



Vol. 81, Number 1 • Spring 2024

**THE CANADIAN SOCIETY OF
ENVIRONMENTAL BIOLOGISTS
Bulletin**

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CSEB Bulletin SCBE

VOLUME 81, NUMBER 1, SPRING, 2024

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

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Front Cover: Spring crocus (*Crocus sativus*). Photo Credit: Peter Wells, CSEB Atlantic Director.

Back Cover: Top Photo: Mother Mallard Duck (*Anas platyrhynchos*) with her brood, just a few weeks old. Photo Credit: P. Wells.

Bottom Left: Magnolia (*Magnolia grandiflora*) blossoms, Nova Scotia. Photo Credit: P. Wells.

Bottom Right: Bumble bee (*Bombus* sp.) on a flower. Photo Credit: P. Wells.

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CSEB BULLETIN

Vol. 81, Number 1, Spring 2024

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.

Editor: Gary Ash

Layout: Gary Ash

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LE BULLETIN de la SCBE

Vol. 81, Numéro 1, Printemps 2024

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

Rédacteur en chef: Gary Ash

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

The views expressed herein are the writers 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.

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:

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DISPLAY ADS• (4 issues)	Rate Per Issue	Annual Rate
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

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• ads are subject to our approval for acceptance

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NATIONAL News

PRESIDENT'S Report

By Barbara Hard, CSEB President

Dear Members, I am honoured and humbled to serve as the new president of CSEB. I would like to thank the outgoing president, Curt Schroeder, for his outstanding leadership and dedication to the CSEB over the past five years.

As the new president, I hope to continue Curt's great work and build on the achievements of the CSEB. During my tenure I would like to accomplish three things: to increase the visibility and recognition of the society and its members, to foster collaboration and communication among environmental biologists across Canada and for CSEB to continue advocate for policies and practices that support the conservation and sustainable use of natural resources and the environment. To accomplish these goals, I will work closely with the CSEB executive and regional directors, as well as with our members and stakeholders in government, academia, and members of the public.

My professional experience of ten years in research and for over two decades in environmental consulting working across Canada has allowed me to gain insight into many different aspects of environmental biology, and I particularly enjoy going in the field to work on Species at Risk Studies, vegetation surveys or wetland assessments. Having spent many years in Ontario, my family and I moved to the Maritimes three years ago where we are happily homesteading with two horses, 15 chickens and two dogs.

I am looking forward to this exciting journey and I invite you to join me and to share your ideas, feedback, and suggestions on how we can make the CSEB a more vibrant, inclusive, and relevant society for environmental biologists in Canada. Together, we can make a difference for our profession and the environment.

Thank you for your trust and support.

SCIENCE TIDBITS

Submitted by John Retallack, CSEB Alberta Member

RAISING THE CURTAIN ON SO-CALLED "DARK VESSELS"

Global Fishing Watch is an ENGO partnering with leading scientific institutions to raise awareness of critical challenges to the world's oceans. GFW has created a set of detailed maps documenting human activity on the high seas highlighting a very large number of vessels that have been flying under the radar.

The study gathered satellite imagery and GPS data from 2017-2021 and found about 63,000 vessels could be detected at any time navigating the world's oceans. Until now, methods such as self-declaration, aerial and at-sea observations/inspections, and

analysis of Automatic Identification System (AIS) data were used to try to understand what everyone was doing out there.

Combining satellite imagery, vessel GPS data, and using deep-learning models to classify seagoing objects GFW was able to attribute and map industrial vessel activities with over 97 percent accuracy. Notably, about three-quarters of globally mapped industrial fishing did not appear in public monitoring systems, compared with only one-quarter for other vessel activities.

Following are pure excerpts from the article (figure and table references removed) that gives a clear picture of the message provided by GFW.

"By mapping vessels that fail to broadcast their location, we show far more accurately the global distribution of industrial fishing. AIS data alone, for example, wrongly suggest that Europe and Asia have comparable fishing activity, with other continents having less than one-fifth as much activity. Our global map, however, reveals that Asia dominates industrial fishing, accounting for 70% of all fishing vessel detections; nearly 30% of all mapped fishing vessels were concentrated in the exclusive economic zone (EEZ) of China alone. Similarly, AIS data suggest that European countries in the Mediterranean have more than ten times as many fishing hours in their EEZs as do African countries, but our mapping shows that detections of fishing vessels are fairly balanced between the northern and southern parts of the Mediterranean Sea."

"Vessel activity was widespread but also highly concentrated. Dividing our study area into 0.1° cells (about 11 km), we detected a vessel at least once in 84% of the cells covered by the satellites, yet half of all vessel activity was concentrated in less than 3% of the cells. Most vessel activity (86% of fishing and 75% of non-fishing) was focused in waters less than 200 m deep, which constitute only 7% of the ocean. Activity is also unevenly distributed by continent, with approximately 67% of all vessel activity in Asia, followed by 12% in Europe, 7% in North America, 7% in Africa, 4% in South America and 2% in Australia."

"Numerous fishing vessels not publicly tracked were also detected inside many marine protected areas (MPAs). For example, two of the most iconic, biologically important and well-monitored MPAs in the world—the Galápagos Marine Reserve and the Great Barrier Reef Marine Park—showed, on average, more than 5 and 20 of these vessels per week, respectively."

"Our satellite mapping¹ revealed high densities of vessel activity in large areas of the ocean that previously showed little to no vessel activity by public tracking systems. Indonesia, South Asia, Southeast Asia and the northern and western coasts of Africa all show substantial amounts of activity not publicly tracked."

¹Satellite mapping reveals extensive industrial activity at sea. F. Paolo, D. Kroodsma, J. Raynor, T. Hochberg, J. Cleary, L. Marsaglia, S. Orofino, C. Thomas, and P. Halpin (Global Fishing Watch, Washington, DC, USA and various partner institutions). *Nature* - volume 625, pages 85–91 (2024).

CSEB 2023 AGM

Minutes of the 2023 Annual General Meeting (Draft)

18 December 2023 at 10:00 pm MDT (online meeting)

1. **Welcome** - CSEB President Curt Schroeder (Quorum)
The AGM was convened at 10:02 (MST) by Curt.
Attendance: Loys Maingon, Curt Schroeder, Anne Wilson, Brian Free, Sean Mitchell, Barbara Hard, Peter Wells, Robert Stedwill, Bob Gainer, Urooba Ahmed. Regrets: Gary Ash
2. **Assigned duties:** Moderator (Curt), Recording Secretary (Anne), Timekeeper (Loys), Parliamentarian (not appointed).
3. **Approval of Agenda** - Motion to approve by Loys, seconded by Brian, carried.
4. **Approval of Minutes** from 2022 AGM (19 June 2023). Minutes were reviewed, and a motion to accept made by Robert, seconded by Peter, carried.
5. **President's Report** - Curt Schroeder
Since last AGM in June 2023 (short report):
 - Continue to contribute to President's report in Bulletin
 - Continue to submit Saskatchewan report to Bulletin
 - Letter sent to Jonathan Wilkinson (AGM resolution)
 - Continue to participate in website update process
 - Bylaw review/update recommended
 - As stated in my last AGM report, I'm stepping down as President at this AGM.
6. **1st Vice President's Report** - Not present
7. **2nd Vice President's Report** - Robert Stedwill – nothing official to do, dealt with the Prairie Conservation Board; has reported for Manitoba for the Bulletin; need a Manitoba member.
8. **Secretary-Treasurer's Report** - Anne Wilson
The draft 2024 budget (attached) was presented with comparisons to 2023, and commentary on each line item. Motion to accept the draft budget for 2024 was made by Anne, seconded by Loys, carried.

A question was raised about increasing the membership fee by \$5. This year's notices have gone out, so consider raising them for 2025. Put on agenda before next renewal notices go out for 2025.

9. **Membership Report** - Gary Ash sent in his report with numbers for 2023 and a graph over time; Curt presented. Membership has dropped – we need to further recruit students. Question about whether we have contacted members that don't renew to see why – is it worth following up to see how we can meet needs better? Are there fewer environmental biologists with reduced industry activity? We need to reach out to biologists in areas where membership is lowest, idea of sending bulletins to biologists in consulting firms. Haven't had a membership drive in a long time, could also reach out to universities. Could have a marketing student take this on – cost benefit analysis of how many members would offset paying for this.

10. **Bulletin Editor's Report** - Gary Ash provided his report, which Curt presented (attached below). Many thanks to Gary for all his work on the Bulletin!

11. **Webinar Chair Report** - Loys Maingon. Held 14 webinars, these can be found on the website.

12. **CSEB Website Report** - Brian Free
Brian presented his report. Website functioning well. He updates as changes occur. About 100 job ads added to jobs page; most come from government organizations. BC government departments are the main contributors. Brian adds new webinar announcements and adds recorded webinars to archive pages. Various conference and similar opportunities have also been posted; please continue to send these to Brian. Gary has been posting the 2023 Bulletins on the web site, as well as handling online membership subscriptions. Brian has been backing up the website and renewing domain name and hosting. Brian provided statistics on monthly website visits, noting that for the year we had 6560 visits, we have increased slightly. Monthly visits in 2023 averaged 547. The top pages are home page; biology, membership, and about the CSEB. We are in discussions with a website developer from BC. There may be a volunteer student member assistant.

13. Directors' Reports (Regional)

Ontario Report: Premier's greenbelt scandal and details on that issue from the environmental perspective. Now under RCMP investigation and the decision is being reversed, so we wouldn't comment at this time.

Alberta report: There were 28 members in AB at the end of 2023. The AB chapter is not currently active, but AB members are active on the national level. Joseph Hnatiuk and Brian Free are the AB directors and chapter contacts.

Saskatchewan Report: Curt noted that there was a coalition of environmental groups pushing for a wetland conservation policy (SK is the only province without one). The draft prioritizes agricultural rights and ignores treaty rights. SK has major investment in micro nuclear reactors. The carbon tax fight with Ottawa dominates provincial politics. The Premier recently attended COP 28 to promote SK as an energy powerhouse.

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

15. Elections

Call for nominations from the floor. Curt Schroeder is stepping down and looking for a nomination to be president. Loys nominated Barbara Hard. She accepted the nomination, which was seconded by Curt. Motion carried. Curt will move into Past President. Loys nominated Peter Wells to be a Regional Director for the Atlantic; seconded by Bob Gainer. Carried. Bob was nominated for 1st Vice President, and will step in if Patrick Stewart wants to step down. Anne moved that nominations cease, and the remainder of the current board be re-elected; Loys seconded, carried. The rest of the Board is re-elected by acclamation.

16. Other Business – Bylaw updates would be good, Brian moved that we strike a committee to review bylaws, and bring back proposed amendments to the Board. Peter seconded. Carried. This should be taken forward by the executive.

17. Resolutions/advocacy – Bob raised the idea of environmental assessments being required for wind and solar. Letter to provincial organizations would be supported.

We need to consider the impacts of climate change more actively, with recommendations. Noted that webinars on this have been excellent. Barbara noted that many assessments now have to consider climate change assessments for future impacts. Actions that could be taken by the CSEB? We can help on the climate change issue by writing short docs for public use and to help understanding of what they can and should do, e.g., have cc resistant properties. Send a letter

to the Federal Minister? Motion: Peter suggested how environmental biologists can help the public better understand the ramifications for CC effects on wildlife. Should this go to the federal minister? Loys seconded. Carried.

Bob moved to write a letter to the Province of Alberta and potentially other jurisdictions where not currently required, asking that alternative energy developments (e.g. wind and solar) be subject to Environmental Assessments. Brian seconded; carried.

18. Adjournment at 11:53 p.m. MDT: Bob G. moved to adjourn, carried.

19. Next Board meeting is January 17th, 2024 at 9:00 a.m. PST

Recorded by Anne Wilson 18 December 2023.

