there remained nothing but nests.

"We were like, is this ever going to end?" Purser said. "How come no one has ever seen this before?"





*Jonah's Icefish, Niopagetopsis ionah. Photo by E. Hofinger, available in Fishbase.*

The nests persisted for the entire four-hour dive, with 16,160 recorded on camera. After two more dives by the camera, the scientists estimated the colony of *Niopagetopsis ionah* icefish stretched across 92 square miles of the serene Antarctic sea totalling 60 million active nests. The researchers described the site — the largest fish breeding colony ever discovered — in a paper published in the journal *Current Biology* (Volume 32, Issue 4, 842-850, February 28, 2022).

“Holy cow,” said C.-H. Christina Cheng, an evolutionary biologist at the University of Illinois-Urbana-Champaign, who was not involved with the research. “This is really unprecedented,” she said. “It is crazy dense. It is a major discovery.”

The paper provides “evidence of a complex and so far undescribed benthic ecosystem in the Weddell Sea,” said Mario La Mesa, a biologist at the Institute of Polar Sciences in Bologna, Italy, who was not involved with the research.

La Mesa in 2021 described the same Antarctic icefish species’ nest-guarding behaviour from sites near the newly discovered colony.

Each of the newly discovered nests held, on average, 1,735 large, yolky eggs — low fecundity for a fish. An unprotected clutch would prove an easy snack for predators like starfish, polychaete worms, and sea spiders, Cheng said. So the males stand sentry to ensure their offspring are not devoured, at least not before they have the chance to hatch, and might clean the nests with their elongated lower jaw, according to Manuel Novillo, a researcher at the Bernardino Rivadavia Museum of Natural Science in Argentina, who was not involved with the research.

About three-quarters of the colony’s nests were guarded by a single fish. The others had eggs but no fish, a fish carcass furred white with bacteria or nothing at all. Near the edges of the colony, many unused or abandoned nests cradled several icefish carcasses, many with starfish and octopuses feasting on their eyes and soft parts.

The researchers observed that the colony occupied an unusually warm patch of deep-sea water, with temperatures up to about 35 degrees Fahrenheit – practically toasty compared with other Antarctic waters..Although the discovery of the nests contributes

to the understanding of the icefish life cycle, it raises more questions. How often are the nests built, and are they reused? Do the fish die after the eggs hatch? Or, perhaps the most obvious – “why there?” Cheng asked.

The authors have no sure answers, only speculation.

#### *Journal Reference:*

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*The above article was authored by Sabrina Imbier, New York Times and reprinted from the Honolulu Star Advertiser, January 18, 2022.*

### **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 \$1,100 (2022 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 recipients since 2008 have been as follows:

Year of Award	Name of Student
2008-09	Chen, Qiting
2009-10	Veillard, Marie Frances
2010-11	Zhang, Daiwei
2011-12	Jacklin, Meghan Lynn
2012-13	Cherlet, Erin Alexandra
2013-14	O'Neill, Megan Nicole
2014-15	Wheatley, Melissa
2015-16	Suhertan, Ellis
2016-17	Huang, Rebecca
2017-18 (2)	Moir, Anthony and Thomasson, Charlotte
2018 -19 (2)	Griffith, Conor and Qwttrim, Kevin
2019 -20 (2)	Rehlau, Abigail and Hermary, Jessica
2020-21	Krehut, Ashley
2022-22	Campbell, Katherine



## REGIONAL News

### BRITISH COLUMBIA News

Submitted by Loys Maingon, CSEB BC Director

#### Would a Species at Risk Act Really Protect Biodiversity in BC in a world of Public Relations?

*"I'm here because scientists are not being listened to... we are going to lose everything and we are not joking."*

- Dr. Peter Kalmus (2022)

Frederic E. Clements (1874-1945), who is best known as a pioneer plant ecologist and taxonomist, was one of the last disciples of Alexander von Humboldt in American botany before the re-birth of interest in Humboldtian Science in the 1990s. That makes Clements a forerunner of modern biologists and foresters who advocate for plant sentience, such as Suzanne Simard and others who tend to see forests as super-organisms. It is noteworthy that while Clements' organismic view of nature may have been viewed as "unscientific" in some quarters during the post-1945 era, Clements was responsible for developing some of the most rigorous methods used in the study of plant ecology. It was Clements who introduced America to the methodical survey of plants and their landscapes by quadrats, transects, bisects, camera sets, and ring counts. These methods were described in the second chapter of his 1929 classic text, *Plant Ecology*, that he co-authored with John Weaver.

One hundred years on, these methods remain fundamental to our knowledge of site biodiversity. Even if the sampling methods are refined by technological advances to aerial, soil, or aquatic environmental DNA analysis, they remain essentially the same. They are systematic subsamples of hard data to be analysed statistically. Biologists can only assess the species composition of a site and its biodiversity by carrying out systematic site surveys. It is a simple fact: no data, no science, only hearsay.

That has an important implication if we bear in mind current growing concerns about climate change. As recent IPCC reports have been at pains to stress, climate change cannot be addressed if we do not also address the biodiversity crisis. The planet is not a machine. It is a living system. The complex interactions of living organisms control and regulate climate. Federal and provincial institutions that claim to protect or be concerned with biodiversity, and by extension, climate change, without supporting a programme of systematic biological surveys to assess biodiversity, are simply misleading the public. The state of our forests' biodiversity is essential to the future of climate change. The state of our forests' biodiversity can only be ascertained by carrying out rigorous species composition surveys.

In a remarkable entry regarding the application of belt-transects, Clements makes the following observation about the use of ecological survey methods in forestry:

*"The belt-transect method has been used very successfully for recording the composition of tropical rainforest and*

*especially for commercially important trees. The belts are of sufficient width (66 ft) and frequency (1.25 miles apart) to include 1 per cent of the area. In fact, the method has long been used by American foresters, although they make an optical estimate of the width of the area cruised and record the number and size of merchantable trees instead of mapping them."* (p.26)

This archaic forestry norm has largely remained unchanged and unquestioned for the past century. As Maingon and Neilson discovered in the course of an effort to save a population of *Pseudocyphellaria rainierensis*, a rare lichen nominally protected by a provincial and federal agreement, and listed in standard forestry documents, that norm still applies in BC.<sup>1</sup> While some forestry companies may elect to carry out biological species surveys before clear-cutting an area, in British Columbia there is no legal requirement for forestry companies and forestry stakeholders, such as First Nations, the Ministry of Forests, or the Ministry of Environment and Climate Change, to carry out biological surveys and identify species at risk that may be impacted by forestry operations. Western legal ownership rights trump environmental obligations to community stewardship of biodiversity. In forestry operations, barring explicit cultural interests, the value of "merchantable trees" remains the primary, if not the only, determinant of where forestry operations will take place. Species composition and biodiversity assessments are disregarded.

This common practice means that we have very little idea of what faunal and floral species have been lost and extirpated over the past 150 years of colonial occupation, which is synonymous with "forestry operations." Indeed, the case of the discovery of hitherto undocumented populations of listed species at Fairy Creek and the demise of *Pseudocyphellaria rainierensis* at Fairy Creek should serve as a cautionary tale of Canada's lack of actual concern for biodiversity, outside of the arcane world of the biological scientific circles not in the pay of industry and government. Although this area is less than 80 kilometres from the Ministry of Environment and Climate Change's and the Ministry of Forest Lands and Natural Resources Operations' offices, these ministries could not provide Maingon and Neilson with data concerning faunal or floral species that might be adversely affected by ongoing and proposed forestry activity. Astoundingly, the presence of at least 16 well-recognized and easily identifiable species-at-risk was hitherto unknown and unrecorded by ministry staff, whose Ministries are nominally responsible for documenting BC's flora and fauna, and biodiversity data collection.

As we enter what the United Nations has proclaimed to be "The International Decade of Biodiversity", there is an obvious disconnect between stated concerns for biodiversity and actual policy direction. In keeping with the Convention on Biodiversity, the joint report of the IPCC and the IPBES, and a growing string

of IPCC reports, politicians are urged to understand that climate change cannot be addressed independently of the biodiversity crisis. The world is neither a machine nor a supermarket. As Humboldt and contemporary science increasingly tell us, only life makes life possible on a living planet, and even processes driving phenomena like temperature and climate that we once considered to be “abiotic” are in fact biologically driven by floral and faunal composition and organization. Provincial and federal governments, if they care at all for climate change, do not seem to understand the link between biodiversity and climate change. The World Meteorological Organization’s recent report *State of the World’s Climate 2021*<sup>2</sup> makes the transient front pages of mainstream press to tell the public that we have indeed crossed critical thresholds. However, as the WMO notes, thanks to government inaction, generations to come can expect continued ocean warming and acidity as well as increased heat waves, cyclones, and hurricanes. Political action on climate change over the past three decades appears to have been mainly cosmetic and out of touch. Within this context, when it comes to actually protecting biodiversity, at all levels government response belongs with an alternate reality reminiscent of *Monty Python’s Dead Parrot Sketch*.<sup>3</sup>

The recent excellent work of Melissa Aroncyk and Maria I. Espinoza, *A Strategic Nature*, which traces the role of corporate public relations in shaping public understanding of nature and the environment, is worth reading.<sup>4</sup> It traces the evolution of public relations strategies, often illegal but highly effective, in shaping public policy by manipulating the public and political understanding of science and the response to environmental problems. Their thesis is that through public messaging, corporate interests capture and create the illusion of environmental awareness and responsibility. That illusion pervades government and mainstream environmental organizations, on whose boards corporate representatives sit, and on whom these organizations depend for funding. Indeed, in BC, the boards of many land conservancies, land trusts, and mainstream environmental organizations are peopled by corporate executives who help finance these organizations. Serious environmental concerns such as biodiversity become subordinated to corporate messaging and greenwashed. It, therefore, is not surprising to find that Calvin Sandborn and Bronwyn Roe of the University of Victoria’s Environmental Law Centre have reported that corporate greenwashing is up 40%.<sup>5</sup>

That is just the marketing aspect of corporate greenwash. It does not include the cultural and institutional greenwashing that pervades all aspects of our lives, as Aroncyk and Espinoza argue. For corporations and the governments that effectively serve them, climate change and biodiversity policies are just a public relations exercise, which is why they have failed for the past 40 years and are designed to continue to fail. Climate change policy and biodiversity policies in Canada fail because they are designed not to encroach or conflict with corporate forestry, mining, and oil and gas interests.

