



THE CANADIAN SOCIETY OF ENVIRONMENTAL BIOLOGISTS Bulletin

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Front Cover: Snorkel survey to count fish numbers in the upper Oldman River in southern Alberta.

Back Cover Top: Fyke net traps to collect fish for PIT tagging at Bernard Harbour, Nunavut.

Bottom: Getting ready to implant a PIT tag into an Arctic Char.

Photo Credits: Gary Ash, CSEB Alberta Chapter member.

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CSEB BULLETIN 2021

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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.

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LE BULLETIN de la SCBE 2021

Vol. 78, Numéro 2, Été 2021

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

Tout la correspondance d'affaires, y compris les abonnements, les changements d'adresse, les exemplaires retournés et les formulaires: CSEB National Office, P.O. Box 962, Station F, Toronto, ON, M4Y 2N9. **Les lettres à l'éditeur:** Gary Ash, Editor, Courriel: garyash@shaw.ca
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The views expressed herein are the writer's of the articles and are not necessarily endorsed by CSEB, which welcomes a broad range of viewpoints. To submit a piece for consideration, email newslettereditor@cseb-scbe.org.

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.

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NATIONAL News

PRESIDENT'S Report

By Curt Schroeder, CSEB President

With most provinces experiencing some form of COVID-19 recovery this spring, field research and laboratory activity will begin to normalize, especially in situations involving groups of researchers, students, and assistants. Being flexible in transitioning from in-person instruction to online and back again are unprecedented challenges for the scientific and educational communities. Returning to work will take many different forms as institutions and businesses grapple with a measured return to a new-normal. During the pandemic, new ways of achieving the same end results means that we all have learned to adjust and adapt, and this momentum will likely continue. New skills we have learned during the pandemic broke established and settled rules of business or procedure but were found to be just as effective in accomplishing the same tasks. In my own field as an educator, learning technologies have been more widely adopted during the pandemic, and hybrid or hyperflex models of learning are replacing some traditional forms of post-secondary education. Young students are particularly driving this change as many are choosing to learn in new ways. We are conducting an enormous experiment, and willingness to change will become a more significant part of our emerging way of living.

On March 4, 2021, Dr. David Schindler, an internationally known limnologist, based at the U. of Alberta, passed away. His contribution to freshwater ecology is celebrated in Canada and around the world. The CSEB extends condolences to his family and close friends. I had the pleasure to hear him speak in person at the Royal Saskatchewan Museum in Regina many years ago. He had a powerful message to share about our treatment of lakes and rivers in a way that left an indelible impression on the audience. His voice will be missed, but his message lives on.

Scientists Study Sporadic Spread of Salmon Across the Arctic

An interesting article was published in NNSL Media about the spread of salmon across the Arctic, and concerns by biologists and local Indigenous communities.

The article can be accessed at <https://www.nnsl.com/news/scientists-study-sporadic-spread-of-salmon-across-arctic/>.

There is also a link to the Aurora Research Institute Speaker Series on Arctic Salmon: The Ups and Downs of Salmon in the Canadian Arctic. This recorded session is available directly at the following link:

<https://youtu.be/JNqva7GGv1k>

SCIENCE TIDBITS

Submitted by John Retallack, CSEB Alberta Member

Tasmanian Devils Reintroduced Into Australian Wild

Tasmanian devils were likely eliminated from the Australian mainland about 3000 years ago due to predation by dingoes. Dingoes are absent from Tasmania and there are still some Tasmanian devils on that Australian island state. Recently 26 of the mammals were released into a 400 ha fenced sanctuary north of Sydney.

After the success of an initial introduction of 15 devils in early 2020, a further 11 were released in September 2020. Forty more devils are due to be released over the next two years.

And just to make sure that this trends properly, I am obliged to note that Chris Hemsworth (aka Thor) and Elsa Pataky assisted with the releases.

Spider Butts Look Like Faces

As with many other spider species, mating is a dangerous time for male peacock spiders (*Maratus* sp.)! And like many other spiders, peacock spiders use elaborate mating displays and other visual subterfuge to keep from getting eaten.



Male *Maratus volans* courtship display.
Photo by Jurgen Otto.

The colourful and animated dorsal surfaces of the spiders' abdomens don't actually look like human faces. But, due to human tendency to want to see faces in odd places, the authors of a recent study (led by Olivia Harris at the University of Cincinnati) compared images of male peacock spider abdomens to images of

their likely predators. Using visual comparison software, the researchers 'trained' the software to identify different groups of animals (i.e., spiders, moths, mantis). The machine did fairly well with the various types of invertebrates but when presented with images of peacock spider butts, the computer frequently wanted to categorize the spiders as potential spider predators such as mantis.

Peacock spiders use their colourful abdomens and ritualized movements in mating displays. The researchers proposed that the appearance of the abdomen mimicking potential predators may elicit a 'freeze' response in the female (OMG, that's a mantis!)

that may allow the male spider enough time to approach closer and use the other parts of the display to help seal the deal.

One of the more amazing 'faces' is that of the abdomen of *Maratus aquilus* – it doesn't take much imagination to see the face of a praying mantis.

If you haven't seen photos of peacock spiders, check out spider photos by Jurgen Otto. One caveat—I can't take responsibility for your misplaced research time as you use the rest of the afternoon scrolling through his amazing images. <https://www.youtube.com/user/Peacockspiderman> And remember, these amazing animals are three to five millimetres in length.

Creating an 'Earth Sandwich' - Flat Earthers Beware

This is a VERY COOL diversion!

Do you have any spare time on your hands today? Have you ever wondered what is on the other side of the earth from your current position or any other location on earth? Well, there is a simple web tool for that!

Simply Google search:

Tunnel-to-the-other-side-of-the-earth

Navigate to your desired location on the input map and instantly a companion map will show the location on the other side of the earth.

FYI for Calgary people...I already looked and we cannot create a true "earth-sandwich" since our opposite location is a bit wet. Our emergent location is the centroid of a rough triangle using South Africa, Australia, and Antarctica as the three points. The closest land is the French Southern and Antarctic Lands about 300 km to the northeast of the emergent 'hole'.

Have fun!

New Praying Mantis Species Discovered In Peru

Instead of grasping and gathering prey with their spiny forelegs like other praying mantis, a newly described species of praying mantis (*Carrikerella simpira*) impales its prey with specially adapted spines on the tips of their forelegs.

C. simpira, about 3 cm in length, mimics the gray-green lichen of its home in the lowland tropical rain forest of Peru and hunts by impaling its prey using forward-oriented, trident-shaped spines on the tips of its foretibiae. Most frequently, *C. simpira* is able to impale prey very effectively with its elongated (1 mm) apical tibia spur, in the middle of its tarsal arsenal! What is perhaps more interesting is the precise nature of their attacks that allows it to exploit small prey, including accurately targeting mites as small as 0.5 mm.

And, by the way, in South American mythology, the *simpira* is a jaguar-like creature that uses its spring-like front legs to capture and strangle prey.

Coconut Crabs

Coconut crabs (*Birgus latro*) are the largest terrestrial arthropods on the planet. They are related to hermit crabs, and juvenile coconut crabs still use snail shells for shelter before growing the tough protective shell over their abdomens and discarding the

shelled life! Coconut crabs weigh more than four kg and have leg spans of more than one metre. They are notorious for being able to open coconuts relatively easily and catch and eat nesting seabirds.

Coconut crabs also appear to have a diverse 'vocabulary', especially during mating.

Coconut crabs have long been known for making tapping sounds but researchers from Okinawa, Japan, led by Shin-ichiro Oka (Okinawa Chirashima Foundation) (in *Zoology* [Volume 137, December, 2019]) used X-ray videography to confirm the exact source of the sound. The sound originates when the crabs vibrate their scaphognathites against the sides of their gill channels to create the tapping sound.

Both males and females make the tapping sounds, and the sounds are different at each stage of mating. While not the subject of the researchers' work, it is speculated that the tapping and ability to modulate the sound makes it likely that coconut crabs also use the tapping sounds as a general communication pathway.

WWF Estimates That Up to Three Billion Animals Were Affected by Australia's Recent Forest Fires.

A report by the World Wildlife Fund suggests the 2019/2020 Australian bush fires that affected 11.5 million hectares of land, resulted in the direct and indirect deaths of almost three billion animals. That number includes more than 143 million mammals, 180 million birds, 2.46 billion reptiles and 51 million amphibians. The report notes that reptiles had an unusually high death rate because they tend to live in higher densities than the other animals—some skinks have population densities exceeding 1,500 animals per hectare.

The animals in the groups of charismatic and conspicuous fauna described in the summary report (i.e., mammals, birds, reptiles, and amphibians) represent only a fraction of the animals affected by the Australian bush fires. Can we get a little respect for the other animals affected (insects, annelids, mollusks, and other animals not aided by an internal skeleton)?

TECHNICAL WRITING SERIES

Submitted by Sean Mitchell, CSEB BC Director

Conciseness: An Inappropriate Goal of Writing

Concisely written prose is often used as a gold standard in technical writing. I have worked with client groups for whom, I come to realize as I learn more about them, the dictates from management on high are all about word count. Their entire writing strategy is about reducing the length of the document. This is ubiquitous. In nearly every course I teach, students say something along the lines of "But we are told to write concisely." It has become a goal of writing, but the wrong goal. Our ability to communicate has come to be measured in how many words we use instead of how effectively we use powerful words; the number of pages in the document rather than how persuasive our argument is. I wish to argue here that this misplaced focus is harmful to our writing and disengaging to the reader. As writers, we need the freedom to deploy our tools of words and sentences

as we see fit to create a compelling argument. It does no one—not the writer, nor the reader—service to consider word count a measure of quality.

Of course, brevity is a key feature of good writing. The classic text—Strunk and White's *Elements of Style*—provides guidance on conciseness. They say the following:

*“Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason a drawing should have no unnecessary lines and a machine no unnecessary parts. This requires not that the writer make all sentences short, or that he avoid all detail and treat his subject only in outline, but that every word tell.”*¹

On its own, this is valuable advice... but it is not dogma. Of course, we should ‘omit needless words’ (Strunk and White’s actual advice) but that pearl of wisdom is no greater than their ‘make the paragraph the unit of composition’ (p 15) or ‘use definite, concrete language’ (p 21). Within the realm of technical writing though, we have transmogrified Strunk’s counsel to ‘minimize word count’. We have raised conciseness to gospel. I see the outcome of this fervor... and it is not pretty. The result of a focus on word count are paragraphs missing introductory sentences and so looking as bedraggled as a three-legged cat. There are incompletely constructed arguments, resembling the abandoned frameworks of potentially beautiful architecture. As a reader, I feel the writer has led me along a path of persuasion—and I am with her—then all of a sudden she leaves me alone in the wilderness. Only a few more words, a couple more sentences, perhaps a subsequent paragraph, and the cat would be a quadruped again, the cathedral would be clothed, and my guide would lead me to where she wants me.

Pity the poor recent university graduate thrust into this form of writing. Through 12 years of education, they were forced to write paragraphs or essays to a word count (three paragraphs, one page, 1000 words), typically on a subject they were ambivalent about or uncertain of. They mastered the ability to lengthen sentences and inset additional words to hit that target. Then four, or more, years at university to refine these skills for longer essays of 5,000; 10,000; 20,000 words. Now, enter the professional work world and we expect them to write in the entirely opposite manner. We ask them to undo all that we have conditioned them for.

Okay, enough complaining. Do I suggest complete freedom to be as long-winded as we want? Not at all. Concise writing is an attribute we should strive for... it just should not be the proverbial brass ring. In my courses, I teach ‘Conciseness is not the Grail; persuasion is.’ When we develop a well-formed argument, and write with creativity and strategy, brevity is the natural outcome. It is a result of writing well, not a metric of it.

Writing concisely, yet persuasively, requires having a clear vision of what the writing is intended to accomplish, and seeing distinctly the path of argument that you are taking the reader on, from the beginning to the end. This, in my experience, is one of the greatest causes of poor writing (or as Strunk and White call it: vigorous writing). The author does not know where they are taking us on the persuasive journey; they are hacking out

the trail and referring frequently to their compass as they try to find their way. To be concise, the starting point, end point, and path between the two must be clear, and the author must know the route well to lead us (the reader) on it. Then we are led directly, point-by-point, to our destination without superfluous detours or wandering down uncertain secondary trails. The structure of the argument is fundamental architecture to frame the concise writing.

Once our pathway is clear in our mind, we must then use specific and concrete, and connotative, language to build images in the reader’s mind. These are direct and unambiguous; they bring clarity without the need for explanation or justification. The imagery we create in the mind’s eye of our reader allows them to fill in details—we do not have to provide every nuance and brush stroke to their developing image. This is about concise writing at the structural level.

Then, at the sentence level we follow the more prosaic advice from the style guides:

- Omit unnecessary words (thank you professor Strunk)
- Avoid repetition; say something once and only once
- Replace passive meaningless words with active verbs
- Cut out empty or inflated phrases
- Hunt down and get rid of redundancies and repetition
- Simplify sentences where you can.

There is a difference between wordy and long. Wordy is when a sentence contains words not essential to it. A long sentence is not necessarily wordy, and a short sentence can be wordy. The trick is, irrespective of sentence length, to be sure every word is necessary. My advice, for what it is worth:

“Make every word count; don’t count every word.”

There are strategic reasons to occasionally create long, seemingly ‘wordy’, sentences that would raise flags among the word-counters. One of my favourite tools is juxtaposition where I intentionally compose long sentences (not wordy, mind you; just long) simply to highlight the short sentence that follows; I make the reader work slightly to emphasize the contrast with the short sentence following. Such as done here. (42 word sentence followed by 4 words). But to do this, I need freedom to write with strategy, not to an artificial dictate.

There is an abyss of difference between conciseness and word count. Many reviewers today do not understand the distinction. To write concisely is to omit unnecessary words while creating a compelling argument. It is not about fitting your writing to a page, 10 pages, or any other defined limit. When you omit unnecessary words, your word count automatically decreases; but brevity is the end product of effective writing; not a tool to achieve it.