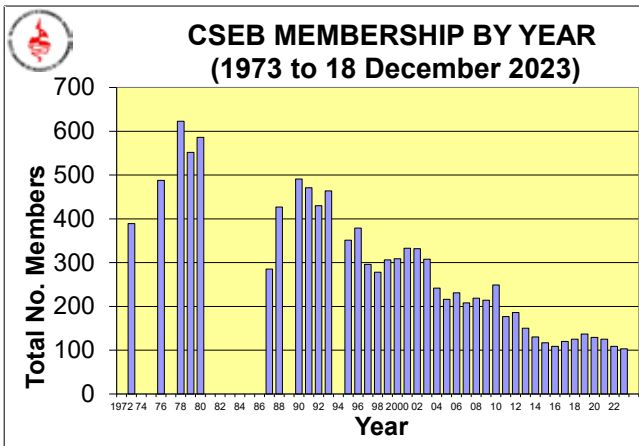
CSEB 2023 Financials and Proposed 2024 Draft Budget

Category	Draft 2024 Budget	2022 Budget	2023 Actual to Dec. 17	2023 Variance	Notes
INCOME					
Advertising Revenue	\$375.00	\$375.00	\$0.00	-\$375.00	
Bank Interest	\$0.00	\$0.00	\$0.00	\$0.00	
Conference Proceeds (incl sponsorship)	\$0.00	\$0.00	\$0.00	\$0.00	
Journal Orders	\$950.00	\$950.00	\$912.93	-\$37.07	Total charged for journal orders was less Stripe fees.
Membership fees	\$2,800.00	\$2,800.00	\$2,018.68	-\$781.32	
Other Income - Misc	\$0.00	\$0.00	\$0.00	\$0.00	
Newsletter Subscription	\$120.00	\$120.00	\$120.97	\$0.97	
Publication Sales	\$0.00	\$0.00	\$0.00	\$0.00	Handling income for Journals included in Journal Orders
Donations	\$0.00	\$0.00	\$0.00	\$0.00	
TOTAL INCOME	\$4,245.00	\$4,245.00	\$3,052.58	-\$1,192.42	
EXPENSES					
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	\$12.00	\$12.00	\$12.00	\$0.00	
Journal Order Payments	\$900.00	\$900.00	\$906.00	-\$6.00	Includes outstanding payment of about \$50 not remitted yet
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	\$1,500.00	\$1,501.05	-\$1.05	
Newsletter Mailing	\$300.00	\$300.00	\$291.71	\$8.29	
Postal box rental	\$280.00	\$280.00	\$276.85	\$3.15	
Postal box redirect mail	\$400.00	\$400.00	\$399.46	\$0.54	
Sponsorship	\$0.00	\$0.00	\$0.00	\$0.00	
Web site	\$2,500.00	\$1,955.00	\$68.64	\$1,886.36	2022 & 2023 Hosting services not paid for; pd Stripe 31.10, Ninja forms \$32 Website update not completed and balance not paid 1262.50 (50%). 2024 budget includes 1 years hosting, website update estimated cost, Stripe and Ninja renewals.
Webinar Platform	\$0.00	\$0.00	\$0.00	\$0.00	
TOTAL Expenses	\$5,912.00	\$5,367.00	\$3,455.71	1911.29	
Difference:	-\$1,667.00		-\$403.13		



2023 CSEB Membership
by Region and Membership Category
as of 18 December 2023

Region	Complementary	Honourary	Associate	Library	Regular	Student	Total	Change
1 Atlantic		1	2		4	2	9	2
2 Quebec			1		2		3	3
3 Ontario	1			1	16	7	25	-3
4 Manitoba					2	2	4	-4
5 Sask.					9	1	10	-3
6 Alberta		1		1	25	1	28	1
7 BC			1		16	3	19	-3
8 Territories					3		3	0
9 USA				1			1	0
0 Foreign					1		1	0
Totals	1	2	4	3	77	16	103	-6
Change	0	0	2	0	-7	-1		-6



Bulletin Editor's Report

- 2023 – Four issues published
- Looking for guest editors for 2024
- Bulletin distribution format:
 - Electronic = 71
 - Hard copy = 33 (includes two copies to National Library)
- Need contributions from membership & Directors
- Looking for photos of Biologists-in-Action for upcoming Bulletin covers
- 2024 Deadlines: 1 Feb, 15 May, 15 Sep, 15 Nov
- Thanks to everyone who submitted content during 2023



Alberta Director's Report for AGM 2023

Alberta Director Brian Free

There are 28 members in Alberta as of mid-December, 2023. The Alberta Chapter is not currently active, but any suggestions from members regarding potential activities for Alberta CSEB members are certainly welcome - Joseph Hnatiuk and Brian Free are the Alberta Directors and Chapter contacts. Several other Alberta members continue to be active at the national level with Anne Wilson and Gary Ash on the CSEB board. Bob Gainer and John Retallack contribute regularly to the Bulletin. Thanks to them all for their contributions to our organization.

TECHNICAL WRITING SERIES

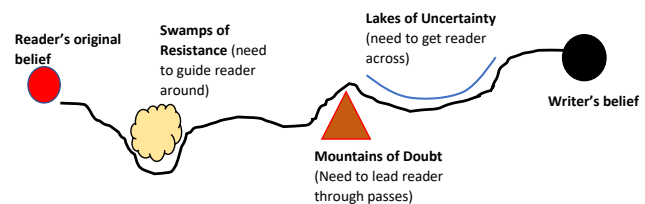
Submitted by Sean Mitchell, CSEB BC Director

Persuasion: A Visual Guide

In our modern technical writing, the author, it appears, wants to let the facts 'speak for themselves'. The belief seems to be that if enough data are presented, then any reader has to agree with the writer. They think that numbers are immutable, unarguable, and compelling – that they will sway the reader. In adopting this complete reliance on a quantitative presentation; however, the writer discards their most fundamental, powerful, and useful tool: persuasion. Data are important to an argument, but they are not the argument.

When I speak of persuasion, I do not mean convincing you to change your mind. Persuasion, when properly done, has none of the manipulative to it. Rather, I take the definition of persuasion as "Moving the reader to your belief". The word belief is important here. I want to take the reader from a position from which they currently view the topic I am writing of, and, gently, lead them through a landscape to my belief of the same topic (see graphic below). When I treat my "position" as a belief, rather than an absolute truth, it takes a tremendous amount of pressure off of me as the writer. It is a belief only, I could be wrong, the reader may be right, the truth may lie somewhere else on the landscape. I am not defending a truth, only inviting the reader to see the problem as I do. Then my persuasion becomes an invitation to the reader to journey from their perspective over to mine.

If I want to move the reader to my belief though, I must guide them: I need to lay out and show them the route to take them from their original position to where I want them. To do this I must use the same tools that a professional guide uses in leading clients (indeed, I could consider writing as, quite literally, being a professional guide). A good guide (i) knows well the route they are taking the client, (ii) plans the route to avoid obstacles and seek least strenuous approaches, and (iii) points out interesting features along the way. Our persuasive writing needs to do the same. Let's walk through the graphic below as an example of what I am talking about.



Imagine I am writing to a project engineer about a need that I see to re-design part of an ongoing project to avoid impact to fish habitat (or, if you prefer a terrestrial example, I am asking the engineer to re-route a part of his road to avoid a snake hibernaculum). This will add \$25,000 to the budget and affect the schedule. How do I try to persuade the engineer to make the changes I recommend?

To begin, recognize that your route through the persuasive landscape will include a few challenges that you need to identify in order to help your client through some obstacles. Some common ones, though not the only ones, I have placed on the graphic in a topographical context. I call them Swamps of Resistance, Mountains of Doubt, and Lakes of Uncertainty.

Swamps of Resistance: These are areas in which we are likely to bog down. My persuasion requires that I identify these swamps before writing and determining how I can lead the reader around them (not through them). Some examples of Swamps of Resistance may include “We can’t afford that”; “We don’t have time for that”; “We have always done it this way”; or “we want to stick with the tried and true, not new and innovative”. Whatever the swamps, the persuasive writer identifies those before writing and plots how to circumvent them in a respectful and interesting manner.

Mountains of Doubt: Anytime we encourage people to change their mind or alter their viewpoint, they are going to have some doubts. This is a wise approach. Their beliefs have served them well to this point; we are asking them to change those beliefs. They should start from a very sceptical position. We need to be respectful of those doubts, anticipate them, and find the lowest passes to get the reader over their Mountains of Doubt.

Lakes of Uncertainty: Whatever argument we use to move a reader to our belief, there will be some uncertainty. How do I know the outcome will be as I predict? How do I know there would be consequences? How certain am I in what I am saying? We need to get our reader across these lakes – sometimes we can wade, sometimes swim, and sometimes we need to build boats.

The swamps, mountains, and lakes to identify will vary with audiences. Those of an engineer are different than a government regulator, which are different from a client, and again from an audience of peers. These need to be identified individually for the audience for which you are writing.

Returning to my engineer example with the fish (or snakes), I identify these features as follows:

Swamps of Resistance: Increases to cost and schedule is the primary swamp of resistance; these are the points the engineer, and project client, will, in all likelihood, push back on. To lead them around the swamp, I might focus on the legal consequences of not making the change (charges and significant fines by government regulators). The path around the swamp, that is, doing the recommended work, will keep them out of a larger—and more expensive—legal quagmire. I lay it out as understanding that this expensive modification is unwelcome, but that the alternative of not doing it, and impacting the fish or reptiles, is more unacceptable. I am trying to help the engineer understand the money and time spent up front is preferable to ignoring the problem. They may agree with me in principle, but still those doubts and uncertainties remain.

Mountains of Doubt: Sources of doubt by the engineer may include the following:

- Whether the originally proposed design would impact the fish or snakes as I believe. This is where I lay out the argument with

data, references, figures, etc. This is the standard data analysis and technical writing we do. It is meant to allay those fears about our forecast of the impact. It provides some certainty to offset their doubts.

- Whether there would be legal follow up to any infractions (this applies to the unethical practices of some people who would advise their clients to go ahead anyway – certainly not my experience with engineers I have worked with). Perhaps I make the point that the construction monitor will be closely monitoring these specific sites as they have been highlighted of concern and so the likelihood of impact going unnoticed is low. And that there are legal requirements around notification of regulators regarding infractions. I want the engineer to be clear the work will be monitored closely.

Lakes of Uncertainty: These are different from the Mountains of Doubt. Here the question is more about the uncertainty of the data I am providing or the alternative solution I provide. How do I know that what I am saying is correct? This is where high-quality writing comes into play. Clarity of prose, well supported statements, no hyperbole allowed, etc. It is in our prose that we demonstrate we are knowledgeable, accurate, and fair. That is how we move over the uncertainty. We build trust with the reader. With my engineer, I would make sure they understand that I see the problem from their perspective and that I appreciate my requested changes are not trivial. I lay out clearly, but without resorting to exaggeration or hyperbole, the problem as I see it and the solution I envision. I am crystal clear in my communication, choosing my words with care, making sure I am providing all the information required to support my belief. If I can come across as a trusted authority trying to help the engineer address a significant problem, I am an ally, and that alone removes some uncertainty. When I come across as an authoritarian biologist exclaiming the problems with the design... well that raises hackles and causes my reader to look for flaws in my logic and areas of uncertainty. By building a respectful relationship with my reader – presenting myself as knowledgeable but understanding the problem my design change is posing – I create trust; with trust, uncertainty decreases.

Finally, a critical aspect of this approach I have outlined is that the reader needs to feel at every step that they agree with what I am saying, and that I am not forcing my opinion or belief on him. By having free choice at every point to agree or disagree with my argument, they end up at my belief; they realize that they have agreed, of their own volition and without manipulation, with my argument at every point along the trail. I have moved them to my belief – that is true persuasion.

CSEB Regional Directors Needed

CSEB is seeking Regional Directors for Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and the Territories. Duties involve promoting CSEB in the region, attendance of monthly teleconference Board meetings, contributions of regional reports/news for the quarterly CSEB Bulletin, and promoting membership in the region. If interested, please contact Gary Ash at garyash@shaw.ca

REGIONAL News

BRITISH COLUMBIA News

Submitted by Loys Maingon, CSEB BC Director

Where are “Nature’s and Biodiversity’s Rights”?

“...for I am a sensitive man.”¹

-Al Purdy

Seven years (two elections) after promising a *Species at Risk Act*, only domestic dogs are now legally considerate in BC. That is a legislative breakthrough. Just another 2 to 5 million species to go, most of which are seriously endangered by the economy.

The winds of elections federal, provincial, and municipal are blowing hard again for fall 2024. Politicians are playing the old saws of past broken promises made new again. Premier David Eby (KC) demonstrated his silken sensitivity for the rights of other species by passing a law that requires that pets be treated more like children in divorce proceedings.² For, as only Al Purdy could have countenanced, Eby too is “a sensitive man.” (Rumpole would smile at “the old darling.”) Dogs matter as BC’s long-awaited *Species-at-Risk Act*, promised as an NDP electoral commitment since 2015, matters less so and waits in line far behind old-growth protection, fish farms, pipelines that have broken all the “stringent” environmental regulations and contaminated rivers, mining impacts, and water sustainability chatter in times of a looming drought. All of which sustainably generates appropriate electoral promises every four years “*ad nauseam*”.

BC isn’t talking about a *Species at Risk Act* anymore. To be fair it isn’t just BC that has this particular problem. It is “a mari usque ad mare” (or as they say in Quebec “C’est juste de la merde.”) *Species at Risk Acts* and environmental assessments don’t seem to mean very much in Canada when business interests are at stake. The Northvolt case in Montreal provides an edifying insight into the environmental priorities of federal, provincial, and municipal governments. If this does not have a telling representative bad smell, nothing does, and it is instructive for every province.

