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THE CANADIAN SOCIETY OF ENVIRONMENTAL BIOLOGISTS • SOCIÉTÉ CANADIENNE DES BIOLOGISTES DE L'ENVIRONNEMENT •

THE CANADIAN SOCIETY OF ENVIRONMENTAL BIOLOGISTS Bulletin

In this Issue:

CSEB Bulletin SCBE

VOLUME 77, ISSUE 1, SPRING, 2020

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

Webmaster: Brian Free • Email: bfree@cseb-scbe.org

In this issue

Date of Issue - March 2020

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Front Cover: Magellanic penguins (*Spheniscus magellanicus*) near Puerto Madryn, Argentina.

Back Cover Top: Adélie penguin (*Pygoscelis adeliae*), Antarctica.

Bottom Left: Humpback whale (*Megaptera novaeangliae*), Hope Bay, Antarctica. Bottom Right: South American sea lions (*Otaria flavescens*} at Isla de los Lobos, or Sea Lion Island, in the Beagle Channel near Ushuaia, Argentina.

Photos Credit: Gary Ash, CSEB member, January 2020.

CSEB BULLETIN 2020

Vol. 77, Number 1, Spring 2020

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

All business correspondence, changes of address, undeliverable copies and membership applications should be sent to: CSEB National Office, P.O. Box 962, Station F, Toronto, ON., M4Y 2N9. **Editorial correspondence: Gary Ash, Editor, e-mail:** garyash@shaw.ca.
Editor: Gary Ash
Layout: Gary Ash

LE BULLETIN de la SCBE 2020

Vol. 77, Numéro 1, Printemps 2020

Le Bulletin de la SCBE est une publication trimestriel de la Société Canadienne des Biologistes de l'Environnement. Le Bulletin informe les membres des activité 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 diverssifié d'environnementalistes Canadien. Les membres sont invités a contribuer des articles, photos (noir et blanc) ou des messages qui sont d'intérêt nationale en sciences biologiques et environnementales. Les lettres à l'editeur sont bienvenues.

Tout la correspondence 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'editeur: Gary Ash, Editor, Courriel:** garyash@shaw.ca
Rédacteur en chef: Gary Ash

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.

NATIONAL News

PRESIDENT'S Report

By Curt Schroeder, CSEB President

On behalf of the Board of Directors of the CSEB, I sent out nine letters of introduction to various federal Ministers to congratulate them on their new post in Cabinet, draw their attention to our mandate as an organization, offer to collaborate with their Ministries on issues of common concern, and invite their membership in our organization. Raising our profile within federal departments is consistent with our mandate as an organization, as we can express qualified support or concern about the direction of department plans or decisions as they may affect Canada's natural resources.

If CSEB members are aware of local or regional issues of public interest in their community related to the conservation of natural resources and sustainable management of the environment, feel free to contact a board member (see the Contact link on our website) and raise the issue with them. Between pipeline developments, climate change related impacts, mining developments, legal issues of regional and national importance affecting the environment and Canada's response to the United Nation's Sustainability Development Goals, to name a few, this is an extraordinary moment to be living and working to create a sustainable future for all Canadians.

CSEB 2019 AGM

Held 19 December 2019 at 2:00 PM PST via teleconference

President's Report - Curt Schroeder

Can't believe two years have gone by as President. There has been progress on several fronts. Our Linkedin account is now up and running thanks to Sean Mitchell (B.C.). Check out our website home page (cseb-scbe.org), at the lower right is the Linkedin icon.

I would like to highlight parts of our website that serves as a hub for communication among members. I think it is an under used resource by members.

Current and back issues of our quarterly Bulletin can be found on the website in PDF format, going as far back as 2006.

The website contains an archive of some previous webinars that we have hosted. Presented by experts in the field, they provide timely updates on research in the field and public policy. Keep checking the News and Events section of the website for upcoming webinars. Webinars are free to members.

We continue to speak out and advocate where doing so fits our mandate. For instance, our website spoke to the Global Climate Strike in September, which encouraged young people and our members to petition governments in all provinces and territories to take action on climate change. The Regina legislature, for example, had over 500 young people and others calling on legislators to take climate action seriously.

Looking forward to continuing to serve our members in the coming year. Regards,

Curt Schroeder President

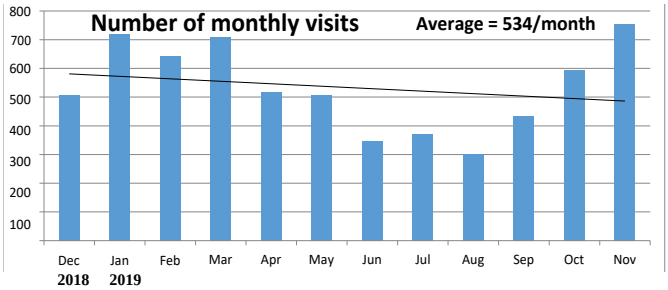
Treasurer's Report – Anne Wilson

11 months ending November 30, 2019

Income Statement

2019 Budget		Est. Total	Variance
INCOME	**Budget:**		
Advertising Revenue	$400.00	$375.00	-$25.00
Journal Orders	$1,400.00	$1,883.27	483.27
Membership fees	$3,270.00	$4,141.80	871.8
Other Income - Misc	$0.00	$40.00	40
Newsletter Subscription	$200.00	$0.00	-200
Publication Sales	$80.00	$0.00	-80
TOTAL INCOME	**$5,350.00**	**$6,440.07**	**1090.07**
EXPENSES			
Admin and office (eg copying)	$170.00	$105.62	$64.38
Banking	$0.00	$157.79	-$157.79
Chapter Rebates	$0.00	$0.00	$0.00
Contingency	$1,000.00	$0.00	$1,000.00
Corporate Registration	$20.00	$0.00	$20.00
Journal Order Payments	$1,325.00	$1,682.95	-$357.95
Miscellaneous	$200.00	$1.63	$198.37
Newsletter Production	$900.00	$633.02	$266.98
Newsletter Mailing	$420.00	$137.26	$282.74
Postal box rental	$260.00	*$275.00*	-$15.00
Postal box redirect mail	$355.00	$358.15	-$3.15
Sponsorship	$250.00	$116.38	$133.62
Web site	$450.00	$159.76	$290.24
Webinar Platform	$0.00	*$1,288.20*	-$1,288.20
TOTAL Expenses	**$5,350.00**	**4915.76**	**$434.24**
Net Surplus (Loss)		**$1,524.31**	

WebMaster Report - Brian Free



Number of Visits per Page

	2019	2018
Home	1900	1946
Home page / Archives	742	873
Resources	703	699
Biology Careers and Employment	652	565
Membership	530	581
Contact	416	465
About	391	504
Renew	215	233
Bulletin	142	152
Join	140	158
CSEB Webinar Archives	101	185
Scholarships	92	72
Publications	59	59
Links	40	57
*News and Events**		
*Current issues**		

*No data because these are formatted as posts, not pages.

Alberta Report - Brian Free

There are currently 32 members in Alberta. The Alberta Chapter is not currently active, but any suggestions from members regarding potential activities for Alberta CSEB members are certainly welcome - Joseph Hnatiuk is the Chapter contact. Several Alberta members continue to be active at the national level with Anne Wilson, Gary Ash and Brian Free on the CSEB board.

On the political front, we have witnessed a lot of change in Alberta. The United Conservative Party under Jason Kenny replaced the NDP government in April. Several actions have been taken that affect environmental management in the province:

- The NDP's carbon tax was scrapped and replaced with a new regulation.
- The program to cut government red tape including environmental approval processes.
- A public enquiry has been launched to investigate foreign-funded campaigns against Alberta's oil and gas industry. Public discourse on the issue is largely focused on environmental groups. The CSEB is preparing a letter to the provincial environment minister, seeking assurance that this not hamper the positive contribution environmental groups make towards Alberta's good quality of life.
- Substantial budget cuts were announced affecting all government spending, including post-secondary education, provincial research programs and staffing across government.
- Even with reduced budgets, the battles continue against aquatic invasive species, such as Asian carp, zebra and quagga mussels, whirling disease in our trout, and "federal politicians".

On a positive note, the budget to fight pine bark beetle infestation in our forests has increased.

Territories Report – Sharleen Hamm

In my role as director for the Territories, I continue to try to raise the profile of the CSEB through my routine professional engagement with northern biologists, and bring forward northern content to the webinar series and bulletin

Accomplishments supporting achievement of these goals in 2019 included:

- Participation in seven Board meetings;
- Contributing content to four newsletters;
- Arranging for two guest article featuring Northern content, along with contributing photographers for each newsletter;
- Arranging for the AGM keynote speaker;
- Informal in-person engagements with students, practicing environmental biologists and other interested parties in all two of three territories at venues such as the ArcticNet Annual Scientific Meeting (Halifax), Nunavut Mining Symposium (Iqaluit), Geoscience Forum (Yellowknife), and the Kitikmeot Trade Show (Cambridge Bay), to increase awareness of the CSEB and to identify opportunities for partnerships and participation;
- Regular dissemination of Northern-related CSEB content through my own professional network across the North.

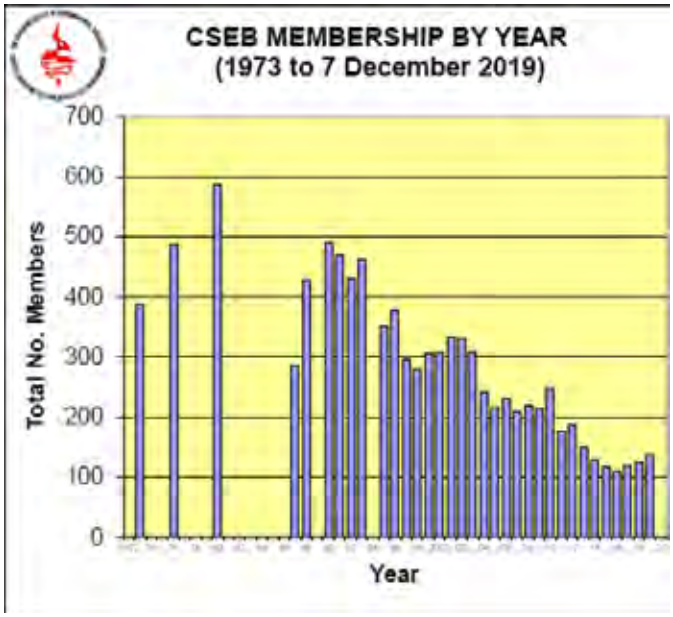
A specific goal for me was to bring forward more Yukon content; this was fulfilled in 2019, with one Director's report and a guest article featuring Yukon content.