It would be misleading to think that the problem might be limited only to British Columbia. The recent unprecedented decision of the federal government to use its powers under the *Species at Risk Act* to intervene by decree to protect dwindling caribou populations in Quebec raises basic questions. By setting aside 35,000 square

kilometres of critical habitat amounting to 2.3% of Quebec’s territory, Ottawa is not simply infringing on Quebec’s jurisdiction, it is protecting First Nations’ interests.<sup>6</sup> One of the principal drivers of Ottawa’s intervention is the request of the Assembly of First Nations Quebec-Labrador that Ottawa protect the cultural rights and interests of First Nations that were excluded from Quebec’s public consultative process. The commission set up by Quebec to determine the fate of the caribou was driven by forestry interests and stakeholders that did not include First Nations.

In Quebec, as in BC, this is a debate that is focused on the fate of the last remaining “old-growth” forests, which are critical to the survival of the species, and which are also of cultural interest to local First Nations. Thirty-seven leading biologists from 11 of Quebec’s universities weighed in to protect this habitat in the interests of the species and climate change.<sup>7</sup> The scientific intervention had little impact. In this instance, the *Species at Risk Act* is not being used to protect the species per se, but rather First Nations’ rights to the species and the forests that are their critical habitat. It is crucial to note that throughout this saga that while Quebec biologists and naturalists have been extremely vocal about the need to protect biodiversity and species at risk, the official and publicly stated position of the Legault government and the “Ministère des Forêts, de la Faune et des Parcs” (“Ministry of Forests, Fauna and Parks”) has been that the economic priorities of the forestry industry trumped biodiversity. It is also worth noting that, as in BC, in Quebec the ministry responsible for biodiversity is a ministry of forests closely aligned with the interests of the forest corporations and unions. These are really ministries dedicated to the well being of the forest corporations, not to forests and biodiversity.

So, the provincial and federal interest has only been tangentially in biodiversity and in the species themselves, though the public is misdirected to think otherwise. It has been mainly interested in either the mainstream forestry economy or in the First Nations’ cultural rights and interests in that economy and the management of the forest and its “resources.” While First Nations’ management of the forest may indeed have a better track record than mainstream industrial forestry as has been demonstrated,<sup>8</sup> it is still focused on the forest as a source of economic prosperity and employment. The fate of species and biodiversity is still subsumed to economic interests.

It is critically important to note that although Quebec, unlike BC, has species at risk legislation, Quebec’s provincial government has an appalling track record when it comes to protecting biodiversity.<sup>9</sup> The act is set aside or generously interpreted whenever the interests of development or forestry are threatened. With complete disregard for scientific advice to the contrary, the Quebec government recently opposed the protection of the copper redhorse (*Moxostoma hubbsi*) and authorized the extirpation of the last habitats of the Boreal chorus frog (*Pseudacris maculata*). These species, whose future is now largely uncertain, were only possibly saved after much public outcry, at the very last minute by federal interventions.<sup>10</sup>

The Quebec examples demonstrate that the federal *Species at Risk Act* has very little real power to effectively protect species biodiversity throughout Canada’s increasingly endangered ecosystems. Provincial Species at Risk legislation can be

disregarded in favour of the economy at the discretion of ministers. We, therefore, have every right to ask: “*Is species at risk legislation in Canada just another bureaucratic shibboleth to pay lip service to?*”

Recent variations of the same provincial and federal half-truths or prevarications can be found in BC.

In British Columbia, the current government was elected in 2017 on an electoral platform that captured “environmental” votes with promises to implement species at risk legislation. Upon election, the Ministry of Environment and Climate Change (MECC) began work on species at risk by de-listing about 30% of listed species. After three years of delays and promises, by 2020, the MECC ceased work on this file. Responsibility for the protection of species at risk was magically transferred to the Ministry of Forests, Lands and Natural Resources Operations (FLNRO). This move corresponded to the government’s much heralded review of the *Forest and Range Practices Act*, to align the problem of “species at risk” with the 2019 *Declaration on the Rights of Indigenous Peoples Act*.<sup>11</sup> The unstated aim of these changes was to put decision making back in the hands of forestry-dependent communities, which was now to include and give greater prominence to First Nations dependent on forestry revenues. This was explicitly summed up by Minister Conroy: “*We’ll put government back in the driver’s seat of land-management decisions in partnership with First Nations, including where forest roads are built.*” Like Quebec, the forest industry’s priorities are to be supported by communities that are economically dependent on the forest industry. Unlike Quebec, the BC government also understood that by including First Nations in the economic benefits and decision-making associated with the forestry industry, status quo could effectively be maintained without making real changes to the *Forest and Range Practices Act*.

This strategic public relations move was clearly intended to download responsibility for species-at-risk, which has always stood in the way of the forest industry’s interests, onto First Nations. As a result of this strategic downloading, any public or scientific attempt to protect endangered species stands to be interpreted as an attack on the corporate interpretation of “ownership” under “*The United Nations Declaration of the Rights of Indigenous Peoples Act*.” Under this scenario, science no longer matters when a First Nations government beholden to the forest corporations upholds its logging interests.

In spite of all the sweet-sounding motherhood and pie promised under the much-heralded revisions to the *Forest and Range Practices Act*, at no point is protection of species at risk ever really considered. There is no real interest in the act and its revisions in the protection of biodiversity. The essential point that a biological survey needs to be carried out to determine the ecological impact of logging activities before a logging permit is issued is never even remotely considered in this legislation. The act, together with its much-heralded “progressive” revisions, remains beholden to the forestry practices and interests described by Clements in 1929. A species at risk act, based on basic scientific principles inherent in biological surveys, such as was promised and envisioned before 2017, would seriously compromise the viability of this economic and political edifice.

This government has not stalled work on species at risk legislation, it has duplicitously shifted the conversation to make species at

risk and biodiversity legislation disappear by promoting First Nations’ interests in mainstream forestry economics. Biodiversity is inconvenient to political interests. It is neither a federal nor a provincial priority, any more than climate change has ever really been for the past 30 years, as the track record shows.<sup>12</sup>

The general assumption made by the public and the environmental community is that First Nations stewardship for the land should provide better protection for species at risk, as indeed it usually does. The assumption is largely based on the cultural value that keystone or umbrella species, such as large mammals or salmon, have within the First Nations world-view. As with the general keystone and umbrella top-down approach in ecology, this approach has all the pitfalls of coarse-grained approaches. The survival of bottom-up primary producers of lesser cultural immediacy, which is only evident in fine-grained analysis, stands to be jeopardized. In a society in which the public itself is largely unaware of species other than signal macro-species, First Nations’ cultural nature-literacy does provide definite leadership. However, as in any society, the requisite fine-grained knowledge necessary for environmental management is the domain of only a select number of trained scientists and knowledge-keepers. The problem for settler society seems to be that in rejecting a species at risk legislation, it also rejects its knowledge-keepers, its biologists, and in so doing, encourages First Nations to turn their back on their own knowledge-keepers.

The assumption that First Nations’ leadership and engagement will substitute species at risk legislation is misleading because it depends on the ambiguity and fluidity of the concept of “ownership.” In *Delgamuukw*, hereditary chiefs set the bar for subsequent aboriginal rights and claims by stressing that aboriginal ownership is an obligation to the care for the territory because it is identical with the people. Aboriginal ownership is, therefore, diametrically opposed to western legal concepts of “ownership.” Anglo-American law defines “ownership” as “*the power to enjoy and dispose absolutely.*” Ownership as it is related to industrial practices and corporate interests, by definition invites “the power to enjoy and dispose absolutely.” The meaning of a word is always performative. There are no essences that magically define a word outside of the role it has in a context. The meaning of “ownership” shifts with the economic framework and context. In a corporate economy, ownership is the power “to dispose absolutely,” regardless of the culture. As Joel Bakan has repeatedly demonstrated, a corporation is a psychopathic entity, no matter what cultural dressing it takes.<sup>13</sup>

Through the revisions to the *Forest and Range Practices Act*, as well as the recent doubling the First Nations’ share of forest revenues, the provincial government has effectively modified the “ownership” of First Nations as major stakeholders in the forest industry. By increasing the dependency of First Nations communities on revenues from the forest industry as a matter of social justice, it would be naïve to argue that the meaning of ownership within those communities is not affected. Indeed, while hereditary Pacheedaht chief Bill Jones in keeping with *Delgamuukw* argued against logging of old-growth and for his obligations to his traditional territory, elected chief Jeff Jones has publicly argued forcefully for his right to dispose of the forest as he sees fit for the economic well-being of his community. These are two starkly different versions of “ownership.” The Jeff Jones



version, which was opposed by the position taken by the BC Union of Chiefs, is the version of ownership upheld and promoted by the Minister of FLNRO and her many colonial predecessors. This version is diametrically opposed to the spirit informing Delgamuukw and UNDRIP, which the same government and its First Nations supporters claim to promote in support of corporate interests. That is corporate greenwash at its finest. Can one really have one's cake and eat it? Apparently so ....