In spite of public outcry from residents, naturalists, scientists, and First Nations over the development of the Swedish “Northvolt” electric car battery mega-plant on the outskirts of Montreal, federal and provincial governments have granted permits. Courts have overruled the provisions of the federal and provincial *Species at Risk Acts*, because electric car batteries are green and “this is in the public interest,” probably proving Dickens’ Mr. Bumble to have had a profound insight into the wisdom of courts. The development site is an environmentally sensitive wetlands, which are home to 21 listed species-at-risk.³ What “public interest” means to the courts and Justice Collier is the antithesis of what it means for Chief Ross Montour of the Mohawk Council:

“The site contains some of the highest quality wetlands in the region. Wetlands are essential ecosystems, serving as critical habitat for fauna and flora, and providing multiple ecosystem services such

as cleaning water, storing carbon, and retaining and redistributing water during major storm events, helping to prevent flooding”⁴

However, unlike dogs in BC, species at risk in Canada are not legally considerate, particularly when business comes calling.

A year ago, a housing development permit for the same site was denied on the grounds that the site was extremely environmentally sensitive and too valuable ecologically to ever be developed. Notwithstanding this precedent determination, the federal and provincial government have approved and fast-tracked Northvolt’s application, which promises 3,000 jobs. The Legault government avoided a repeat of a rigorous environmental assessment by modifying Quebec’s *Environmental Assessment Act* to exclude properties of the size of the Northvolt site. The same civil servant who signed the letter denying the previous application signed the approval letter for Northvolt reversing all previous reasons. Facts seem to have been reversed in a mere six months. This raises serious questions about the objectivity of the science behind environmental assessments.

When the Canadian Press asked to see the environmental assessment report, it was told to apply for it under Freedom of Information. This means they cannot get that for another six months, after delays and censorship. Following court authorization, Northvolt has already proceeded with the removal of 170 trees. Northvolt claims to be committed to restore the site and its biodiversity values after the project is completed. Wetlands and their biodiversity can apparently be restored and created at will. Local First Nations (Mohawk Council of Kanawake) have initiated court action based on provincial and federal failure to consult meaningfully, noting that riparian wetlands are lost forever, but battery plants can be built anywhere else.⁵

There are four important simple lessons to be learnt from the Northvolt affair for BC and the rest of Canada:

First, if environmental assessment findings can be reversed within a six month period to suit different affluent clients, then they are not even worth preparing. They are just a sinecure, not science.

Second, a **Species at Risk Act** that can be set aside at will to facilitate business interests is not even worth writing, because it does not protect species-at-risk.

Third, following Justice David Collier, the courts are not here to protect concerned citizens, the environment, or uphold laws written to protect the environment. The law is here to protect “the public interest” which is synonymous with the business interest of corporate citizens and the politicians that support them. In essence that is another case of: “What is good for GM is good for America,” or in this case: “What is good for Northvolt is good for Quebec”, particularly, Quebec’s economy.

Fourth, for all the pious talk of provincial and federal commitment to UNDRIP, (United Nations Declaration on the Rights of Indigenous Peoples), the only First Nations that provincial and federal governments are interested in consulting and working with are those First Nations who become shareholders in and promoters of corporations developing projects on their territories. As witnessed by all at Wet'suwet'en, the rights of First Nations hereditary chiefs and followers who are at odds with corporate interests are deemed not to be "in the public interest" and of little interest to governments. The economy is in the public interest, the environment and UNDRIP are not.

These principles apply in BC, as they do in Quebec and throughout Canada. For the past 50 years, concerns about climate change have been consistently substantiated and are plain to see for the vast majority of people across the planet. At a time when scientists agree that the climate crisis is intimately linked to the state of biodiversity, government priorities remain development and the economy.⁶ Nature has no effective legal status or protection. Nature and biodiversity are an afterthought, when it is more urgent than ever that they be treated as the priority.

Rather than deal with the spectre of its broken environmental promises that could haunt campaigning politicians, the BC government has decided to distract the public with the release of another aspirational framework: the Draft *B.C. Biodiversity and Ecosystem Health Framework*.⁷ This is really a set of electoral mirages, promises of broad nebulous "good intentions," none of which are framed as deliverables or implementation targets by a set date. It reads like siren calls in the fog of memory. It is hard not to remember that these are promises from a government that began by betraying its voters on Site C and has continued to break its environmental promises ever since.

To understand this document, one has to be familiar with the April 2020 Merkel Gorley report on The Old Growth Strategy, and the Price, Holt and Daust report *BC's Old-growth Forest: A Last Stand for Biodiversity*⁸, as well as their predecessors from the 1990s. The eloquent "Message from the Minister," which sets the tone, is in fact a re-phrasing of key recommendations of the Merkel and Gorley report *A New Future for Old Forests*. Most notably, the Draft B.C. Biodiversity and Ecosystem Health Framework, talks about "ecosystem health" without ever really defining it. To do so would be self-incriminating. "Ecosystem Health was defined in the 1990s Old Growth Strategic Review as the percentage of intact forest needed to protect BC's biodiversity and ecological function. As Merkel noted in an interview, some 30 years ago, the government's own scientific review established a series of "risk levels" that defined ecosystem health and biodiversity. The findings stipulated that a healthy forest maintained biodiversity at 70% intact forest, risk was passable at 50%, imperilled at 30%; however, after political shenanigans, BC set the bar around 17%.⁹ To address this problem would have required an immediate moratorium on old-growth and the logging of intact forests. Instead this government and the courts protected the industry, and prosecuted people who called for this ban. The current government has failed to take and implement immediate steps recommended by its own Old Growth Strategic Review for the last 30 years.

It is no wonder that BC has seen a collapse of the timber supply, which has led the premier to declare that "BC forests

are exhausted." Prince George mills closed this summer and this month saw the closure of the West Fraser Lake sawmill.¹⁰ This problem is not unique to BC. It is a national industry-wide systemic problem of failed industrial forestry, which governments continue to protect at public expense. A recent study of the state of the boreal forest in Ontario and Quebec after decades of "sustainable management" concludes that much of the boreal has been severely degraded causing long-term ecological damage that will make restoration difficult: "Major changes are needed in boreal forest management in Ontario and Quebec for it to be ecologically sustainable, including a greater emphasis on protection and restoration for older forests..."¹¹

The same can be found throughout BC because, for the last 20 years, the rate of deforestation has continued unabated, with the protection of forest corporations by the government and the law courts. The *Draft B.C. Biodiversity and Ecosystem Health Framework* comes 30 years too late. It is a political promise to implement old growth deferrals, which were not implemented four years ago, as promised in the last election (2020).

This document misleads. It is simply fodder to re-build confidence in the NDP's "green vote" which has been betrayed by, and lost to, the past seven years of dismal government performance on the environment. While it talks about the importance of nature and biodiversity, a careful reading should reveal that nature and biodiversity are an afterthought when they should be a priority. The only real priority in this document is and remains "the economy." While it abuses cherished terms like "resilience", "adaptive management", and "ecosystem-based management", nowhere is there any real protection for nature. Far from being the "transformational" vision that it claims to be, this framework is just a re-working of the same economic objective to make "business-as-usual" resilient. That is explicit in the section "Designing for Economic Resilience" (page 13) in which biodiversity is reduced to "diversified revenue streams," and "food security through changes in soil health." And other species become just "assets."

There are some prize paragraphs that deserve quoting to highlight the meaninglessness of this public electoral exercise. Under the headline of "Meaning of prioritization of ecosystem health and resilience" paragraph 2 page 12 is one of many jewels of vacuous tropes and formulas repeated like mantras throughout the text:

"Conservation and management of biodiversity and ecosystem health is proposed to be based on an ecosystem approach, which includes ecosystem-based management. In some cases where an ecosystem is severely degraded or at risk, that ecosystem may need protection restoration, or enhancement efforts."

What does this gobbledygook mean? Management of ecosystem biodiversity is going to be "ecosystem-based." The reality of what ecosystem-based management (EBM) means in practice is clearly illustrated by Dave Broadland, using an areal example of Timberwest's ecosystem-based forest management of the Thurlow Landscape unit in The Great Bear forest. It looks just like devastation-as-usual but bigger at the ecosystem scale.¹²

The EBM concept rests on a huge false assumption. It assumes that foresters and forest operators have a sufficient a priori knowledge of the biodiversity of a site or ecosystem to be impacted by forest operations. Nothing could be further from the

truth. Forest operations do not require that a biological assessment of site biodiversity be carried out before clearcutting. As a result, we have little or no idea of what species are being impacted or exterminated. Biodiversity is taken for granted, there is no account of what species are present. All that is accounted for is the timber volume and value. A case in point was the elimination of BC's biggest population of the species-at-risk Old-growth Specklebelly (*Pseudocypbellaria rainierensis*) at Fairy Creek.¹³ There was no previous record of the presence of this species in the cutblock, and in spite of the discovery being documented and reported to the Ministry of Forest, the Ministry of Environment, and Pacheedaht Nation, no effort was made to protect this listed species or consider the biodiversity impact of forest operations.

The EBM is really an economic forestry strategy that tries to bridge human cultural and economic demands and very general ecological impacts. EBM in itself is defined by its originators as an "*adaptive approach to managing human activities that seeks to ensure the coexistence of healthy, fully functioning ecosystems and human communities. The intent is to maintain those spatial and temporal characteristics of ecosystems such that component species and ecological processes can be sustained, and human well-being supported and improved.*"¹⁴ Crucially, EBMs rely on general broad scale information at the ecosystem scale and do not include a local site survey and analysis. Under those circumstances, it is not clear what information will guide "adaptive management" to protect biodiversity, since the biodiversity is not actually measured and quantified.

That is particularly disturbing given that as indicated by Neilson, Maingon, and Lavdovsky,¹⁵ a biological survey is not required prior to forest operations on a site; therefore, it is not clear what biodiversity is protected at an ecosystem scale if there has been no detailed biodiversity survey of sites to be clearcut. The point is that work done in protected areas shows that scientists are still discovering species new to science, to the Americas, and to British Columbia. Based on that, we have very little idea of what species have either yet to be discovered or have already been lost in the unprotected areas to forest management practices. Significantly, the *Draft B.C Biodiversity and Ecosystem Health Framework* does not propose that any requirement for a biological survey of forestry operations sites be mandated.

So this begs the question: "What biodiversity is actually being protected, if the proponents are just proceeding on a nebulous large-scale idea of general biodiversity and the actual biodiversity of an ecosystem is not first determined at all scales?"

The fine logic at work is further illustrated by the second part of this paragraph: "...where an ecosystem is severely degraded or at risk: that ecosystem may need protection, restoration, or enhancement efforts." This is tautological. It is "destroy to protect." This says that once we have destroyed an ecosystem perhaps we should protect it or restore it. That is the Northvolt logic of environmental reversibility in the name of "resilience and sustainability."

Contrary to the practice of this government, the time to protect ecosystems is not when they are severely degraded. As I pointed out in the CSEB Bulletin (80:4:2023, p. 5-9), conservation biologists have known for at least 90 years what Rosalie Edge noted in 1934: "*The time to protect a species is while it is still*

common." In point of fact, the time to protect old-growth or intact forests and biodiversity in British Columbia is not in a nebulous future after they have been extirpated, but now. That urgency was clearly pointed out in 2020 in the Price, Holt and Daust report and *The Old-Growth Strategic Review*, both of which called for an immediate deferment or moratorium on old-growth logging. While there has been some progress, four long years on that simple first step has yet to be implemented.

This raises the simple question: "Where is the long-promised species-at-risk legislation that is essential for biodiversity protection?" Unless species are protected, biodiversity cannot be protected. This document protects the economy, not biodiversity. While the broad scale and generality of EBM seems targeted mainly at the fate of large animals of cultural and economic interest, surely domestic dogs are not the only species eligible for legal consideration? If as in its "Statement of Intent" the government of British Columbia "*commits to the conservation and management of ecosystem health and biodiversity as an over-arching priority and will formalize this priority through legislation...*" (page 1), then where is there legislation that gives species at risk and biodiversity legal consideration? "The Statement of Intent" goes on to lay out its actual priorities "*to advance sustainable communities and economies.*"

The reality beyond this electoral fog is that nature is only protected from human impacts where it either is in a designated enforced protected area free from exploitation, or where it is protected by enforceable legal rights of nature. In many places around the world, particularly at the request of indigenous peoples, legal rights of places and rivers have been legislated. BC needs to follow suit.