I see the year ahead bringing a continuation of these efforts, with a continued interest in and focus on governance and accountability and a specific focus on finding a northern-based biologist to replace me at the end of my term.

Bulletin Editor's Report – Gary Ash

- In 2019, three issues of the CSEB Bulletin were published (Vol 76 issues 1, 2, 3) to date, with the fourth issue to go out in December.
- Newsletter/Bulletin distribution format in 2019 was as follows:
  - Electronic Distribution – 104
  - Hard Copy Distribution – 34 (incl. two copies to National Library of Canada)
- Deadlines for Submissions for 2020 CSEB Bulletin (Volume 77) are as follows:
  - Spring – 1 March 2020
  - Summer – 1 May 2020
  - Fall – 1 August 2020
  - Winter – 1 November 2020
- Currently looking for Guest Editors and submissions for 2020 Bulletins – Contact Gary Ash (garyash@shaw.ca)

- The CSEB Bulletin can only be as good as the input of content received. Consider submitting a scientific article for publication.
- Currently looking for photos of Biologists in Action for upcoming newsletter covers
- I would like to especially thank Loys Maingon, Peter Wells, Sharleen Hamm, Curt Schroeder, Robert Stedwill, Brian Free, John Retallack, Patrick Stewart, and Anne Wilson for their numerous contributions over the year, as well as the rest of the executive for their continued help in content submission and proofing the draft Bulletin in 2019.



Region	Complimentry	Honourary	Associate	Library	Regular	Student	Total
1 Atlantic	1	1	2	1	6	5	16
2 Quebec					3	2	5
3 Ontario	1		1	1	23	9	35
4 Manitoba					5	1	6
5 Sask.					13	4	17
6 Alberta		1		2	26	3	32
7 BC		1			21	1	23
8 Territories					1		1
9 USA				1			1
0 Foreign					1		1
Totals	**2**	**3**	**3**	**5**	**99**	**25**	**137**

CSEB membership by region (December 7, 2019)

Correspondence

The Honourable Catherine McKenna
Minister, Environment and Climate Change Canada
200 Sacre-Coeur; 2nd Floor
Gatineau, Quebec K1A 0H3
catherine.mckenna@canada.ca

January 31, 2019

The Honourable Jonathon Wilkinson
Minister, Fisheries, Oceans and the Canadian Coast Guard
200 Kent St.
Station 15N100
Ottawa ON K1A 0E6
Email: min@dfo-mpo.gc.ca

Dear Ministers McKenna and Wilkinson,

Re.: Creation of Department Science Advisors

On behalf of the Board of Directors of the Canadian Society of Environmental Biologists (CSEB), I congratulate your government on the creation of positions for Departmental Science Advisors, as announced on September 27, 2018. We applaud your government's action towards further integration of science into departmental operations across Canada, increasing support for high quality scientific research within the federal government and increasing the availability of government science to the Canadian scientific community and the public.

The CSEB is a national, non-profit registered society celebrating it's 61st year in 2019, whose primary focus is to further the conservation and prudent management of Canada's natural resources based on sound ecological principles. Our membership is comprised of professionally-trained biologists and biology students; interested individuals with other backgrounds comprise our associate membership. We feel that the creation of Departmental Science Advisors aligns with many of our objectives and the interests of our membership.

The CSEB welcomes an opportunity to collaborate with the National Science Advisor's office on matters pertaining to environmental biology. Further, the CSEB invites the National and Departmental Science Advisors to consider membership with the CSEB, to support a continued conversation on the important role of science in the prudent management of Canada's natural resources.

Sincerely,

Curt Schroeder, B.Sc., M.E.Des.
President
Canadian Society of Environmental Biologists

c.c.: Hon. K. Duncan, Minister of Science and Sport
Dr. M. Nemer, Chief Science Advisor of Canada
CSEB Board of Directors

PO Box 962, Station F, Toronto, ON Canada M4Y 2N9 cseb-scbe.org

Response from Minister:

DEC 2 3 2019

Mr. Curt Schroeder
President
Canadian Society of Environmental Biologists
P.O. Box 962, Station F
Toronto ON M4Y 2N9

Dear Mr. Schroeder:

Thank you for your letter of January 31, 2019, addressed to my predecessor, the Honourable Catherine McKenna, regarding collaboration with the Departmental Science Advisor on matters pertaining to environmental biology. I regret the delay in responding.

The Government of Canada is committed to meaningful engagement, both of intramural and extramural science capacity, to leverage science for the benefit of Canadians. Environment and Climate Change Canada recognizes the value in augmenting collaboration across the Canadian science system. The network of Departmental Science Advisors will build on the culture of science excellence in the Government and promote scientific innovation in Canada.

The process for selecting Environment and Climate Change Canada's Science Adviser is ongoing. I will share your invitation with the Science Advisor, once appointed, to consider as part of his/her mandate to harness opportunities for partnerships and collaboration with external researchers and networks, and leverage external science perspectives on science priorities.

I appreciate the Canadian Society of Environmental Biologists' support for, and interest in collaborating with, the Departmental Science Advisor. Please accept my best regards.

Sincerely,

The Honourable Jonathan Wilkinson, P.C., M.P.

c.c.: The Honourable Bernadette Jordan, P.C., M.P.

Canada

Canadian Society of Environmental Biologists
Annual General Meeting Minutes (DRAFT)
December 10, 2019

	Discussion	Motion
1	Quorum established.	-
2	Roles: • Curt Schroeder, Moderator; • Sharleen Hamm, Secretary; • Loys Maingon, Timekeeper; • Gary Ash, Parliamentarian.	-
3	Clarifications/changes to Agenda: • AGM Elections are for Executive • Regional directors are not elected at AGM, but available positions can be advertised	-
	Approval of amended agenda: • No discussion.	Moved: J. Hnatiuk Seconded: B. Free Opposed: None Abstained: None Motion carried
4	Approval of Minutes of previous AGM: • No discussion.	Moved: R. Stedwill Seconded: J. Hnatiuk Opposed: None Abstained: None Motion carried
5	President's Report • As in Annual Report, provided by Curt Schroeder.	-
6	Treasurer's Report: • Treasurer not in attendance, President provided report on her behalf. • Report as in Annual Report. • Discussion o Source of Advertising revenue is advertising in the Bulletin. o Newsletter production appears to have increased. Why? ▪ Treasurer's Report does not include current year-end statement, so values presented are not directly comparable year to year. o CSEB has an asset, being a GIC and funds in a chequing account. o Status of year-end statement and balance sheet ▪ 2018 unaudited financial statement was presented at last AGM and was approved. ▪ 2018 financial statement has since been audited and will be made available to membership. ▪ 2019 year to date statement has been provided to membership. ▪ 2019 statement will be audited and subsequently will be provided at next AGM for approval.	-
7	Webmaster's Report • As in Annual Report, provided by Brian Free. • Discussion: o Job ads ▪ Main source is BC Government. Other provincial governments, along with consulting firms, First Nations and universities also provide postings. ▪ Possible revenue opportunity, to charge to post job ads.	-

Canadian Society of Environmental Biologists
Annual General Meeting Minutes (DRAFT)
December 10, 2019

	○ Bulletin on website ▪ Bulletin is posted on website, but only once the next issue is released.	
8	Other Reports: • Director's Report, Alberta ○ As in Annual Report, provided by Brian Free. ○ Discussion: ▪ No Chapter inquiries over the year. ▪ New program in Alberta regarding orphan well remediation. CSEB can support if needed or appropriate. • Director's Report, Territories ○ As in Annual Report, provided by Sharleen Hamm. • Director's Report, Atlantic ○ As in Annual Report, provided by Patrick Stewart. • Director's Report, Saskatchewan ○ Membership focussed. ○ Working with local university. ○ Provide Bulletin content for both Manitoba and Saskatchewan. ○ Wanting more input on work being done in Manitoba. ○ Participated in a face to face meeting among three CSEB members. ○ Providing input into Bulletin submission guidelines. ○ Guest article form membership forthcoming. • Editor's Report ○ As in Annual Report, provided by Gary Ash. • Membership Report ○ As in Annual Report, provided by Gary Ash. ○ Discussion: ▪ Slight increase in membership this year, with Alberta and Ontario increasing and BC decreasing. ○ Low membership in Quebec ▪ Possibly due to language, no representation on the Board from QC, another organization exists that represents biologists in Quebec ○ Membership renewals going out soon. ○ Historic CSEB discussion contemplated government biologists required to be a member of the CSEB. ○	
	Motion to accept reports as presented.	Moved: J. Hnatiuk Seconded: B. Gainer Opposed: None Abstained: None Motion carried
9	Elections • No nominations from the floor. • Executive re-elected by acclimation, as follows: ○ President – Curt Schroeder ○ 1st Vice-President – Patrick Stewart ○ 2nd Vice-President – Robert Stedwill ○ Secretary/Treasurer – Anne Wilson	-

Canadian Society of Environmental Biologists
Annual General Meeting Minutes (DRAFT)
December 10, 2019

	o Past President – Anne Wilson.	
10	New business • None.	-
11	Resolutions • Draft resolution presented to membership at AGM, regarding recent amendments to the Ontario Species at Risk Act and the related changes in protection, specifically to the Blanding's turtle. • Discussion: o If provided on behalf of membership, must be passed at AGM, not Board meeting. o Important for CSEB to express concern for species at risk and implementation of protections. CSEB role is to advocate for related public interest. o Whether more appropriate to deal with specific matter brought forward at a national level or local level. o Important for the CSEB to focus on the principle not the specifics of an individual issue. o Revision to the resolution as presented needed to clarify matter. • Revised resolution: "Be it resolved that the Canadian Society of Environmental Biologists, a national organization, advocate on behalf of all Canadians those interests that pertain to the environment; whether it be legislation, policy, or projects of national, provincial or municipal interest."	
	Motion to accept revised resolution.	Moved: R. Stedwill Seconded: J. Hnatiuk Opposed: one Abstained: one Motion carried
13	Motion to adjourn at 6:51 pm EST	Moved: J. Hnatiuk Seconded: - Opposed: None Abstained: None Motion carried

Editor's Note: These are the draft minutes from the 2019 AGM, and their acceptance will be voted upon at the CSEB 2020 Annual General Meeting.

SCIENCE TIDBITS

Submitted by John Retallack[1], CSEB Alberta Member

Good News Everyone! – Excerpts from the annual Future Crunch list of good news stories you probably didn't hear about (apologies for the Futurama quote)

We all know mainstream media loves negative stories and images…they sell more media space! But now for the rest of the story!