In 2021, this cultural contradiction had tragic consequences for the largest population of *Pseudocyphellaria rainierensis* ever found in Canada. This unique population of a rare lichen protected by a federal and provincial agreement received no protection whatsoever and has now been extirpated. Every level of government, starting with the elected Pacheedaht Council, MECC, and FLNRO as well as the forestry company concerned and federal Minister Steven Guibeault were formally appealed to in order to save this species at risk. What stood in the way were the financial interests of Teal Cedar and Pacheedaht council led by Chief Jeff Jones. There is no difference between Premier Francois Legault's claim to Quebec's territorial right to extirpate three populations of endangered mountain caribou because endangered species cannot be allowed to stand in the way of jobs, and Chief Jeff Jones territorial claim to protect aboriginal employment on Pacheedaht lands by enabling the extirpation a population of endangered lichens. The non-aboriginal logic of legal ownership gives license to those private interests that steal from the inheritance of future generations.

The extirpation of this population is a confirmation that, while intentions may be good, and while some First Nations feel more obligations to endangered species than others, the ultimate protection of species at risk cannot be left to the discretion of First Nations, as the BC government contends, anymore than it can to municipal, provincial, or federal governments.

Should there be any illusions about the moral high ground that the federal government may claim thanks to its obligations under the *Species at Risk Act*, two recent actions of Canada's ex-Greenpeace firebrand minister of the environment may leave one somewhat nonplussed. Back in 2021, marbled murrelets (*Brachyramphus marmoratus*) were one of the species at risk found to be nesting in the Fairy Creek area. Leading experts urged the minister to issue a ministerial order to protect this blue listed species whose numbers are steadily declining and which is now known to be functionally extinct. It was then thought that by November 2021, Steven Guibeault would issue a ministerial order to protect critical marbled murrelet habitat, which is known and mapped.<sup>14</sup> Instead, minister Guibeault has upheld the standard provincial development and forestry guidance norm, which is an extension of the *Migratory Bird Convention Act* (1994) that no tree could be fallen if it was found to have an active nest.<sup>15</sup> Of course that depends on making a determination that a) there is a nest, and b) that it is occupied, without actually having to carry out a minimal biological survey.

For anyone familiar with marbled murrelet habitat, this protection can only strike one as 100% montypythesque. First, murrelet nests are minimal and notoriously difficult to locate, as they consist of a mossy depression enclosed between two densely vegetated branches about 30 to 60 metres (100 to 200 feet) up

an old-growth tree in a dense forest. The only way to find a nest is to be on location before sunrise and observe a tiny bird come out of the ocean clouds and enter its "nest" at high speed, from which its partner will depart shortly after. Second, after August, the nests are vacated and the tree can be fallen, thereby removing critical habitat together with the need to protect this species at risk. Indeed that is what occurred in the fall to critical marbled murrelet habitat in the Fairy Creek area. That is the high level of federal protection that has not too surprisingly resulted in the extirpation of yet more marble murrelet habitat throughout BC, and the further decline of the species protected under SARA. That is what greenwashing government institutions sell to the Canadian public as a gold standard in Canadian conservation and biodiversity protection.

It is no surprise that the Minister of Environment and Climate Change now faces a lawsuit for failing to uphold his responsibilities as outlined in the federal *Species at Risk Act*.<sup>16</sup> For this external observer, the lawsuit itself is somewhat surreal. While one needs to keep a straight face listening to the serious intent of environmentalists and lawyers, most court and media discussions tend to be simplistically devoid of a sense of the biological reality based on facts. It is all arcane points of law between learned friends paid to argue in court. The government and the corporations don't collect biological data. The environmental organizations rarely collect data. If they do, it is at the last minute. How can anything be based on facts without, established baselines and robust data? Yet we are told that everybody cares for "the environment," "resilience," and "sustainability."

Conservation is not difficult if you start with the facts. The facts are the data of a biological survey. But nobody, no lawyer, no environmental activist, no forestry executive or FLNRO official, or First Nations' representative, wants to talk about the most basic and urgent fact: there has been no real data collection, because the data are inconvenient to the political and financial interests at play.

The basic facts are either absent because a survey was not carried out, or because if the facts do exist they are disregarded in favour of forestry or natural resources industry interests, which in this case have been compounded by BC's downloading of its responsibilities for species at risk to First Nations under UNDRIP. If we want to understand why Steven Guibeault, a bona fide environmentalist, could avoid taking action and produce an irrelevant statement, we have to understand his predicament. Should Guibeault uphold actual protection of critical marbled murrelet habitat, he would infringe on the financial interests of the forestry industry, forestry unions, and First Nations forestry revenue dependency. Under the new provisions of BC's *Forest and Ranges Practices Act*, that would constitute an infringement on the *United Nations Declaration on the Rights of Indigenous Peoples Act*, which is a hot potato nobody wants to touch or discuss seriously. It would be interpreted as an act of colonialism infringing on the right of the Pacheedaht and Ditidaht to enjoy and dispose absolutely of their property and maintain forestry revenues, notwithstanding that this interpretation vitiates the original understanding of aboriginal ownership under *Delgamuukw*. So marbled murrelet protection is limited to a public relations exercise.

This is also consistent with the federal government's protection of Southern resident killer whales and Chinook Salmon habitat in

the Salish Sea. While the fate of prime nursing habitat at Roberts Bank continues to be threatened, after adverse scientific reports were submitted to the minister three years ago, the minister has yet to sign an order to put an end to the ecological threat posed by the Vancouver Port Authority's Roberts Bank Terminal 2 project. The problem here is not that the reality of this threat is not soundly established by scientific evidence. The problem remains that this project is considered economically essential to Vancouver's growth. It may yet appeal to the public if the economy slumps. "Roberts Bank Terminal 2" has gone eerily silent, though mention surfaces from time to time awaiting for the right circumstances. Meanwhile, as like every good magician, Steven Guibeault has used misdirection to draw the public's attention to a renewal of fisheries closures and the re-introduction of "sanctuary zones" for Chinook Salmon off Pender and Saturna islands.<sup>17</sup> Roberts Bank used to be nature's "sanctuary zone" for salmon. The newly selected zones may soon be used to mitigate planned losses needed to support endless growth. After all, if Legault can't trade jobs for endangered caribou, or Chief Jeff Jones can't trade old-growth jobs for rare *Pseudocyphellaria rainierensis* populations, maybe Steven Guibeault, who could not trade oil and gas jobs on the Bay du Nord project for beluga habitat, will likely find it necessary to save jobs rather than salmon habitat and biofilm at Roberts Bank? The writing is on the wall – forget Species at Risk legislation, it leaves too much discretion to ministers, and only deals with isolated species within complex ecosystems.

There is a sad consistency in this logic. Corporate interests and the jobs that come with them consistently trump endangered species legislation and biodiversity. Yes, this is psychopathic. Canada and BC claim to be able to meet climate change targets they have never met – and never will, as they develop more oil and gas! BC claims to save endangered species without even having inventoried them as it cuts old growth! We are told First Nations log sustainably without really carrying out a biological survey anymore than the corporations they work with, because this is not a permit requirement! And yet we are told that we really care about biodiversity... as we see it dwindle before our eyes and daily witness more destruction.

Fifty years after Richard Nixon signed into law the US *Endangered Species Act*, the NDP government of British Columbia has shelved plans to introduce species at risk legislation. It has cleverly downloaded that responsibility to First Nations engaged in forestry and increased their dependency on forestry revenues. Maybe it is time to realize that species at risk acts were cutting edge in 1973, but are no longer up to the task? What we now need is a *Biodiversity-Protection Act*.

A *Biodiversity-Protection Act* would really not be very difficult to write or implement. Its fulcrum is this simple point: sites must be professionally surveyed before any resource extraction takes place. It begins with the simple recognition that the protection of biodiversity is essential to humanity's survival on this planet. Corporate interests cannot be given precedence. The protection of biodiversity is a universal human obligation based on science, which is our objective common ground. The protection of biodiversity is not a cultural privilege, and it should not be treated as a cultural football. Management protocols must be adhered to for listed species identified. Critical habitat must be mapped and protected. If we are serious about addressing climate change and

biodiversity for future generations, science must take precedence over economics, politics, and cultural privilege, for the good of all humanity.

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## *Cosmarium woronichinii*: Record of a Rare Species in Strathcona Provincial Park, New to the Americas<sup>1</sup>

-in memoriam Dr. Taylor Steeves (1926-2011)



Figure 1 *Cosmarium woronichinii* (~ 90 microns at 1,000X magnification). Note the polysaccharide shells and the two chloroplasts surrounding the darker nuclei.