Next column: Paragraphs have purpose: using them to strategic advantage

¹ Strunk, W. Jr., and E.B. White. 1979. *The elements of style*. Third edition. McMillan Publishing Co. Inc. New York. Page 23.

Dr. David Schindler

August 3, 1940 - March 4, 2021



Dr. Schindler giving plenary session address on The “Boreal Biome: A Climate Change Time Bomb?” at the 2009 CSEB Annual General Meeting and Conference held in Edmonton, AB.

‘Truth to Power:’ Lab Was Not Enough for Renowned Scientist David Schindler

By Bob Weber, The Canadian Press (Originally published March 8, 2021; reprinted with permission)

His research in the lab and the field was published in some of the world’s top journals, but that was never enough for David Schindler, who died March 4th, 2021 at age 80.

“The importance of David Schindler was his ability to talk truth to power,” said Jim Handman, a longtime science journalist and journalism professor.

“He was extremely brave in doing that at a time when very few scientists in this country were willing to challenge politicians and put themselves on the line.”

Few Canadian scientists—Schindler held joint Canadian–U. S. citizenship—can claim the influence on public policy achieved by the bluff, straight-shooting University of Alberta ecologist, who was known to call politicians “turkeys” if that’s what his reading of the data suggested.

In the 1970s, Schindler pioneered a study of acid rain at Ontario’s Experimental Lakes Area. By gradually adding acid to a lake under controlled conditions, he was able to link the toxin to effects that were being seen in thousands of lakes across Central and Eastern Canada and in the United States.

His work was at the heart of talks between prime ministers and presidents and helped prod the U.S. and Canada to sign 1991’s Acid Rain Treaty, one of the most successful environmental accords ever signed.

In the early ‘90s, Schindler was a major part of the Northern River Basin Study, a five-year effort looking at the health of the vast Peace-Athabasca River Basin, one of the largest in the world, as it came under increased pressure from industrial development such as pulp mills.

That study brought together diverse perspectives from industrial to Indigenous in a way that was unique at the time. It set a framework that is still referred to today for understanding and regulating the area.

In 2010, he and co-author Erin Kelly published some of the earliest work showing that contaminants from oilsands developments were showing up on land and in water.

The work was hugely controversial, especially in Alberta, but it led to a federal review of how the province tracked environmental impacts and resulted in legislation still in place that requires industry to chip in \$50 million a year for environmental monitoring.

“His personality, his booming voice, the way in which he dealt with reporters was a skill that many of us find to be quite a challenge,” said his University of Alberta colleague Mark Boyce. “He had a special knack and a special communications style that was very effective.”

That voice wouldn’t have been heard unless the science was top-notch. Schindler regularly published in some of the world’s best journals, including *Nature*, *Science*, and the *Proceedings of the National Academy of Sciences*.

He won at least 18 medals and prizes in Canada and abroad and was a member of four elite Canadian and international scientific societies.

Boyce remembers how Schindler loved the cut and thrust of scientific debate.

“We had some long-standing disputes,” he recalled.

“He just delighted in being challenged and thinking through various topics. It was wonderful to have a colleague who delighted in challenge and complexity.”

“He knew what the important questions were,” said John Smol, a Queen’s University ecologist who worked with Schindler. “Almost every important problem with water, he was on the front line.”

Water was also where he turned for pleasure. Schindler was a passionate fly fisherman and legend has it that he convinced then-federal environment minister Jim Prentice on the importance of oilsands monitoring while the two were on an angling trip.

He mushed dogs, too, and raced teams for years.

“He was very good at it,” said Boyce.

“When I first came to Edmonton, he had 90 dogs. He’d buy a semi-truck full of chicken scraps in the early winter to keep his dogs going.

“He was crazy about dogs.”

Even when he was out on the water casting a fly, Schindler would still cast his mind to his research and the problems he was trying to unriddle.

“He was not divorced from that while we were out fishing,” said Boyce. “An interest in the environment is something that dominates your life.”

Schindler, whose health had been in decline for two years, died in Brisco, B.C., where he had retired with his wife and fellow scientist Suzanne Bayley. Although he had stepped back from public life—increasing deafness made him a difficult interview—he had lost none of his passion.

In an email last summer to The Canadian Press, Schindler quoted a saying of his grandfather’s in reference to politicians and industry officials who turn a blind eye to science: “Too low to kick and too slimy to step on.”



COSEWIC
Committee on the Status of
Endangered Wildlife in Canada

COSEPAC
Comité sur la situation des
espèces en péril au Canada

Even Species at Risk are cramped at home

(Ottawa, May 7, 2021). For over a year now, Canadians have been urged to stay home. Sometimes, though, home can not only *feel* too small, it can *be* too small. At their most recent virtual meeting, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed the status of 26 wildlife species, some of which have particularly small spaces to call home. While not all are actually declining, a single stroke of bad luck could eliminate their entire Canadian population. And climate change may bring that bad luck.



Black Hills Mountainsnail © Robert Forsyth

Two rare lichens were assessed. Both live in specialised environments, one on the Pacific coast and one on the Atlantic. The tiny Seaside Centipede Lichen occurs on a narrow strip of western Vancouver Island and nearby islands. It occurs only on small Sitka Spruce twigs that are within a few metres of the forest floor. This lichen also needs a nitrogen supply, and so is usually found on trees near Bald Eagle perches and sea lion haul-outs where poop supplies that key nutrient. In Nova Scotia and Newfoundland, Vole Ears Lichen occurs in a few forests near the coast where necessary fog is common. We know more about this rare lichen because of the increased interest of naturalists -- the Canadian population is the only one remaining in North America and may number fewer than 2000 individuals.

Increasingly severe storms can damage the lichens and their host trees on both coasts, layered upon local threats. Seaside Centipede Lichen was assessed by COSEWIC as Threatened and Vole Ears Lichen as Endangered.

Black Hills Mountainsnail has been isolated in the Cypress Hills on the Alberta-Saskatchewan border since glaciers covered much of the continent. The Canadian population is one of only four in the world that survived on rare hills or "sky islands" above the ice (the others are in Montana, Wyoming and South Dakota). Climate change-fueled megafires could affect all these Canadian snails in one fell swoop. COSEWIC assessed this snail as Endangered.

"Large wildfires can damage and even wipe out snail populations -- they really can't just run away!" noted Dwayne Lepitzki, Co-chair of the Molluscs Subcommittee. "The

Cypress Hills had major fires in the 1880s and we know that wildfires are getting bigger and more common in western Canada. Hopefully, fire management can help protect this snail."

The attractive Edwards' Beach Moth is restricted to a few windswept beaches and small dunes around southern Vancouver Island, isolated from populations known in California. Thanks to work by dedicated volunteers, invasive vegetation is being kept at bay. However, climate change is a threat because warming brings rising sea levels and more numerous and intense storms that threaten to destroy the upper beaches and dunes where the moth lives. It was assessed as Endangered.

Fully 15 of the 26 wildlife species assessed by COSEWIC are threatened by climate change. Not all of them have restricted ranges. Short-eared Owl is still widely distributed, but Christmas Bird Count and Breeding Bird Survey volunteers have documented a worrying decline in their numbers.



Edwards' Beach Moth © Nicole Kroeker

"Citizen science observers across the continent are fundamentally important in determining population trends for this and many other species," commented Birds Subcommittee Co-chair Richard Elliot. "We couldn't do it without them."

Climate warming in the North is resulting in shrubification of tundra habitat, making it less favourable for the owl, and adding to human impacts it faces further south. Short-eared Owl was assessed as Threatened.



Short-eared Owl © Gordon Court

Altogether, COSEWIC assessed 5 birds, 5 plants, 3 insects, 3 reptiles, 3 molluscs, 2 sharks, 2 lichens, 1 amphibian, 1 freshwater fish, and 1 mammal wildlife species. Further details on all the wildlife species assessed at this meeting can be found on the COSEWIC website (<https://www.cosewic.ca/>). For more information on how COSEWIC assesses species, and a complete list of Canadian wildlife species assessed by COSEWIC up to 2020, please see https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/species/CanadianWildlifeSpeciesAtRisk-2020.pdf.

Next meeting

COSEWIC's next scheduled wildlife species assessment meeting will be held in November 2021.

About COSEWIC

COSEWIC assesses the status of wild species, subspecies, varieties, or other important units of biological diversity, considered to be at risk in Canada. To do so, COSEWIC uses scientific, Aboriginal traditional and community knowledge provided by experts from governments, academia and other organizations. Summaries of assessments are currently available to the public on the COSEWIC website (<https://www.cosewic.ca/>) and will be submitted to the Federal Minister of the Environment and Climate Change in fall 2021 for listing consideration under the *Species at Risk Act* (SARA). At that time, the status reports and status appraisal summaries will be publicly available on the Species at Risk Public Registry (<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>)

At its most recent meeting, COSEWIC assessed 26 wildlife species in various COSEWIC risk categories, including 7 Endangered, 9 Threatened, and 10 Special Concern.

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Fisheries and Oceans Canada, and the Canadian Museum of Nature), three Non-government Science Members, and the Co-chairs of the Species Specialist and the Aboriginal Traditional Knowledge Subcommittees.

Definition of COSEWIC terms and status categories:

Wildlife Species: A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.

Extinct (X): A wildlife species that no longer exists.

Extirpated (XT): A wildlife species that no longer exists in the wild in Canada, but exists elsewhere.

Endangered (E): A wildlife species facing imminent extirpation or extinction.

Threatened (T): A wildlife species that is likely to become Endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

Special Concern (SC): A wildlife species that may become Threatened or Endangered because of a combination of biological characteristics and identified threats.

Not at Risk (NAR): A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

Data Deficient (DD): A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

Species at Risk: A wildlife species that has been assessed as Extirpated, Endangered, Threatened or Special Concern.

Dr. John Reynolds
Chair, COSEWIC

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<https://www.cosewic.ca/>

Summary of COSEWIC Wildlife Species Assessments, May 2021
Wildlife species are sorted according to current status and then by common name.

Status	Common name (population)	Scientific name	Range of occurrence
Endangered	Black Hills Mountainsnail	<i>Oreohelix cooperi</i>	AB SK
Endangered	Common Five-lined Skink (Carolinian population)	<i>Plestiodon fasciatus</i>	ON
Endangered	Edwards' Beach Moth	<i>Anarta edwardsii</i>	BC
Endangered	Lake Chubsucker	<i>Erimyzon sucetta</i>	ON
Endangered	Ross's Gull	<i>Rhodostethia rosea</i>	NU MB NL Arctic Ocean Atlantic Ocean
Endangered	Vole Ears Lichen	<i>Erioderma mollissimum</i>	NB NS NL
Endangered	White Shark (Atlantic population)	<i>Carcharodon carcharias</i>	QC NB PE NS NL Atlantic Ocean
Threatened	American Water-willow	<i>Justicia americana</i>	ON QC
Threatened	Atlantic Mud-piddock	<i>Barnea truncata</i>	NS Atlantic Ocean
Threatened	Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>	ON
Threatened	Kentucky Coffee-tree	<i>Gymnocladus dioica</i>	ON
Threatened	Purple Wartyback	<i>Cyclonaias tuberculata</i>	ON
Threatened	Seaside Centipede Lichen	<i>Heterodermia sitchensis</i>	BC
Threatened	Short-eared Owl	<i>Asio flammeus</i>	YT NT NU BC AB SK MB ON QC NB PE NS NL
Threatened	Swift Fox	<i>Vulpes velox</i>	AB SK
Threatened	Western Silvery Aster	<i>Symphyotrichum sericeum</i>	MB ON
Special Concern	Band-tailed Pigeon	<i>Patagioenas fasciata</i>	BC
Special Concern	Barn Swallow	<i>Hirundo rustica</i>	YT NT NU BC AB SK MB ON QC NB PE NS NL
Special Concern	Coastal Wood Fern	<i>Dryopteris arguta</i>	BC
Special Concern	Cobblestone Tiger Beetle	<i>Cicindela marginipennis</i>	NB
Special Concern	Coeur d'Alene Salamander	<i>Plethodon idahoensis</i>	BC
Special Concern	Common Five-lined Skink (Great Lakes / St. Lawrence population)	<i>Plestiodon fasciatus</i>	ON
Special Concern	Ferruginous Hawk	<i>Buteo regalis</i>	AB SK MB
Special Concern	Grappletail	<i>Octogomphus specularis</i>	BC
Special Concern	Lakeside Daisy	<i>Tetraneuris herbacea</i>	ON
Special Concern	Tope	<i>Galeorhinus galeus</i>	BC Pacific Ocean

Correspondence

CSEB Letter Regarding the Proposed BC “*Shoreline Protection Act*”



Canadian Society of Environmental Biologists
National Office, PO Box 962, Station F
Toronto, ON Canada M4Y 2N9
March 9, 2021

Honourable George Heyman,
Minister of Environment and Climate Change Strategy
Room 112 Parliament Buildings
Victoria, BC V8V 1X4
Email: ENV.Minister@gov.bc.ca

Re: Proposed “*Shoreline Protection Act*”

Dear Minister Heyman,

On behalf of *Canadian Society of Environmental Biologists*, I am writing to express our professional support for the “*Shoreline Protection Act*” currently being proposed by the University of Victoria’s Environmental Law Centre (ELC) and WWF Canada.

Based on the data available to us from the Department of Fisheries and Oceans, and a growing body of scientific literature, the *Canadian Society of Environmental Biologists* is deeply concerned with the decline of salmon fisheries in BC and the decline of BC’s iconic southern resident killer whales. While some of the factors driving these declines, such as climate change and associated ocean temperature and salinity changes are difficult to address in the short term, protection and restoration of critical habitat present immediate opportunities for positive action.

As Oceana Canada’s 2020 fisheries audit has highlighted, the conservation of forage fish stock is one of the most important means of rebuilding the foundations of the food chains needed to rebuild healthy fisheries. Regrettably, throughout the world, ill-conceived development accompanied by uncontrolled hard armoring of shorelines has resulted in the destruction of vast areas of critical spawning habitat for forage fish.