All of these stories appeared in the 2019 fortnightly newsletter of a group called Future Crunch (based in Australia). Some have been edited for brevity and to remove live links to various media sources. Also included are a few other good news stories that are not directly related to environment/conservation. The key message from Future Crunch — the hand-basket might have a few problems but also may not be as hellish as it has been portrayed.

- New surveys revealed that the population of humpback whales in the South Atlantic region now number 24,900 —about 93% of their population size before commercial whaling.
- Dolphins are breeding in the Potomac River in Washington for the first time since the 1880s.
- Whale populations are thriving off the shores of New York.
- 100 seal pups have been born on the shores of the Thames River in London, 60 years after the river was declared 'biologically dead'.
- In Kenya, poaching rates have dropped by 85% for rhinos and 78% for elephants in the last five years.
- In South Africa, the number of rhinos killed by poachers fell by 25%, the fifth annual decrease in a row.
- In Mozambique, one of Africa's largest wildlife reserves went an entire year without losing a single elephant.
- Belize doubled the size of ocean reserves around the world's second largest barrier reef.
- Herds of bison are roaming the Badlands National Park in South Dakota for the first time in almost 150 years. 1,200 bison now have 80,000 acres to graze.
- India reported that its population of tigers has risen by over a third since 2014.
- In Nepal, satellite images revealed that forests expanded from 26% in 1992 to 45% in 2016.
- Costa Rica announced it has doubled its forest cover in the last 30 years and half its land surface is now covered with trees.
- In Great Britain, populations of wild carnivores (e.g., otters, pine martens, badgers) have "improved markedly since the 1960s."
- The US Senate passed its most sweeping conservation legislation in a decade, protecting 1.3 million acres and withdrawing 370,000 acres from land available to mining companies.

Some others:

- While some countries, including first-world countries, have had difficulty getting traction for childhood vaccinations, in Rwanda, 95% of babies currently receive vaccinations for rubella, measles and polio. Rwanda is also on track to be the first country to eliminate cervical cancer.
- Save the Children's 2019 Global Childhood Report showed that in the last 20 years, children's lives have improved in 173 out of 176 countries. Compared to 2000, today there are
  - 4.4 million fewer child deaths per year
  - 49 million fewer stunted children
  - 130 million more children in school
  - 94 million fewer child labourers
- Air pollution in Delhi has dropped by 25%.
- In Madrid, a ban on vehicles in the city centre reduced levels of nitric oxide by 38%
- In London, pollution fell by a third inside a new low emissions zone that was launched at the beginning of the year.

[1]*Remember, I only find these articles and write the summaries. I do not judge the authors' opinions or motives (well, maybe sometimes) but do provide occasional 'colourization' of articles where I believe such action is warranted!*

CSEB Regional Directors Needed

CSEB has Regional Director vacancies as follows:

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

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

BC Hydro Operations in the Cheakamus River System, BC

By: Francesca Knight, R.P.Bio, President of the Squamish River Watershed Society

BC Hydro is a Crown corporation responsible for producing hydroelectric power at 23 facilities around British Columbia. As with many hydroelectric power plants, there are impacts to fish and aquatic life as a result of plant operations. The scientific literature is robust in this regard; impacts to fish can range from entrainment through the turbines, disrupted access to spawning grounds, and stranding when water levels in the affected river drop too fast, as well as displacement when water levels rise too fast.

This article focusses on one BC Hydro facility, located in Squamish, BC. The Cheakamus River is affected by BC Hydro's Cheakamus Generating Facility (CGF). This facility was completed in 1957 and is comprised of the Daisy Lake storage reservoir (capacity is 55 million cubic metres of water), an 11 km long intake canal through Cloudburst Mountain, twin penstocks that convey water to the powerhouse, and a tailrace that discharges into the Squamish River. This type of facility is termed inter-basin transfer, where water for power generation is taken from one river (the Cheakamus) and discharged into another (the Squamish). In today's regulatory permitting landscape, this type of project likely would not be approved.

Beginning in 1999, the CGF went through a Water Use Planning (WUP) process. BC Hydro, the Squamish First Nation, federal and provincial regulatory bodies, and local stakeholders participated in this six-year process. The purpose of the WUP was to identify potential impacts to fish and aquatic life in the Cheakamus, and to develop plant operational constraints to mitigate these impacts. For example, the Cheakamus WUP specifies minimum seasonal instream flows, as well as ramping rates. BC Hydro conducted WUP processes at all of their 23 facilities. Consensus among all parties was the goal of each WUP process, and the Cheakamus WUP was the only one where consensus was not reached. Ramping was one of the key technical issues that resulted in this lack of consensus.

Ramping can be explicitly defined as the rate of flow change or stage change per unit time (e.g., m^3/s or cm/h). Streamflow (and therefore water surface elevation, or stage) variability occurs both naturally and because of hydroelectric plant operations, but the rate and frequency at which streamflow changes can vary greatly between a flow-regulated versus an unregulated river. Generally, putative (facility-induced) ramping events are more extreme; they change flows at a faster rate, and more frequently, than flows typically change on a river with no hydroelectric facility. The efficiency of a plant can be increased when it ramps quickly, thereby capitalizing on profitability.

However, ramping during hydroelectric facility operations puts fish at risk of increased mortality through stranding and downstream, or lateral, displacement due to operationally-induced rapid changes (increases and/or decreases) in streamflow that can exceed natural streamflow fluctuation rates. Juvenile salmonids (young-of-year fry) are typically the most vulnerable to stranding, and stranding generally occurs either as bar stranding (fish stranded along gravel bar margins when water levels drop quickly) or pool stranding (rearing pools becoming isolated from mainstem flows when water levels drop quickly and/or with large reductions in flow).

The Squamish River Watershed Society (SRWS), a local environmental non-profit focussed on salmon habitat restoration and a WUP Technical Committee member, and other local fisheries stewardship groups, have prompted a long and detailed technical discussion around ramping and flow reductions on the Cheakamus River. However, the issues brought up here are not limited to this particular facility. Fish stranding due to rapid flow reductions is common to many hydroelectric facilities, whether storage hydro (like CGF) or run-of-river plants.

A local fishing guide and river steward sounded the most recent alarm about fish stranding in August 2018. BC Hydro had just ramped down (reduced flows, with a corresponding reduction in river stage) in accordance with the ramping rates allowed under the WUP flow requirements. Photos of stranded steelhead fry got everyone's attention (Figure 1).

Figure 1: Stranded steelhead fry on the Cheakamus River after a typical ramp down at the CGF.

The ramp down on August 20 consisted of a discharge drop of 40 m^3/s down to 20 m^3/s over about two hours. Correspondingly, stage dropped from about 114 cm down to 92 cm, for a ramp rate of 8 cm/h (Figure 2). The Department of Fisheries and Oceans has default ramping guidelines for most hydroelectric plants in BC. The rate that would apply in this case is a stage drop of ≤ 2.5 cm/h.

Several ramp downs of similar magnitude occurred in July and August of 2018. As a result of the fish stranding and public pressure around it, BC Hydro undertook its own study in August 2018. They used their WUP ramping rates, which are many times higher than DFO's default rate for protecting juvenile salmonids. Both coho and steelhead fry were stranded, and it was estimated that 10% of the 2018 steelhead brood year was stranded. And most of these fish would die, either from desiccation on gravel

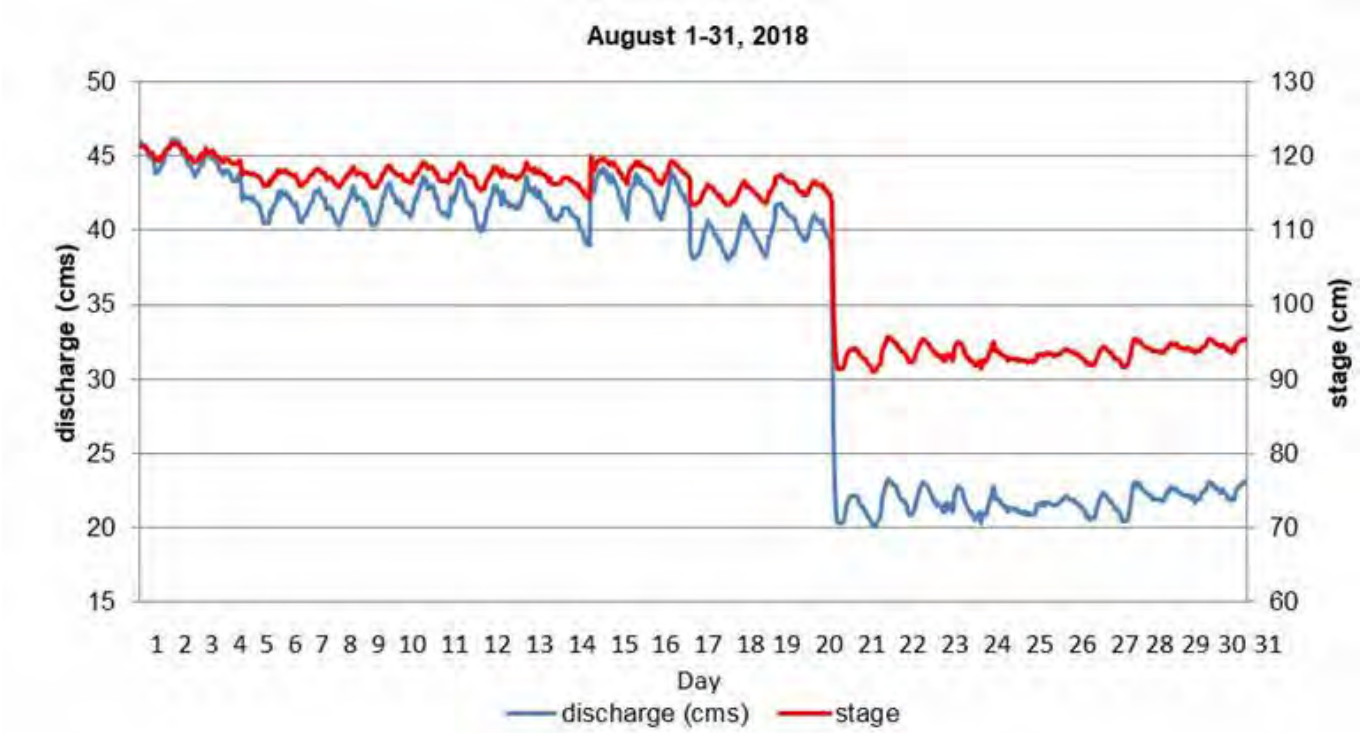


Figure 2: August 20, 2018 ramp down of CGF, which resulted in both bar and pool stranding of steelhead fry.

bar margins, or predation in and dewatering of isolated pools. The results of this study were worse than expected by both the WUP Technical Committee and BC Hydro.