Not all the gold in the Price Creek Valley is mineralogical, or fool's gold. Though no cairn stands to commemorate, as it should, the dedication, vision and valour of the mine protesters of 1988-89 who were socially berated, arrested, and sentenced, as are the protesters of Fairy Creek today, and none were ever given the Orders of BC or Canada, they are to be commended and remembered for saving a public treasure of unique invaluable biological gold for future generations. This is confirmed by the discovery on May 20, 2022, in the Price Creek Valley, of an extremely rare algal species that is not listed in any known species data banks routinely consulted by phycologists such as the Integrated Taxonomic Information System.<sup>2</sup> However, it is a taxonomically recognized species in "AlgaeBase" for which there is only a single entry from 1936.<sup>3</sup> Had the mine development proposed by the mining company in the 1980s succeeded, we would have lost not only the beauty of Cream Lake, but yet untold other species to the growing biodiversity emergency that is currently driving climate change, as increasingly urgent IPCC and IPBES reports tell us.<sup>4</sup>

In the great chain of being, every species counts. Every species is essential to the fabric of life. Aquatic species probably count a little bit more on the scale of life because they control water quality, quantity, and availability, essential to life itself, and are evolutionary predecessors that remind us that terrestrial angiosperms are just descendants of obscure algae that mastered the arts of water transport and condensation. Without humble little algae, there are no towering old growth forests to marvel at. No wonder, E.O Wilson often quipped that: "It is the little things that run the world."<sup>5</sup>

That this algae could not initially be identified would normally have suggested that this is a new addition to science. Fortunately, thanks to iNaturalist, it was identified by Dr. Roman Romanow of the Komarov Botanical Institute in St. Petersburg, whose reaction was: "Amazing record of really rare species!!! *Cosmarium woronichinii* described from wet mosses from Yakutia (North West Siberia)."<sup>6</sup> Just how rare? My understanding is that it was found once, and was never found again in spite of dedicated surveys. So this would appear to be the second global observation of this species, and the first in the Americas. I say the "Americas" because *Cosmarium woronichinii* was found in conjunction with another "rare" or "rarely found" algae, *Spirotaenia endospira*, (Figure 2). In the Southern hemisphere *Spirotaenia endospira* is found without any *Cosmarium* in Bromeliads, which are known to be home to some unique epiphytic aquatic species.<sup>7</sup> Unfortunately, to the best of my knowledge, Canada has no native Bromeliads.

The Price Creek Valley trail is important geologically, historically, and biologically. Geologically the valley rests on a mantle of Sicker and Buttle Lake volcanic rocks, rich in gold, which has made it a target for mining interests, and which are well represented in the BC Geological Survey map of 1995 (Figure 3). As noted by Phil Stone, historically before 1920 mining interests made the Price Valley the pioneer trail between Port Alberni and Buttle Lake.<sup>8</sup> Historically, this is the area that the 1988-89 protest over the proposed expansion of the Cream Silver Mine at Cream Lake saved from destruction. The protest resulted in the aberrant ceding of a central part of the park to Westmin mines, and the limitation of mining in the park, as the Strathcona-Westmin Provincial Park



Figure 2: *Spirotaenia endospira* (25 microns at 4000x magnification) Note the spiral chloroplast, two nuclei, and the beginning of a cell wall dividing the cell into two)

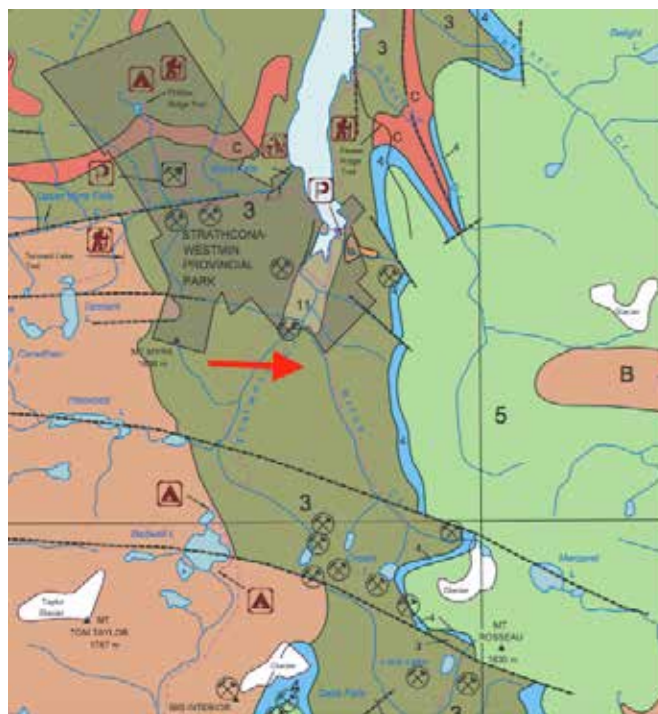


Figure 3: Geological map of the Price Creek and Thelwood Creek Valleys reproduced from the BC Geological Survey map of 1995.<sup>9</sup>

on the recommendation of *The Larsen Report*, which condemned commercial development in the park.

Most of the trail is now overgrown and reduced to a narrow footpath. Some sections of the trail are engineered and drained roads out of Great Central Lake to Della Falls and from Buttle Lake into the current Strathcona Provincial Park boundary. What makes the Price Creek Valley both biologically and geologically distinct from the more frequented and better-known Thelwood



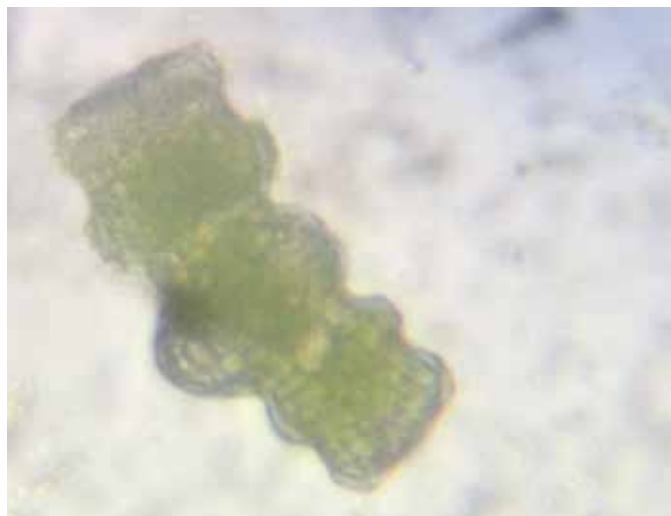
Valley that regularly provides access to thousands of tourists to the Bedwell Valley, is the narrow karst intrusion shown in blue below Flower Ridge, which lines almost the entire drainage of the valley from Buttle Lake to Mount Rosseau. This means that the water chemistry of surface streams draining into Price Creek is higher in calcium than the Thelwood and most streams in the park. That this affects the floral species composition of Price Creek is evident from the fact that Dr. Randal Mindell found the calcium-loving moss *Cratoneuron flicinum* in the Price Creek drainage. This moss is endangered in some parts of the world.<sup>10</sup>

The Strathcona Wilderness Institute "Lakes Project" collects small 10-50 mL water samples from rills, streams, and lake outlets for microscopic species composition analysis. This is the same water that thousands of hikers collect by the litre in water bottles and then treat with UV to kill all waterborne organisms. Freshwater microalgal and plankton species composition is one of the most sensitive indices of water quality and climate change. A majority of these unheralded micro-organisms that play a key role in shaping entire ecosystems are sensitive to changes in pH, temperature, oxygen, and carbon dioxide. At a time when we do not know very much about our freshwater ecosystems, there is growing concern about the impacts of climate change on freshwater ecosystems.<sup>11</sup> The SWI Lakes Project is an unfunded modest attempt to collect data to characterize and model the park's freshwater systems and provide a baseline for future comparisons as climate change proceeds.

Given the particular conditions of the Price Creek drainage, it is therefore not entirely surprising that it has been found to be home to an "extremely rare algae." It had previously been collected with mosses in Siberia. At Price Creek it was collected from water and gel debris dripping from a large forest boulder covered with mosses. The gel debris may be a key to understanding the distribution of this species. It was not found floating independently from the gel debris in open water, as so often happens with other species of *Cosmarium*. It appears to have only been present in association with the gel, which was the mucilage of a large colony of *Spirotaenium endospira*. The bryophyte and lichen environment within which these two microalgae were found is largely controlled by the physics of water on bryophytes covering a vertical rock face. On the one hand, in the West Coast's torrential rains, these organisms have to eke an existence in the shearing forces of laminar flow through bryophyte foliage. On the other hand, they are subject to surges of electrostatic water movement on bryophyte foliage. At scale, the environment of these microalgae is similar to that of barnacles on an ocean rockface. What may seem to the passing observers to be a passive existence to the naked eye is in fact a violent world that requires physiological adaptations to extremes.

To understand the evolutionary significance of these two algae in association with mosses on a rockface, it helps to know that both of these algae are "placoderm desmids." As with all Desmidiaceae, they consist of two semicells with a median connection joined by a connection zone ("isthmus"), and ornamented porous cell walls. Desmids can be solitary, or form filamentous or amorphous colonies. Most significantly, desmids are members of the "Zygnematales." These unique chlorophytes reproduce by isogamous conjugation. That makes them the direct forerunners of our land plants. Conjugation involves the creation of a zygote, which forms a cell wall, rests, and germinates meiotically.