BC has just gone through a disastrous cycle of oil and natural gas pipeline development, which has left many streams and rivers and the salmon they are home to, impaired, some seriously so according to all reports. Trans Mountain and Coastal Gaslink, which were opposed by hereditary chiefs, but supported by local municipal chiefs, have provided a litany of environmental violations, some irreversible.¹⁶ The concern now should be that as the world pivots away from fossil fuel energy, the government of BC and the mining industry are already planning for a critical mineral mining boom, at a scale unprecedented since the Gold Rush of 1858.¹⁷ As with Northvolt in Quebec, this will be sold to the public as climate-busting "green energy" for electric vehicles that reduce your carbon footprint. The map distributed by the Mining Association of BC (Figure 1) shows that 14 new mines are expected to open and be fast-tracked in the near future. In addition, two existing mines are to be extended. Of these two, "Red Chris," has a notorious environmental history.¹⁸ All are on First Nations territories.

Here again it is the government and industry's use of UNDRIP and DRIPA (*Declaration on the Rights of Indigenous Peoples Act*) that should be a point of concern. While there is no doubt that First Nations are entitled to economic well-being and consultation on their territories, the economic and social reality is that because there is no substantial compensation for conservation, they are compelled to enter in minority partnerships with forest and mining corporations in order to make ends meet. Unfortunately, that provides forestry and mining with a social license to continue "business-as-usual." To address problems posed by this abuse,



Figure 1: Potential critical mineral mines in BC (Graphic distributed by the Mining Association of BC)

it is necessary to implement two mechanisms: A) provide fair compensation for conservation, and B) curtail damage to species at risk and biodiversity by providing prior legal protection in the form of enforceable and robust Species at Risk and Biodiversity Acts that would guarantee nature legal rights, and not be subject to political and ministerial tampering. Neither of these mechanisms form part of the *Draft BC Biodiversity and Ecosystem Health Framework*.

The implications of not implementing legal protection are clear in two recent examples of the handicaps and pressures that First Nations' ecosystem management faces. The provincial model for EBM is the Great Bear Forest where BC and Canada have supported the First Nations Guardian programme to guide and support indigenous-led management. The programme is supposed to be financed by the sale of carbon offsets. However, it turns out that the sale of carbon offsets has not been successful. The sale of carbon offsets faces a 50% shortfall and does not provide sustainable financing for the First Nations Guardians. As a result three contradictions arise out of this situation. First, contrary to public expectations, old-growth logging continues as a necessity to pay for the guardian programme:

"One of the criticisms of the Great Bear Rainforest carbon offset project is that old-growth logging has continued despite the protection of more forested areas. There's less logging, but it's the biggest, oldest trees that are now being essentially targeted, because they're the most valuable," said Jody Holmes, director of the Rainforest Solutions Project and one of the architects of the Great Bear agreement. Holmes says the value of carbon offsets is enough to slow second-growth logging, but not enough yet to save old-growth."¹⁹

Second, if old-growth logging is needed to pay for the carbon offsets, then the trees that are supposed to store carbon are being removed. That defeats the purpose of the offset market. The offset market is not consistent with its public representations. In other words, the same programme that was created to capture carbon and protect old-growth, which is a key reservoir of the region's biodiversity and species at risk, has to be financed by the destruction of old growth out of fiscal necessity. The soft revenue target is exactly what was supposed to be protected. Third, this is happening because the absence of legal protections for old growth and biodiversity in forestry regulations encourages biodiversity destruction. The key deterrents to this are a) a rigorous biological determination of species present, and b) enforced legal protection of old-growth and species at risk.

That forestry regulations encourage old-growth and biodiversity destruction is evident in the practice of "co-location." Under the *Forest Planning and Practices Regulation*, forest operations are required to set aside and retain at least 7% of the total area of the sum of all cutblocks harvested in a year as

"Wildlife Tree Retention Areas" (WTRA). No less than 3.5% of any single cutblock must be retained as WTRA. Co-location is the practice of increasing the harvest volume and area clearcut by incorporating WTRA's into Wildlife Habitat Areas (WHA). That means that "an area reserved from harvest can serve more than one purpose, and this reduces the amount of habitat that is actually reserved from harvest."²⁰ This is a form of over-cutting within a cutblock, which increases the take of old-growth. It is, therefore, a considerable impact on biodiversity. As noted by the Forestry Practices Board, this is encouraged by the government and by the forest regulations: "Since 1996, government has encouraged licensees to colocate WTRA and areas reserved from harvest to reduce the impact on timber supply. The most current guidance regarding the practice is the 2006 *Wildlife Tree Retention - Management and Guidance*. The practice of colocation is not prohibited by the *Forest and Range Practices Act*."²¹

The co-location complaint to the Forest Practices Board brought to the public eye the contradictions inherent in the Ministry of Forests' responsibility for the management of species at risk. It is part of practices more interested in economics that contradict the Ministry of Forests' stated mandate to protect biodiversity. These practices are, by any measure, poor stewardship of the land. That has particular relevance concerning what happens when First Nations have to enter into a business relationship that violates the social contract that underlies *Delgamuukw vs British Columbia*, which is the foundation for aboriginal rights and reconciliation. *Delgamuukw* does not just establish rights, it also sets out obligations. Aboriginal rights rest on a cultural understanding of ownership as stewardship, which the Supreme Court of Canada found to be distinct from the colonial concept of ownership as "the right to destroy." Reconciliation depends on the contractual nature of aboriginal stewardship. First Nations cannot be asked to follow different forestry regulations than those

that are set out in the *Forest Planning and Practices Regulation* and followed by industry. Yet, that necessary business relationship sets them at odds with their obligations. It is, therefore, necessary to constrain industry by codifying the rights of biodiversity and species at risk.

In this instance, the colocation occurred on Huu-ay-aht territory, and was amply reported by the CBC.²² In 2019, Huu-ay-aht Nation bought a 35% share of TFL 44 from Western Forest Products. This, after decades of social marginalization in their own home, at last gave them a limited say on what happens on their territory, as well as much needed revenues. The problem that arises in these relationships is that the minority shareholders provide a social license for the companies to continue business as usual. To prevent these abuses which place an undue burden on First Nations, and elicit potential hostility to reconciliation, which comes to be perceived as an abuse of the public trust inherent in stewardship obligations, the government has an obligation to reframe the limits of industrial activity in legislation that establishes rights of nature in a *Species at Risk Act* and a *Biodiversity Protection Act*.

If, as the government claims in the *Draft B.C. Biodiversity and Ecosystem Health Framework*, it “commits to conservation and management of ecosystem health and biodiversity as an overarching priority...” it needs to begin by recognizing the rights of nature, with two essential pieces of legislation. To be “transformational”, as it claims to want to be, it must cease to prioritize the economy and make biodiversity the real priority, not a means to unsustainable affluence. It must do so by fulfilling its long-standing and repeatedly broken promise to deliver a robust and enforceable *Species at Risk Act*. Additionally it must protect the intact spaces and intact forests that are essential to species with a *Biodiversity Protection Act*. It should deliver on its commitments before the next election, not in the hereafter.

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Mycetozoans and the Continuity of Life



Figure 1. *Diderma* (possibly “asteroides”) “sorocarp” June 15 2023, Strathcona Provincial Park.

With rotting snow still on the ground in mid-June of this year when the first blueberry blossoms were out in Strathcona Provincial Park, I spotted a strange new fungus on the bark of an oval-leaved blueberry (*Vaccinium ovalifolium*) twig. It looked like a diminutive “earth-star” (*Geastrum*). I was not clear as to

what it was. It seemed to be a fungus that was not listed in my field guides, so I ran it by my mycologist friends who tried as best they could—but finally came up blank. It was only months later as I was preparing to write something on the evolution of fungi that I stumbled on the answer. It was *Diderma asteroides* (“little star-shaped Diderma”) or a close relative thereof. It wasn’t a fungus, or a plant, or an animal. It was a mycetozoan, a plasmodial “slime mold” distantly related to amoebas, something from the chaotic Kingdom Protista where nature seems to test-run all manner of strange single-celled organisms. The key to identification was that first instinct: they looked very much like diminutive fungal “earth stars.”

Although the Salish Sea region is home to about 90 known species of “slime molds,” Mycetozoans are notoriously hard to spot, even if you know what you are looking for. I was used to seeing the usual common slime molds after a rainfall (*Fuligo septica*, *Physarum polycephala*, *Lycogala epidendrum*, *Stemonitis* and *Trichia*), all of which can be found in guide books. As one expert aptly notes after 45 years of experience: “They are usually hard to find, but their beauty rewards the time, persistence, and luck it takes to find them.”¹ They are ever-present around us microscopically as amoebas, but only fleetingly observable at the macroscopic scale in their inflorescence. They are among the most difficult organisms to explain to a gaggle of naturalists on an outing. In spite of their English name, they are neither mold, nor fungus, nor plant, nor animal, but rather a bit of everything shoved into a complex single-cell with a brain, so complex that some taxonomists believe that they should be placed in their own kingdom.

We take for granted too many of the organisms around us, and we go about our busy lives largely unaware of our kinship with and dependence on the presence of a multitude of smaller organisms we mistakenly class as “lesser” organisms. That may be particularly true of the “mycetozoans.” The mycetozoans used to be generally called “slime moulds,” or “Myxomycetes.” A few short decades ago, they were still studied as primitive fungi, at a time when fungi were lumped with plants in the study of botany. With DNA studies, those classifications have been set aside. Of course, it turns out that they were never molds either, and don’t belong to the fungal kingdom, which is not part of the plant kingdom.

Mycetozoans are a lesson in, and about, evolution. They are a “polyphyletic,” they are a group of unrelated organisms with more than one common ancestor.² They are poorly understood amoeboid protists, and they don’t fit our normal preconceptions. Their taxonomy is very complicated. It is made even more difficult using the catch-all name “slime molds”, which lumps mycetozoans and phytomyxans together. Phytomyxans are non-amoebozoan plant parasites, that have an amoeboid-like stage. (Is that confusing enough?)

Fungi originated as a microscopic single flagellated single-celled endoparasite in algae. Mycetozoans are also single-celled protozoans, but they are not parasitic. They merely feed on surface and do not penetrate the substrate. Some scholars suggest that they are not host or substrate-specific, though others group them by

substrate. They are sensitive to pH and, therefore, are grouped in four ranges of pH, which grossly corresponds to the pH variations of their substrates. They feed on bacteria and microbes that are found on a variety of substrates: soil, moss, fungi, decaying wood, tree bark, flowers and leaves, and therefore perform an extremely important role in controlling bacterial and microbial densities. They play a poorly understood essential role in nutrient cycling, on which entire ecosystems depend.



Figure 2. *Fuligo septica* (sorocarp-bearing “aethelium”) and *Stemonitis* (sorocarps) in Strathcona Provincial Park

Notably, mycetozoans that have received considerable attention in biomedical research, such as the commonly seen *Fuligo septica*, which is known to accumulate a lot of essential elements such as zinc, iron, magnesium, selenium, and especially calcium. The high amount of calcium in mycetozoans is of particular interest because calcium is essential for neural function (muscular synapse and brainwork). Myxozoans are known for being able to compute and solve complex problems. They have been used to operate computer circuitry and to operate six legged robots.³ As the foremost authority on slime molds, Princeton’s late Dr John Tyler Bonner, frequently noted, these simple one-celled organisms are a brain-in-a-bag: “they manage to have various behaviours that are equal to those of animals who possess muscles and nerves with ganglia—that is, simple brains.”

As the name suggests, they are “fungal-animals,” (“myceto” = fungus and “zoan”= animal.) Their life cycle involves the formation of a spore-bearing structure (“sorocarp”) that outwardly resembles, but is not, a fungal-reproductive structure (“sporocarp.”) They all seem to share a similar life-cycle. They begin as haploid spores that develop into microscopic single nucleus “amoebas” or flagellated zooids, which aggregate into a multi-nucleated “plasmodium” (slime blob), which mature in an “aethelia” out of which “mold-like” diploid sorocarps emerge, eventually to break and spread haploid spores, which will repeat the cycle.

Mycetozoans are part of a number of groups of organisms mainly found among the protists, which merge characteristics

1 <https://www.wnps.org/blog/slime-mold-interlude>

2 See: https://www.mun.ca/biology/scarr/Taxon_types.htm

3 https://www.researchgate.net/publication/242492553_Importance_of_Myxomycetes_in_Biological_Research_and_Teaching

of fungi, animals, or plants. They defy our normal categories of classification. By doing so, they tell us a lot about the dynamism and creativity of nature and biodiversity. Biodiversity is not a collection of species, it is a transition of connected life forms. Darwin's great challenge to the Victorian world he lived in was a question that remains to this day central to our understanding of biodiversity: "*Is life on earth united in an evolving continuity, or is it a network of competitive hierarchies?*" That is a question for "planetary biology", which traces the evolution and transformation of DNA and proteins through a constantly changing planetary history. Because of DNA, we no longer think of Neanderthals as "another race" but as evolutionary cousins in humanity's journey whose DNA we inherited. The Neanderthals are us, and the mycetozoans are not too far behind!