The SRWS undertook intense technical review of years of Cheakamus River flow data, and concluded that a ramping rate of 2.5 cm/h, coupled with a more natural daily hydrograph (e.g., release into the Cheakamus of 55% of the previous day's average inflows into Daisy reservoir) would be more protective of fish populations. The SRWS put this conclusion forward as a recommendation to BC Hydro, and other stakeholder members of the WUP Technical Committee supported it. However, rather than implement the recommendation, BC Hydro has continued to execute ramping tests throughout much of 2019, evaluating different ramping rates under different flows. Most of the tests have shown that both ramping rates and the total amount of flow reduction on the test day result in the stranding of an abundant number of fry. With more than 17km of anadromous salmon and steelhead habitat, we can expect total fry stranding to number in the 1,000s and more.

The current difficulty in mitigating these stranding events rests with BC Hydro controlling the message about the ramping tests, implying that many sites along the river are at moderate-to-low risk of stranding (based on several hours of fish stranding surveys on the river following the completion of the ramp down). The SRWS and other river stewards have spent considerable time looking at various sites two and three days post-ramp down, and habitats continue dewatering, with more fry stranded than was initially imagined in the first 3-4 hours post-ramp down assessment.

BC Hydro is in conversations with federal and provincial regulators about the ramping problem, but regulatory staff are not questioning BC Hydro's conclusions (e.g., effects are not too serious), and no punitive or mitigative measures have been required of BC Hydro. The CGF Water Use Plan and accompanying flow order are under review by the provincial Comptroller of Water. This review may result in changes to the CGF flow order in an effort to reduce the impacts to salmon and steelhead fry. However, changes will likely not occur if public pressure is not maintained on both BC Hydro and regulatory authorities.

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Check out the CSEB Video at http://youtu.be/J7cOuDbBf9c or https://www.youtube.com/watch?v=J7cOuDbBf9c

REGIONAL News

BRITISH COLUMBIA News

Submitted by Loys Maingon, CSEB BC Director

Conservation Failure In A Time of Preservation

> ***"The environment on Earth is unstable, without control by life it rapidly degrades"***
>
> ***(Victor Gorshkov and A.M. Makarieva)***

As winter draws to an end and an early dry spring heralds low springtime river flows, potential water problems, such as those faced by California,[1] and increased forest fires for this summer, are looming. Possibly the best environmental news in BC has to be the partnering of the province with the Moberly and Saulteau nations in the formation of a tribally-managed 206,000-hectare provincial park as an addition to Klin-se-za Provincial Park, dedicated to the recovery of six at-risk caribou herds.[2] The announcement consolidates a long-heralded implementation of the Aboriginal "Land Guardians programme", to oversee the restoration of lands associated with the park. In addition to the park, the agreement places interim protections on another 550,000 hectares in the mountainous area east of Mackenzie and west of Hudson's Hope and Chetwynd. This comes on the heels of the announcement of the creation in mid-January of a much less heralded, but equally important park "Quat'muk" a 700 square kilometre Indigenous and Conserved Area.[3] For the past three decades, Quat'muk had been known as the controversial "Jumbo Resort development," which took the Ktunaxa Nation against both the province and developers all the way to the Supreme Court of Canada, where Ktunaxa claims to protection of cultural precedence were denied.[4]

Notwithstanding the positive and rosy good-will image of the provincial government vis-a-vis the Klin-se-za announcement projected by mainstream media, it is hard for anybody endowed with the gift of memory to forget that these gains have not come from the good-will of the province. After some 40 years of indigenous court actions, the fact is that since 2003, when COSEWIC recognized that these caribou herds were in danger of extinction, the province has continued (and continues to this day) to issue mining and forestry permits in unceded territories. The Moberly and Saulteau nations have had to fight illegal development in court to achieve conservation objectives that required territorial land preservation. They have had to take very controversial conservation action without any support from the province i.e., "British Columbia declined to fund the maternal pen, so the group sought money from industry and launched a crowdfunding campaign."[5]

BC, like all other provinces with their own populations of caribou, has hardly led the way in efforts to follow up on SARA's 2003 designation of mountain caribou in BC as endangered. It has only followed up on the call for provinces to produce a recovery plan under duress. By 2017, no province had submitted a plan to the federal government. BC has, therefore, been under extreme pressure since 2017 from the federal government to put its house in order. The creation of these two new parks, or "Indigenous and Conserved Areas," have to a great extent been the product of federal diplomacy. They come in the wake of the federal creation of "Thaidene Nëné," which touts a new era in national park creation, which is at the centre of reconciliation and climate change policies: "The park — part wildlife conservation area, part territorial park and part national park reserve — makes up 26,525 square kilometres of lakes, old-growth spruce forests, rivers, and wildlife", in the NWT.[6]

These two new announcements in BC in which the federal government has played a leading role are very much part of Canada's climate action plan: *Pathway to Canada Target 1*.[7] This action plan heralds a first phase of a new approach to conservation and sets ambitious land preservation targets:

> *"11.8% of Canada's land and freshwater is conserved as of spring 2019. Through an initiative called Pathway to Canada Target 1, we are aiming to conserve at least 17% by the end of 2020!"*

The Moberly and Salteau agreement with the province, Quat'muk and Thaidene Nëné are part of the missing 5.2% of the land base needed to meet the 2020 objectives of *Pathway to Canada Target 1*. One should expect to hear more similar announcements by the end of 2020, if Ottawa's target is to be met.

These recent announcements are important for biologists working in BC. As I have repeatedly pointed out, any projects requiring environmental management, planning, and development are impossible in BC as long as the question of Aboriginal title remains unresolved. This point was the crux of the ruling set out by the Supreme Court of Canada in *Delgamuukw v Regina* [1997] 3 SCR 1010, which was further clarified by the *Tsilhqot'in Nation v British Columbia* 2014 SCC 44 decision. The ruling made very clear that where no treaty or conquest was made, First Nations have a pre-existing and active claim to title and jurisdiction over their traditional territories and need to be fully and meaningfully consulted. That is the situation in most of BC. If anybody doubted the validity of Aboriginal title before 1997, the recent publication of James Teit's biography by Wendy Wickwire can provide some edification.[8] If anybody doubts the bad faith in which the province has proceeded and obstructed efforts to follow up on judicial directives after *Delgamuukw v British Columbia*, a recent article documents corporate and civil service attempts to circumvent the Rule of Law and to abolish Aboriginal title.[9]

This recent and much-touted announcement comes at a time of crisis in BC over Wet-suwet'en opposition to LNG Canada's Coastal GasLink pipeline, which has spread to the rest of Canada. It is as much the articulation of a biological crisis as it is a political crisis.

The Quat'muk, and the expansion of Klin-se-za Provincial Park, signal the beginning of a new direction in conservation and restoration in BC, in keeping with the United Nations Declaration that the 2021- 2030 decade has to be "The Decade of Restoration." This is very much central to Aboriginal efforts to preserve the natural heritage, which is central to their cultural existence. As the lead biologist working for the Moberly and Saulteau Nations put it, the survival of the endangered caribou requires the restoration and preservation of their habitat. To quote McNay:

> *" There's no point in protecting and restoring caribou habitat — by decommissioning roads, planting trees in tricky high-elevation cut-blocks and limiting recreational uses — if more habitat is simultaneously destroyed"*
>
> *"You wouldn't go out and restore one road when five new roads are getting built. It's really important to understand that concept. The basis for getting [to recovery] is either to do one heck of a lot of restoration or curtail some of the industrial disturbance."*[10]

Standard conservation strategies that claim to enable development while preserving habitat values, such as has been standard practice in BC for at least the past 30 years, are inconsistent with what is required at this point in time.

The way forward requires that we recognize the inherent limitations of environmental conservation and mitigation policies. The measure of any set of policies or practices lies in two things: the assumptions and the outcome. The current crises signal that assumptions that have dominated environmental management for the past hundred years are failing and can no longer guide decisions, even if these assumptions continue to loom large in the public psyche. As McNay notes, we can no longer be content to restore and mitigate while the pace of development outstrips that of species recovery.

In 1970, concerns for the state of the environment that grew in the wake of the 1962 publication of Rachel Carson's *Silent Spring* resulted the first *Clean Air Act* and a succession of groundbreaking pieces of environmental legislation. Nearly 50 years ago, President Nixon brought into being a series of environmental acts to extend federal jurisdiction over recalcitrant state jurisdictions. He created the Environmental Protection Agency in December 1970. He would go on to enact the *Clean Water Act* in 1972. (In response to the trend set in the US and public pressure, Canada implemented a federal *Clean Water Act* and a *Clean Air Act* in 1971.[11]) The North American policies associated with these acts, and the work of the agencies that have provided the basic science for their political implementation, have guided and inspired international environmental policy for the past 50 years.

Interestingly, the *Endangered Species Act* was only implemented subsequently, in 1973. It has always remained an awkward and difficult to uphold appendage subject to utilitarian and economic debates, which many jurisdictions have yet to emulate. It is an awkward piece of legislation because, unlike its counterparts the *Clean Water Act* and the *Clean Air Act*, which mitigate a problem while still enabling development, an endangered species act cannot compromise and must preserve critical habitat over any development. Canada only introduced the *Species at Risk Act* 30 years after the US, in 2002. Ontario introduced an *Endangered Species Act* in 2007. Although a proposal for an *Endangered Species Act* was tabled repeatedly in 2017 in the BC Legislative Assembly by Andrew Weaver, the reigning NDP government continues to stall, as did its Liberal predecessor.[12] BC still has no endangered species legislation, and Ottawa has repeatedly found it necessary to intervene in the protection of endangered populations of species, such as mountain caribou.[13]

However far-reaching these progressive policies may seem to us today, we should always remember that they were a response to 1960 problems and that they were conceived within the constraints of environmental science and the state of the planet as we understood it to be in 1970. They were intended to address environmental problems of a global population of 3.7 billion, which is 46% of today's population, within a set of assumptions characteristic of the cornucopian optimism of the 1960s and within the flawed assumptions of a largely mechanistic paradigm of the planet that did not include consideration of the impacts of a collapsing biodiversity on the functioning of a living planet.