As scientists and professional biologists, we feel that it is now urgent that Canadians restore these lost or degraded habitats, to meet the natural resource challenges before us. COSEWIC has now listed most of our Chinook Salmon populations as endangered. The restoration of BC’s Chinook Salmon populations and the southern killer whales depends largely on the restoration of forage fish populations. The conservation and restoration of spawning beaches is an urgent necessity. The State of Washington has enacted pro-active legislation to meet those challenges in Puget Sound. Biology knows no borders. British Columbia deserves a *Shoreline Protection Act* commensurate with that which protects forage fish populations in Washington State.

cseb-scbe.org

The proposal presented to you by the University of Victoria's ELC and WWF is, in our estimation, simply consistent with the scientific evaluation of environmental needs to restore BC's Salish Sea fisheries to a healthy state. The Canadian Society of Environmental Biologists hopes that your government will be able to implement this important and much needed piece of legislation.

Yours respectfully,



Curt Schroeder [B.Sc.](#), M.E.Des.

President

Canadian Society of Environmental Biologists

Email: curt.schroeder@saskpolytech.ca

c.c.:

WWF jbarrs@wwfcanada.org

CSEB Board of Directors

BC Ministry's Response Letter Regarding the Proposed BC "Shoreline Protection Act"



Reference: 262358

April 7, 2021

VIA EMAIL: schroederc@saskpolytech.ca

Curt Schroeder, President

Canadian Society of Environmental Biologists PO Box 962, Station F

Toronto, ON, M4Y 2N9

Dear Curt Schroeder:

Thank you for the letter dated March 9, 2021, submitted on behalf of the Canadian Society of Environmental Biologists, outlining your collective support for the University of Victoria's Environmental Law Center and WWF Canada's proposed Shoreline Protection Act. As the Executive Director of the Marine and Coastal Resources Unit at the Ministry of Forest, Lands, Natural Resource Operations, and Rural Development (FLNRORD), the agency responsible for leading the Coastal Marine Strategy, I have been asked to provide the Province's response on behalf of Minister Heyman.

The province shares your concerns about the marine environment and takes its role as a marine steward seriously as evidenced by our decades long work to improve the management of our foreshore and submerged lands over which we have jurisdiction. For example, under the Marine Plan Partnership (MaPP), the province and our First Nations partners developed and are now implementing four marine spatial plans on the North Coast (i.e. the marine area north of Bute Inlet/Quadra Island up to the Alaska border). The MaPP plans inform provincial resource management decisions by helping ensure compatibility with local and regional values and objectives for stewardship, conservation, sustainable use, and economic development and diversification.

Where the province's interests in protecting our tidal waters fall under federal jurisdiction, we have partnered with the federal government to advance actions through several ongoing initiatives. Currently, and in partnership with Indigenous groups, the parties are working to develop an ecologically comprehensive, resilient, and representative Marine Protected Area (MPA) Network on the north coast to help protect the biological diversity and health of the marine environment for present and future generations. Other federal initiatives in which the province plays a key supporting role is the Southern Resident Killer Whale Task Force, the Cumulative Effects of Marine Shipping Initiative, the Anchorages Initiative, among others.

As part of the government's recent mandate commitments, the Minister of State for Lands and Natural Resource Operations, in partnership with First Nations, and with support from the Ministry of Environment and the Ministry of Agriculture, Food, and Fisheries, will lead work to develop a Coastal Marine Strategy that will seek to better protect coastal habitat while growing coastal economies. Initial work on the scope of the Coastal Marine Strategy is underway internally and future engagement on a draft strategy will enable local and regional values to be reflected. The development of a Coastal Marine Strategy may provide an opportunity to explore issues such as the protection and restoration of forage fish habitat and assess proposals for future action.

On behalf of the province, we appreciate your input and I look forward to future engagement on this important initiative.

Sincerely,

Charlie Short

Executive Director, Coast Area

pc: Honourable George Heyman, Minister of Environment and Climate Change Strategy

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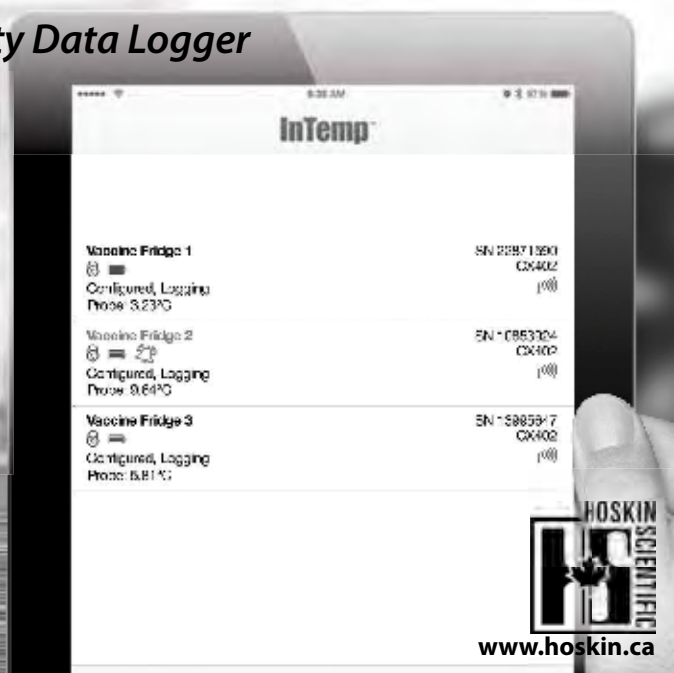
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REGIONAL News

BRITISH COLUMBIA News

Submitted by Loys Maingon, CSEB BC Director

In Praise of “Guerilla Scientists”

“Science bats last” - David Schindler¹

Our greatest environmental problems remain our sense of place, or rather, the lack thereof, and the growing ideological chasm between science and politics. In both instances, politics reveal themselves to be fundamentally incompatible with facts, truth and numbers, which are intrinsic to science. The modern tension between politics and science can be illustrated from the life and writings of the late David Schindler, whom one obituary aptly referred to as a “guerilla scientist,”² and three recent examples from BC’s environmental and political landscape.

The premier of this province, John Horgan, recently demonstrated the deceptive political use of fake scientific-sounding numbers in a morning CBC interview. This only adds to the all-too-common misleading falsehoods bandied by politicians that seem to have become the salient hallmark of our governments over the past 50 years.³ The premier publicly proclaimed that: “Just in the lower mainland, 500 million hectares have been set aside to protect spotted owls.” Unfortunately for the premier, one listener with a better sense of math remembered the surface area of the province is 944,735 km² (94,473,500 ha.). The premier seemed to inform taxpayers that he had annexed Alberta, Yukon, Alaska, and western coastal United States to save Lower Mainland Vancouver spotted owls! Not only does this indicate that the premier has a poor sense of numbers and magnitude, a disconcerting consideration regarding anyone managing public finances, it is consistent with a poor sense of the place in which one lives, of the limitations of a finite environment, and of the impact of extractive industries on it.

The disturbing question that arises from this is whether this incident is to be taken as an honest mistake or as an intent to mislead the public. The latter is suggested by similar egregious misrepresentations made by the premier, and his representatives in the Ministry of Forests in September 2020.

In the electoral campaign of September 2020, the premier announced “a paradigm shift in BC forestry” that would protect 353,000 hectares of forest in nine old-growth areas throughout the province from logging, in keeping with the recommendations of the Old-Growth Strategy Review. This was to be done by putting a two-year deferral, not a complete moratorium, on these 353,000 hectares in order to transition and implement the recommendations of the Old-Growth Strategy Review during negotiations with First Nations. As they bandied this number, which people took at face value, neither the premier nor the Minister of Forests made clear exactly what it referred to. It has turned out to be yet another nebulous big number at odds with reality.

The announcement came six months after foresters, Garry Merkel and Al Gorley, submitted their report on the “Old-Growth Strategic Review”, entitled *A New Future for Old Forests*,⁴ in April 2020. The government kept the contents of the report from public scrutiny until the September election campaign. The release of the Merkel / Gorley report was anticipated by the private release of a report prepared by outspoken independent scientists, Karen Price, Rachel Holt, and Dave Daust, entitled *B.C.’s Old Growth: A Last Stand for Biodiversity*.⁵ The Price/Holt/Daust report, which was originally prepared as a submission for the Merkel/Gorley Old-Growth Strategy Review, proved to be an extremely important piece of “guerilla science” because it went to the heart of the old-growth debate that has been ongoing for the past three decades. Remarkably, the Merkel/Gorley report pointedly takes a historical approach. They pointedly note in the Foreword to their report that in 1992, BC’s government had commissioned a similar strategic review, that faced a similar, but not quite as grave, problem, and had come to the same conclusions. They also pointedly noted that we would not be currently facing the same problems if the commission’s recommendations had been implemented by the NDP government of 1992. To quote:

“Almost three decades ago, over a hundred people from various walks of life, including government, worked for 18 months to find consensus on An Old Growth Strategy for British Columbia (B.C. Ministry of Forests, May 1992): In that report the development team said:

“Members of the public, public interest groups, professional resource managers, and representatives of industry have expressed increasing concern about management of old growth forests in British Columbia. Not only does the forest industry depend heavily on old growth for its current wood supply, but many new demands are being placed on the remaining old growth to satisfy a broad range of forest values. In parts of the province, meanwhile, opportunities to reserve representative samples of old growth are dwindling rapidly (emphasis added). These pressures are leading to increased instances of conflict among supporters of competing land uses.”

Although many subsequent measures were taken under the auspices of land-use planning and the forest practices code (some of which carried forward to the current legislation), many critical aspects of the strategy laid out in that report were either discarded or only partly implemented. Had that strategy been fully implemented, we would likely not be facing the challenges around old growth to the extent we are today:

- *High risk to loss of biodiversity in many ecosystems.*
- *Risk to potential economic benefits due to uncertainty and conflict.*
- *Widespread lack of confidence in the system of managing forests.”*⁶

One might note with Spike Milligan that, as in Ireland, in BC nothing happened. Thirty years on, we seem to have discovered the rediscovery of the wheel.

The question has always been that of disentangling the industry's and government's claims that 23% of BC's old growth remains, from the actual losses of the highly commercially valued and impacted high productivity old-growth, which is also home to high biodiversity values. The latter is what people, and the scientific literature, associate with "old-growth" ecosystems. By directly analysing what the numbers in the "government's working definition, old-growth forests comprise about 23% of forested areas, or about 13.2 million hectares", actually referred to, Holt et al. were able to demystify the number by breaking down the data by "productivity class."

They were able to show that 80% of the 13.2 million hectares of "old-growth" were high latitude or high elevation low productivity trees too small to be of commercial interest. The report mapped and provided, from the government's own data, a comprehensive assessment of the actual state and distribution of BC's old growth, in keeping with the accepted norms of ecological science. Their assessment was fully consistent with the Merkel/Gorley report's. Both reports therefore came to the factual conclusion that only 3% of the province has sites capable of producing old-growth forests. Of that 3% only 2.7% is currently old. The central conclusion of both reports is that the "current status puts biodiversity, ecological integrity, and resilience at risk today."

The figure bandied by politicians and the Ministry of Forests proclaiming to defer logging on "353,000 hectares of forest in nine old-growth areas" came straight from the Holt et al. report. Implementation of a deferral came from Gorley/Merkel, together with a broad concern that 30 years of failure to address the known problem of continuous extraction of productive old-growth had diminished these ecosystems to about 3% of their original glory. Regrettably, the intent to deceive came from government and from the Ministry of Forests. While the announcement was enthusiastically greeted by a politically compliant media, political pundits and even mainstream environmental NGO's like Wilderness Committee, it immediately aroused the suspicions of the scientific community. Rachel Holt's reaction was that a cursory review of the nine deferral areas named suggested to her that only 10,000 hectares in the proposed deferred areas actually contained old-growth forests that were at risk.⁷

While the nine areas slated for a two-year deferral were identified as the Incomappleaux Valley, the Seven Sisters region near Smithers, Crystalline Creek and Stockdale Creek watersheds in the East Kootenay, the Upper Southgate River in Bute Inlet, Skagit-Silverdaisy near the U.S. border, and H' Kusam, McKelvie Creek, and Clayoquot Sound, the announcement was short on specifics. Neither maps nor specific data outlining how much productive old-growth was available for logging in these areas were ever presented. When queried, it was evasively suggested that specifics were being worked out in ongoing negotiations with First Nations. Notwithstanding that areas like the Southgate River have already been heavily logged and that the Skagit-Silverdaisy areas were already set aside following protests from Washington state, the bulk of the protected areas was in the controversial Clayoquot Sound, which amounts to 70% of the deferral area or 248,667 hectares.

Once the government mapping (**Figure 1**) was released, the deceitfulness of these figures became clear to everybody. To reach the desired figure of 353,000 hectares, Ministry of Forests officials misrepresented the actual area of the deferrals by including previously clearcut areas in most of the nine areas, and by inflating the actual available areas in the Clayoquot Sound area by including about 62,200 hectares of Strathcona Provincial Park, together with another 43,000 hectares from adjacent 18 parks, ecological reserves, and protected areas, where logging would never have taken place, and which do not necessarily contain high productivity old growth.



Figure 1: Ministry of Forests mapping indicating the deferred 248,667 hectares area for Clayoquot Sound. The crosshairs locate the overlapping with 105,437 hectares of long-established parks, ecological reserves and protected areas. (See: <https://www.focusonvictoria.ca/forests/35/>).

Why government might have gone to the extent of including parks to find 353,000 hectares of old-growth in BC might find some justification in what has become known as "The Red Map" (**Figure 2**). This map shows in green how little of BC has never been clearcut in a sea of red.



Figure 2: The Red Map. Produced by Conservation North, based on available government data. The map shows in green areas that have never been clearcut.⁸

It is clear from the Red map that in a province that has clearcut its forests to the very borders of its parks, locating large areas of now rare productive old growth is difficult. Productive old-growth remnants are largely restricted to areas inside national and provincial parks. As the map shows, the green areas on Vancouver Island largely correspond to provincial and national park areas and a small number of small ecological reserves.