**Figure 4** captures the meiotic development of a zygote between parents in *Cosmarium woronichinii*.



**Figure 4:** Conjugation and zygote development in *Cosmarium woronichinii*.

The Zygnematales are the algae that moved onto land. They did not just wash up onto land. Most Zygnematales that we still have today are capable of self-directed movement. They move by the excretion of a mucilage, that is "a gel". Interestingly enough, algal movement is activated by light, which activates chloroplast energy, but it is not a response to the direction of light.<sup>12</sup> Light provides autotrophic energy, but the algal colony determines the direction of its movement. In that respect, when autotrophic algae like *Spirotaenium endospira* form an amorphous colony, directional movement by mucilage production is a variant on cytoplasmic streaming that we find in heterotrophic amoeboid organisms like *Fuligo septica*. Given the current growing interest in "plant behaviourism" and the neuroscience of angiosperms as argued by Suzanne Simard and others, the extent to which Zygnematales' movement is not simply a phototactic reaction but a display of sentient intention is open to consideration.

The presence of *Cosmarium woronichinii* in the mucilage of a large amorphous colony of *Spirotaenium endospira* is not, as standard texts argue, a simple question of these algae being somehow loosely associated with bryophytes. It appears to form a symbiotic "coenobium," that is, a loose association of single-celled organisms acting independently as a colony. The mucilage serves at least four purposes for the host organism (the one that produces the mucilage): physiological water regulation, colony movement, solar orientation, and bacterial exclusion. In many ways, this symbiosis recapitulates the evolution of land plants from single-celled algae. Algal mucilage serves to regulate osmosis. It creates a stable cellular environment for algae emerging from water. As countless studies have demonstrated, algal mucilage not only maintains a relatively constant chemical environment for cells immersed in water, it also regulates water potential around single-celled algae through drying periods and prevents cell lysis from rapid dehydration. Additionally, the mucilage may limit bacterial activity. Various medical studies of algal mucilage have focused on the antibacterial properties of algal and plant mucilage.

*Spirotaenium endospira* is a producer of copious amounts of mucilage visible to the naked eye as a large mass of gel. It is, therefore, able to regulate its internal physiological environment, displace itself as a colony on a vertical rockface, and orient itself for light. We can, therefore, speculate that the observed presence of *Cosmarium woronichinii* within the gel itself rather than independently in boundary water at the surface of the *Spirotaenium endospira* or in the surrounding water may present certain obvious advantages for both organisms. *Cosmarium woronichinii* is two to three times bigger than individual *Spirotaenium endospira* cells. It, therefore, adds to the photosynthetic power of the coenobium. Additionally, it is likely to respond to a different, though complementary, light activation spectrum. *Cosmarium woronichinii* itself gains from bacterial protection and the shelter of the coenobium's mass and movement.

Finding an organism new to the North American flora should not be just an addition to a catalogue. It should be an invitation to add to our understanding of evolution and the factors that made the survival of life on this fragile planet at a time when it is increasingly threatened. To have the good fortune to find a tiny algae in a place that has been nearly devastated by man's lust for gold invites one to reflect on the fortune that lies in finding a lost Zygnematales at a time of conflict and climate change. This is the lineage that gave us one of the greatest marvels in the evolution of life, "the seed," which is best defined as a spore that packed its lunch for the long migratory journeys out of water. Without the Zygnematales, no seed, without the seed, no agriculture, no civilization. And civilization may still have a lot to learn from the lowly unimportant algae that knew interspecies cooperation, how to save energy to survive, and how to conserve water. All elemental lessons of biodiversity, still valid, and yet to be learnt by mankind.

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## "Alison's Gloiodon": A Palmetto Unique to Science and Strathcona Provincial Park (for now...)!<sup>1</sup>



Figure 1: *Sabal Palmetto* rarely associated with Strathcona Provincial Park (picture from public domain)

There may be stranger things in remote parts of Strathcona Provincial Park than Horatio might think in heaven and earth. Though fossil cycads can and have been found in the park, and climate change is upon us progressing irreversibly, it would defy science and common sense to find a native palmetto endemic to Vancouver Island in the subalpine reaches of Strathcona Provincial Park. And yet, it is so, for those who favour common names over botanical Latin taxonomy, Strathcona Provincial Park has been found to be home to a "palmetto" new to science. It is a palmetto, of sorts. It is a member of the "palmetto fungi," which is the common genus name for "Gloiodon." (It is pronounced "Gloy-Oh-Don.") The accepted common name for this new species of the Gloiodon in the Vancouver Island mycologist community is "Alison's Gloiodon," (the formal Latin name is being worked on.)

"Gloiodons" are already known to be quite rare. One will not find references to them in even the best mushroom handbooks. **Figure 1** above, which illustrates a classic Texan *Sabal Palmetto*, might seem spurious, but it can help one understand the classic description of the genus, and its association with palmettos. Gloiodons "have resupinate to effuso reflexes or hat-like, brownish fruiting body with a prickly hymenophore."<sup>2</sup> In other words, as in **Figure 2**, like palmettos, Gloiodons have a brushy brown cap/canopy with fibres pointing up or down. They are a toothed fungus in which the hymenium consists of spines that resemble palmetto fronds pointing down. This genus was originally described by the Finnish mycologist Peter Karsten in 1879. As a tooth-fungus, it was originally grouped with the *Hydnum* genus, which includes the ever popular (edible) *Hydnum washingtonianum* (formerly *H. repandum*), hedgehog mushroom. Unlike some *Hydniums*, Gloiodons are not edible.

As noted, Gloiodons are rare, except it seems in the Baltic states. From what little documentation is available, the species found in Europe is *Gloiodon strigosum*. In North America, three more species are recognized, *Gloiodon occidentalis*, *Gloiodon nigrescens*, and *Gloiodon stratosus*. Gloiodons are wood decomposers. They are usually found on rotting spruce. That





Figure 2: "Alison's Gloiodon"

in part explains the high incidence of *Gloiodon strigosus* in the Baltic forests where spruces are often the dominant trees. In the West, that means that Gloiodons are found in association with Sitka spruces. Alison's Gloiodon was found on decomposing mountain hemlock (*Tsuga mertensiana*.)

For various reasons, some of the attributions in the Encyclopedia of Life Project may be erroneous, because the species are morphologically alike and the Encyclopedia of life entries are not verified by DNA analysis. In 2019, we photographed a *Gloiodon* in Strathcona Provincial Park and I uploaded photos of the observation to iNaturalist, which the well-known American mycologist, Noah Siegel of *Mushrooms of the Redwood Coast*, kindly, if possibly erroneously, identified as a Western Gloiodon (*Gloiodon occidentalis*). That identification made sense because it is the species to be expected regionally.

In 2021, Strathcona Wilderness Institute hosted its annual Mycology Workshop that brings together some of BC's top mycologists, Dr. Shannon Berch, Dr. Thom O'Dell, Andy MacKinnon, and Juliet Pendray. By chance, a Gloiodon had been photographed a few days before, and it proved to be an interesting point of discussion that nobody could quite identify. Dr. Berch, therefore, decided that a specimen was needed for DNA analysis, so a specimen was obtained on Dr. Berch's Ministry of Environment and Climate Change permit and sent for analysis to the University of Victoria.

The DNA results came on May 25, 2022: "Genbank does not house another sequence belonging to this species." These results confirm that this is definitely not similar to a *Gloiodon occidentalis*, and, therefore, is a distant relative. The closest matches are 85% genetic similarity with *Gloiodon strigosus* ("the ragged palmetto fungus"). This is a new species whose closest relative is the lesser documented *Gloiodon nigrescens* ("the blackening palmetto fungus") that shares 97% of its genes.

It is biogeographically significant that the genetic analysis indicates that this appears to be a Vancouver Island endemic. It is not closely related to the regionally dominant species, *Gloiodon occidentalis*, but more so to the globally distributed type-species



Figure 3: Map of known *Gloiodon* species distribution (Encyclopedia of Life)<sup>3</sup>

*Gloiodon strigosus*, and the even more rare *Gloiodon nigrescens*. Alison's *Gloiodon* is a species unique to Vancouver Island, and until further notice, unique to Strathcona Provincial Park, "Home of the Gloiodon!"

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## Upcoming CSEB Research Webinar

The next CSEB Research Webinars series will be held in the fall, as many biologists are out conducting field work, and others are on vacation during the summer.

Check the [CSEB Website](#) in September for the dates and times of the fall series of webinars.

If you are willing to give a webinar on one of your monitoring or research programs, or have suggestions for future webinars, please contact Dr. Loys Maingon at [tsolumresearch@gmail.com](mailto:tsolumresearch@gmail.com).

## CSEB VOLUNTEERS NEEDED

### Social Media Coordinator:

CSEB requires a volunteer to manage our social media (e.g., Facebook, Twitter, etc.). The volunteer should be familiar with social media, have a good command of the English language, and willing to spend the time to post new items, keep the social media current, and communicate with our members. Awareness of environmental biology issues would be an asset.

If interested, please contact President Curt Schroeder at [schroederc@saskpolytech.ca](mailto:schroederc@saskpolytech.ca).

### Regional Directors

CSEB Requires Regional Directors for the following Regions:

Alberta (1), Saskatchewan (1), Manitoba (2), Ontario (2), Quebec (2), Atlantic (1), and Territories (2).

Duties involve promoting CSEB in the Region, participating in monthly Board conference calls (1 hour/mo), and providing regional news for the CSEB Bulletin four times per year.

For more information, contact President Curt Schroeder at [schroederc@saskpolytech.ca](mailto:schroederc@saskpolytech.ca).