Notwithstanding the many positive benefits of these pieces of legislation, and the attacks to which they are subjected by the current administration in Washington, which seeks to dismantle all environmental protection in favour of business interests, it behooves us to question to what degree these policies have been able to protect the environment. To do that, we have to understand the historical set of references that frame these acts and the EPA's work. The concerns behind these acts were always utilitarian. They stem from the same concern for the impact of pollution on human health as did Carson's *Silent Spring*. The concern is not for nature or the environment in itself. It is for human well-being. That is so because the predominant world-view that informed these acts 50 years ago was utilitarian and mechanistic.

This explains why debates about controlling drivers of environmental deterioration within the *Clean Air Act* or the *Clean Water Act* have always been awkward, ever since the problem was formally presented to Congress in 1988 by James Hansen. Thus, legal determinations about climate change in the United States, as elsewhere in the world, could not be made simply on the basis of physics or environmental science. To meet the legal standard, climate change has had to be framed legally as a kind of air and water pollution. To do that, carbon dioxide had to be defined as a product of human waste and, therefore, as a pollutant and a contribution to pollution that mandated legal regulation. [14]

These laws, therefore, are defined and constrained by the human economy imposed on global ecosystems, rather than by the evolving understanding we have today of a much more complex living planet. The focus of most environmental legislation is to provide a sustainable relationship between the human economy and nature, which is taken to be just a set of "resources." The *Clean Air Act* and the *Clean Water Act* are not inherently intended to protect nature. They are intended to protect humans from the consequences of their potential destruction of nature. In this respect, their formulation and adoption 50 years ago represent the culmination of mainstream conservation thinking that crystallized in 1913 with Woodrow Wilson's signing of the *Raker Act* authorizing the damming of the Tuolumne River in the Hetch-Hetchy Valley to provide San Francisco's water supply. This controversy and the decision taken continue to generate opposition to this day.[15]

The complexity of the controversy that surrounded the founding of the Sierra Club and ultimately pitched John Muir against his conservationist friends, Theodore Roosevelt and Gifford Pinchot, is too often overlooked, and taken to be "over and done with." The consideration of some of its subtleties is instructive if we are to understand many of the environmental and social problems we face today. The controversy did not simply pitch industry proponents against "conservationists" and "preservationists." It subsumed conservation within the interests of industry by presenting "sustainable" options and adaptations to development. The *Raker Act*, which made the flooding of the Hetch-Hetchy valley possible, was a "conservationist" compromise to problems posed by the fact that Hetch-Hetchy was within a national park system. The *National Parks Act* forbids all for-profit development within National Parks jurisdiction. (This same legal constraint is currently stopping the development of the $8 billion Atlantic Coast Pipeline, and eleven other pipelines, which propose to cross the Appalachian Trail, which is not under National Forest Service jurisdiction but under the National Parks jurisdiction.[16])

The *Raker Act* mandated that the O'Shaunessy dam be in the public interest and that "because the source of the water and power was on public land, no private profit could be derived from the development."[17] That, of course, turned out to be a complete fiction in practice. Violations have been so numerous that in 1980s and 2000s, even the Reagan and Bush administrations were forced to consider removing the dam because it has never complied with the non-profit conditions and public benefit conditions set out in the *Raker Act*.[18] While there is no reason to doubt that Raker and his supporters did earnestly believe that the damage would be offset by public interest, and that the benefits of nature could be conserved elsewhere, notwithstanding this encroachment, it is important to note that neither the legal nor the ecological expectations of conservationists were ever fulfilled.

"Conservationists" have always advocated that some kind of "sustainable development" is possible and that humans can develop within nature and control adverse impacts. "Preservationists" have always argued that all things are closely connected and that damage to a part is damage to the whole, and that therefore the only sustainable conservation lies in preservation. The subtext in these ideological positions is that both conservationists and industrialists, in keeping with the "wise use" ideology advocated by Gifford Pinchot, conceive of nature as a machine and an endless set of resources to be used for the prosperity of mankind.[19] This utilitarian mindset is diametrically opposed to the preservationist position taken by John Muir who furthers the tradition of Alexander von Humboldt that all things are connected and that nature is a fragile sentient superorganism of which human beings are only one member species. For preservationists, nature is not simply a set of inanimate resources for mankind's benefit.

After 100 years of utilitarian conservation and 50 years of progressive utilitarian conservation legislation, recent assessments of the state of the planet, in the wake of *United Nations IPBES Global Assessment* (6 May 2019)[20] calling for "transformative change", come as a test for the validity of that ideology. A recent review in the December 13th issue of *Science, "Pervasive human-driven decline of life on Earth points to the need for transformative change*," tacitly homes the point that the past 50 years of utilitarian conservation policies and legislation have failed to deliver on the promises of environmental "sustainability."[21] While these policies may have to some degree tempered and slowed the emergence of a multi-layered global environmental crisis, this is the latest of a growing number of global reports that indicate the extent to which, in the words of its authors: *"The fabric of life on which we all depend—nature and its contributions to people—is unravelling rapidly."*[22]

In keeping with the findings of reports that have multiplied over the past decade, **Figure 1** provides a summary of the extent to which the condition of the biosphere has deteriorated in spite of the implementation of "conservation" policies since 1970.

The findings of this report indicate that as the data continue to pile up, and the results of this uncontrolled experiment "can now be seen much more clearly than 15 years ago". These alarming trends become clearer every year. Every trend, except those associated with consumption, such as expansion of agricultural land for energy production and material production, is in alarming decline. There is an inverse relationship between the decline of forests, marine resources, and diversity and their consumption for a growing market. As global trade has increased more than 900% since 1970, the biosphere has been plundered with the extraction of living materials increasing by 200%, and the biomass of the world's vegetation has been halved. The numbers, which should come to us as no surprise, indicate that 70% of the land surface and 66% of the ocean surface have been modified and impoverished by man's actions. The most productive zones of the biosphere have been pillaged, i.e., 85% of wetlands have been lost since the beginning of the industrial era. Coastal ecosystems, which are some of the world's most important fisheries, are undergoing precipitous declines. As we know the extent of coral reefs, which are essential to global fisheries, have been halved through over-exploitation over the past 150 years and are increasingly expected to disappear by the end of this century as climate change impacts continue unabated.

The first seven items in **Figure 1** are particularly interesting because they illustrate the actual state of seven domains of nature, which we take for granted, and expect to be in "good or reasonable condition." Most people take for granted that freshwater supplies and coastal waters that form an essential part of their daily experience of nature are well stewarded. For all the concern expressed over the past 50 years about habitat protection, pollinator health, biodiversity, water and air quality, and water abundance, all show precipitous declines.

The numbers associated with these declines, using the past 50 years as a baseline, substantiate the adverse character of the structural relationship that drives them. It is like looking at our apparent material prosperity and discovering the extent to which it is based on unsecured credit. The list of drivers and impacts in **Figure 2** from the same report illustrates some examples of declines in nature and their relationship to indirect and direct drivers in terrestrial, freshwater, and marine environments. The "indirect drivers" are essentially government policies that control land, freshwater and sea use and over-exploitation. Land and sea use and overexploitation and pollution make up 50% of the impacts that have resulted in a 47% loss of ecosystems,

Fig. 1. Global trends in the capacity of nature to contribute to good quality of life from 1970 to the present. Fourteen of the 18 categories of nature's contributions to people show a decline. Half of the 18 categories show consistent patterns globally, whereas the other half show declines in some regions and gains in others. For example, forest areas and the nature's contributions to people supported by forests have generally declined in tropical regions while increasing in some temperate areas over the past 50 years. Data supporting global trends and regional variations come from a systematic review of more than 2000 studies (*8*). Indicators were selected on the basis of availability of global data, prior use in assessments, and alignment with 18 categories. For many categories of nature's contributions, two indicators are included that show different aspects of nature's capacity to contribute to human quality of life within that category. Indicators are defined so that an increase in the indicator is associated with an improvement in nature's contributions.

put 25% of species at risk, caused a 23% decline in naturally occurring species, 82% decline in large species biomass and species abundance, and are causing a 72% loss of nature for Indigenous peoples.

Perhaps the most interesting item in this analysis is the finding that climate change itself accounts for only 10–15% of these declines. This means that if land and sea change and direct exploitation can be brought under control, then their knock-on effects on climate change impacts, and climate change itself, can be brought under control. As Diaz et al. note, the trends analysed in their report indicate that the "Aichi Targets" of the Strategic Plan on Biodiversity (2011-2020)[23] have not been, and are unlikely to be, met because control of the drivers of biodiversity loss has not been achieved. As they conclude, there has been some measure of success in preservation targets in which Indigenous Peoples play a key role:

"The vast area of the world managed by Indigenous Peoples (at least 25 to 28% of land surface) under various property regimes is no exception to these trends. Because of their extent, the fact that nature is overall better preserved within them and because of the diverse stewardship practices within them around the world the fate of nature in these lands has important consequences for wider society as well as for local livelihoods, health and knowledge transmission."[24]

In that context, the greatest progress made by the Convention on Biodiversity since 2010 has been in meeting the objectives of Aichi Targets 11 and 17; that is, in increasing conservation areas and in developing biodiversity recovery plans. However, globally, protected areas only cover 14.9% of terrestrial and freshwater, and 7.4% of marine environments. The quickest way to increase conservation coverage lies in increasing Indigenous land management and the preservation of associated lands. This objective is, in fact, consistent with the goals and strategy of *Pathway to Canada Target 1*, as noted above.

Pathway to Canada Target 1 is also in keeping with the over-arching intent underlying the United Nations declaration of the coming decade as the "UN Decade on Ecosystem restoration 2021-2030", which aims to "*prevent, halt, and reverse the degradation of ecosystems worldwide.*"[25] The practical articulation of these objectives lies in the "Global Deal for Nature", as set out by Dinerstein et al. (19 April 2019) "A global deal for nature: Guiding principles, milestones, and targets" in *Science Advances*, which articulates the most consistent preservationist agenda yet. The GDN calls for what has long been touted as "de-development": *"a rapid reduction in land conversion and a moratorium by 2035."* In keeping with E.O. Wilson's call for "Half-Earth," the authors of this research lay out an ambitious plan:

"Less than half of the terrestrial realm is intact, yet conserving all native ecosystems - coupled with energy transition measures- will be required to remain below 1.5 degree C rise in average global temperature. The GDN targets 30% of Earth to be formally protected and an additional 20% designated as climate stabilization areas, by 2030, to stay below 1.5°C."