The extent of this deceit was excellently covered by Dave Broadland in a December 2020 article: *“Mapping of old-growth deferral areas confirms forests ministry deception.”*⁹ The catalogue of misrepresentations makes for edifying reading. It invites the reader to consider the distance that separates truth in politics from truth in science, and the extent to which politicians are willing to corrupt science. It is clear that this was not a simple information error. These figures are corrupted figures produced by scientists working for the ministry. There was a deliberate intent by ministry staff, and presumably the politicians who direct them, to mislead the public. The government announcement of the 353,000 hectare deferral was as substantial as John Horgan’s 500 million hectare protection of spotted owls. It is worth quoting Broadland. It was more an exercise in *“testing the government’s ability to mislead reporters than it was about protecting old-growth forests.”* Viewing this from a reporter’s perspective, Broadland sums this misdemeanour up as follows:

“A comparison of the way in which the deferrals have been presented to the public with the actual on-the-ground substance of the deferrals—which is now made clearer by the mapping—makes it evident that the ministry of forests is not willing to protect much of the remaining old-growth forest that’s in the commercially operable zone of the timber harvesting land base. Their strategy for maintaining control of those areas appears to include utilizing deception. By “deception” I mean the transfer of misinformation from the ministry to mainstream media and then from the media to the general public. The ministry appears willing to fool the public into thinking they are doing something that they apparently have no intention of doing.”

This should be more deeply disturbing to any scientist than it might be to any other citizen. This is not a simple tawdry set of lies. This is a breach of public trust by public scientists in the public eye. This is the stuff that warrants and generates the much decried public cynicism at science that gives rise to socially corrosive populism witnessed in the USA. At a time when the world needs to be able to trust science more than ever, the damage that this does to the social fabric cannot be underestimated. Regrettably, in spite of the social engagement of “guerrilla scientists” like David Schindler over the past 50 years, this appears to be becoming an increasingly prevalent norm.

That BC’s government has no intention of saving the 2.7% of old growth that remains has become evident in the last six months following the September announcement. The submission of the Gorley/Merkel report, its recommendations to halt old-growth logging, and its endorsement by the government in April 2020, have not increased the government’s concern over the impact on biodiversity, nor has it slowed down the pace of destruction. The government’s own data show that over the past 12 months, permits to log the last remaining old-growth have increased by 40% over the previous year.¹⁰ A year on and the public consensus seems to be that the government’s promise on old-growth, like

its previous promises on Site C, LNG, and fish farm aquaculture are “all talk, no action.”¹¹ In all these cases, the government has chosen to forgo the long-term interests of the environment and future generations in favour of the short term corporate interests of labour and shareholders.

This has all the hallmarks of a deliberate liquidation. In its rush to accommodate the demands of the forest industry, the government is not even intent on following the minimal requirements of its own laws. A recent investigation initiated in 2018 concerning old growth logging in the Nahmint watershed by the Forest Practices Board has revealed that BC Timber Sales (BCTS) failed to observe the Vancouver Island Higher Level Plan Order and has not adequately protected old-growth and biodiversity values in some ecosystems. As observed by Kevin Kriese, Chair of the Forest Practices Board: “BCTS’s FSP did not meet the legal objective, and it should not have been approved. We looked at the remaining forest in the watershed and found there are some ecosystems that could be at risk if more logging takes place in them.”¹² Unfortunately these findings always occur after the damage is done. During the three-year investigation, BC Timber Sales continued to liquidate old-growth forests and rare ecosystems, just as “business-as-usual” has continued to be the common practice even since the September 2020 announcement, which announced a “paradigm shift.” While we can expect many more investigations, given the rate of deforestation, the limitations of old-growth restoration may make this a pyrrhic endeavour.

The political manipulation of science is not just a provincial problem. It is a long-standing national problem that shaped David Schindler’s career. That it continues to this day can be illustrated by a recent report on the interference of DFO bureaucrats in the recommendations by both BC provincial scientists and DFO scientists into the recovery of Thompson and Chilcotin steelhead. The Fraser River ecosystems are experiencing a general collapse associated with the demise of Fraser salmon. The Fraser River steelhead population has generally declined by 80% over the past two decades. As **Figure 3** illustrates, Thompson and Chilcotin steelhead populations have dwindled to a point of extreme conservation concern.

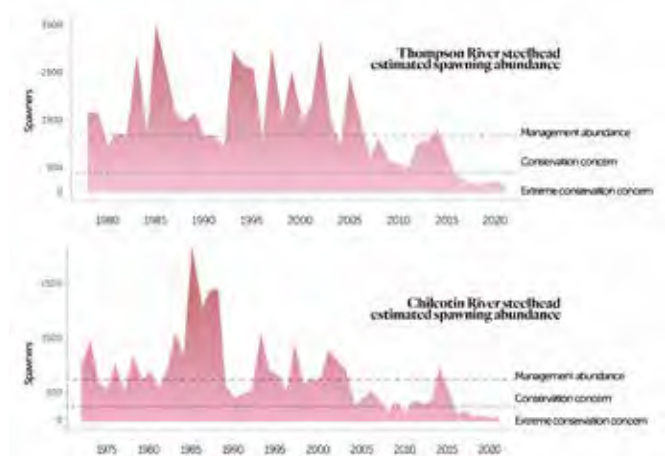


Figure 3: Thompson and Chilcotin spawner abundance. (See <https://thenarwhal.ca/dfo-steelhead-scientists-emails/>).

The decline of Fraser River steelhead is largely attributable to the fact that steelhead migrate at the same time as chum and pink salmon and are by-catch in the commercial interception fisheries. Listing the steelhead as endangered would trigger recovery actions that would curtail chum and pink fisheries. DFO, therefore, has re-written the scientific report intended to minimize the risk to these endangered populations and blocked listing them under the *Species at Risk Act* for economic, not scientific reasons: “*DFO estimated listing the species would lead to a \$90.7 million loss in profit for commercial fisheries, Indigenous commercial fisheries, and seafood processing over 20 years, plus an additional \$16.2 million in losses for the recreational fishing sector over the same period.*”¹³ As noted by Dr. Eric Taylor (SFU), DFO appears to be more concerned with the immediate economics of fisheries than with the benefits of that would ensue from the recovery of “the stock.”

Of greater concern is the fact that the scientists involved feel that the interference “undermines the scientific credibility of the process.”¹⁴ DFO’s concern is not scientific, yet is presented to the public as scientific. It is the economic protection of a commercial fishery.

The problem here is not the absence of DFO science, but that political interests within DFO are protecting and prioritizing immediate commercial interests to maintain the industry’s status quo. In this framework, the environment is not DFO’s prime concern, no more than it is BC’s Ministry of Forests. In both instances, the ministries are usurping their environmental mandates to protect the status quo of commercial interests. As Mark Zacharias, BC’s then-deputy minister of the environment, stated to his federal counterpart in e-mails, DFO changed conclusions in a scientific report to “support status-quo commercial salmon harvesting.”¹⁵

It is important to recall that there was a time in Canada, prior to 1973, when that conduct would have been deemed completely unacceptable.

While David Schindler is best known for his 1971 paper on the role of phosphate in the eutrophication of lakes,¹⁶ and the many papers that followed from his time at the Experimental Lakes Area, as well as his work in Alberta on fish introductions in fishless lakes with Rolf Vinebrooke, and more recently, on the impact of oil sands development in the lower Athabasca, his lesser publicized presentation of historical topics marking the evolution of Canadian science and science policy that he raised in his 2008 Killam Lecture “The Role of Science in Making Sound Environmental Policy” is a landmark contribution to understanding the problems we face today. It also sheds important light on the making of Schindler as a “guerilla scientist.”¹⁷

Writing 13 years ago, in 2008, Schindler was in no doubt as to the direction that Canadian science has taken since 1972: “*I have also spent 22 years as a federal government scientist. During that period, I have seen the role of science in environmental policy making decline from being the best in the world 40 years ago, to today when science has about the same influence on Canadian environmental policy as it does in most third world countries.*” The consistent political interference and dishonesty exemplified by the conduct of DFO and BC Ministry of Forest documented in the examples just given above, are not novel, they are routine.

That conduct in which the interests of industry override science and public interest in the integrity of the environment has been the accepted norm for the past five decades. It is not the absence of science, but political hegemony, that has brought many of our ecosystems either to the brink of, or to a point of, collapse. That is what Schindler unabashedly refers to.

While few Canadians may recall, or have been taught in school, Canadian environmental science has enjoyed two high renaissance periods. The first came with the creation of the “Commission of Conservation” in 1909, which was endorsed by the Conservative leader and member of parliament, Robert Borden before he became Prime Minister, and was implemented by the Liberal government of Prime Minister Laurier. The Commission of Conservation was a non-partisan body, independent of any ministry and consisting of the Minister of Natural Resources of each province and territory, and the leading scientists from each provincial university, answering only directly to parliament. “*The Commission was unique, intended to be an independent, autonomous, objective, and fully non-partisan body that would explore all questions pertaining to natural resource conservation in Canada.*”¹⁸ Though it was disbanded by the short-lived Conservative government of Arthur Meighen of 1921-1922, the work and independence of the Commission lies behind the founding of many of Canada’s environmental research institutions, notably The Biological Board of Canada established in 1912, which became the Fisheries Research Board of Canada (FRBC) in 1937, marked a second renaissance period that lasted until 1973.

Schindler came to Canada to teach at Trent University in 1966. In 1967, Schindler met Jack Reuben Way Vallentyne (whose own unorthodox obituary, authored by Schindler, signals him out to be a remarkable scientific mentor to Schindler’s own guerilla spirit.)¹⁹ In 1968, Vallentyne persuaded Schindler to join the FRBC’s Freshwater Institute in Winnipeg and head the Experimental Lakes Area research on eutrophication. As Schindler notes in his 2008 Killam lecture, the FRBC was staffed with Canada’s best fisheries scientists and limnologists. It retained the hallmark independence of the Commission of Conservation. It received a flat sum of money to investigate and solve aquatic problems, and allocated funds to projects without any government interference. In Schindler’s terse summary: “*The focus was on excellent science, not political spin.*”²⁰

Historical memory, which is so lacking in a society bent on avoiding accountability and responsibility, is important if we are to understand what brought about the demise of the ideal relationship between politics and science, as experienced by Schindler during his time at the FRBC. The tremendous success of Vallentyne and Schindler at solving the central problem of eutrophication turned out to be one of the driving causes of the demise of the FRBC. Having identified phosphate as the agent of pollution, Schindler and Vallentyne drew the ire of industries that were large contributors of phosphates in waterways, the pulp and paper industry and the large labour forces whose employ depended on their continued production of mills. These demographics were also contributors to political parties that won the 1972 election.

It is particularly significant that the demise of the FRBC came about after the 1972 election that brought in a Liberal minority led

by Pierre Elliott Trudeau and supported by Stephen Lewis' NDP. It was that combination that ushered in a process of underfunding and silencing of Canadian science that would culminate in the overt repression of the Stephen Harper years, ironically in deliberate repudiation of the work of Borden.

As Schindler sums it up:

"The Government of Canada disbanded the Fisheries Research Board in 1973. The Board's employees became part of Environment Canada, a part of the civil service under a new Minister of Environment. A few years later, this organization was separated into what are now the separate departments of Environment and Fisheries and Oceans (DFO)...a bizarre split that bureaucratically isolates fish from many important features of their environments.

*Instead of answering to a panel of the country's most eminent scientists, we now reported to politicians and their deputies. Half of our building became occupied by bureaucrats who had little background in science, and no concerns about the role of science in making sound policy. There was little talk of major environmental problems and their solutions among our managers. Instead, the major concerns were on the sort of spin that would make the Minister of Fisheries look good, and to make it appear that funds had been well managed."*²¹

Though it is undoubtedly not to be uttered in polite society if one wishes to enhance one's career, this shift, which took the leadership of science policy out of the hands of scientists, where it had been since the early days of the Commission of Conservation in 1906, to the benefit of every Canadian, and placed it into the hands of elected officials and appointed bureaucrats, is largely responsible for the decisions that have resulted in the collapse of species populations and ecosystems that we have witnessed over the past 50 years. The proof is always in the pudding. Since 1970, we have witnessed the collapse of Northern Cod, Pacific salmon, elk, arctic ecosystems, productive old-growth ecosystems, and the list goes on and grows. These collapses are a product of mismanagement. The interference of DFO bureaucrats in the recovery of endangered Thompson and Chilcotin steelhead, documented above, is but one more egregious case re-enforcing David Schindler's stated belief that DFO should be dismantled and its science arm restored to its former independence to provide leadership in the shaping of environmental policy.

There are a number of instructive historical lessons to draw from this. The role that science plays in shaping environmental policy has less to do with political parties in power than it has to do with changes in the society that elects those parties to government. A recent book by Sally Weintrobe *The Psychological Roots of the Climate Crisis*, reviewed in *Science* (May 2021), helps make the case.²² The early 1970s faced the first backlash against the growing wave of environmental legislation that saw the first implementation of progressive environmental legislation, such as "*The Clean Air Act*" (1970) and "*The Clean Water Act*" (1972) by President Nixon, which empowered the Environmental Protection Agency to enforce environmental standards. The reaction to this wave of environmental awareness was a swell of short-term economic writing against environmentalism and the science that informed it. This seeded the neoliberal ideology and economics that would inevitably lead us to the anti-science populism of Trumpism and Harperism that I have written about in a recent review.²³

It was in that context that Schindler developed his persona as a "guerilla scientist." As he explains in the Killam lecture, he frequently found himself at odds with senior bureaucrats who accused him of undermining Canadian policy, and attempted to silence him by demanding that he submit written copies of his public lectures for pre-approval. Fortunately, his lawyer informed him that as long as he remained an American citizen, the Canadian government could not silence him. So Schindler was able to remain a publicly outspoken scientist. To be an outspoken scientist is to be a "guerilla scientist." It is to avoid the fate of the BC Ministry of Forest scientists referred to above whose fake data confirms Schindler's belief that: "*governments have made their scientists the tools of politicians, their results and opinions twisted if necessary for political gain.*"²⁴

In the 1980s, Jack Vallentyne and David Schindler offered a very simple message to children and young adults: "be kind to the Earth and it will be kind to you."²⁵ Unfortunately, like much common-sense wisdom, this fairly simple advice that came with a lot of sound science, appears to be difficult to assimilate. BC's judges recently brought down two judgements that prove the truth of Dicken's Mr. Bumble's most famous utterance.²⁶

One of the last intact old-growth valleys on Vancouver Island, Fairy Creek, has been the scene of protests for the past year. Teal-Jones, the logging company interested in clearcutting this untouched valley, sought an injunction to remove the protesters. Notwithstanding the shakiness of claims made in court by Teal-Jones, which some believe led to a "flawed decision,"²⁷ Justice Frits E. Verhoeven, ruled that an injunction could be issued because the protest was causing Teal-Jones "irreparable harm".