## ALBERTA News

*Submitted by Brian Free, CSEB Alberta Regional Director*

The Impact Assessment Act (Bill C-69), proclaimed in 2019 to update the federal EIA process, has been declared to be unconstitutional by the Alberta Court of Appeal. One judge dissented. It was not the merit of the new provisions that was in question, but rather the apparent over-reach of the federal government into provincial jurisdiction. This appeal had been supported by the Ontario and Saskatchewan provincial governments.

So does that settle the issue? Of course not.... the federal government intends to appeal this decision.

The Alberta Government continues to work on the protection of woodland caribou in different parts of the province. They recently released two “sub-regional” plans to manage land use and resource development and improve habitat protection for this threatened species. The **Bistcho Lake sub-region** is located in the northwest corner of Alberta where there are a few hamlets including a number of Dene Tha’ indigenous communities. Most of the roads have been built to support forestry and oil & gas development in the Zama Lake area. The **Cold Lake sub-region** extends along the Saskatchewan border north of Cold Lake and east of Lac La Biche. It has a number of cities and towns and significant oil and gas development, including oil sands.



The sub-regional plans addresses indigenous land use, access (road) management, energy and mineral activity, pipeline development, geophysical activity, mining of sand, gravel, and peat, linear disturbances, and tourism/recreation. There are provisions related to caribou management throughout these plans, largely related to habitat disturbance.

Wolves are noted as an important cause of caribou mortality in the Bistcho Lake region. Wolf populations will be monitored and action taken if necessary. Efforts to limit moose populations, an important prey item for wolves, is also part of the strategy to keep wolf populations down. Wolf predation is not mentioned in the Cold Lake plan.

To view these plans yourself, follow these links; [Bistcho Lake Sub-regional Plan](#) and [Cold Lake Sub-regional plan](#).

## MANITOBA News

*Submitted by Robert Stedwill, CSEB Vice President*

Tucked away in northern Manitoba on the Cape Merry Peninsula close to Churchill, is the Churchill Marine Observatory, associated with the Centre of Earth Observation Science at the University of Manitoba. I have written on this research facility previously in the CSEB Bulletin.

For those of you unfamiliar with the Observatory, it offers multidisciplinary and collaborative research to improve the

understanding of complex inter-relationships between earth systems, and how they will likely respond to climate change.

A listing (but not all-inclusive) of the research areas includes atmospheric science and meteorology, biogeochemistry, ice-associated biology, inland lakes and waters, marine mammals, oil spill response, remote sensing and technology, and trace metals and contaminants.

One of the current research projects is the **Hudson Bay System Study (BaySys)** \*



“The overarching goal of the project is to understand the role of freshwater in Hudson Bay marine and coastal systems, and in particular, to create a scientific basis to distinguish the effects of climate change effects from those of hydroelectric regulation of freshwater on the physical, biological, and biogeochemical conditions in Hudson Bay.

BaySys was designed to help Manitoba Hydro investigate ways to enhance the quality and capacity of environmental science in the regions in which it operates, produce reliable assessments of impacts of climate change on water supply, and increase the understanding of the effects of climate change on the North. More broadly, BaySys was designed to provide a better understanding of how seasonal shifts in freshwater, sediment, and nutrient delivery and climate change may affect primary productivity, and transportation in Hudson Bay.

BaySys is led by Principal Investigators Dr. David Barber at the University of Manitoba and Kevin Sydor at Manitoba Hydro. The project is managed and coordinated by Lauren Candlish and Dr. David Landry at the University of Manitoba in collaboration with Kevin Sydor and Karen Wong at Manitoba Hydro.”

Unfortunately, Dr. Barber’s untimely death on April 15 of this year will no doubt have a significant impact on the completion of this research. He was one of Canada’s most influential and accomplished Arctic researchers. A Distinguished Professor at UM, Founding Director of the Centre for Earth Observation Science (CEOS), and Associate Dean Research of the Clayton H. Riddell Faculty of Environment, Earth, and Resources, he also held a Canada Research Chair in Arctic System Science and Climate Change.

\* Extracted from the Centre of Earth Observation Science

# ATLANTIC News

By Peter Wells, CSEB Atlantic Member

## Nova Scotia Environmental and Living Resource Issues

A number of familiar environmental issues continue to dominate the news. Climate change is a major concern in the Maritimes, given the documented warming and acidification of the Gulf of Maine, and concerns about sea level rise, more frequent and stronger storms, a longer and stronger hurricane season, etc. In the news, especially, has been concern about the Isthmus of Chignecto, the narrow stretch of low-lying marshy land where Nova Scotia joins New Brunswick (Cole 2022a,b). It is a major transportation route and is threatened by rising tides and the inability of existing dykes to hold back the water during extreme weather events, hence inundating and damaging both the railroad and the main highway. Considerable discussion is underway to finance restoration (repairing, replacing) of the dykes. As well, there has been discussion about “climate change not only as an ecological emergency but also as an international security threat and risk multiplier” (Winston 2022).

Concern continues about declining fish stocks (Beswick 2022c, Dean-Simmons 2022a), especially herring, with declines brought on by multiple factors such as warming waters, predation, lower survival of younger fish, and the commercial fishery itself. There is special concern in the Gulf of St. Lawrence due to reduced sea ice in the winter and warming sea temperatures. There have been fishery closures for herring and mackerel. As well, there was a recent large fish kill of gaspereau in a river system in SW Nova Scotia, attributed to improper fish passage past a power station (Comeau 2022). On the positive side, there is considerable applied research taking place to track the northern cod, by tagging small numbers of them individually with surgically implanted acoustic transmitters (Dean-Simmons 2022,b); knowing where they go, how fast they grow, and how the stocks intermingle is critical information to help guide cod management.

Forest management persists in the news, given many and vocal concerns about the need for sustainable and ecologically based forestry on both private (60-70%) and crown lands (30-40%) (Campbell 2022b, Smith 2022). Progress on the recommendations of the now famous Lahey report (mentioned in previous columns) is being tracked and discussed; concerns include too slow progress to implement ecological forestry and the conflict of interests that persist in the responsible provincial department. Clear cutting persists, regardless of the use of the forest habitat by wildlife in the late winter and spring, e.g., nesting of birds (Wigney 2022). The once biologically diverse Acadian mixed forests are being turned into mono-cultures of coniferous softwoods, entirely unsuitable for many avian species. These problems persist as there is no serious government or industry action to change industry behaviour, just talk and unfulfilled promises.

Again, related to forestry, the closure of the Northern Pulp mill is in the news due to the mill's owners suing the province of NS for forcing its closure in early 2020 (Beswick 2022a,b). At the same time, the mill persists at designing its waste treatment

system and working on its environmental assessment file for the proposed facility, assuming that permission will eventually be given to resume operation.

Fur farming with mink farms in Southwest NS is back in the news. The province is giving the industry more funding, despite a downturn in the demand for fur, concerns about effects of mink farming on public health, ethical concerns related to raising the mink in cages, and the downstream environmental effects of the wastes from the farms, with high levels of pollution in local lakes being observed (Hofman 2022).

Along with these challenges, there continue to be good news stories related to the biodiversity of the province and surrounding waters. A plea has been made for people and municipalities to let their lawns grow uncut for the month of May to aid the wide range of pollinators (bees, hummingbirds, butterflies, moths, beetles, and ants) and to leave the fallen leaves for longer periods undisturbed on ones' property (Fairclough 2022). How practical this is within urban settings is as yet unanswered as many homeowners like to clean up their gardens at the first sign of spring! Research continues unabated on the great white shark, with the OCEARCH tagging program that is demonstrating the presence and migratory range of these amazing elasmobranchs (Peddle 2022). Lastly, work continues on land protection, with the Nova Scotia Nature Trust purchasing land for three new small wilderness areas (Campbell 2022a), and citizens continuing the fight to save wetlands in municipal Dartmouth (Taplin 2022).

Clearly, the role of the environmental biologist is critical, both for bringing attention to these issues and more importantly, participating actively in efforts to reverse unsustainable practices and behaviours in the interests of protecting species and conserving critical habitats. It is very encouraging that local reporters continue to cover these issues, providing a record of the challenges and the successes taking place in Nova Scotia, and the fodder for this short column.

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### Recent ACCESS/BoFEP Conference on Ocean Science, Ocean and Climate Literacy, and the Bay of Fundy

A recent (May 17th-21st) Conference in Truro, NS, was just concluded, co-sponsored by the Atlantic Canada Coastal and Estuarine Science Society (ACCESS), and the Bay of Fundy Ecosystem Partnership (BoFEP), and co-chaired by Drs. Jeff Clements (DFO-Moncton) and Peter Wells, Dalhousie University and Chair, BoFEP. The meeting's title and theme was "Advancing Estuarine and Coastal Science and Ocean and Climate Literacy", and was the 13th of BoFEP's biennial workshop series, begun in 1996. The meeting offered university investigators and their students, government scientists and managers, and personnel from the private sector an opportunity to present their recent aquatic and environmental research, especially that pertaining to the Bay of Fundy and its watersheds. It also helped BoFEP celebrate its 25th anniversary. Over 100 people attended in person and on-line, over four days, presenting 48 talks, 22 posters, 2 plenary presentations (one on ocean and climate literacy), 2 panels (the linkage between ocean education and climate change; ecosystem services and dykeland decision making), and a public forum addressing the implications of sea level rise to coastal flooding. It is clear that there is a vibrant research community in the Maritimes addressing a wide range of aquatic and terrestrial questions and issues, with much emphasis on utilizing the latest techniques, especially genomics. The quality of the graduate student research was outstanding. The meeting ended with awards being given for best student papers and posters. As well, Dr. Jeff Ollerhead, a coastal geomorphologist from Mount Allison University, Sackville, NB, was the recipient of BoFEP's Environmental Stewardship Award, recognizing his many contributions to salt marsh restoration

and protection in the upper Bay of Fundy. Further details of the conference are on the BoFEP website ([www.bofep.org](http://www.bofep.org)) and a full Conference Proceedings will be completed shortly.