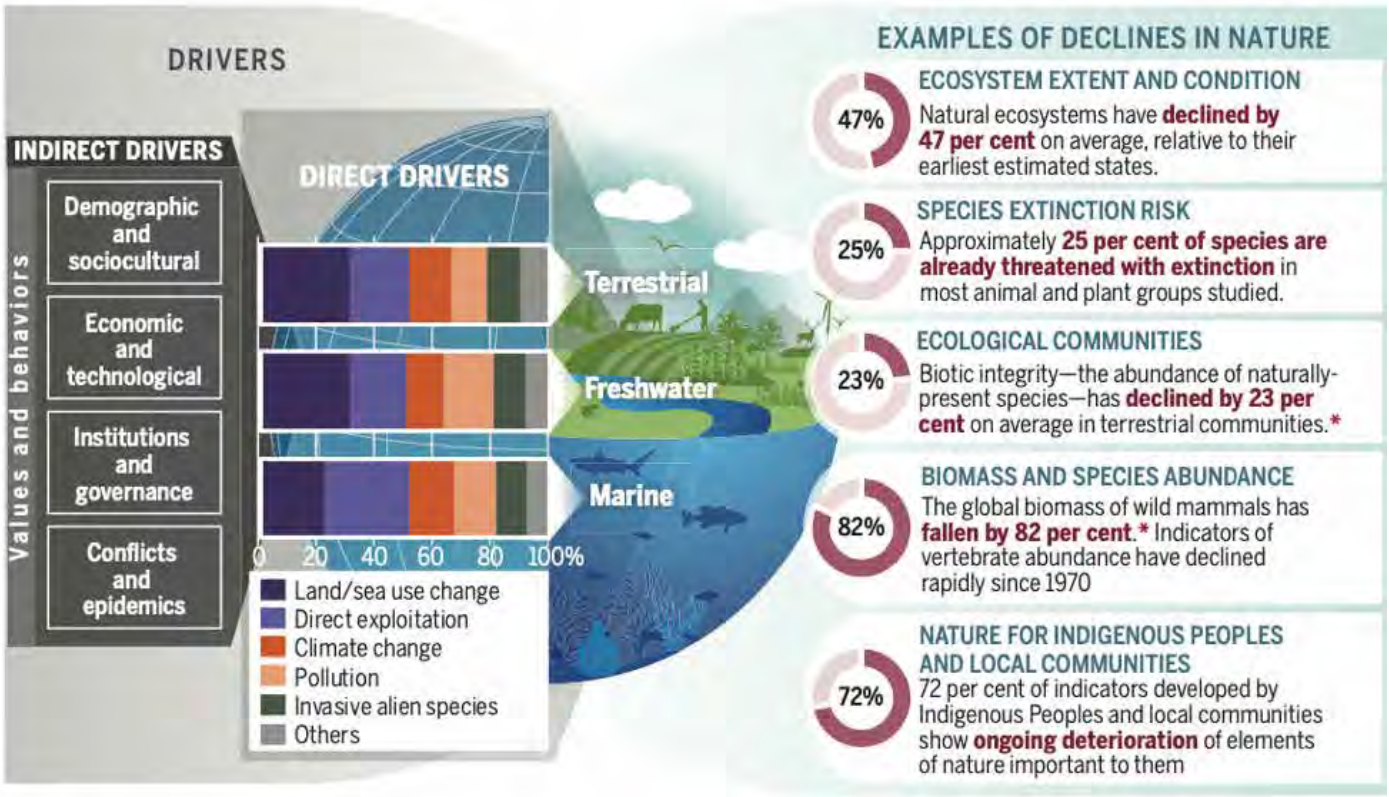


Figure 2: Examples of global declines in nature that have been and are being caused by direct and indirect drivers of change. (Sandra Diaz et al. (2019) Pervasive human-driven decline of life on Earth points to the need for transformative change, Science 366.)

The GDN spells out a positive and relatively painless roadmap to resolve many of the problems posed by climate change. It is, as the authors note: "*the most logical path to avoid approaching a crisis.*" It requires, however, that we recognize the limits of development assumptions that have governed much of the 20th century.

If we consider the target currently set at 17% by the end of 2021 in *Pathway to Canada Target 1*, the goal put forward in the GDN of reaching a further 13% by 2030 is not unfeasible. The key to reaching 30% lies, as discussed by Sonia Diaz et al.[21] ("*Pervasive human-driven decline of life on Earth points to the need for transformative change*") in shifting the sociological assumptions behind the direct drivers of the current decline of nature, particularly institutional governance. In that sense, the most exciting and positive event of this winter for environmental management in BC was the adoption of UNDRIP, or "Bill 41: *Declaration on the Rights of Indigenous Peoples*" by the legislative Assembly.[26] Before the debacle of LNG Canada's Coastal GasLink's project on Wet'suwet'en territory, Bill 41 presented an opportunity to resolve 162 years of unresolved territorial claims, as well as the uncertainty of the framework left by the *Delgamuukw vs BC* decision.

Currently, throughout Canada, the problem of meeting 2030 GDN targets seems to lie in the economic and business priorities of provincial governments. Provincial governments seem mired in corporate interests. The problem is not unique to BC. In Newfoundland a few weeks ago, two well-known Canadian biologists, Bill Montevecchi and Victoria Neville, resigned from their advisory positions on Newfoundland's Wilderness and Ecological Reserves Advisory Council. They explicitly refused to continue to provide professional advice that is sidelined by business interests.[27] After 30 years on the Council, Monevecchi sums up the frustration of many biologists across Canada:

"The government has to change its priorities, shifting them from an emphasis on oil and mining."

He said government needs someone who wants to protect the environment.

"*We don't need another minister who is going to spin a happy time story about how committed he or she is. We need a paradigm shift. We need people who have courage*," he said.

"*The environment in this province doesn't have a priority.*"

(Of course, nor does Newfoundland have any Beothuks….. and therein may lie the problem.)

In BC, as in Newfoundland, we need real environmental priorities, not lip-service. Oil, LNG, mining, forestry, and fish-farming can no longer continue to be the provincial government's priorities. Paying lip-service to the environment, often dismissing the meaning of the territorial ownership of an Aboriginal opposition cannot provide the transformative change needed to address the climate change and biodiversity crises we currently face.

The appetite for a paradigm shift is indeed in the air, and we can sense it in federal documents like *Pathway to Canada Target 1*,

and in the rigorous modelling of the GDN. The GDN provides a viable, and fairly simple roadmap to addressing climate change. There is in BC considerable support for the preservation opportunities inherent in the expansion of our provincial parks in collaboration with First Nations, such as in the "Grow BC Parks" campaign[28] spearheaded by the Valhallla Wilderness Society, which complements the federal Pathway to Canada strategy. The much touted "climate change" and "reconciliation" objectives can be achieved quite simply through the creation and expansion of Indigenous and Conserved Areas like Thaidene Nëné, Quat'muk, and Klin-se-za Provincial Park. These initiatives are consistent with the GDN. They guarantee the preservation of ecological and cultural values that have eluded standard conservation strategies aligned with corporate interests fostered by government, and implement the much talked about "trans-formative change."

As we increasingly see the fabric of life unravel before us, we can no longer operate on the assumptions of 1914 or 1970, which guided the best environmental legislation of my generation. We need to move beyond conservation in the service of development. We need to develop new far-reaching legislation based on the primacy of preservation that prioritizes a renewed respect for the environment and for the rights of Indigenous Peoples who continue to be its legal cultural guardians in BC.

References

1 https://www.theguardian.com/us-news/2020/feb/21/california-drought-february-rain-snow-pack-sierra?CMP=share_btn_fb&fbclid=IwAR1Q1PwqcFIA7z7onVPrL2losM1WDjKsAej6BGSERNOT3km7iVM5VmfN3Kk

2 https://www.cbc.ca/news/canada/british-columbia/partnership-southern-mountain-caribou-1.5471574;https://thenarwhal.ca/b-c-partners-with-first-nations-to-create-new-park-in-habitat-for-endangered-caribou-herds-threatened-species/?fbclid=IwAR16OqOStsRzqOciUP4fTcP5TCwC6mKj4dcq-s8jR-Go-wVx2oo8LfCsFyE

3 https://www.keepitwild.ca/jumbowildforever/?fbclid=IwAR1mra1TGmmk51NncNys-EGKq2oE6gkeDuz_3hljijPuSDuCPzm88Pgz7M4

4 https://www.cbc.ca/news/indigenous/supreme-court-canada-ktunaxa-1.4385234

5 https://www.theatlantic.com/science/archive/2018/12/heroic-measures-for-canadas-caribou/577789/

6 https://thenarwhal.ca/thaidene-nene-heralds-new-era-parks/

7 https://www.conservation2020canada.ca/home

8 Wendy Wickwire (2019) At the Bridge: James Teit and An Anthropology of Belonging. UBC Press

9 https://thenarwhal.ca/industry-government-pushed-to-abolish-aboriginal-title-at-issue-in-wetsuweten-stand-off-docs-reveal/?fbclid=IwAR0GEH81HJlJ5dFAZlDzntZyFcNK__3zMEy7FJR_6Me_MCw131YN0iKrPHA

10 https://thenarwhal.ca/the-caribou-guardians/

11 R. J. Powell & L. M. Wharton (1982) Development of the Canadian Clean Air Act, Journal of the Air Pollution Control Association, 32:1, 62-65. https://www.tandfonline.com/doi/pdf/10.1080/00022470.1982.10465370

12 http://www.andrewweavermla.ca/2017/11/06/reintroducing-endangered-species-legislation-british-columbia/

13 https://www.theglobeandmail.com/canada/british-columbia/article-ottawa-orders-bc-to-act-to-save-threatened-caribou/

14 https://sciencing.com/list-5921485-effects-carbon-dioxide-air-pollution.html; https://skepticalscience.com/co2-pollutant-advanced.htm

15 https://www.hetchhetchy.org.; https://en.wikipedia.org/wiki/Raker_Act

16 https://www.nytimes.com/2020/02/23/opinion/appalachian-trail-pipeline.html?fbclid=IwAR0GySpVQECyZu4EDbCdiW6z_QcAvYa11JlUPSxLfBhVRTAtu2bedtAw3uM

17 https://en.wikipedia.org/wiki/Raker_Act

18 https://en.wikipedia.org/wiki/Raker_Act; https://web.archive.org/web/20110607140232/http://www.sfbg.com/PDFs/politics/Chronology.pdf

19 https://www.fs.fed.us/greatestgood/press/mediakit/facts/pinchot.shtml

20 https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/

21 Díaz et al., *Science* 366, eaax3100 (2019) 13 December 2019

22 Díaz et al., *Science* 366, eaax3100 (2019) 13 December 2019 , page 1328.

23 https://www.cbd.int/sp/

24 Díaz et al., *Science* 366, eaax3100 (2019) 13 December 2019

25 https://wedocs.unep.org/bitstream/handle/20.500.11822/30919/UNDecade.pdf?sequence=1&isAllowed=y

26 https://www.cbc.ca/news/indigenous/bc-undrip-indigenous-rights-1.5333137

27 https://www.cbc.ca/news/canada/newfoundland-labrador/environment-council-members-resigning-1.5474870?__vfz=medium%3Dsharebar&fbclid=IwAR0tbVSZ3uoL-bsmCjIBcEt5YpvopY-7z-5pVyGuSO2INkbuBdFUzq_SGwQ

28 https://www.vws.org/growbcparks/

ALBERTA News

Submitted by Brian Free, CSEB Alberta Regional Director

One new initiative of the provincial government that bears watching is Red Tape Reduction, found in the United Conservative Party's policy platform. I believe there was a similar federal initiative under the Harper government. Alberta's red tape reduction program is intended to identify and remove unnecessary rules, regulations, applications to government, and other such requirements facing businesses operating in Alberta. The government is committed to reducing red tape by one-third over the four years of their current mandate.