In classical biology, this same question is phrased as: "*Is it better to try to unify organisms by evolutionary history than to divide them?*"⁴ The concept behind "natural selection" was never meant to be Herbert Spencer's (1820-1903) unfortunate catch-phrase "survival of the fittest." Darwin's "struggle for existence" was meant to connote the fitness of an organism for an ecological place or "niche" in a continuously evolving and changing environment.

Darwin's nineteenth-century Victorian world was built on the racially- structured and class-obsessed colonial empire that drove the rise of industrial capitalism and reduced nature to "resources." (A misconception still promoted by our politicians and corporate leaders, which is largely responsible for our current climate and biodiversity crisis that endangers humanity's survival on this planet.)

Darwin came from a long tradition that saw the earth as a living organism. The challenge that Darwin presented to Victorians was at odds with the popularly endorsed simplistic and misleading misinterpretation of the theory of evolution, which suggested that "man descended from monkeys." That was what the popular press, gutter politicians and racist apologists like Spencer would use to promote "social darwinism," a cornerstone of fascism that still finds favour today in right-wing conservatism. Darwin followed in the anti-racist footsteps of von Humboldt, whose works he prized, took and read on the voyage of the Beagle. Long before advent of genetics and DNA, Darwin was awestruck by the relatedness of all life, and man's indebtedness and evolutionary proximity to all other species. Darwin's theory of evolution ties all life together as one large complex interdependent unity.

Unfortunately, over the last 100 years, poorly taught science promoted throughout our conventional educational system, which mis-educates children for corporate careers, has often reduced the theory of evolution to hierarchies, levels, and categories. Two centuries after von Humboldt and Darwin, that approach facilitates the view of nature as just "resources." The inconvenient essential part about the continuity of life, and the sentience of even single-celled organisms we rarely see has unfortunately been overlooked and failed to enter public discourse. We overlook or understate the problem of the unity of life at our expense, as the lack of a public understanding of the linkages between the climate and the biodiversity crises illustrates.

⁴ <https://asm.org/Articles/2021/January/Three-Reasons-Fungi-Are-Not-Plants>

Mycologists often point out that members of the fungal kingdom are closer to animals and human beings than they are to plants.⁵ What then of the mycetozoans? They seem even closer to us, though distant in evolutionary time. The division between plants and animals gets blurred when we stop to consider "plant sentience" and models of sentient forests proposed by Suzanne Simard and others. The division even becomes increasingly spurious when we leave the comfort zones of our accepted categories and mental routines and take time out to stop to observe and consider the intractable mycetozoans.

The sooner we come to terms with the continuity and interdependence of life throughout nature, the sooner we will be able to address the rights of nature and overcome the divisiveness that has brought upon us the biodiversity and climate crisis.

⁵ <https://www.newscientist.com/article/mg13818773-300-science-animals-and-fungi-closer-than-anyone-expected/> ; <https://asm.org/Articles/2021/January/Three-Reasons-Fungi-Are-Not-Plants>

ALBERTA NEWS

Submitted by Brian Free, CSEB Alberta Regional Director

More on Coal Mines

In the Winter 2022 Alberta report, I described research demonstrating the contamination of an Alberta alpine lake via windblown dust from nearby historic coal mining¹. Just recently, another study² in the Crownsnest Pass describes the direct contamination of lakes and rivers downstream from two other mine sites. At the Tent Mountain site, decades of waste rock were piled beside a retention pond where they found selenium concentrations above 100 micrograms per litre. The pond drains into Crownsnest Creek that runs through a wetland at the base of Tent Mountain. Researchers found that much of the selenium has been retained within the wetland, a testament to the importance of wetlands to the health of aquatic ecosystems.

At the Grassy Mountain mine site, selenium contamination was less intense, but researchers found that there have been periodic discharges from the mine entrance with very high iron concentrations.

The take-home message—it appears that these legacy coal mines continue to contaminate their downwind and downstream environments. Is this the state of mine reclamation in Alberta?

¹ Cooke, Colin A., and Paul E. Drevnick (2022) Transboundary atmospheric pollution from mountaintop coal mining. *Env Science & Technol Letters* 9(11) 943-948.

² Cooke, Colin A., Craig A. Emmerton and Paul E. Drevnick (2024) Legacy coal mining impacts downstream ecosystems for decades in the Canadian Rockies. *Environmental Pollution* 344 (2024)

Alberta Has Made Little Progress To Protect Caribou Despite Conservation Deal, Report Shows

By Bob Webb, *The Canadian Press* /from CBC News

An Alberta government document suggests the province has made little progress in protecting its 15 threatened caribou herds,



Woodland Caribou - Jasper National Park. Source: Parks Canada.

despite having signed an agreement with Ottawa that promised it would. That document, released three years late on Jan. 19, is the first report into the so-called Section 11 agreement between the province and Environment Canada.

The 2020 agreement was made under threat of the federal government stepping in to protect critical habitat for the herds, which are in many cases almost entirely disturbed by resource development.

The report considers the deal's first two years. But even that limited time frame suggests a long list of problems, from the slow cleanup of seismic lines to the ongoing growth of industrial footprint to the lack of range planning that would let the species survive in some of Canada's busiest landscapes.

"There's not much here that is encouraging in the data," said Phillip Meintzer of the Alberta Wilderness Association.

Critical Habitat Disturbed

Despite the agreement's focus on habitat protection, human disturbance increased in 23 out of 28 caribou subranges between 2018 and 2021.

The average amount of critical habitat undisturbed by industry or wildfire in an Alberta caribou subrange is 19 per cent, when federal guidelines say caribou need 65 per cent to be self-sustaining.

Of those 28 subranges, seven have more than 10 per cent of their area under some form of protection. Nine have no protection at all and the rest average about three per cent.

Forestry, energy, agriculture, recreation and homes all chip away at caribou habitat, but they also provide jobs that thousands of Albertans depend on. Range plans laying out how those uses can coexist with caribou are a major objective of the agreement.

Fifteen range plans were to have been finished by the end of 2025. Two have been completed, said Meintzer, and those have not yet been implemented by legislation.

Guidelines for activity on caribou habitat that do exist may be adjusted at industry request. Between October 2020 and December 2021, Alberta Environment processed 101 such applications.

One of the biggest causes of disturbance is seismic lines, which chop up forests and allow predators access into groves that would otherwise be hard to get to.

The report says Alberta has 250,000 kilometres of seismic lines on caribou range. By the end of 2021, 138 kilometres had been restored and work started on another 763.

Meanwhile, activity on caribou range proceeds. In 2020 and 2021, new approvals for forestry, energy and other industrial activities covered more than 700 square kilometres.

15 Alberta Herds Remain

Despite the pressure, recent government estimates say caribou numbers seem to be steady at about 2,000. Of Alberta's 15 herds, the report is confident that eight are at least holding their own. One is almost certainly shrinking. For the rest, things could be going either way. The report attributes that to the province's annual wolf cull, conducted by helicopter gunning and strychnine poisoning. In 2020 and 2021, 824 wolves were killed.

"In all cases, the trends are poorer," said Meintzer.

Meintzer points out the report is two years overdue. Attempts to find out why have failed, he said.

"We've talked to folks at both Alberta Environment and Protected Areas and Environment Canada. Both are pointing at each other."

In a statement, Ryan Fournier, press secretary to Alberta's Environment Minister Rebecca Schulz, said caribou recovery takes time but the province is making progress.

More than \$49 million has been invested into restoring caribou habitat and two more land-use conservation plans are "nearly done," the province said.

"We are doing more for caribou than any government in Alberta's history. While caribou recovery takes many years, this report and our many activities since show that we are making progress," the province said.

"Many significant milestones were reached during this time period, including releasing draft sub-regional plans for the Cold Lake and Bistcho Lake areas, finalizing caribou sub-regional task force recommendations for Upper Smoky, and 138 kilometres of legacy seismic lines were treated for restoration through Alberta's Caribou Habitat Recovery Program."

The federal government did provide comment on the report.

University of Alberta ecology professor Mark Boyce said the report throws doubt on Alberta's caribou conservation efforts.

"I was in the Little Smoky range this fall and was disturbed to see extensive expansion of oil/gas and continued logging of the remaining habitat patches," he wrote in an email.

"Some herds are persisting because of wolf poisoning, a despicable practice that kills vast numbers of non-target wildlife. [Alberta's] own data in this document show how they have totally trashed habitats for most herds."

Because of the sensitivity of caribou to disturbance and their need for the same landscapes that humans depend on for resources, biologists have described preserving the species as one of the toughest problems in conservation.

Meintzer said that's what makes the delay and the conclusions of the report so disappointing. Section 11 agreements, in effect on animals from killer whales in British Columbia to lake sturgeon in Quebec, are supposed to be an important tool to bring governments together for conservation.

"Just having the 2021 numbers doesn't really give us the ability to assess whether the agreement works," he said.

"Without these annual reports, we just can't say whether these Section 11 agreements help at all."

SASKATCHEWAN News

Submitted by Curt Schroeder, CSEB Past President

Water for a Growing Province – Moving Toward a Wetland Policy for Saskatchewan

Saskatchewan remains the only province without a Wetland Conservation Policy.

Since 2013, the Saskatchewan Water Security Agency (WSA) has committed to developing a Saskatchewan Wetland Policy, and 10 years later there is still nothing. Instead, the Province is developing a Wetland Drainage Policy (now Agricultural Water Stewardship Policy) which embeds all wetland management in a framework that focused mainly on farm profitability. For nearly a decade, the Saskatchewan Auditor has been critical of WSA, the agency responsible for protecting our wetlands and water supplies, citing that the Agency has limited and ineffective policies around wetland retention and water quality. The Auditor also recommended that WSA needs to identify and bring unapproved high-risk drainage works into compliance, and that they develop a plan to address unapproved drainage in high or severe risk regions. A key example of this failure is the Quill Lakes area where flooding continues to consume tens of thousands of acres of valuable cropland and pasture and yet wetland drainage into the lakes continues unaddressed, unregulated, and uncontrolled.

A coalition of environmental groups is very concerned that the proposed policy prioritizes agricultural development over all other water uses, ignores treaty rights of First Nations, and creates a hierarchy in which economic development is paramount. There has been no mention of requirements to restore any drained wetlands; instead WSA states that they will maintain existing drainage and create new wetland drainage projects. Similarly, there is no explicit plan to improve water quality already damaged by wetland drainage and other inappropriate land uses or restore previously drained wetlands which recharge groundwater supplies, fight climate change, improve water quality, reduce impacts from flooding and drought, and sustain biodiversity. Finally, there has been limited recognition that wetland loss and agricultural intensification degrade the quality of remaining surface and ground waters. In contrast, 30 years of research by Dr. Peter Leavitt, Canada Research Chair in Environmental Change and Society at University of Regina, has shown that our lakes are getting sicker and levels of toxic algae blooms detrimental to human health are increasing due to agriculture, urbanization, and climate change.

The current government has said that water quality is at top of mind, but evidence does not back that up. Instead, the government approved ongoing wetland drainage and WSA has licensed a drained area that is 17 times the size of Regina in just the last few years, but did not require any wetlands to be restored or protected (WSA 2021-22 Annual Report).

The creek flowing through Regina to the Qu'Appelle is rated as unhealthy, and water quality is being made worse by licensed and illegal wetland drainage. The City of Regina's wastewater was once a major source of those pollutants but now it is not.

With ongoing drainage planned, the new drainage policy may not ensure that water quality is improved, or will it continue to be made worse, causing more toxic algae blooms and undoing all the great work the City of Regina has done by upgrading its Wastewater Treatment Plant.

Water supplies are of much greater value—for all uses—if healthy water quality and ecosystem functions are maintained. Contamination of surface and ground waters, degradation of ecological health and function, and loss of biodiversity and wetlands, comes with real economic, social and environmental costs. These costs include health risks, loss of recreational opportunity, loss of habitats, reduced biodiversity, reduced water quality and supply, increased water treatment costs, and many others.

Failure to maintain the quality of our water supplies places additional stresses on Saskatchewan's ability to meet the demands for water and constrains population and economic growth. Also, groundwater aquifers are a valuable part of our supply that, contaminated or drained, can take centuries to recover.

Wetlands store water during floods, reduce damage from droughts, replenish well water for rural uses, aid livestock, and are critical to wild game and other species. They improve water quality by removing nutrients, sediment, pesticides, metals, and pathogens. Wetlands also store large amounts of carbon thus fighting climate change, while at the same time are important habitats supporting the maintenance of biodiversity.

(from a submission by Saskatchewan Alliance for Water Sustainability, 2023)

MANITOBA News

Submitted by Robert Stedwill, CSEB Vice-President

I've written about the Centre for Earth Observation Science (CEOS) before, and I'm surprised we don't hear more about it in the news, especially as the effects of climate change become more pronounced.