The "irreparable harm" is that, while Teal-Jones and its employees could log in many other locations, they are not able to log in their place of choice, and this apparently causes them to incur an economic loss. Apparently the loss of old-growth, rare ecosystems, the biodiversity they support, and their importance to climate regulation and fish habitat, are not part of the consideration included in the legal concept of "irreparable harm." So now, young people who may have listened to, and taken to heart, Vallentyne's and Schindler's advice, may face fines of up to \$20,000 for following sound scientific advice.

Inasmuch as in BC, judges grant corporations injunctions with the same largesse that bishops toss blessings, the Fairy Creek injunction is just part of BC's social landscape. Of greater interest is the recent ironic injunction against the Minister of Fisheries and Oceans, Bernadette Jordan. In June 2020, Minister Jordan acquiesced to decades of scientific research, protests, and requests from First Nations in the Discovery Islands to close down 19 farms by June 2022. The order fulfills UNDRIP obligations to the 102 First Nations who have requested that salmon aquaculture farms be removed from their territories. In December, the minister ordered no further re-stocking so that the pens would be empty by June 2022. Federal Court Justice Peter George Pamel has granted an injunction to two large aquaculture companies Mowi Canada West and Saltsream, which are seeking to mount a larger legal challenge against the minister's order. The judge invoked the doctrine of "irreparable harm" based on estimated economic losses to the corporations and regional loss of employment.

Interestingly, Homalco and Tla'amin Nations, who are the rightful owners of the territorial waters, were denied the right to intervene.²⁸ This is strange given that the Fairy Creek injunction was granted in part because of Teal-Jones' ownership claims. Just as cultural concepts of ownership may be posing problems of interpretation, so do concepts of "irreparable harm." We are living in an increasingly schizophrenic culture. As Chief Dalton Silver observed: "*It always seems that industry, and the interest of economics, wins out when the environment is involved.*"²⁹

It is also good science that is disregarded, the law that is brought into contempt by biasing economics over the environment, and the social fabric that is rent by alienating younger generations with an interest in the future of this planet, until the logical consequences catch up. Irreparable harm does come from forgetting the value of intact environments and prioritizing the economics of politics over the facts of science.

So maybe it is time to speak out and be guerilla scientists, and bring back scientific institutions independent of government and funded by the tax revenues of constituents who place the interests of the environment above the interests of industry.

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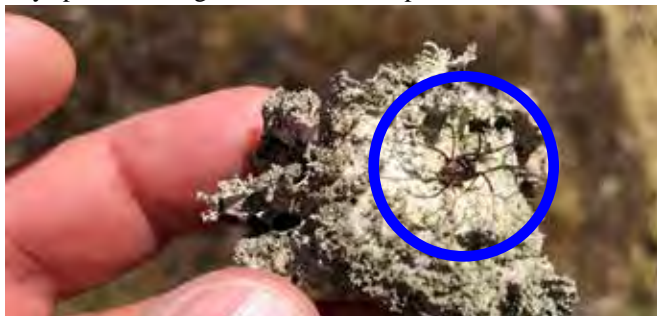
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Meet "Togwo", the Comox Valley's Ecological Reserve's Unique Resident

It is an extraordinary affirmation of the Comox Valley's biological wealth and British Columbia's unique biodiversity potential that at a time when the world faces a global biodiversity collapse, researchers can still find new species records. That is largely thanks to the foresight of Dr. Bristol Foster and others who from 1964 to 1974 urged BC's government to create the "Ecological Reserves." In a rare affirmation of long-term political generosity, the "*Ecological Reserve Act*" came about in 1971 with the unanimous support of both sides of the Legislature. Ecological reserves are a precious gift for future generations. There can and should be political common ground for the preservation of our natural heritage.

The "Comox Lake Bluffs Ecological Reserve" was set aside mainly for its rare and vulnerable plants in an unusual dry-site community of plants that one would normally associate with dry grasslands. The Comox Valley is greatly indebted to Betty Brooks for initiating and driving community efforts to set aside this jewel in our natural heritage as of May 1988.

Recent work, largely by Dr. Randal Mindell at the ecological reserve has greatly expanded the floristic record of lichens and mosses, most of which can be found as part of the unique endangered and fragile ecosystems of South Vancouver Island and the Gulf Islands. In the course of this work, Dr. Loys Maingon accidentally discovered on April 30th of this year that the Ecological Reserve is also home to a small harvestman "*Togwoteus biceps*" normally found in grasslands of Interior BC. From an evolutionary point of view, "Togwo" is a bit special. It belongs to the large family "Sclerosomatidae," where it is the only species in its genus. There is no species like it.



Togwoteus biceps (in circle) found in the Comox Lake Bluffs Ecological Reserve. Photo by Loys Maingon, CSEB BC Director.

This discovery is the first and only record of this animal on Vancouver Island. Barring future information to the contrary, this means that on Vancouver Island this species is unique to the Comox Lake Bluffs Ecological Reserve. The Ecological Reserve is home to a unique population of this invertebrate. That makes the Ecological Reserve a very special and vulnerable place that needs to be protected.

Unfortunately, in spite of heroic efforts by BC Parks, the Comox Bluffs Ecological Reserve continues to be overwhelmed by an increasing number of visitors, high impact traffic such as dirt bikes, fat E-bikes, and ATVs, as well as party-goers whose fires pose regular threats. As part of ecologically important areas that affect the water quality of a community watershed, the Ecological Reserve deserves better and more stringent protection. With good planning, education, and political support, expanding the Ecological Reserve's surface area and status to a Provincial Park could meet both recreational needs, as well as our obligations to conservation and to ecological services for future generations.

With this discovery, "Togwo" presents an opportunity for Comox Valley politicians to care and protect endangered species at home. It is an opportunity to show the same rare, disinterested political generosity of spirit that politicians showed in 1971 to do great things for this province's biodiversity.

The CSEB John Lilley Undergraduate Scholarship



Prepared for: Ms Judiann Lilley

March 2021

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Claude Shannon and "The Arnica Trail": Why Tracking Common Species Matters

One of the popular errors committed by neophytes in biodiversity studies is to develop an obsession for rare species. There are a number of very basic problems associated with this. First it reveals a poor understanding of biodiversity, and second, a worse understanding of ecologically important processes that drive biodiversity. Common species have a lot to tell us. In an age of climate change, they are in fact becoming even more important because their fluctuations within their regional populations tell us a lot about shifts in the chemical processes that sustain life and what is happening to the variety of species around us.

I happen to loathe iNaturalist because it encourages users to think of ecosystems as just a collection of species in a museum, rather than a living interplay of species. It de-contextualizes species. The world is not a collection of items. It is a living network. Biodiversity is not "species richness," which is the number of species in an area. Biodiversity is a measure of the probability of encounter of species in a communication network that is an ecosystem. Regrettably, this is a point poorly taught in textbooks and frequently misunderstood by educators and media. One can't really understand biodiversity, anymore than one can understand Suzanne Simard's work on forest ecology without understanding its foundations in Claude Shannon's "communication theory." Failure to understand the difference leads to a number of erroneous basic assumptions.

The first wrong assumption is that there is more "information value" in rare species than in "common species." The faulty rationale used is that a rare species bears a more significant information signal against a "noise" background of common species. That is related to the second false assumption, that the set of common species is a constant. The general false idea is that because common species are by definition "common," they are ubiquitous. The expectation is that one can always expect to find common species, as though they were a permanent framework. That creates the false common bias that there is a stable uniformity to regional species distributions. This is poor linear thinking, because the background noise is actually dynamic.

It is the interplay of random noise and signal that matters. That interplay is the essence of diversity and information. Both rare species and common species matter, because their interplay creates random species variations, even within apparently similar regional ecosystems. Data sets that select one to the detriment of the other are non-random. Biased data leads to misleading conclusions, and generally, to very bad science.

Biodiversity ("D" or "H") is a statistical measure of the probability of encounter of species in a random sample area. As an aside, but related, as I will explain, that was developed by Claude Shannon (1916-2001), the "father of information-theory" who after 1945 worked at Bell Labs on communication and information theory, but who from 1939-1945 worked at the top-secret "Statistical Research Group" with Abraham Wald (1902-1950). Wald was a remarkable statistician with a bend for seeing unconventional blind spots or anomalies in data sets.¹

Abraham Wald is best remembered for his solution to the problem of armouring warplanes. Airforce generals collected supposedly

“random” data on the location of bullet damage on returning planes. Most of the damage was in the fuselage, wings and tail. While most statisticians worked on how to armor the fuselage and wings, Wald noticed what simplistic linear-thinking generals and statisticians did not. He observed that the data was nonrandom, it exhibited “survivor bias.” It was biased to the exceptions that appeared to be the norm. Very few planes returned with damage in the engine area, because planes that did not return were predominantly hit in the engine area. The common source of mortality—and most informationally rich data—were absent from the generals’ dataset.

The obvious and loud signals were irrelevant to the problem, because the common factor was overlooked. This remains a very common logical problem in everyday life and in environmental management.

These points can be illustrated in the results of a trail transect on the “Arnica Lake Trail” just above the Westmin Mine taken on May 25, 2021. Biodiversity transects should be as representative as possible of site species diversity. Observations of common species, in particular *Cladonia bellidiflora*, are therefore routinely collected (**Figure 1**). This graceful lichen species, which has a global distribution, is often mistaken for *Cladonia squamosa* when the apothecia is underdeveloped. Remarkably, unlike most transects carried out in Strathcona Provincial Park over the past year, the entire 3.5 km transect produced only one shrivelled and malformed specimen at the very end of the transect. The common species turned out to be “rare.” But as it is, that turned out not to be the most surprising observation made that day.



Figure 1: *Cladonia bellidiflora* (a.k.a. “Toy soldiers”)

With minimal search effort, and only along the 3.5 km transect 18 separate observations were recorded of *Psoroma hypnorum* (**Figure 2**). Even more were observed, but not recorded. (Familiarity breeds contempt.) This is a very showy lichen that is not regularly observed. It is considered rare in Saskatchewan, Ontario and Nova Scotia. Since the founding of iNaturalist in 2011, it has garnered only 65 global observations to date, including the 18 on the Arnica Lake trail.

So on the Arnica Lake trail, the common species became rare, and the rare species became common. Does this affect



Figure 2: *Psoroma hypnorum* (a.k.a. “Bowl lichen”)

biodiversity? The answer to that is “enormously.” Does it affect species richness? The answer is “no.” The community richness remained similar and probably about equal to other south-facing subalpine montane sites in Strathcona Provincial Park. However, the high density of *Psoroma hypnorum* and absence of *Cladonia bellidiflora* does tell us a lot about the chemical processes at the site and about the age of the site. Although we might be tempted to blame the minesite activity and air pH for the shift in lichen distributions, which may or may not be contributing factors, there are simpler, and therefore better, explanations for this species shift.

Assuming that precipitation on the Arnica trail is consistent with rates around Buttle lake, the difference lies in the nitrogen and phosphate availability at the site, which is related to the age of the ecological community. To understand that we can turn to Chilean research on Ardley Island in the South Shetland Islands. In arctic and antarctic environments, and wherever there are large bird populations, soil processes depend on bird guano for nitrogen inputs. Sites that do not receive guano directly or aerially depend on cyanolichens, “nitrogen-fixing lichens,” like *Psora hypnorum*, to fix nitrogen biologically. These sites are usually young soil-forming sites characteristic of either glacial retreat or geological instability.

What the Chilean researchers found is that if guano is added to low nitrogen *Psora hypnorum* sites, biological nitrogen fixation ceases, and the community of the lichen and moss flora changes.² This is not a gradual shift. It is a shift between two different ecological states, as indicated by the presence or absence of *Cladonia bellidiflora* at the Arnica Lake trail.

The Arnica Lake trail is a long series of switchbacks that crisscrosses a large number of unstable relatively recent rockslides south of a major blow-out below the outlet of Arnica Lake. One has to wonder what happened there during the 1946 earthquake that formed the nearby Landslide lake. The presence of *Psora hypnorum* tells us that the vegetation is the product of relatively low nitrogen early soil-formation processes in a geologically disturbed area. On the other hand, *Cladonia bellidiflora*, is not a cyanolichen. It is a chlorolichen dependent predominantly on green algae and it is associated with a flora adapted to higher soil nitrogen levels and stability characteristic of a later successional state.

The Arnica Lake trail is really an anomaly that we have long taken for normal. It is an invitation to what Claude Shannon

called “anomaly detection.” These are fine shades of floral and faunal successions to the untrained. They require a more sensitive approach to floral community distributions that recognizes the dynamics inherent in the landscape, that is the biodiversity, not just the species richness. That is part of learning to read the landscapes. Nitrogen fluctuations are a very large if poorly understood climate change concern, which are expected to have a major impact on global biodiversity.³ Monitoring the distribution of common indicator species like *Cladonia bellidiflora* is an essential part of establishing a baseline to track biodiversity shifts in an environment that is rapidly evolving around us, unless of course we believe in the constancy of the ark and deny climate change.

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Upcoming CSEB Research Webinar

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

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

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

CSEB VOLUNTEERS NEEDED

Social Media Coordinator:

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

If interested, please contact President Curt Schroeder at schroederc@saskpolytech.ca.

Regional Directors

CSEB Requires Regional Directors for the following Regions:

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

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

For more information, contact President Curt Schroeder at schroederc@saskpolytech.ca.