The BoFEP display, with Sandra Currie, Vice Chair, BoFEP; a participant; and Peter Wells, CSEB Member and BoFEP Chair.

## TERRITORIES News

Submitted by Anne Wilson, CSEB Territories Director

### News Bits:

Spring flooding of the Hay River has caused extensive damage in the community and area, with evacuation of the nearly 4000 residents required. In addition to "icebergs" left on roads and lots, the West Channel area had fuel drums, a vehicle, and an entire house left on land by the floodwaters. Fuel contamination of water and soils is a concern. Other areas of the NWT and Yukon are experiencing flood watches with ice jams and high water levels.

In the southern NWT, bears are emerging from their dens and looking for food! Of eight bears collared with GPS trackers, six had emerged just after mid-May. The collaring program is part of a larger study being conducted by the GNWT to look at the movements of bears, wolves, bison, caribou, and potentially moose.

Research is currently being done in the Smoking Hills area of the NWT, with the objective of understanding the environment on Mars. This area has a unique geology of shales and jarosite (also found on Mars), which smolders and produces acidic conditions (Figure 1). This makes for an inhospitable environment with highly acidic ponds, and deposits of metals like iron, lead, nickel, zinc, and arsenic into pristine Arctic waters. See the recently published article in *Chemical Geology* titled "Extensive jarosite deposits formed through auto-combustion and weathering of pyritiferous mudstone, Smoking Hills (Ingniruyat), Northwest



*Territories, Canadian Arctic – A potential Mars analogue.”* <https://www.sciencedirect.com/science/article/pii/S0009254121005775>.



*Figure 1. The sea cliffs of Franklin Bay with active burning shale sending clouds of smoke inland. (Photo from Natural Resources Canada).*

The Canadian High Arctic Research Station in Cambridge Bay is opening up to researchers and the public after an extended closure during the pandemic. State-of-the-art technology has been installed, including a powerful wi-fi network and robotic system!

In the Arctic Archipelago, northwest of the community of Pond Inlet, local harvesters are concerned with the drop in narwhal numbers in Eclipse Sound. This waterway is a narwhal migration route from Baffin Bay each summer, as well as being the shipping route for ore carriers from the Baffinland iron ore mine. Local stakeholders and ENGO Oceans North have recommended mitigation and reduction of spring icebreaking and limits to speeds and shipping activity.

### Notes on NWT and NU Development and Activities

Rare Earth Elements: Cheetah Resources operates the Nechalacho Project just north of Great Slave Lake, NWT. The project is permitted for a test-scale extraction, and is shipping its first load of ore to Saskatoon, where it will be processed. Rather than mill the ore on site, it is crushed and separated using x-ray technology, then shipped as concentrate. Further refining will occur in Norway, where the individual elements will be separated. Canada's 13 active rare earth projects (most in SK and Quebec) hope to contribute to independence from the China-dominated supply chain. The project is still at demonstration-scale, and if full development is contemplated, will need to undergo a full assessment for environmental impacts. The original assessment was done over a decade ago, and would not have accurately considered climate change factors and revised project conditions.

Baffinland's Phase 2 expansion application to increase production to 12 million tonnes of iron ore extraction was rejected May 13<sup>th</sup> by the Nunavut Impact Review Board. In their reasons for the decision, NIRB said the project had the potential for "significant adverse ecosystemic effects" on marine mammals, fish, caribou, and other wildlife, which in turn could harm Inuit culture, land use, and food security. The expansion decision now goes to the federal northern affairs minister to endorse or potentially alter, within a 90 day time frame. In the meantime, Baffinland has asked the federal government for an emergency order that would allow production to continue at 6 million tonnes for 2022; otherwise it will shut down operations when the production limit of 4.2 million tonnes is reached.

The ebb and flow of development activity and projects in the North include the following:

- Temporary closure of the Hope Bay Doris North mining project, due to poor recoveries by the mill.
- An application has been submitted for the expansion of mining at the Meliadine Gold Mine.
- Exploration for diamond and metals continues across the NWT and NU.
- The Diavik Diamond Mine is developing closure plans, with the anticipated end of mining in several years.
- The Chidliak Diamond project in NU is expected to submit their development applications shortly.

### Closing

If you are connected to activities in the Yukon, Northwest Territories, or Nunavut, doing work north of 60 that you would like to highlight in the newsletter, or running some seminars or other training opportunities, please let us know. The CSEB provides a valuable networking and communication forum, and a voice for biologists on any issues to be raised. There is also the option of instigating other CSEB activities – both of the fun and/or of the educational variety – with colleagues in the North. Please email your thoughts to Anne Wilson at [anne.wilson@ec.gc.ca](mailto:anne.wilson@ec.gc.ca). There is also an opening for another Territories Director – please contact Curt Schroeder or myself if you would like to take on this role!

### What is a Bald or Golden Eagle Worth?



Billings Mont. - A wind energy company was sentenced to probation and ordered to pay more than \$8 million in fines and restitution after at least 150 eagles were killed over the past decade at its wind farms in eight states, according to federal prosecutors.

NextEra Energy subsidiary ESI Energy pleaded guilty to three counts of violating the Migratory Bird Treaty Act during a Tuesday court appearance in Cheyenne, Wyoming. It was charged in the deaths of eagles at three of its wind farms in Wyoming and New Mexico.

In addition to those deaths, golden and bald eagles were killed at wind farms affiliated with ESI and NextEra since 2012 in eight states. The birds are killed when they fly into the blades of wind turbines. Some ESI turbines killed multiple eagles, prosecutors said.

It's illegal to kill or harm eagles under federal law.

ESI agreed under a plea agreement to spend up to \$27 million during its five-year probationary period on measures to prevent future eagle deaths. That includes shutting down turbines at times when eagles are more likely to be present.

Despite those measures, wildlife officials anticipate that some eagles still could die. When that happens, the company will pay **\$29,623 USD** per dead eagle, under the agreement.

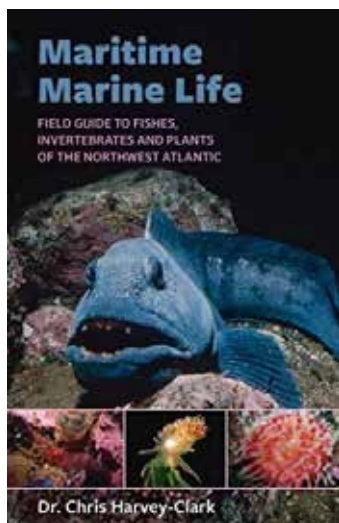


## BOOK Review

Submitted by Peter Wells, CSEB Atlantic Member

### *Maritime Marine Life*

by Dr. Chris Harvey-Clark 2021 Meisterworks Publishing,  
Timberlea, NS. Softcover, 96 pages, \$21.05 + Tax CAD



A superb little field guide was published in 2021, entitled “Maritime Marine Life. Field Guide to Fishes, Invertebrates and Plants of the Northwest Atlantic”. It was written by Dr. Chris Harvey-Clark of Dalhousie University and published by Meisterworks Publishing, Timberlea, NS.

After an informative introduction to seashore biology, the guide covers a range of marine plants, invertebrates, chordates (tunicates, fish) and summer

visitors (finfish, other species, turtles) found in our waters and along Maritime shores. It has a small format, is beautifully illustrated, has a paragraph on each species, and at 96 pages is a light and easily carried guide for the intrepid beach and coastal walker. I was especially intrigued by the section on our summer visitors, some brought in on currents from the Gulf Stream (e.g., Portuguese Man o’ War, the Chesapeake blue crab now well established in the Gulf of Maine, and 18 species of finfish) and some being common visitors from the Caribbean, such as the loggerhead and leatherback sea turtles.

Many people contributed to the information and photos of this excellent guide, succinctly summarized by the author who is an intrepid diver, photographer and documentary film maker. Especially noteworthy is that the book has amazing images of the Great White Shark, the presence and migration of which is now studied intensively in our waters. This field guide should find much use by residents and visitors alike, contributing to their knowledge of the many species inhabiting our coastal waters.



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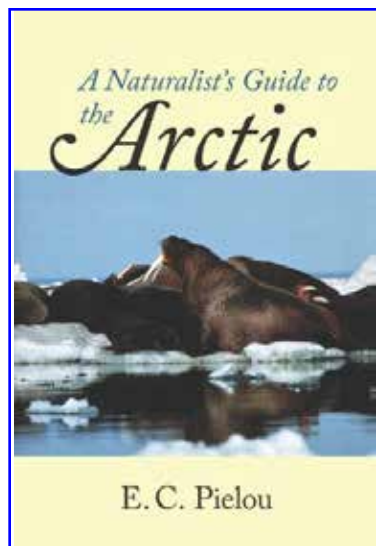
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## BOOK Review

Submitted by Bob Gainer, CSEB Alberta Member

### *A Naturalist's Guide to the Arctic*

by E.C. Pielou 1994 University of Chicago Press. Available from [Amazon.ca](https://www.amazon.ca/): \$17.23 (Kindle), \$26.16 (Paperback) CAD



This is my second all time favourite book. It is not sophisticated biology, just a plain ordinary down to earth Canadian Book (albeit American publisher) about the basic natural history of our Canadian north. It is not that Pielou wasn't internationally renowned for sophisticated biology as a biostatistician, mathematician, and computer modeller, she wrote this because there was a great need for it and out of her love for this part of the world. She passed away in 2016, age 92, after

being on faculty at Queen's, Dalhousie and the University of Lethbridge (specializing in oilsands biogeography) and retiring in 1988 to Vancouver Island to write five more books including this one. She was originally from Britain, in the royal navy during WWII, married her husband, had and raised three kids, got a bachelors and then two PhDs (the first in mathematics, and the second in Biology) from the University of London, emigrated to Canada to work for the Federal Government Forestry and Agriculture Division, then on to the three Faculties afterwards.