"The Centre for Earth Observation Science (CEOS), housed in the Clayton H. Riddell Faculty of Environment, Earth, and Resources, is a leading research centre at the University of Manitoba focusing on understanding how the Earth will respond to climate change. Since its founding in 1994, CEOS has always been multidisciplinary and collaborative, drawing on researchers from different areas and faculties. CEOS researchers conduct their field work all over the world; however, the Arctic marine system has always been a unifying focus of activity because climate change affects this region more acutely than anywhere else in the world."

As a former research field biologist with the former Ontario Water Resources Commission (OWRC), which subsequently became the Ontario Ministry of Environment (MOE), which has morphed into the now Ministry of Environment, Conservation and Parks, much of my field work included aquatic macrophytes in the Kawartha Lakes, along with related lab work associated with nutrient uptake in *Vallisneria americana*. Some of the original 1970s satellite chlorophyll "ground truthing" was also part of this

Kawartha field work. Heavy metal uptake, particularly mercury in fish in some of the northern Ontario Lakes, including Lake Superior, resulted in satisfactory outcomes in a number of court cases. Suffice to say, even with this truncated description of some of the elements of my career, I have been fascinated by the work of the CEOS. Perhaps only in terms of my own nostalgia.

“The Manitoba Great Lakes (MBGL) program is led by researchers at the Centre for Earth Observation Science (CEOS) at the University of Manitoba, and is a multi-disciplinary collaboration dedicated to conducting research and providing data for science-based decision making in the Hudson Bay Watershed.

The upper Manitoba Great Lakes (Lake Manitoba, Winnipegosis, and Waterhen) include the 27th (Winnipegosis) and 32nd (Manitoba) largest lakes in the world. They are important drinking water sources for the people who live near their shores, and important recreational and fisheries resources for the region and the Province as a whole. Moreover, they help to protect Lake Winnipeg by filtering nutrients and contaminants in runoff from its western watershed. In particular, the operation of the Portage Diversion during flood events has effectively shifted significant fractions of the Assiniboine River nutrient and contaminant load from the south basin of Lake Winnipeg to the south basin of Lake Manitoba, with undocumented impacts on the latter.

Currently, the physical, chemical, biological and geological processes in the lakes are not well understood. Therefore, we have a poor ability to predict responses to change in factors such as climate, fishing pressure, and nutrient or contaminant loading from the watershed, or to understand impacts carried downstream to Lake Winnipeg, into Hudson Bay and the Arctic. For example, climate change impacts include direct lake warming, which intensifies in-lake chemical and biological processes, and increasingly intense precipitation events. It is likely that this has led to increased runoff and more frequent flooding, and hence, increasing nutrient and contaminant transport from the watershed to the lakes, but we have no data to support this speculation. In Lake Manitoba, commercial catch of the most valuable species, pickerel, has declined by more than half since the 1980s. This may be due to pike in-migration through the Portage Diversion, or to high fishing pressure; we have too little information to know the cause. Most recently, in the summer of 2021, zebra mussel larvae were discovered in Lake Manitoba; again, without better information, the impact of this invasive species is a matter of conjecture. Overall, lake management and governance are being decided without adequate scientific support.

The MBGL program deploys moorings to measure physical and biological parameters in the lakes. Through various initiatives, including graduate programs, we also collect nutrient, biological and physical data from the MBGL lakes as well as the surrounding watersheds. Other projects include studying nutrient forcing of algal biomass and associated algal toxins. We look at water quality indicators such as chlorophyll, suspended solids and dissolved organic carbon and can use them to create visualizations such as maps of chlorophyll concentration in surface water. These methods combined with satellite data can be used for early detection of algal blooms and identify potential sites where algal toxins may occur.

Through our multi-disciplinary research the MBGL program will provide biological and physical data to support science-based

decision making in the Hudson Bay Watershed, at local, regional and hemispherical scales.”

The information above has been extracted from the website of the Centre for Earth Observation Science. I admire its work and the scientists that work therein, and will monitor their efforts and live vicariously through them.

It would be good if scientists themselves, working with the MBGL or the CEOS, report directly on their work and contribute to the Bulletin.

ONTARIO News

Submitted by Barbara Hard, CSEB President

From an environmental perspective, one of the most noteworthy current controversies in Ontario is t Premier Doug Ford’s Greenbelt scandal.

The Greenbelt, established in 2005 by the previous Liberal government, is a vast area of protected land surrounding larger cities in Ontario, including those in the Greater Toronto Area. It is a crucial ecological and agricultural buffer, protecting natural habitats, safeguarding watersheds and supporting local food production (Greenbelt, 2023). The Greenbelt is also a recreational space, providing numerous opportunities for outdoor activities.

In early 2019, Premier Ford’s government introduced Bill 66, also known as the Restoring Ontario’s Competitiveness Act. The bill proposed amendments to the Planning Act, the Clean Water Act and the Greenbelt Act, amongst others. One of the most contentious amendments was the loosening of restrictions on development within the Greenbelt with municipalities having the power to fast-track development projects, circumventing environmental assessments and public consultations (Government of Ontario, 2019). This could potentially lead to irreparable loss and damage to natural resources and wildlife habitats.

Proponents of Bill 66 argued that it aimed to boost Ontario’s economic competitiveness by attracting investments and creating jobs and that streamlining the approval process for development projects would lead to increased economic growth and prosperity. However, from an environmental perspective the potential economic benefits are outweighed by the long-term environmental costs.

Premier Doug Ford’s decision to weaken environmental protections in the Greenbelt sparked a firestorm of controversy and outrage from the public, including the Chiefs of Ontario which were firmly opposed as it involved a number of nations’ ancestral and traditional territories, maintaining that the government had failed to meet its duty to consult (Toronto Life, 2023).

As a result of public and political pressure, Premier Doug Ford reversed the decision.

New legislation tabled by Premier Doug Ford’s government to return land to Ontario’s Greenbelt also seeks to shut down a developer’s \$120-million lawsuit that began before the Progressive Conservatives took office (CBC, 2023a). The government’s bill, the Greenbelt Statute Law Amendment Act, would stop all landowners whose Greenbelt properties were

selected for housing development from taking any future legal action against the province, cabinet ministers and government staff in response to Ford's reversal.

In October of 2023, Minister of Municipal Affairs and Housing Paul Calandra announced the government is reversing another of its controversial moves to open more land for housing: boundary expansions and zoning changes it forced on 12 municipalities, including Ottawa, Hamilton and Waterloo Region.

The RCMP is currently investigating Ontario government's plan to open Greenbelt land for development. The RCMP announced in October it has launched a criminal investigation into Ontario Premier Doug Ford's plan to open up Greenbelt land for development (CBC, 2023b).

(From Ontario Report presented at the CSEB 2023 AGM)

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QUEBEC News

Submitted by Gary Ash, Bulletin Editor

Quebec's Environment Department says it is introducing a new measure to mitigate the impact of wind farms on bats native to the province.

The government will require all future wind farm projects to increase turbine cut-in speeds — when the blades start rotating and generating power — to 5.5 metres per second at night between June 1 and Oct. 15. Those months coincide with the period of the year when bats are most active in North America — and when they are most often killed by turbines.

The department says the measure has proven effective elsewhere and should significantly reduce the risk of bats colliding with turbines in Quebec, the second-largest wind energy market in Canada, after Ontario.

In June, the province designated four of eight bat species in Quebec as threatened or vulnerable, and said that three of the four others are likely to meet the criteria in the future to be designated as threatened or vulnerable.

Reprinted from the Edmonton Journal, 27 December 2023.

ATLANTIC News

By Peter Wells, CSEB Atlantic Regional Director

Introduction

As fall of 2023 flows into winter of the new year, a survey of environmental and resource issues of note shows a wide range of topics and disappointingly slow progress on some of them. One wonders about the challenge of getting government bodies at all levels to move faster under firm policies focussed on improving environmental conditions, the future of economically important species, and the preservation of key habitats and species. While I revisit a highly influential book of the last century — *The Quiet Crisis* by Stewart Udall — I keep asking the question — have we yet to learn to live and work within our natural environment, and respect it for all it offers us, instead of continuing to modify and destroy it? As the survey below of current Atlantic (mostly NS) issues shows, we seem to be forever repeating the errors of the past and ignoring the future for ourselves and the natural ecosystems upon which we depend. As mentioned many times by other contributors to the CSEB Bulletin (especially Loys Maingon), timely and effective action is needed by our decisions makers and managers in government, based on the facts provided by our science.

Climate Change

This has understandably been in the news a lot lately due to the COP28 meetings in Dubai in late November. Prior to that, in NS, a survey with specific questions was initiated “to understand what elected representatives are doing about climate change” (Davis 2023); an email was sent to every member of the NS legislature in August. Only six detailed replies were received; half the representatives did not reply at all. The study investigators concluded, perhaps prematurely, that government is not considering climate change a high priority and an urgent threat. The study, in my view, requires repeating to be conclusive but their point that “urgency is required for any hope of managing the future” is one to consider very seriously. COP28 started and was covered extensively in the press (Reuters 2023 a,b; Pearce 2023; Dickie 2023), with a focus on the warmer temperatures occurring globally and anticipated to continue to rise, with massive human health and economic impacts unless the world weans itself off fossil fuels as an energy source.

Talks continue, actions are not occurring fast enough. Scientists are not optimistic about our collective ability to control temperatures below the 1.5°C limit (Dyer 2024), massive storms continue (Reuters 2024), and extreme weather is considered likely to trigger a major global policy, economic, and environmental crisis very soon, according to a survey by the World Economic Forum (Waldersee 2024). None of this bodes well for the Atlantic region, so prone to the vagaries of the North Atlantic Ocean and the major storms that annually sweep up the coast from the Caribbean region.

Terrestrial Issues

• Forest management

In early January, Dr. Helga Guderley of the Healthy Forest Coalition gave a spirited presentation about the immediate need

for sane forestry procedures, policies, and practices for NS. There is still much evidence that companies are not complying with the recommendations of the Lahey Report (mentioned in this column in previous issues of the Bulletin), to the detriment of provincial landscapes, soil retention, water quality, the success of migratory birds during nesting season, and critical habitat for mainland moose. This issue remains unresolved in NS and in my view, requires activism by environmental groups to wake government up and demand a change in corporate behaviour. Society is mismanaging the land much like it was done in the early days of colonization across North America (read Udall's 1963 book and others for the history).

● Mining

Mining has not been in the news much lately, only in the context of the continuation of the Donkin coal mine on Cape Breton Island; this mine produces metallurgical (steelmaking) coal for export (Brisco and Budreski 2023). Thermal coal is still being mined and produces a significant amount of electricity for the province, despite the greenhouse gas emissions.

Marine Issues

● Fisheries

The squabble over fishing rights between commercial fishers and indigenous fishers continues unabated and unresolved (Beswick 2023b), a resolution proving to be elusive and likely detrimental to the various species being exploited. Fishing outside of the carefully set commercial seasons cannot be helpful for the species, especially lobsters (Comeau and Johnson 2023; Beswick 2023c). Lobster landings have been down significantly in SW NS (Johnson 2023) and concerns are being expressed about illegal, unreported and unregulated fishing, and the impact of that on their breeding stocks. It is clear that existing fisheries policies and regulations need to be enforced, regardless of who is fishing. Again, this is another example of pillage of an ecosystem and its species for purely economic reasons, any wider considerations about the marine ecosystem being completely disregarded.

The same situation is occurring for the eel fishery (Hurley 2023a; Beswick 2023d, 2024a). Juvenile American eels (*Anguilla rostrata*), at the elver or glass eel stage, enter NS coastal waters and rivers after migrating long distances from the Sargasso Sea. In the rivers, as they swim upstream, they are captured in a very lucrative "fishery" that is poorly regulated despite DFOs efforts, and it is very prone to corruption. Fishers ignore federal regulations and squabbles continue between indigenous and non-indigenous people. All of this is being driven by the extremely high value of the glass eels in the Asian market. Besides the fishing impacts, which are extreme, dams on the many river systems impede eel movement. No real thought or coordinated action is being given to the fate of this species by the fishers, just their market value. Are eels going the way of the northern cod? Will society ever learn from past mistakes? Is DFO completely impotent as a regulatory authority?

● Energy Resources

The request for exploratory drilling on the Scotian Shelf, between Sable Island and the Gully MPA was turned down recently by the Canada-Nova Scotia Offshore Petroleum Board, due to concerns

brought forward by numerous environmental groups, and the desire to focus on clean energy options, such as wind (Chronicle Herald 2023). Wind energy developments, on land and at sea, are gaining momentum, with a new wind farm in Colchester County being approved, and offshore wind development, especially on Sable Island Bank with up to 1000 turbines being discussed (Beswick 2023a; Wright 2024). The fishing industry is expressing concerns about their fishing grounds, despite there being many examples of compatibility in European waters. Further nuclear power developments are being seriously discussed in New Brunswick, with the focus on small nuclear reactors (Chilibeck 2023). Extracting gas from shale deposits is also a possibility. All of this discussion is in the light of trying to reduce dependence on fossil fuels and harmful emissions.