As you can imagine in a resource-based economy, a lot of these rules and regulations (but not all) relate to environmental protection. One of the first steps is conducting a count of the regulatory burdens to determine when we have reached that one-third reduction threshold. In the meantime, three industry panels have been established to identify burdens to the tourism and the hospitality industry, oil & gas, and small business. There is also a web site on red tape reduction where anyone can report an example of red tape that should be removed.

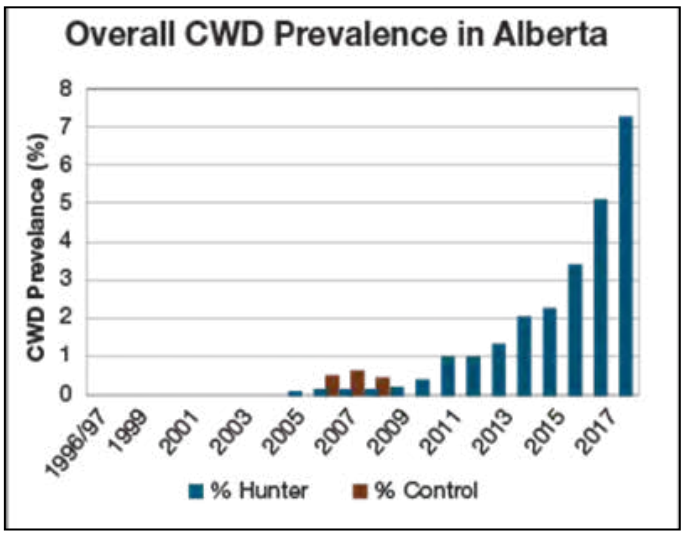
While I'm sure there are some government requirements that should be removed as a step towards modernizing and improving the efficiency of our environmental regulatory system, organizations like CSEB should be vigilant in case any worthwhile protections are removed.

For more information, see the government's web site, https://www.alberta.ca/cut-red-tape.aspx.

For those interested in wildlife disease, here's an update on Chronic Wasting Disease (CWD) in Alberta. CWD is a nervous system disease (prion) in the deer family in which infected animals cannot maintain their weight and slowly waste away. There is no evidence of transmission to people.

It was first found in Alberta's wild deer population in 2005. To track CWD in our cervid populations, hunters must submit heads from animals harvested in eastern Alberta from Cold Lake south to the US border.

The ongoing CWD surveillance program has completed tests on over 5,000 heads since September 2019. In the 2019/20 samples



to date, there have been 500 mule deer, 74 white-tailed deer, and 1 moose infected with this disease. These animals were harvested largely within the area already known for the disease; however, there seems to be further extension of the disease within the Battle River and North Saskatchewan River watersheds.

SASKATCHEWAN News

Submitted by Robert Stedwill, CSEB Saskatchewan Member

The Gunnar Mine site reclamation is in the news recently. This open-pit mine site was built in the 1950s and 60s on the shore of Lake Athabasca, in northern Saskatchewan. After extracting 7.5 million cubic metres of uranium from the open-pit mine, it was finally abandoned in 1959 due to falling uranium prices. Among other dangers is the consumption of contaminated fish and wildlife by hunters and fishers in the area.

Finally, in 2006, the federal and provincial governments agreed to clean up this site and others and reclaim much of the disturbed landscape. The final stages of remediation are underway at the Gunnar site, although the completion schedule could last another decade. The Gunnar mine site is considered to be the single largest environmental reclamation project in Saskatchewan history.

Originally budgeted to cost $24 million, the reclamation bill is now over $280 million. Both governments agreed to each pay half of the original budget, but with the cost now well over that amount, the provincial government is currently seeking court approval to force the federal government to increase its original share of the cost.

CSEB Research Webinars

Check the CSEB Website at
www.cseb-scbe.org
for upcoming webinars and registration information.

MANITOBA News

Submitted by Robert Stedwill, CSEB Member

I've reported on these two items before; however, there have been some developments since.

The Zebra Mussels Issue

It appears that Manitoba is becoming very concerned about the infestation of zebra mussels in its waters, to the point that it is now pushing the federal government to enforce the border—not from asylum seekers, but for inspection of water vessels arriving from the United States.

"Manitoba is concerned with the (Department of Fisheries and Oceans') capacity to implement the aquatic invasive species regulations," reads a briefing note the Free Press obtained through access-to-information laws.

"In particular, they would like increased federal assistance to control for (such species) at the Manitoba–U.S. border."

Manitoba has since launched an unspecified pilot project with the Canada Border Services Agency at Manitoba crossings.

With respect to the veligers (mussel larvae) found on the Minnesota side of Lake of The Woods in 2019, the lake has now been added to the list of lakes in Minnesota as infested. There is optimism, however, that the population of mussels will not be excessive due to the low calcium content of the water, and that the healthy population of walleye and sauger in the lake will keep the mussels in check. Phil Talmage, Supervisor in the Department of Natural Resources at Baudette, Minnesota, suggests that Lake Sturgeon may prey on zebra mussels, which has been observed in other bodies of water.

Shoal Lake, which is an extension of Lake of The Woods, is also, as you will recall, the water supply for the city of Winnipeg, and monitoring will continue there. Monitoring also continues at Manitoba Hydro facilities, and to date, no larval forms have been detected.

Vigilance will always be required, especially to the north and west, as prairie water bodies generally tend to be high in calcium, and with the mussels' ability to quickly multiply, it only takes one careless boat owner to transfer a veliger to an adjacent body of water.

Churchill Marine Observatory

The Churchill Marine Observatory (CMO) is scheduled to be completed this month, following the completion of the Phase 2 component of the facility. The CMO was planned to achieve the goal of dramatically advancing knowledge of oil spills in sea ice and ice-covered waters, impacts of these contaminants on the marine ecosystem, and development of environmental technologies designed for detection and mitigation of oil in ice and ice-covered waters. It is proposed as a national facility, serving international needs, to be located in the Canadian Arctic on the shores of Hudson Bay at Churchill, Manitoba.

Hopefully, as the Observatory becomes fully operational, some of our Manitoba CSEB members can provide updates as to the findings being derived on an ongoing basis.

ONTARIO News

Submitted by Barbara Hard, CSEB Ontario Director

Ontario Species at Risk Stewardship Program

The Minister of the Environment, Conservation and Parks (MECP), Jeff Yurek, recently announced the Species at Risk (SAR) Stewardship Program, which is providing up to $4.5 million for the years 2020/2021 in funding to support projects by non-profit organizations, Indigenous communities, and other stakeholder groups, such as conservation authorities, businesses, consulting firms, landowners, and farmers. The program is part of the government's "Made-in-Ontario Environment Plan—a roadmap to preserving and protecting the province's land, air and water".

Currently, 85 local SAR projects receive funding. New applications for funding can be for projects on any SAR listed in *Species at Risk Ontario*; however, MECP has identified several priorities. SAR on the priority species list include, amongst others, American chestnut, American ginseng, bird's foot violet, wood-poppy, American water-willow, American eel, grey ratsnake, loggerhead shrike, piping plover, and small-mouthed salamander.

Other priorities for the Stewardship Program include projects that are focused on the protection of ecosystems that may provide habitat for SAR, including prairie, savannah, dune systems, as well as rivers and riparian ecosystems. In addition, the program will provide funding for filling knowledge gaps on certain SAR, such as wood aster, false hop sedge, and boreal caribou as well as for projects that look at threats to SAR and SAR habitat, such as neonicotinoids impacts on SAR bumble bees.

Activities that are eligible for funding under the program include SAR habitat management and restoration, surveys, inventories and monitoring, threat mitigation, education, research, and local and traditional knowledge.

Information is available from the MECP Stewardship Program website at https://www.ontario.ca/page/grants-protecting-species-risk.

ATLANTIC News

By Peter Wells, CSEB Atlantic Member

Reflecting on the Importance Of Scientific Anniversaries—The SS Arrow Oil Spill in Chedabucto Bay, NS, in 1970—A Legacy in Oil Spill Research

Scientific anniversaries are times of appreciation and reflection—appreciation of the significance of a discovery, event or process, the persons or people involved, and reflection of its longer significance to human-kind. For example, last year (2019) was the 50th anniversary of the Apollo landing on the moon on July 20, 1969 (Berg 2019), the first time humans had exited the Earth to land on another planetary body; the 75th anniversary of Erwin Schrodinger's prescient book "What is Life" (Schrodinger 1944), which stimulated several advancements in molecular biology and structural chemistry that led to the discovery of the structure and role of DNA; the 150th anniversary of the Periodic Table of the Chemical Elements, a landmark achievement in chemistry by the Russian scientist Dmitri Mendeleev (Szuromi 2019); and the 500th anniversary of Leonardo da Vinci's death in 1519 (Wikipedia), whose many outstanding contributions to the sciences and arts are being celebrated worldwide. These anniversaries make us pause to reflect on advancements in science that are important stepping stones of progress in our scientific knowledge and practice.

The coastal environment is at the heart of this article, drawing attention to the anniversary in 2020 of a shipping disaster in eastern Canada that helped shape an important aspect of marine environmental research in Canada and beyond.