I spent five seasons guiding tourists for a barrenlands ecotourist camp on Whitefish Lake, headwaters of the Thelon River, and this book was a must read for guides. There are many unusual features of the landscape on the barrenlands, from the soil, weather, clouds, climate, geography, vegetation, and animals, and Pielou pointed them out and explained them. For tourists, who came from all over the world except the north, they didn't have a clue about the north and we became super guides, primarily because of this book.

The first thing you had to explain to the tourists about flying out to the camp was that there was not a so called "tree line" per se, but a "tree zone". The "zone" actually starts back in the taiga. The taiga is the forest next to the tundra that has some tundra, but a higher proportion of tree cover. As you go towards the "treeline" it becomes 50/50 tree and tundra cover, and it is no longer considered taiga but "the treeline". As you move away from the "treeline", it is now considered the barrenlands as the proportion of trees become less and tundra more. A small proportion of trees still extends well past the "tree line"

depending upon shelter, water, soil, north or south facing slope, and nearness to Hudson's Bay. The forest on the tree side of the "tree line" is the "taiga" part of the boreal forest, and the tundra on the other side of the "tree line" is called the barrenlands. When you get far enough away from the "tree line" and trees no longer occur, the ground-cover becomes less moss or vegetation of any kind, and rock and gravel become more dominant; the area is now generally referred to as the "arctic" tundra, and not the barrenlands.

The other noticeable feature about flying out to the camp was seeing the eskers from the air snaking across countryside, especially noticeable on the barrenland side of the "treeline". They are so noticeable that they are actually navigational landmarks on aviation maps for pilots. On the ground, they were often where we would travel by foot for our hikes. They usually had the most trails, vegetation, animal and bird-life, and native artifacts associated with them, and their beaches were often sandy, so ideal for boat and floatplane docking. "What is an esker"? they would ask you as a guide. You reply: "A complicated geological phenomena associated with the glaciers in the past. We need to sit down at night and take several minutes to explain it to you." It was a very foreign concept and wasn't easily understood.

Back at the camp, you would start by saying "An esker is an upside down river." "What!" a shocked look on everyone's face. You'd continue: "This part of the world was covered with glaciers several kilometres thick for thousands if not millions of years. The glaciers would have cracks, and water from melting ice would flow down below the glaciers, and underneath the ice, the water would drain away as rivers where the glaciers would allow it to flow. Running water picks up sand and gravel. When the glaciers melted, there were no more rivers underneath them and what was left were the riverbeds of the dried up rivers, which form the eskers". "Wow upside down rivers"!

The next thing they would discover was permafrost. When they landed at the camp and helped unload the float plane, the frozen food was put in holes in the ground that had ice-like bottoms, permafrost. Some of them actually dug their own little fridges besides their tents for their bottles of wine they had brought. Then we would point out the "polygons" on the north facing slope near camp. They were five-sided, and about 20 metres a side, and hundreds of them were adjacent to each other all along the north facing slope of the esker. These were the result of permafrost thawing and freezing and each time there was a freeze, the moisture between the edges of the grooves that created the sides acted as a wedge to create these ditches in a polygon shape. Permafrost also created circles, pulsas (miniature pingos), and hummocks depending upon the slope or type of bottom area they were on and the moss or other type of topsoil. Also there were several little ponds in the esker nearby, these were created by "ice chisels", chunks of ice breaking off from melting glaciers with sharp bottoms and the weight of the ice drove them into the soft soil of the esker where they melted and the ponds are still glacial water to some degree to this day.

The location of this camp was chosen because it was the shortest distance for floatplanes to fly from a land base to the barrens,

and it had several eskers nearby that facilitated their dockings on sandy beaches. The first to take advantage of this was Al Oeming in the early 1960s to capture muskox for rearing back at his Game Farm near Edmonton, followed by the Calgary Zoo. In the early 1970s, Bryan Gordon found out about its location from Al Oeming and used it as a base camp for his archaeological study of the Taltheilei culture for several summers for his PhD at the University of Calgary on the Dene people's use of the Thelon River over a period of 8,000 years. He wrote a book on his work and what he found: "*People of Sunlight, People of Starlight*". This was an exceptional experience for Gordon and several of his assistants. Gordon contracted the family of the Tourist Lodge that I worked for to outfit this study on the Thelon River, and the base for the study became the Lodge.

The people that Gordon was studying were the Dene or Athapaskans or Chipewyan group that inhabited the taiga from the Mackenzie Delta to the Hudson Bay. They wintered along the "treeline" but foraged in the taiga or out on the barrenlands for caribou primarily. The local tribe was called the "caribou eaters" (Ethen-eldeli in their language) and many were based about 200 km northeast of Fort Smith (described by Helge Ingstad in "*Land of Feast and Famine*"). The majority may have been based around the Lakes Rennie and Dumant, 200 km northwest of where Thomson Highway was born and raised (although Thomson was a displaced Metis/Cree and distantly related to Riel) because of Sir John A.'s fatwah against French Catholics after the first Riel Rebellion. During summers, the caribou eaters were mostly traveling north along the Thelon River, where there were the most likely big caribou crossings until they got close to Baker Lake (the actual boundary fluctuated over time) where there were resident "inland caribou eskimos" (Ilhalmuit of Farley Mowat fame/infamy).

For about 25 years, this was the best tourist camp and base for photographers and filmmakers interested in the barrenlands. Virtually all the big name wildlife photographers wanted quality pictures of muskox especially, but also caribou, wolves (especially whitish), barrenland grizzlies, and specialty bird-life like Harris sparrows, tree sparrows, nesting gyr, and peregrine falcons, migrating flocks of geese and ducks, close ups and panorama views of bear berry and crow berry in the fall, muscarinic and bolete mushrooms, northern lights, our native assistants and especially their shore lunches, etc. Several films were made about caribou and wolves for the BBC and the Wild TV network. This was the base, partly because of the several eskers and their shelter with beaches facilitating boat and floatplane docking (and wheel/skis in the winter), but partly because it was one of the best "oases" for vegetation, birds and wildlife. This was one of the key places the caribou eaters had depended upon for their caribou harvest but also their use of other wildlife.

Eventually though, economics caught up with the camp and it was closed down about 10 years ago. Post 9/11 aviation regulations made travelling more difficult but especially in regard to charter flying, especially floatplanes. This one expense was more than could be paid for. Most of the staff worked for free just for the privilege of being out there for a few weeks, but it

required the service of floatplanes. For those few years, it was the highlight of my life, and Pielou's book was the bible — it gave me so much credibility I didn't really have. Whether planning a barrenlands (or arctic) journey, actually doing it or just to learn about the Biome, this is the start. If you go there, you will not miss out on a lot of the natural history of this fantastic place with this as your reference. And it is written by one of our own (adopted but Canadian), another in a long list of people like us but who actually put down words that become books.

My wife actually came out to the camp for a week. She loved every second of it but several times felt so vulnerable. I think it probably would not be a good place for people prone to panic attacks to come (I never heard of anyone having one). We had a satellite phone but if anything went wrong we needed the services of a floatplane to come to our rescue, and the cost of course was so much. She told me recently "I didn't marry you because you'd be a boring husband". Most of the time she regretted it but occasionally she was happy to get her money's worth. The first thing she figured out was I wasn't as smart as she (I) thought I was when she saw me looking up things in Pielou's book back in our tent. She started using it and realized she was now just as smart or smarter than me. To show her diminished respect for me that night, when I was kindly snoring her to sleep, she borrowed my shoes to go out and have a pee outside. Every bush, every rock seems to have a bear or a wolf hiding behind it (for everyone, not just her) so her hand was always on the flap of the tent. Invariably my shoes were soaked in the morning so the good pair I then put under my pillow and the ones I didn't like I put by the door flap. Did Pielou envision her work to be so misused? I beg her forgiveness because otherwise people wouldn't have put me on a pedestal (none ever knew about the book). It is too bad it is not better known. I highly recommend it to anyone who wants to know about this poorly known Biome. This was a big part of my greatest experience, and every year I yearned to be invited back, but I wasn't the one who had to pay for the float plane.

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### Website Assistant:

CSEB requires a volunteer to assist our Webmaster Brian Free with managing the CSEB Website. You should be familiar with using WordPress for website management, and able to gather relevant material for posting on the site. It would also be useful to have experience with MailChimp for sending out webinar and other notices, but training can be provided. For more information, please contact Brian Free at [bfree@cseb-scbe.org](mailto:bfree@cseb-scbe.org).

For more information, contact President Curt Schroeder at [schroederc@saskpolytech.ca](mailto:schroederc@saskpolytech.ca).

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