ALBERTA News

Submitted by Brian Free, CSEB Alberta Regional Director

Coal and Caribou Have Been High Profile Issues of Late

As the 1976 Coal Policy is now being reviewed and updated, public interest is high, as this policy protects sensitive lands in Alberta's foothills and Rocky Mountains. An independent Coal Policy Committee has been established to conduct the review of this policy. Of note, the committee is only allowed to focus on matters related to coal that are under the administration of the Minister of Energy. Other aspects, such as those related to fish and wildlife habitat and water quality, appear to be out-of-scope. Public engagement is limited to interviews, investigations, surveys, and meetings as the Committee deems necessary. The Committee will conduct their engagement until September 15, 2021. For more information about the committee and public engagement, go to <https://www.alberta.ca/coal-policy-engagement.aspx> For the perspective of an environmental group, see the Canadian Parks and Wilderness Society website at https://cpawsnab.org/coal_campaign/.

With the public attention now focused on coal, there has been a formal submission to the federal government regarding a proposed reactivation of the Tent Mountain Coal Mine in southwest Alberta. A conservation organization, an Indigenous collective, and a landowner organization are together seeking to have this project reviewed by the federal Impact Assessment Agency. It currently requires only provincial review.



Alberta's caribou are at risk and the provincial government is preparing caribou management plans to ensure their survival. For the Jasper population, prospects do not look good. Since the 1960s, when southern Jasper National Park (JNP) was home to hundreds of caribou, there are

now fewer than 60 caribou residents. One herd is gone and the two others are at low numbers. A larger fourth herd visits northern areas of the park, but spends much of the time on adjacent provincial lands.

Parks Canada met resistance when it had closed areas of JNP for part of the year to protect caribou. As a last ditch effort to save them, it has been proposed to permanently pen some caribou and breed them to repopulate the region. A scientific review panel recently approved the plan.

Parks Canada has proposed a \$25-million project that would confine up to 40 females and five males in a one square-kilometre area in JNP that will be surrounded by an electrified fence. Careful

monitoring of the young caribou released into the wild will be needed to determine their survival rate. Although not a certain component of the plan, wolf culls are a possibility. For more information, visit Parks Canada's website at <https://www.pc.gc.ca/en/pn-np/ab/jasper/nature/conservation/eep-sar/caribou-jasper> or the David Suzuki Foundation at <https://davidsuzuki.org/press/helping-jaspers-caribou-survive-needs-more-than-conservation-breeding/>.

Wind Turbines Deter Whooping Cranes From Stopover Sites, Study Confirms



Photo by Laura Erickson

A new [study](#) published this month (March 2021) in the journal *Ecological Applications* reveals that migratory habitat for the [Whooping Crane](#) (*Grus americana*) is being gradually reduced by wind energy development.

Researchers found that this Endangered bird avoids turbines to a distance of 3.1 miles (5 kilometers), eliminating otherwise usable stopover sites if turbines are placed too close to them. Five percent of the best stopover habitat has already been functionally lost, the authors found. Many more wind facilities are being planned, indicating that unless steps are taken to distance turbines from stopover sites, this situation could grow even more dire.

“The results of this ground-breaking study are really eye-opening—the buildout of wind energy is already having a negative cumulative impact,” says Joel Merriman, Director of the Bird-Smart Wind Energy Campaign at American Bird Conservancy. “There are more than 10,000 wind turbines scattered throughout the Whooping Crane’s migratory pathway. We now know that too many of these turbines are eliminating important migratory stopover habitat for this Endangered species.”

Each year, the last naturally occurring Whooping Crane population makes a 5,000-mile round trip, moving north in spring then south in fall along a narrow corridor between Canadian breeding grounds and wintering grounds in coastal Texas. Not marathon flyers, the birds must stop to rest and refuel several times along each seasonal journey.

There are a handful of well-recognized major stopover sites where migrating Whooping Cranes reliably concentrate that are designated Critical Habitat by the U.S. Fish and Wildlife Service. However, there are other [stopover sites](#) that these birds need as “stepping stones” to successfully complete their journey. Maintaining the availability and quality of these sites is a critical element of the continued conservation of this species. Many are on private lands, making protection more challenging. The study indicates that these smaller stopover sites are being functionally lost due to wind energy development.

And these impacts are growing. In the timespan of the study, from 2010 to 2016, the number of turbines quadrupled in the center of the migratory corridor. Overall, wind turbine placement was found to be essentially random in relation to Whooping Crane stopover habitat.

The study shows that Whooping Cranes avoided areas within five kilometres of wind turbines. Essentially, the presence of turbines rendered any habitat within that distance unusable.

This problem will only continue to grow unless turbine siting practices are improved. “There is good news here as well,” says Merriman. “The study also provides a clear blueprint for preventing additional migratory habitat loss from wind energy development: Avoid placing turbines in the species’ migratory pathway and absolutely stop putting them within 5 kilometers of stopover sites.”

The Whooping Crane has been clawing its way from the brink of extinction for almost a century. One of the rarest and most threatened North American bird species, the crane’s population had dropped to a low of fewer than 20 individuals in 1941. After many decades of collaborative conservation work by U.S. and Canadian partners, today the population stands at [more than 800 individuals](#). About 500 of these constitute the only self-sustaining population, which nests in Canada’s Wood Buffalo National Park and winters in and near the Aransas National Wildlife Refuge in Texas. There are two substantial reintroduced populations—a nonmigratory flock in Louisiana and a second migratory population in the eastern U.S.—plus about 150 birds in captivity.

Wind turbines are, unfortunately, just one part of the issue for Whooping Cranes. For some wind energy facilities, and particularly those in more rural locations, new powerlines must be constructed to connect the new facility to the energy grid. Powerlines are a primary source of mortality for Whooping Cranes due to collisions while in flight. This is one of the reasons a [permit was canceled](#) in June of this year for the “R-Project,” a proposed 200-mile transmission line that would have crossed an ecologically sensitive part of southeastern Nebraska.

“We need wind energy to combat climate change, but we have to be [smart](#) about facility development,” says Merriman. “This is particularly important for rare species like the Whooping Crane that have slow reproductive rates and thus less ability to recover from losses. These birds have enough challenges, including a small population, continued habitat loss, powerline collisions, illegal shooting ... the list goes on. Now they’re also having to dodge wind energy facilities. We can’t afford to stand by while this species’ remaining habitat is lost, especially when this loss is so clearly preventable.”

ABC thanks the Leon Levy Foundation for its support of ABC’s Bird-Smart Wind Energy Campaign.

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American Bird Conservancy is a nonprofit organization dedicated to conserving birds and their habitats throughout the Americas. With an emphasis on achieving results and working in partnership, we take on the greatest problems facing birds today, innovating and building on rapid advancements in science to halt extinctions, protect habitats, eliminate threats, and build capacity for bird conservation. Find us on abcbirds.org, Facebook, Instagram, and Twitter (@ABCBirds).

Reprinted from American Bird Conservancy [News](#)

SASKATCHEWAN News

Submitted by Curt Schroeder, CSEB President and Saskatchewan Member

Looking for Signs of COVID-19 in Regina Sewage

Two University of Regina microbiologists (Tzu-Chiao Chao and Nicole Hansmaier) are leading a study to assess the City of Regina sewage for early signs of COVID-19 in the community.

The study assesses the viral load in the sewage that can then be compared to the number active cases of COVID-19 in the City. Any discrepancy may indicate that more testing is needed or that an outbreak in the City has not been detected. This can have an impact on health management in the City, suggesting that current testing is sufficient or there could be a high number of asymptomatic cases.

A similar study underway at the U of Saskatchewan in conjunction with the City of Saskatoon has already successfully predicted spikes in COVID-19.

With data collection still in progress, it will be some time before accurate modelling can be performed, but it is anticipated that it will produce results of value to the current pandemic.

For more on this, connect with the U of R biology department: <https://www.uregina.ca/science/biology/index.html>

Zoo, Energy Firm Team Up to Help Burrowing Owls

By Bill Kaufmann—A Calgary-based energy firm is bankrolling efforts to save burrowing owls (*Athene cunicularia*) struggling to survive on Saskatchewan's prairies.



Burrowing Owl (Photo Source: ebird.org)

Crescent Point Energy is teaming up with the Calgary Zoo by donating \$150,000 to the Calgary Zoo's conservation work in preserving the endangered species.

Of that, \$100,000 will go toward the construction of a new research and breeding facility at the zoo's Wildlife Conservation Centre located south of Calgary, whose focus will be on conserving burrowing owls.

The remaining \$50,000 will support the research and reintroduction work carried out through the Saskatchewan Species at Risk program.

"We are particularly proud to support the Saskatchewan Species at Risk program, which provides funding for conservation ecologists and researchers to conduct meaningful work to sustain and nurture species who depend on prairie habitats throughout Saskatchewan," said Crescent Point Energy president Craig Bryska.

"At Crescent Point, our community investment program is one of the ways we foster a long-lasting, positive impact in the communities where we live and operate." Five years ago, the

zoo launched a program known as head-starting in which young owls are taken into captivity, where they're nurtured and given a better chance of survival before being released into the wild.

Burrowing owls are considered an indicator species whose population health can reflect the condition of their surrounding habitat.

"The generous support and leadership from Crescent Point Energy for our Saskatchewan Species at Risk program and construction of the new Wildlife Conservation Centre will help restore endangered species, including burrowing owls, to ecosystems where they are disappearing," said Clement Lanthier, president and CEO of the Calgary Zoo. It's believed fewer than 1,000 pairs of burrowing owls exist in Alberta and Saskatchewan. Their population is threatened by farmers and ranchers, who consider them pests.

(Reprinted from the Edmonton Journal, 31 March 2021)

MANITOBA News

Submitted by Robert Stedwill, CSEB Vice President

Fisheries

It's good to see that the government of Manitoba invests in its fisheries, particularly when you look at the rural communities of the province, as well as the tourism attraction. Six hundred thousand dollars are being dedicated to wildlife and fisheries management in this fiscal year. Monies will be spent on enhanced monitoring and data collection.

The enhanced data collection will be targeted toward high-use recreational angling lakes and mixed-use fisheries that support domestic fishing, recreational angling, and commercial harvest. Interestingly, a new fish hatchery truck with improved operational features is being acquired to allow more efficient and flexible stocking options.

These will enhance the current tens of millions of walleye fry and 500,000 trout raised in hatcheries to be released in close to 100 lakes. It is believed that for every dollar invested, there is a 40 dollar return in economic activity.

Water Management Strategy

On May 6, the provincial government announced that up to a million dollars will be invested in support of the development and implementation of Manitoba's new provincial water management strategy, the goal of which is "to manage water sustainably as a key resource for Manitobans, ecosystems, and the economy, while considering the impacts of a changing climate and growing economic and social need". It appears the strategy's development will rely heavily on public input from all quarters. The strategy will include short-term actions (to be implemented within five years) to address immediate issues related to water management as well as longer-term actions (implemented over 15 to 20 years) that will support the strategy's goal over the longer term.

Hydro-electric Facilities Licensing

In mid May, Manitoba Conservation and Climate issued the final licences to Manitoba Hydro for the Churchill River Diversion, Lake Winnipeg Regulation, and Jenpeg Generating Station. “The province has undertaken rigorous and decade-long consultations with the Indigenous communities affected. As a direct result of concerns raised, Manitoba Hydro will be held to multiple licence and non-licence conditions in the operation of these water-power licences. Consultation will continue into the future, by the province and by Manitoba Hydro.”

Based on my own experience in Saskatchewan, this last sentence bears repeating, in that as priorities change, and the hydrological cycle is impacted under changing environmental conditions, changes will likely need to be made.

Recognition of Dedicated Manitobans

In late April, the government honoured a number of dedicated individuals who have provided life-long dedication to the improvement of Manitoba’s wildlife and wildlife habitat.

Eight Wildlife Management Areas (WMAs) will be named in honour of these individuals:

- a portion of the Deerwood WMA will become the Don W. Orchard WMA;
- the Lake Francis WMA will be renamed the Dr. Frank Baldwin WMA;
- a portion of the Little Saskatchewan WMA will become the Roy Greer WMA;
- the Parkland WMA’s Horod Unit will become the Kenneth H. Wark WMA;
- the Frank W. Boyd Unit of Pierson WMA will become its own WMA;
- the Thalberg Bush WMA will be renamed the John T. Williams WMA;
- the Edward A. Poyser Unit of Whitemud WMA will become its own WMA;
- the Washow Bay WMA will be renamed the David G. Tomasson WMA.

The first WMA, named after Watson P. Davidson, was established in southeast Manitoba in 1961. Since then, the system has grown to encompass almost 2 million hectares of valuable wildlife habitat throughout the province.

Another Source of Zebra Mussels

Even the non-boaters amongst us need to be ever vigilant. Although most boat owners know to carefully clean their boats when transferring from one body of water to another, especially one that has been known to harbour zebra mussels or its veligers, home aquarium owners now need to take heed. Manitoba Agriculture and Resource Development has detected zebra mussels in moss and algal ball products for aquariums and water gardens sold in Western Canada.

Zebra mussels have been found at all life stages, including some that are extremely small (size of grain of sand), and are often found inside the moss or algal ball itself.

Needless to say, to be on the safe side, the suggestion would be to remove the aquatic life forms from the tank, and dispose of the contents (moss and algal balls and water) in an approved manner recommended by the government, probably similar to boat owner methods of cleaning fish wells on boats.

ATLANTIC News

By Peter Wells, CSEB Atlantic Member

A range of environmental issues continue to be discussed, and in some cases acted upon, in Nova Scotia. This is a short summary of the highlights, supported by references to recent news items. Opinions are mine alone.

Perhaps at the top of the concerns are the politics now surrounding several issues—forestry, biodiversity, and the new provincial *Biodiversity Act* (see below), and the protection of our provincial parks system (Vibert 2021). The new Premier purports to be supportive of the environment, yet while Minister of Lands and Forestry (not Forests), he was slow to consider the Lahey report (Lahey 2018) on ecological forestry, and was part of the move to delist a provincial park in secret and sell it to an American developer. This conflict of interest will plague him for some time unless quickly resolved. As usual, the tension between protecting the environment and wildlife, and support for economic initiatives, remains strong in the province.