● Coastal Zone Management and Coastal Protection

A "wish list of ways to address key resource and environmental issues related to Atlantic coastal zone waters" was presented recently (Hurley 2023b), with a focus on the Atlantic region. Items included having an independent coastal zone management authority and regulatory framework; a strategic regional plan for addressing sea level rise; a clearer environmental assessment framework for proposed industrial projects; confirmation of the authority of treaty rights fisheries; and removal of non-functional barriers to fish passage, i.e., dams, throughout the region. Hurley summarizes progress towards some of these goals, such as removal of the Petitcodiac dam at Moncton, NB, and restoration of salt marshes near Truro, NS, a town that is prone to flooding from the sea and the local rivers. He ends on a positive note that "we can protect coastal zone waters and resources" if we collectively try hard enough. Lethbridge (2024) also homes in on the need for action under the 2019 *Coastal Protection Act* (apparently not yet passed into law), given the recent devastating storms; the government wants more consultations, groups like the Ecology Action Center want immediate action, and property owners along the coast are at risk.

● Marine Environmental Quality/Marine Pollution

A wide array of stresses continue in the coastal zone. Recent ones prominent in the news include the impacts of dams (Campbell 2024), coastal infilling (Taplin 2024), shellfish contaminants (Hurley 2023c), and a new one, the presence of fat/grease on shorelines (Sullivan 2024).

The causeway at Windsor with the new highway planned is hugely controversial, as there is a requirement to have safe fish passage through the aboiteau at the causeway, at the same time as maintaining water level in the upstream lake and river (Campbell 2024). The gates in the aboiteau have to be open on incoming tides to allow fish to swim upstream to spawn. This complex situation has been unresolved for 50 years now. In the meantime, highway completion is stalled.

In Halifax, after much public protest, infilling along the shores of the northwest arm portion of the harbor has been restricted for the time being (Taplin 2024). Home owners along the arm wish to extend their properties in to the sea, apparently allowable under pre-Confederation agreements. This is being vigorously opposed by the many recreational users and it would set a bad precedent for desired coastal protection.

Hurley's article (Hurley 2023c) highlighted the pros and cons of consuming molluscan shellfish, which as filter feeders can accumulate a range of naturally occurring toxins and many persistent chemical contaminants. Cooking does not destroy all of these chemicals. Eater beware! As Hurley states, safe shellfish need to be grown in unpolluted waters. What could be considered in future articles is the knowledge that natural toxin (PSP, ASP) outbreaks are becoming more common in nearby Gulf of Maine waters as water temperatures increase.

Finally, a new pollutant hit the news as fat and grease sludge, named "fatbergs" washed up on a Cape Breton beach (Sullivan 2024), suspected to have originated from municipal sewage system outflows. This story is not yet finished.

Wildlife Issues

Diseases affecting birds have been in the news all of the past year and should be monitored as a crucial hazard affecting birds around the globe. It is a major concern in the Antarctic, with a highly pathogenic avian influenza bird flu spreading in penguin colonies (de la Hamaide 2023). In Atlantic Canada, bird feeding stations must be kept very clean to prevent spread of local viruses.

A good news bird story was reported on the CBC – there has been a recovery of piping plover numbers in NS, pointing to the success of local conservation initiatives such as beach closures during breeding season. These birds nest on sandy beaches and are easily disturbed. People seem to be respecting the closures.

On the other hand, thin ice on local lakes has proved a dire hazard to animals such as deer (Beswick 2024b), another problem linked to our warming winters, and the annual black bear hunt in NS is being suggested for the spring, despite the risks to mother bears with cubs (Beswick 2024c).

Having only seen a bear once in the province in 50 years, my opinion is that trophy hunters seeking our bears should look elsewhere or seek another pursuit. Surely our wildlife deserves some protection in our already highly modified and disturbed environment. Another issue perhaps for the CSEB members to discuss!

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A Report From the Intergovernmental Ecotoxicology Testing Group (IGETG) – Jan. 2024

By Rick Scroggins, Environment and Climate Change Canada, Ottawa, ON.

The Method Development and Applications Unit of Environment and Climate Change Canada is pleased to announce the publication of an amendment to EPS 1/RM/13 Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout – Second Edition with May 2007, February 2016, and December 2023 amendments to permit control sharing.

Environment and Climate Change Canada (ECCC) recognizes the importance of incorporating the 3Rs of animal testing (i.e., reduction, refinement, and replacement) into toxicity test methods. Previously, laboratories were not permitted to use a control for multiple effluent tests. As a concrete step towards reducing the number of fish used in tests for regulatory compliance, this brief amendment to RM/13 will permit the sharing of one control treatment between multiple rainbow trout acute lethality tests initiated on the same calendar day, under certain conditions. We recognize that your institution may not conduct this test method or may not be in a position to implement control sharing due to the type or frequency of testing you conduct. However, we thought you and your colleagues would be interested in this impactful step our group has taken to reduce the use of fish use in aquatic toxicity testing.

Electronic copies of RM/13 and other test method documents are available for download from our website:

English: <https://www.canada.ca/en/environment-climate-change/services/wildlife-research-landscape-science/biological-test-method-publications.html>

French: <https://www.canada.ca/fr/environnement-changement-climatique/services/recherche-faune-science-paysage/publications-methodes-essai-biologique.html>

Contact: rick.scroggins@ec.gc.ca

Announcement of an Upcoming Conference of Interest to CSB Members

The Huntsman Marine Science Centre (HMSC) is hosting a joint conference on estuarine and coastal science, co-sponsored by the HMSC, the Bay of Fundy Ecosystem Partnership (BoFEP), and the Atlantic Canada Coastal and Estuarine Science Society (ACCESS). It will be held on June 4-7th, 2024, at Saint Andrews, NB, at the HMSC aquarium.

The title of this year's conference is **“Tides of Change: Accelerating Conservation and Protection Efforts in Atlantic Canada's Estuaries and Coastal Waters”**. This follows 13 previous BoFEP workshops and conferences, the Proceedings from which are all published and available on the BoFEP website (www.bofep.org). Combining the meeting with ACCESS began in 2022, encouraging more students to attend and present their research findings as they progress through graduate school. The focus of the meeting is both on science pertaining to the Bay of Fundy and more broadly, the estuaries and coastal waters throughout Atlantic Canada.

Abstracts for talks, posters or panel sessions are due on March 31st and should be sent to Dr. Benjamin (Ben) de Jourdan at the HMSC, email: Benjamin.deJourdan@huntsmanmarine.ca.

Sponsors are being sought to support both the conference and the attendance of students. It is hoped that the CSEB can play a role in both promoting the conference and also sponsoring a student or two to facilitate their attendance. Please contact Peter Wells at oceans2@ns.sympatico.ca, for more information as required.

TERRITORIES News

By Anne Wilson, CSEB Territories Director

News coming from the NWT and Nunavut includes evidence of changes associated with this year's El Niño weather pattern conditions. The forecast for February to April indicates a high probability of above-normal temperatures persisting. Thin ice in Pond Inlet claimed a hunter's new snowmobile and qamutik, and very nearly cost his life. Hunters in Fort Smith area are warning of unusually thin ice, with snowmobilers getting stuck up to the handlebars in water. In the Yukon, “yo-yo” weather conditions are bringing rain and slush in January, breaking records for daytime high temperatures. There seems to be some debate about the extent to which conditions are due to El Niño, and how much of a factor climate change might be.

Upcoming conferences and sources of information on current Northern topics include:

- 23rd Annual Arctic Energy & Resource Symposium March 20–21, 2024, at the Hotel Arts, Calgary, AB. Join leaders from Federal and Territorial governments, Northern communities and industry for candid discussions and valuable information on developments in oil, gas, renewable, and low-carbon products as well as critical minerals and other resources. <https://www.canadianinstitute.com/arcticenergy/>
- Arctic Science Summit Week March 21-19, Edinburgh, Scotland. Organised annually by the International Arctic Science Committee to provide opportunities for coordination, cooperation and collaboration between the various scientific organisations involved in Arctic research. <https://www.assw.info/>
- ArcticNet - ArcticNet's multidisciplinary research efforts focus on addressing the challenges and opportunities of the rapidly changing Canadian Arctic. ArcticNet funds projects across the Canadian North and South, including northern Manitoba, Northwest Territories, Yukon, and the four Inuit land claim regions of Canada: Inuvialuit Settlement Region, Nunavut, Nunavik, and Nunatsiavut. <https://arcticnet.ulaval.ca/research/>
- The Nunavut Research Institute periodically updates their Compendium of Research <https://www.nri.nu.ca/2021-compendium-research> as does the NWT's Aurora Research Institute <https://nwtresearch.com/research/publications-and-reports/compendia-research>
- Scientific research from the Government of Yukon is available at <https://storymaps.arcgis.com/collections/9397e0152b7f4b0db5aeeffc701cb4aa>
- Polar Knowledge Canada collaborates with researchers and the Canadian High Arctic Research Station to advance and fund studies and knowledge. <https://www.canada.ca/en/polar-knowledge.html>

Northwest Territories:

The NWT Species Conservation and Recovery Fund provides funding for projects that support the long-term conservation,

recovery and protection of species that are at risk in the NWT. Applications for funding for 2024-2025 projects (beginning April 1, 2024) are being accepted from January 15 to March 1, 2024. <https://www.nwtspeciesatrisk.ca/en/news/species-risk-funding-now-available>

Following on 2023's forest fires, which burned over 4 million hectares, the NWT is preparing for a busy harvesting season for morels in the spring of 2024. Morels are prized for their taste and texture, command high prices, and grow in areas of recent disturbance, such as forest fires. Following the 2014 extreme fire season, some 40,000 pounds of morels were picked and flash dried, valued at approximately \$15 million.

Nunavut:

Nunavut is the last of the three territories to have a signed final devolution agreement in place, transferring the responsibility for over 2 million square kilometers of land and water to the Nunavut government from the federal government. It takes effect on April 1, 2024.

The Nunavut territory was created in 1999, and negotiations on devolution of resource management formally began in 2014. An agreement-in-principle was reached in 2019, which laid out areas of agreement for transferring responsibility. Up until the devolution agreement, the Department of Crown-Indigenous Relations and Northern Affairs Canada has been responsible for administration of land and resources in Nunavut. Upcoming territorial legislation will have to mirror federal regulations governing resource management, and final approval will transfer from the federal minister to a territorial minister. Fisheries-related projects will continue to be federally managed.

Nunavut is the last of the three territories to have responsibility for land devolved to the territorial government. Yukon took over administration of its land and water in 2003, and the Northwest Territories in 2014. The Nunavut Lands and Resources Devolution Agreement and further information is available at <https://www.rcaanc-cimac.gc.ca/eng/1352471770723/1537900871295>

Mining news in the North:

Global resources company BHP is proposing to explore extensive areas of the Queen Elizabeth Islands in the NWT and NU for copper, specifically for renewable energy purposes. Copper demand is expected to double over the coming decades with increasing electrification, electrical vehicles, battery storage and renewable energy infrastructure.

Although wildfires interrupted NWT mineral exploration activities in 2023, exploration for lithium expanded in response to soaring spot prices. Advanced exploration continues for 'critical minerals' as well as precious and heavy metals.

The Prairie Creek zinc/lead/silver project is fully permitted to begin production, and is seeking federal funding assistance to complete the 170 km all-season road to the mine site. The proposed road alignment goes through the Nahanni National Park Reserve.

The Nunavut Mining Symposium will be held in Iqaluit April 22-25, 2024 <https://www.nunavutminingsymposium.ca/>

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 agilewilson@shaw.ca. There is also an opening for another Territories Director – please contact Barbara Hard or myself if you would like to take on this role!

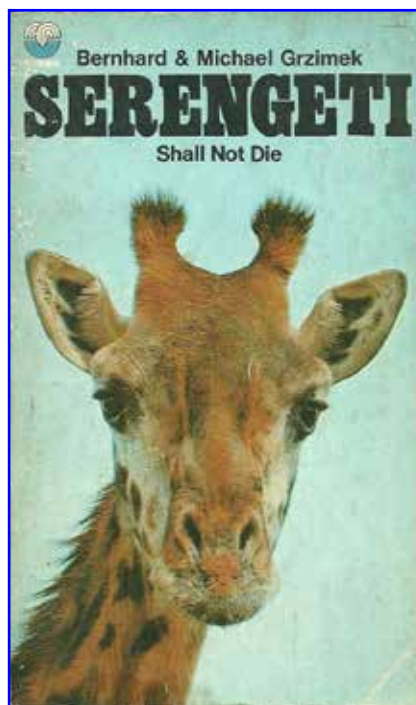
BOOK Reviews

Submitted by Bob Gainer, CSEB Alberta Member

Serengeti Shall Not Die

by Bernhard Grizmek. 1964. Fontana Books, London, England

Available from [Amazon.ca](https://www.amazon.ca/): \$44.31 Hardcover.