The sustainability of the provinces’ forests and the effects of clearcutting of crown lands (30% of the province) remains the number one issue. Extensive clearcutting continues, despite protests led by concerned citizens and many articles for and against the practice (Turple 2021; Voice of the People 2021; Campbell 2021a, 2021b; Lewis 2021; Surette 2021a, 2021b). A plea is being made to stop the practice during the spring migration and nesting of songbirds, to prevent the destruction of nests and young birds. This seems to have fallen on deaf ears at present. What is also disturbing is the visibility of the clear cuts from many highways, spoiling the natural beauty of the province for citizens and visitors alike. To date, action on the recommendations of the Lahey report has been very slow—talk but no action.

The Northern pulp mill near Pictou is back in the news as the company is proceeding with plans for a new effluent treatment system, assuming that the plant will eventually reopen; it is currently in idle status (Beswick 2021a).

Dominating the news has been the Owls Head fiasco (Campbell 2021e, 2021f, 2021g, 2021h; Black 2021; Baker 2021), due to concern not only about a secretly delisted, unique coastal provincial park, but also about the future of the whole provincial park system. There is debate on both sides of the issue, again due to the desire to have jobs in rural areas, but at the heart of it is whether or not our provincial park system is secure. The issue has been heard in court and a decision is due soon as to the legitimacy of the sale of Owls Head. Provincial nature groups have been very active in their opposition to the delisting and potential sale of this unique coastal habitat.

Another issue dealing with parks looms—how much development within them is enough. National parks want more visitors and in this local case, at Kejimikujik National park in southwest Nova Scotia, the campgrounds are being urbanized with yurts and tree dwellings in an attempt to attract urban “campers” (Fairclough 2021).

Progress has been made on the biodiversity front, with the introduction and passage of new provincial biodiversity

legislation—the *Biodiversity Act* (Campbell 2021c, 2021d; Anon. 2021a, 2021b). This was initially lauded by all concerned until a debate opened up between private land owners and the forestry industry, and the environmental lobby, the former wanting no restrictions on how they managed their property to protect wildlife. The drafted legislation was amended at the last minute so its guidelines only apply to crown land. Again, the government caved in to private interests, ignoring the wider interests of the public who care about wildlife and their critical habitat.

Being a coastal province, whales are often in the news (Brodie 2021; Campbell 2021i; Dean-Simmons 2021). Concerns continue about the plight of the North Atlantic Right whale, the effects of fishing gear, and the implications of the loss of sea ice to their movement in areas that overlap shipping routes.

The fisheries debate continues (Burke 2021; Davis 2021) and is unresolved. With the lobster season in the lower Bay of Fundy about to open up again, it is hoped that fishers (commercial and indigenous) will not be in conflict as in past years. The DFO has clearly stated that fishing must be conducted within the established seasons, not year-round, and this remains the heart of the issue. The other fisheries issue pertains to the Windsor causeway and fish passage (Beswick 2021b, 2021c) as the causeway is modified to accommodate the new highway, and the current fish way has to be reconstructed to allow safe passage for anadromous fish such as alewives.

There are some pollution concerns related to gold mining (Taylor 2021, Smith 2021) and coal for energy (Demont 2021), but these seem to be dominated by the other issues at present.

For a small province with fewer than one million people, the variety of environmental issues that confront us continually seems overwhelming at times. It points to the critical role of environmental groups, professional and citizen-based, to hold government, industry, and private land-owners accountable for their actions.

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Do Plastics Pose A Risk to Atlantic Leatherback Turtles (*Dermochelys coriacea*) In Coastal Canadian Northwest Atlantic Waters?

(Noémie Blais, Marine Affairs Program, Dalhousie University, Halifax, NS.)

Atlantic Leatherback turtles (*Dermochelys coriacea*) (Fig. 1) are faced with multiple threats throughout their annual migratory routes in the Northwest Atlantic. Sadly, this subpopulation is currently listed as endangered under the Canadian *Species at Risk Act* or SARA (The Northwest Atlantic Leatherback Working Group, 2019; DFO, 2020). It is just one of the seven marine turtle species that may be greatly impacted by plastic debris, which has become ubiquitous in the ocean.

The Atlantic Leatherback disperses widely from its southern nesting beaches in the Caribbean and South American coastlines to forage in higher latitudes, going as far as waters off Cape Breton Island and Newfoundland (James et al., 2006).



Fig. 1. The Leatherback turtle (copyright – Animal Diversity Web, May 2021)

Atlantic. Hence, a need exists to assess risks associated with their likely encounters with marine plastic debris and the consequent effects on their health and survival. This information would contribute to conservation measures being proposed under the SARA.

Using 2010-2019 data from the regional Great Canadian Shoreline Cleanup (GSCS), an ecological risk assessment of plastics for this species was initiated by conducting a preliminary exposure assessment. The assumption is that the shoreline plastic debris collected by this cleanup program largely comes in from the sea, and is in coastal waters for unknown periods, posing risks to marine life such as these turtles.

Hence, the abundance of plastic debris (Fig. 2) along shorelines of three Atlantic Provinces—Nova Scotia (NS), Prince Edward Island (PEI), Newfoundland (NL)—was evaluated. During the 2010-2019 period, 129,225 plastic items were collected along 653 kilometres of NS shorelines, 22,049 plastic items were collected along 395 kilometres of PEI shorelines, and 71,097 plastic items were collected along 224 kilometres of NL shorelines. Cigarettes/cigarette filters were found most abundantly, with 37,787 items collected in NS, 19,886 items in NL, and 1,910 items in PEI. Rope was the second most abundant plastic, with 14,456 items collected in NS, 4,369 items in NL, and 3,057 items in PEI. Tiny plastics or styrofoam pieces was the third most abundant plastic, with 10,010 items collected in NS, 4,978 items in NL, and 2,360 items in PEI. Plastic bags are the fourth most abundant item, with a total of 11,418 items.



Fig 2. Plastic debris on the beach at Gulliver's Cove, Nova Scotia, June 2019 (photo by Peter Wells).

This study shows that leatherbacks in the Northwest Atlantic may be at risk of plastic ingestion and entanglement (Blais 2020)

from the plastic debris that eventually strands along shorelines. Although additional evidence is needed on the actual exposure of the turtles at sea to the most common items, existing evidence from previous studies shows that there is high risk for lethal and sub-lethal effects from entanglement and plastic ingestion if exposure occurs. This risk could be reduced by better land-based pollution and fisheries gear pollution management and enhanced programs to reduce and reuse plastic items.

Importantly, the potential impacts of plastic debris on leatherbacks go well beyond the Atlantic coast of Canada. This subpopulation may also be exposed to plastics at tropical nesting sites, which may result in a multitude of negative impacts on nesting success. Hence, the issue of plastic debris in the ocean and its risks to wildlife such as turtles needs to be addressed both nationally and internationally.

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Aquatic Toxicology News

The next annual Canadian Ecotoxicity Workshop (the 47th), formerly the Aquatic Toxicity Workshop, will be held in early October in Halifax, NS. It will likely be both in-person and on-line, the exact format yet to be decided.

As part of this workshop, there will be the usual annual meeting of the Intergovernmental Ecotoxicological Testing Group (IGETG), which is celebrating its 45th anniversary. It started in 1976 as a government technical advisory group for the water pollution regulations and guidelines being developed under the Canadian *Fisheries Act*. It has evolved into a Canada wide group involving industry, the consulting industry and provincial and federal laboratories, focused on the development of standardized test methods and the investigation of water quality variables of concern while testing industrial effluents, chemicals, sediments, and soils for toxic substances (chemicals) of concern. Initially chaired by ECCC (Environment and Climate Change Canada), it has been chaired for many years by the Ontario Ministry of the Environment.

Of related interest is the recent publication of the latest Biological Test Method from the Biological Assessment and Standardization Section of ECCC:

Biological Test Method: Test for Measuring Reproduction of Oribatid Mites Exposed to Contaminants in Soil. ECCC, STB 1/RM/61, Sept. 2020. 109 p.

According to Rick Scroggins and Leana Van der Vliet of ECCC, “this test method further adds to ECCC’s suite of toxicity test methods for assessing the effects of contaminants in soils”. Since 1990, 36 reports have been prepared by the ECCC group, covering generic biological (toxicity) test methods, reference methods, and supporting guidance documents. They are all available from ECCC, Ottawa, ON, at <https://www.canada.ca/en/environment-climate-change/services/wildlife-research-landscape-science/biological-test-method-publications.html>.

TERRITORIES News

Submitted by Sharleen Hamm, RPBio, Former CSEB Territories Director

Land and Water Boards of the Mackenzie Valley Notice of Recent Decisions and Release of Documents

On April 7, 2021, the Mackenzie Valley Land and Water Board (the Board) met to review and make decisions on a number of new items. A brief description and the outcomes of those discussions are provided below.

1) Land Use Permit Extensions

The Board considered whether the Land and Water Boards of the Mackenzie Valley may extend the term of a land use permit multiple times under subsection 26(6) of the *Mackenzie Valley Land Use Regulations* (MVLUR). The Board determined that subsection 26(6) of the MVLUR only allows the Board to extend the term of a permit one time and for a period of up to two years. The Board’s Reasons for Decision can be found at the following link: [MVLWB Reasons for Decision on the Interpretation of Subsection 26 of the MVLUR](#).

2) Method for Determining Available Winter Water Use Capacity for Small-Scale Projects

In response to concerns raised over recent years by some applicants of small-scale mineral exploration projects about the challenges of providing the precise location and water use needs of all potential water sources for their work, the Land and Water Boards of the Mackenzie Valley and the Government of the Northwest Territories Department of Environment and Natural Resources (GNWT-ENR) initiated the development of a *Guideline for the Determination of Water Source Capacity in the Mackenzie Valley*. The objective was to identify acceptable methods for calculating or estimating water source capacity when detailed bathymetry is not available or reasonable to obtain. Through work initiated in October 2019, the Boards and GNWT-ENR are pleased to release a Method for Determining Available Winter Water Use Capacity for Small-Scale Projects. Because detailed bathymetric methods require expertise, effort, and resources that may not align with the early stages or scope of smaller projects, the *Method* provides a consistent approach for applicants that also provides a high level of certainty regarding environmental protection. The document is available at the following location: [MVLWB Method for Determining Winter Water Source Capacity for Small-Scale Developments](#).

3) Closure Cost Estimator for Land Use Permits

In response to the longstanding acknowledgement that the security template used by the Boards to estimate reclamation costs for projects requiring a land use permit is very out of date, the Boards took the lead on a collaborative project to develop a new tool. Commencing in May 2020, a Project Team made up of representatives of GNWT ENR, Lands and ITI, Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), the Tłı̨chǫ Government, the Gwich’in Tribal Council, and Board staff worked with a contractor to develop the tool. Following a public review of a draft tool, the Project Team finalized the Closure Cost Estimator and accompanying manual.

The Boards have approved the new tool for estimating the reclamation costs for activities that require a land use permit. Prior to the implementation of the tool, the Boards are seeking the participation of Landowners and Land Managers to develop a policy for how it should be used. For more information, please contact [Andrew Wheeler](#), Regulatory Specialist with the MVLWB.

4) Standards for Reporting Water Quality Information in the NWT

Through 2018 and 2019, the Land and Water Boards worked with GNWT-ENR to assist in finalizing a document to describe specific information that should be consistently presented by project proponents when they are required to collect and report water quality monitoring information under the terms and conditions of water licences. The goal of the work was to address inconsistencies in water quality information posted to the Public Registry of the Land and Water Boards and provide clear expectations to project proponents. The standardized process is also intended to reduce challenges when attempting to combine information collected by different proponents, such as when using information to conduct regional assessments of water quality.

At its December 5, 2019 meeting, the Board passed a motion to adopt GNWT’s Standards for Reporting Water Quality Information in the NWT. The Land and Water Boards and GNWT are now pleased to announce the release of the Standard. The document is available at the following location: [GNWT Standards for Reporting Water Quality Information](#).

Land and Water Boards:

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Submitted by Anne Wilson, CSEB Territories Director

Northern travels remain restricted, including closure of the Common Travel Corridor between the NWT and NU. Conditions had been reasonably normal in the North, while border closures and measures kept the infection from entering and spreading in the NWT and NU. However, that changed this spring, with serious outbreaks in both capital cities derailing meetings and disrupting 'business as usual'. Northern regulatory and environmental assessment boards have cancelled hearings or moved to fully virtual platforms.

On a sad note, Thomas Berger, a former justice who led the Mackenzie Valley Pipeline Inquiry in the 1970s, passed away on April 28th, 2021. Best known for his work to recognise indigenous rights and land claims, he is remembered in the North for his extensive consultations on the pipeline in dozens of communities, where he listened to the concerns of residents. In 1977, Justice Berger released his report that recommended a ten-year moratorium on pipeline development to allow time for indigenous land claims to be settled. This changed the course of development in the Mackenzie Valley, and was a springboard for land claims negotiations. Thomas Berger is remembered in the North with gratitude, respect, and admiration.

News bits

Nunavut:

- There is a quota of 250 Baffin Island Caribou allowed for harvest, and that was reached in early May. This harvest level is set by the Nunavut Wildlife Management Board to allow the herd to recover while providing some harvesting opportunities.
- Crown-Indigenous Relations and Northern Affairs Canada has introduced a virtual system that lets companies stake mineral claims online. This is considered a more environmentally-sustainable way to conduct exploration without the need for field work. For more information see <https://www.rcaanc-cirnac.gc.ca/eng/1609948935479/1609949001844>
- De Beers continues work on the Chidliak Project, located on the Hall Peninsula of Baffin Island. The proposal is to design a carbon-neutral mining operation, using renewable energy and innovative logistics.
- Sabina Gold and Silver is expanding exploration work at the Back River Gold project. This is occurring in conjunction with a proposed expansion in ore to be mined.
- Baffinland's Phase 2 Expansion Environmental Assessment hearings were shut down with six days to run, due to a COVID outbreak in Iqaluit. A subsequent outbreak occurred at the Mary River Mine, and Baffinland has suspended production. This may be a harbinger of a future shutdown, given the delays in Phase 2 approval and forecasted drops in the price of iron.