This book was the inspiration for me spending almost 4 years in East Africa in the early 1970s primarily as a CUSO volunteer studying the population biology of the anthrax-wildebeest host-parasite relationship. Grizmek's book is about the fantastic, beautiful Serengeti wildlife paradise (which I visited several times) whereas I was based in the Selous Game Reserve, the devil's island for wildlife biology according to Pat Hemingway (in hindsight he was right).

Grizmek was a successful veterinarian and owner of the Frankfurt Zoo, with a midlife crisis who learned to fly with his 20 year-old son Michael so that they could do an aerial census of the Serengeti's animal life. Towards the end of the census, Michael was killed piloting his plane by himself and Grizmek's method of grieving was to say that Serengeti (Michael) must not die. I had been working with Al Oeming on a local Alberta Game Farm collecting local animal species (caribou, pronghorn, moose fawns) for several summers. I was a veterinarian learning to fly and this CUSO job was just more of the same.

In the 1950s when the Grizmeks were there, Serengeti was used by Nairobi based professional hunters for a quick and easy safari for big game hunters and for the significant business of zoo collecting

of African species. After the publication of Grizmek's book, the British Colonial Office was forced to create a National Park out of the Serengeti in the 1960s, plus several other Parks nearby and in other areas of east Africa. The primary argument was for the study of wildlife, but some tourism was allowed. Immediately, a Research Center was established (with Schaller) that was quickly expanded and Serengeti became overrun with wildlife biologists (not so the Selous).

I have a German friend, new Canadian, who grew up in the 1970s watching Grizmek's TV show every Wednesday night 9-10 PM before Bonanza and after Flipper, before and after Gunsmoke and the Beachcomber's (Nick and Relic and Molly) dubbed in German (Germany didn't have much of a TV industry). The first minute of Grizmek's show was a minute of silence for Serengeti (Michael).

If nothing else, the cause made Grizmek passionate, and incidentally extremely successful personally. I don't think his intention though was to get rich, or for the Serengeti to be overrun with wildlife biologists darting and tracking, and now tourism and professional photography. Tourists are bumper to bumper wherever they can find predators, and professional photographers have set up shoots where prey are killed or drugged for bait. Helicopters are used for herding animals. This is not caring about the environment or its animals, this is crass commercialism. But what it did demonstrate was the commercial opportunities (to individuals, businesses, and the Government) that publicizing its wildlife and biology had provided.

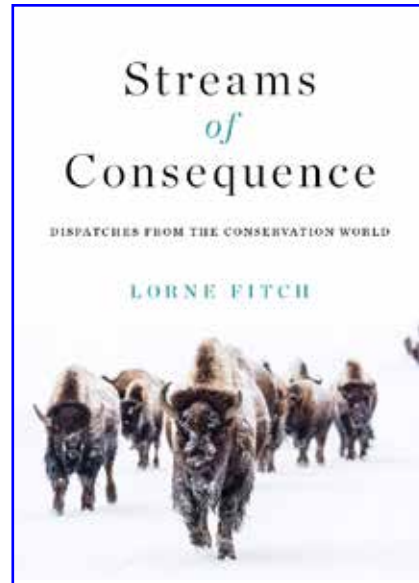
In the 1960s in Alberta, Al Oeming was on the circuit publicizing his Game Farm and helping pay for its operation from the money he collected for his performances. I of course was along with him on some of his tours with Tawanna, his cheetah from the Serengeti. He died relatively well off (Al, that is. The several Tawannas and me got room and board if we were lucky). Brian Keating has been a regular contributor to Alberta CBC radio and TV shows for the past 40 years promoting biology and conservation for the Calgary Zoo. Now he has branched out on his own with a high-end wildlife tours group. My supervisor, Ian MacTaggart-Cowan at UBC, had his own TV show in the 1960s and did very well as a high-profile environmental consultant and academic. David Suzuki was on faculty at UBC at the time and now his net worth is astronomical. However, as an anthrax "nut" I can testify that I didn't have the "gift" (snivel).

Streams of Consequence: Dispatches from the Conservation World

by Lorne Fitch. 2023. Rocky Mountain Books, Victoria, BC
Available from [Amazon.ca](https://www.amazon.ca/): \$24.75 Paperback; \$9.99 Kindle.

Lorne Fitch is another Alberta conservation and biology crusader. He worked for Alberta Fish and Wildlife and was an adjunct professor at the University of Calgary for close to 50 years. He is an extremely gifted writer in the descriptive sense. He thinks of words the way painters use paint, singers use their voice, musicians use their instruments, etc. He would take the work of hands-on, down to earth field biologists in these departments and turn them into works of art that members of the public would appreciate in magazines like the highly respected Alberta Outdoorsman.

Most spin doctors have a background in English or History with no passion for what they write about. Fitch, a baby boomer,



grew up on a hard scrabble farm (I can testify to Alberta farms being hard scrabble at that time working as a hired man for several summers as a teenager) west of Red Deer (now a city), hunting and fishing in natural surroundings. When I was a baby boomer child (1940s) traveling in my family's car on the Calgary trail (not today's 6 paved lanes) to Banff I remember if it rained, you didn't go. Eventually the north part that got the most rain got some gravel

(1950s) and you could go some times when it rained (we were so modern). There is a good chance that Fitch (and myself and a significant number of other Alberta boys and girls) were conceived while our parents were watching the bears at the Banff dump in a car with a bench front seat, the heater on, and a mickey of lemon gin. If Banff brought back the dump, the bears and if the purchase of lemon gin is still available, there would probably be a bump in Alberta pregnancies.

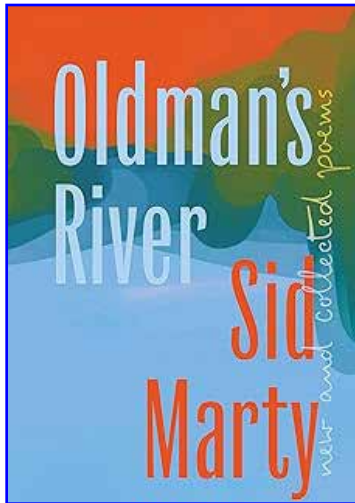
South of Red Deer it was strictly grazing, no farming. Now it is all crops no grazing. Fitch misses the old days and no development. But new technology means crops can grow anywhere the land can be cleared. Alberta more than any Province has crop land from north to south. The great central plains extend from the American border to the Territorial border. To the west are mountains and to the northeast is the Canadian Shield. The north has areas that are not suitable for agriculture but the north Peace region within 100 km as the raven flies of the Territories border is opening up fast and producing great crops. Fitch and I and Sid Marty miss the good old days but the province has gone from being the poorest province before 1965 to one of the richest, producing vast quantities of agriculture and petroleum products for the rest of the world. Also, it supports an urban population that went from 400,000 in 1960 to almost 4 million today. That is 4 million more people looking for outdoor recreation. There is nowhere in the south half of the province that is untouched wilderness. As Fitch says, we are only looking in our rearview mirror, we can only try to fit in now and it is changing faster than is good for the environment.

Oldman's River: New and Collected Poems

by Sid Marty. 2023. NewWest Press, Lethbridge Alberta.

Available from [Amazon.ca](https://www.amazon.ca/): \$38.20 Paperback; \$14.99 Kindle.

Sid Marty is another Alberta environmental crusader and baby boomer. He joined the National Parks service at a young age, even though his university studies included several "artsy fartsy" courses. His career probably reflects his education choices, as



he on and off would work for the Parks until his inner free spirit would drive him to write books and compose poems and songs and sing for his supper like a creative person should. He has authored over a dozen books and may be Alberta's most successful writer in terms of sales but singing for your supper and peddling poetry is a far cry from a Parks salary and pension plan. It is almost in the same category as being an anthrax nut, especially if you are living off poetry sales. I

have read only a few of his poems but he is Alberta's most passionate environmental crusader.

Lorne Fitch's and Sid Marty's writings have changed over time. For instance, in one of Fitch's earlier dispatches, he talks about hiking with his wife along their favourite hiking trail that was now being used by motocross bikers churning up the path's soil. Then they came across a bra, a little farther a pair of panties, and next a pair of a man's underwear. He put his biologist's thinking cap on, like they were on the trail of a bear or deer and theorizes "The back of a motorbike vibration and the thrill of the ride probably has an effect on the human female reproductive system that makes her want to copulate". Now 30 years or so later, in a June 2023 issue of Alberta Outdoorsman dispatch, he is lamenting how desecrating the effect the wind and solar farms have on the landscape and their negative effect on migrating birds and bats. Engineers and economists have recently discovered how they can greatly increase their cost benefit efficiency by doubling the length of the blades on existing windmills. No consideration to the effect on birds and bats.

Local landowners near Hanna describe how ducks and geese come off our local water bodies and are getting chopped up in great numbers. Locals are employed to dispose of the dead and dying on a regular basis but the local newspapers are full of antagonism. About 100 km east of south-central Alberta where Alberta Premier Daniel Smith recently put the development of these wind farms on hold is the whooping crane flyway. Luckily, it is in Saskatchewan where Scott Moe has not jumped on the wind farm band wagon like Alberta has, and the whooping cranes are not being chopped up like the ducks and geese and other migrating birds are on the Alberta side. This after the young whoopers have been chased, captured, tested, radio collared, etc., on their nesting grounds.

Approximately 15 years ago, a state of the art (read extremely expensive) long distance, north south (MacMurray to the U.S. border) transmission line was built just east of Hanna. A branch went to the far east corner of the province where the developers had discovered a mother lode of wind power— Eagle Ridge. The transmission line is in place right up to the base of Eagle Ridge with nothing tied into it. It turns out the locals called it Eagle Ridge because eagles really liked to migrate along it and the local bird club put a stop to any windmills. When it is not

required to have environmental assessments and engagements with local interests, very expensive mistakes like this happen.

Fitch talks about all the well-meaning efforts meant to save the sage grouse in southern Alberta. Actually, the Province of Alberta was taken to court by the Federal Government to force them to prevent their disappearance. An environmental study had determined that the oil industry was destroying their habitat and several of the less productive wells were shut down. Most of this area is crown land and managed by the government. They made extra sure this land would not be abused. It was not cropped and what was grazed was only lightly grazed. The problem is that the sage the grouse depends upon is an invader species that depends upon the land being abused for its survival and as a result of well-meaning management practices, the sage, and sage grouse, almost disappeared. Alberta used modern tilling and herbicides and individually planted sage plants in the hopes the sage grouse would utilize them. The last thing sage grouse need is protected native prairie. On the American side of the border where the land is private the land is cropped, more heavily grazed, oil and gas activity is everywhere, and so are the big bush sage plants and so are the sage grouse. In fact, they have a hunting season on them. In the latest season of "Yellowstone", John Dutton (Kevin Costner) is told by environmentalists in Montana that oil and gas sites will threaten the sage grouse. "Hell, they are nothing compared to a solar farm or those bird chopping windmills" says Dutton.

Rachel Carson thought that DDT might contribute to the elimination of peregrine falcons in North America. At the same time people were enthusiastically collecting peregrines for bird collections in all the major museums of the world where scientists were busy "lumping or splitting" subspecies and branches of subspecies for speciation theories. Falconers from all over the world were busy buying and selling falcons. Falcons are especially easy to locate. The far north and remote areas such as the interior of British Columbia and the Northwest Territories were not being treated with DDT but the collectors all knew how and where to go to collect even these falcons. The ban on falcon collection and a few prosecutions probably accounted for at least some of their recovery.

In many ways, we have collectively been well meaning fools, but fools none the less. If I ever tell anyone what the future holds, I know I will be wrong, and so have all the mentors in my life. Leopold was right, education can be a bad thing if we allow it to blind our thinking. Since Fitch, Marty, and I grew up (got old), Alberta has 10 times the population. The people who have adapted the best, as an economist would recognize, like the Serengeti in Africa, is the local Alberta and British Columbia Parks Canada. That new crush of humanity really wants in, and the park passes are expensive, tenting is expensive, backcountry permits, etc; everything is expensive. Just like Serengeti, Parks Canada is capitalizing on the public's love of nature and biology; just like Grizmek and all the others before showed them not to not block but take advantage of peoples' love of nature.

Aldo Leopold is reputed to have said: "Education I fear is learning to see one thing by going blind to another". The mountains which are unsuitable for farming or mining are being used for recreational commercial purposes. In China they say that the farmers do not want one single bird in their fields as it represents waste. Fitch, Marty, and I are waste.