NWT:

- Arctic Canadian Diamond Company, which purchased the Ekati Diamond Mine earlier this year, is planning to develop a new open pit at Point Lake (within the existing mine lease). This would extend the mine life by four years, past the current life span of 2034.

- Cheetah Resources is conducting a small scale demonstration project to extract rare earths at the Nechalacho property. The mine is not licenced for full-scale production, but hopes to develop the resource with extraction followed by processing in Saskatchewan.
- A historic gold property is being revisited, with Nighthawk drilling greenfield and expansion targets near Indin Lake. The Tlicho all-season highway is anticipated to open this fall, and will improve access to the site.

Arctic:

- While the Arctic is becoming "greener", this is not happening at a rate that will reduce carbon emissions, as the carbon "sink" is limited. <https://www.sciencedaily.com/releases/2021/04/210429112330.htm>
- A study published recently in the Proceedings of the National Academy of Science highlights the under-accounting of emissions associated with thawing permafrost and with wildfires, with implications for increasing climate change. For the publication, see <https://www.pnas.org/content/118/21/e2100163118>
- Overwintering fires in areas above the Arctic Circle account for a large proportion of the burned area each year, and are increasing with the warming climate. In 2020, wildfires in the Arctic Circle emitted a record 244 megatonnes of carbon dioxide, indicating that these so-called "zombie fires" are a significant contributor to emissions. <https://www.nationalgeographic.com/environment/article/zombie-fires-in-the-arctic-are-linked-to-climate-change>

Environmental assessments and regulatory processes in the North continue, albeit at a slower pace, with the shift to virtual platforms for technical meetings and hearings allowing processes to occur in a timely fashion once again. Some of the current reviews include:

- As noted above, the Environmental Assessment process for Baffinland Iron Mine's proposed Phase 2 expansion has been interrupted due to a COVID19 outbreak in Iqaluit. There is uncertainty regarding the company's continued operations given an expected drop in iron prices and the assessment and regulatory uncertainty.
- Agnico Eagle's Meliadine Gold Mine is dealing with higher volumes of saline water than predicted, and went through public hearings April 1-2, 2021 to amend licence discharge limits. They are also undergoing an environmental assessment for the construction of a water line for marine discharge of saline effluent; however, hearings have been delayed due to the COVID19 outbreak.
- Custodians of the historic Rayrock Mine have applied for a new Type A water licence to carry out remedial activities. The tailings were capped and the site abandoned in the 1990s, but further work is needed to stabilize and encapsulate. Hearings were held April 13-15, 2021, and identified a high level of concern from local area residents.
- Pine Point Mining Limited has submitted an application to mine the historic Pine Point site lead-zinc deposits, located near Hay River, NWT. This project is undergoing an Environmental Assessment. Management of brackish/poor

quality groundwater is expected to be an issue. Scoping of the EA is underway.

- Sabina's Back River Gold project has applied to modify and expand the approved development (not constructed), with public hearings tentatively scheduled for the week of July 12-16, 2021. Receiving water effects are a concern, with further modeling to be done to identify changes to the lake receiving effluent.

Closing:

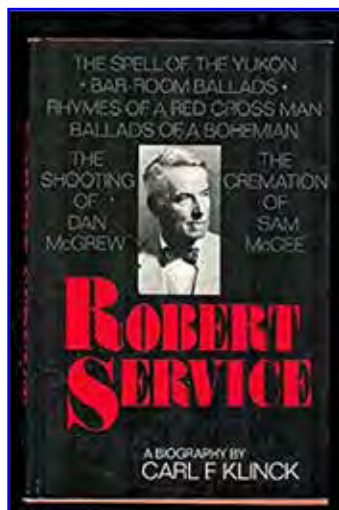
If you are connected to activities in the Yukon, Northwest Territories, or Nunavut, doing work north of 60° that you would like to highlight in the Bulletin, or running some seminars or other training opportunities, please let us know. The CSEB provides a valuable networking and communication forum, and a voice for biologists on any issues to be raised. There is also the option of instigating other CSEB activities—both of the fun and/or of the educational variety—with colleagues in the North. Please email your thoughts to Anne Wilson at anne.wilson2@canada.ca. There is also an opening for another Territories Director—please contact Curt Schroeder or myself if you would like to take on this role!

BOOK Review

Submitted by Bob Gainer, CSEB Alberta Member

Robert Service: A Biography

by Carl F Klinck. 1976. McGraw-Hill Ryerson Limited. Available from [Amazon.ca](https://www.amazon.ca/): \$17.79 CAD



I have a copy of Service's poems given to me by my father, and I bought the booklet "The Cremation of Sam McGee" illustrated by Ted Harrison from Ted when he was touring Fort Smith in 1987. I lived in northern Canada for 10 years at that time and made trips back to provide a spay, neuter, and vaccination, biology contracts, and guiding tourists on the headwaters of the Thelon River for another 20 years. Before that, my father filled my imagination with his adventures in the North during the war with the RCAF and the

building of the Alaska Highway and the Canol Pipeline. It didn't take too many drinks and people would start reciting McGee and McGrew. Even when I was in Africa when Canadians got together and had a few drinks, they were ready to recite these poems at the drop of a hat. When I guided on the Thelon, tourists from all over the world knew those poems. Some could even recite them from memory. More than anybody else, he represented Canada.

There were a few naysayers though. Anybody with any liberal arts background were first to point out that these were not actually poems but "jingles." They didn't have any meaning or message

or literary point to them, they were just... "amusing." Also, there was some question as to his authority to author these descriptions of the Klondike gold rush. After all, didn't he suddenly disappear from Canada about the time that they came out? Wouldn't he have been offered a job at a College or University somewhere in Canada? So I ordered a copy of his biography from our local Interlibrary Loan service.

Service's family was from the same town in Scotland as Robbie Burns. In fact, Burns was supposed to be his great grandfather's second cousin. Burns of course is every Scot's hero, and to some extent, they are all wannabe "Rabbies." According to his family, Service was even more of a dreamer than other Scottish lads. He lived in books—Walter Scott, Robert Louis Stevenson and eventually Henry David Thoreau's "Walden" and any western cowboy authors like Bret Harte. When he got older, he loved to get in Shakespeare plays. From an early age, he could rhyme and talk in poetry, and his greatest joy was to pretend he was reciting Shakespeare when he actually was making it up as he went along. As he got older though, his terrible school marks (except in reading and writing) meant he needed a job. Dreaming of being a cowboy, he tried looking after livestock but he was a "tiny little man with hands like a small woman's" and found being a bank clerk was the only job for him, which his father managed to wrangle.

Boring for a wannabe cowboy, so in 1896 at the age of 22 off to Canada he goes and rides the train to end up on a family friend's farm on Vancouver Island. After a while he found the work unsatisfying and decided to hobo down the west coast and back, surviving on his ability to sing and dance and compose songs on the fly to support himself (he learned to play several instruments, the banjo his favourite). Somehow he managed to return to the Vancouver Island farm with financial help from his family. His original name had been Robert William Service, the William after an uncle who supposedly was to give him money when he died, which he didn't, so forever after he called himself just Robert Service. This would have been material for his poem "The Remittance Man," which he wrote about this time. He was in a bad way, he couldn't stand manual labour but that was all there was for him, and then his father got the Glasgow bank that he had worked for to send over a letter of recommendation and he got a job in Victoria's branch of the Canadian Imperial Bank of Commerce. He fit in perfectly and sold a few poems to the local newspaper on the side. It is also alleged he had a one way infatuation with a local girl, but on a clerk's salary?

In 1904, the bank transferred him to Kamloops in the spring and then Whitehorse in the fall. He went via steamer and Skagway railroad, the easy way, not the Chilkoot Pass. He lived above the Bank in a bedroom and for several years fit in comfortably in the social scene, writing poems and reciting them. One night he staggered home after "A bunch of the boys had whooped it up in the Malamute saloon" when he woke up the Bank guard, armed, who had passed out drunk, and upon coming to, came to blazing away. By the time the guard had emptied his gun, Service managed to stagger to his room and spent the next hour high on adrenaline, the sounds of bullets whizzing past his ears, broken glass and plaster in his hair, and the smell of gun smoke everywhere making his eyes water, and wrote the "Shooting of Dan McGrew." A few weeks later, he recited it to a big placer

mining tycoon as a guest at his supper, and the tycoon immediately told him about “The strangest thing he ever did see in the Yukon was when he had to cremate his pard from Tennessee.” Service staggered back to his Bank drunk again, managed to sneak by the guard, and got to his room to write “The Cremation of Sam McGee” (he waited for the guard to leave and then snuck down, took up the ledger to find a name that rhymed with Tennessee).

A few months later, he put all his poems together to send off to his family (now living in Toronto) along with a cheque for \$150 to have several little booklets printed off for his friends. Instead the printer sent him a cheque for \$150 and 10% royalties for publication rights. Service accepted and immediately the printer was a rich publisher and Service had more money than he had ever had. In the fall of 1907, Service took several months leave and returned to Vancouver Island and his infatuation. The magic didn’t happen and not knowing what to do, when the Bank offered him a Teller’s position in Dawson City in 1908, back to the Yukon he went. The easy route, not the other one.

He did his teller’s work and on the side put together another collection of poems. His publisher wanted anything and everything. People in Dawson didn’t really know or care who he was, but to the rest of the world, he was this sensational legend. After a year of working for the Bank, he quit and rented his own cabin. Now he was a deliberate, professional writer. He didn’t actually say that and still got along with everybody, but he spent the next six months in the cabin writing his first novel and then left the Yukon for eastern Canada and the United States for publication purposes, and then to east central Alberta to live with his parents, who had moved to a farm there (north of me two hours). Money had stripped away a lot of his idealism. He didn’t call himself a poet because of all the literary criticism; he called himself a “versifier.” He said he put all his writing on the wall and looked it over carefully. If ever it looked like he was trying to lecture or teach or have a message, he changed it. All of Thoreau’s high ideals he used for descriptive passages, but the beautiful Yukon scenery was to be used for gold mining. All the heroes were mountain men, not “tiny little” men. His fiction was for commercial purposes, and he produced over 35 books. Dozens of Hollywood and other movies were made based on this writings.

But there was still a nugget of adventure and idealism left in him. He wanted to return to his cabin in Dawson and write another book, but not the easy way this time, or the hard way, but the hardest way of them all. This is down the MacKenzie River to Fort MacPherson, up the Peel then the Rat and then over the Richardson divide to the Bell, and then ultimately the Yukon to Dawson City. In 1911, he left his parents and off he went and just barely made it to his cabin in Dawson. The problem was the manual labour. He did his best and survived it, but it really didn’t suit him. He was 28 and in his prime, but not a mountain of a man, a tiny little man. Some of the other members of the party were on the verge of killing him, and there was little he could do about it, just barely survive. He stayed in his cabin in Dawson for the winter, recovered, put together a novel, and in the spring left to never return to the Yukon (and essentially Canada).

Here is where the myth and reality need matching up. Like my other Canadian superstar, Farley Mowat, the legends they created were that they actually lived what they talked about. Farley little

more than visited the north on several occasions, but he was never there long enough to be considered a resident despite being an authority on the north and representing the north. Similarly Service was always described as a pretender. He liked acting and fooling people about what he said and wrote about, but he would be the first to admit he was not the heroic material he wrote about. The Klondike gold rush started in 1897, and by 1900, all the prospecting and staking was essentially over, and it was now the job of big placer mining operators. In 1904, when Service moved to Whitehorse, they were just a service town, and in 1906 when he wrote McGee and McGrew, it was just bar room talk. When he moved to Dawson in 1908, the town was a fraction of its former self, without any of the action of the gold rush. He was three years in Whitehorse and two years in Dawson. It was all in everybody’s imagination (alcohol fuelled), including Service’s.

In 1912, after leaving the Yukon and tidying up his publishing affairs in the east, The Toronto Star paid him to cover the war in the Balkans. This led to him settling down in Paris to the busy literary scene there, getting married and eventually having a daughter and grandchildren. When the war started, he volunteered for service but was refused. He became a war correspondent and a volunteer for the Red Cross as a driver and stretcher bearer. He really did have adventure in his heart. After about eight months, he was sent home to recuperate. Of course his part in the war provided material for a lot of his writing and war correspondence. The rest of his life until 1958, he lived in France (except for time during WWII when he was mostly in Hollywood), originally Paris, then the Monaco area, and a cottage in Brittany. He finally admitted that he was more suited to being a clerk or a writer and living in the south of France than being the hero in all his books and poems. He could talk the talk but not walk it.

Ted Harrison, the illustrator of Sam McGee that I have a copy of, was brought up in a coal mining town in England. The air was full of coal being burned and the soot from the mines. Living in the Yukon he says “is a magnet to those travelers who prefer to see a few sparkly bubbles in their wine of life.” He lived in Carcross for about 30 years, walked the talk. My wife is from a village on the east coast of Fife, Scotland, and came to Canada for the same reason as Harrison (well she did marry, ahem moi). She was brought up on Hollywood westerns and the Canadian Rockies and couldn’t wait to get here. In 1971, when I was in Tanzania, all the drive-in movie theaters showed Hollywood westerns, and the locals all watched from outside the fences. The music on the radio was Gentleman Jim Reeves and Skeeter Davis. They all tried to mimic their songs. Where was my hat and boots and six gun? Those movies were documentaries and they wouldn’t lie? The real Sam McGee from Whitehorse is buried near where I live. He went back to the Yukon in the thirties and people were trying to sell him his ashes.

This is the basis for the dreamer Robert Service showing up in the Yukon. The reason we never heard of him after he left the Yukon was because he was just a temporary resident, and when he realized how he really didn’t belong here and really did belong in the south of France and Hollywood, he was gone. He never became a Canadian citizen, he stayed British and became French as well. But the sensation his two great ballads made, McGee and McGrew, despite all his critics, means that we embrace him.

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