Fifty years ago, on Feb. 4, 1970, the Liberian tanker SS *Arrow* ran aground on Cerberus Rock in Chedabucto Bay, on the east coast of Nova Scotia (Gordon et al. 2014; pers. observ. Wells). Carrying 14,700 tons (108,000 barrels) of Bunker C fuel oil, the broken ship released about two-thirds of its cargo into the bay, much of it ending up on the bay's northern rocky coastline. Some of it emulsified into the water column and was transported away in ocean currents or consumed by zooplankton. Remaining oil was recovered from the wreck at the time by an emergency response program called Operation Oil, and biological surveys were initiated (Operation Oil 1970)[1]. Though much of the oil was recovered from the hull at the time, as a result of the recent appearance of oil slicks, an additional several thousand litres of oil were removed from the sunken ship a few years ago (CBC News, Oct. 27, 2015). Despite these activities by Transport Canada and the Coast Guard, oil is still present in the sediments in some coastal locations (Yang et al. 2018; Lane, D., pers. comm.).

The legacy of this spill to Canadian marine science, and Canada's capacity to respond to such events, is enormous and worth noting. In the years following the accident, scientific studies ranging from the development of chemical methods (e.g., dispersant use, bioremediation) to the marine ecotoxicology of petroleum hydrocarbons were initiated (Gordon et al. 2014). Research programs were established to assess the fate and effects of oil in cold temperate and northern waters (Gordon et al. 2014), especially oil-sediment-biotic interactions. The Bedford Institute of Oceanography (BIO) became a center for such research, continuing to this day. Important research was initiated on the microbial degradation of oil in cold waters (Mulkins-Phillips and Stewart 1974). Bioassay techniques were developed for working with crustacean (lobster) larvae and post-larvae, given the concerns about oil spill impacts on the lobster industry (Wells and Sprague 1976). Emergency response capabilities to ship-based spills were gradually improved through research by the Canadian federal government and the oil industry, especially through programs at BIO. These proved invaluable for later Maritime spills, such as the one from the *Kurdistan* in Cabot Strait in 1979. Due to concerns about hydrocarbon effects on

[1] I recall participating in those surveys in the bay, in my first job as a government fisheries technician. We sampled benthic invertebrates brought aboard our rolling ship in sub-zero weather. That experience led to an interest in oil pollution impacts and a career in marine environmental science and management, another story.

fisheries, especially on the juvenile life stages, new techniques for aquatic and marine ecotoxicology were developed (e.g., Blaise et al. 1988; Wells et al. 1998). To ameliorate the impact of spills, a major program to test the efficacy and toxicity of oil spill dispersants was established at BIO (Doe et al. 1978; Wells 1984), a program that continues to this day (King, T, pers. comm.). Dispersant use guidelines were drawn up for Canada (EC 1984), with input from local scientists. Above all, the *Arrow* spill led to increased general public awareness of the threats of spilled oil to coastal water and sediment quality, the fisheries and marine wildlife (e.g., seabirds), and the need for enhanced protection and response capability.

Fifty years later, work continues periodically at the site of the *Arrow* spill, improving our understanding of the persistence of oil constituents, such as PAHs (polycyclic aromatic hydrocarbons), in littoral and sub-littoral coastal sediments (e.g., Lee et al. 2003; Yang et al. 2018). The research emphasis at BIO on dispersant efficacy and bioremediation approaches for cold water environments is important, as many studies have shown that components of spilled oil persist for decades in coastal environments, especially low energy, shallow water ones. The field of marine environmental risk assessment has also benefited from questions posed by such spill incidents. In particular, there are implications for spill preparedness in Arctic waters from what has been learned in Nova Scotia, given current and future increases in polar ship traffic. In summary, the legacy of the *Arrow* spill event is huge and should be carefully noted[2].

Many benefits emerge from noting anniversaries of scientific events or issues that have led to the application of new science. Reflecting on these anniversaries, knowing the history of local events, and making known the various key scientific discoveries is an important role for environmental biologists. Too often we forget past events, their significance, the efforts of previous investigators, and the implications for the future. As Adelman (2019) stated, "it is probably easier to look back and weigh the importance of a particular scientific achievement of the past than to predict how science will influence the future". Recalling the legacy of the *Arrow* spill to Canadian marine environmental research is important. Hopefully, this story will encourage CSEB members to note and commemorate such markers of notable scientific progress in both terrestrial and aquatic fields.

To conclude on this theme, it would be remiss to overlook three other recent anniversaries. The year 2019 was the 100th birthday of Dr. James Lovelock, the outstanding British scientist whose chemical expertise led to the detection of chlorofluorocarbons (CFCs) that still threaten the Earth's ozone layer, though banned decades ago. Further, his insights contributed to seeing planet Earth as a whole self-regulating system, the GAIA Principle. November, 2019, was also the 150th anniversary of the journal *Nature*, a seminal journal famed for reporting key scientific discoveries (see www.nature.com). Finally, closer to home in Nova Scotia, this year (2020) is the 50th anniversary of the epic voyage (1969-70) of the oceanographic research vessel CSS *Hudson*, when she circumnavigated North and South America, making numerous marine discoveries in three great oceans. We in the Maritimes will be celebrating this remarkable voyage as the year progresses—perhaps a year of reflection about the significance of scientific anniversaries.

[2]Unfortunately, Canada's capacity for marine environmental research suffered a blow with the major cutbacks to relevant federal science that occurred between 2012 and 2015. Departments such as DFO no longer have established long-term units for marine environmental chemistry, toxicology, and monitoring. To my knowledge, with the exception of one program at BIO, the expertise to study the short and longer term impacts of chemical contaminants such as oil and its constituents now largely resides in the universities and private sector.

Acknowledgements

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References

Adelman, J. (2019). Five notable scientific anniversaries in 2019. The Irish Times, Jan. 10, 2019.

Berg, J. (2019). Editorial. A child of Apollo. Science 365(6450):203. July 19 Issue.

Blaise, C., Sergy, G., Wells, P.G., Bermingham, N. & Van Coillie, R. (1988). Biological testing development, application and trends in Canadian environmental protection laboratories. Toxicity Assessment 3:385-406.

Doe, K.G. & Wells, P.G.. (1978). Acute aquatic toxicity and dispersing effectiveness of oil spill dispersants: results of a Canadian Oil Dispersant Testing Program (1973-1977). Pages 50-65 in Chemical Dispersants for the Control of Oil Spills. ASTM STP 659. L.T. McCarthy, G.P. Lindblom and H.F.Walters, Eds.). American Society for Testing and Materials, Philadelphia, PA.

Environment Canada. (1984). Guidelines on the use and acceptability of oil spill dispersants, 2nd edition. Environmental Protection Service Report EPS 1 EP 84 1. Environment Canada, Ottawa, ON.

Gordon, D.C., Lee, K., Wells, P.G. & Keizer, P.D. (2014). Ch. 44. The Impacts of oil and gas activities on the marine environment. Pages 361-372 in Voyage of Discovery. Fifty Years of Marine Research at Canada's Bedford Institute of Oceanography. Eds. Nettleship, D.N., D.C. Gordon, C.F.M. Lewis and M.P. Latremouille. Bedford Institute of Oceanography, Oceans Association, Dartmouth, NS.

Lee, K., Prince, R.C., Greer, G.W., Doe, K.G., Wilson, J.E.H., Cobanli, S.E., Wohlgeschaffen, G.D., Alroumi, D., King, T., & Tremblay, G.H. (2003). Composition and toxicity of residual Bunker C fuel oil in intertidal sediments after 30 years. Spill Science and Technology Bulletin 8:187-199.

Mulkins-Phillips, G.J. & Stewart, J.E. (1974). Effects of environmental parameters on bacterial degradation of Bunker C oil, crude oil and hydrocarbons. Applied Microbiology 28:915-922.

Operation Oil. (1970). Report of the Task Force – Operation Oil to the Minister of Transport. Information Canada, Ottawa, ON.

Schrodinger, E. (1944). What is Life? Cambridge University Press, Cambridge, UK. 194 p.

Szuromi, P. (2019). Setting the Table. Science 363(6426):464-465.

Wells, P.G. (1984). The toxicity of oil spill dispersants to marine organisms – a current perspective. Pages 177-202 in Oil Spill Chemical Dispersants: Research, Experience and Recommendations. STP 840 (T.E. Allen, Ed.). American Society for Testing and Materials, Philadelphia, PA.

Wells, P.G., Lee, K., & Blaise, C. (Eds.) (1998). Microscale testing in aquatic toxicology: advances, techniques and practice. CRC Press, Boca Raton, FL.

Wells, P.G. & Sprague, J.B. 1976. Effects of crude oil on American lobster (*Homarus americanus*) larvae in the laboratory. Journal of the Fisheries Research Board of Canada 33 (7): 1604 1614.

Wikipedia. (2019). Leonardo de Vinci. http://en/wikipedia.org/wikipedia/leonardo

Yang, Z., Shah, K., LaForest, S, et al. (2018). A study of the 46-year-old *Arrow* oil spill: Persistence of oil residues and variability in oil contamination along Chedabucto Bay, Nova Scotia, Canada. Journal of Cleaner Production 198:1459-1473.

TERRITORIES News

Submitted by Anne Wilson, CSEB Territories Director

The start of 2020 brought some interesting travels in the NWT and Nunavut. When does -32°C with a -42°C windchill feel balmy? —When you are in Baker Lake, NU, and the preceding days have been nudging -40°C with a -62°C windchill! I was grateful for my vintage Canada Goose parka and Sorel boots, veterans of many northern winters and field work on ice. Weather can certainly bring work challenges; the strong winds created near blizzard conditions that closed the airport for two days, and held up public hearings until the 11th hour. It was good to visit Kugluktuk (formerly known as Coppermine) in January, and see the day length increasing by 10-11 minutes each day.

Much of the NWT is predicted to have below-normal temperatures in March through May, while Nunavut is predicted to be above normal temps for that period. This trend is predicted to intensify over the summer months for Nunavut and the high Arctic portions of the NWT. That does not bode well for sea ice conditions. A recent article in *Science News* used forensic analysis of clam shells along with climate models to examine sea ice changes over time scales of decades to centuries, and concluded that Arctic sea ice would not be expected to return rapidly if climate change is slowed or reversed. While some polar bear populations are holding their own, the stress of shorter periods feeding on the sea ice may push them to lower numbers. A summary of polar bear population status is available at http://pbsg.npolar.no/en/status/status-table.html and identifies a mix of stable, increasing, and decreasing subpopulations in the 19 groups, and tracks the percent change in sea ice per decade for each region.

Looking ahead to conferences on the Arctic in 2020, there are a few that look interesting. These include the following:

- **International Symposium on Plastics in the Arctic and Sub-Arctic Region**, 21-23 April 2020 at Reykjavik, Iceland https://www.changing-arctic-ocean.ac.uk/science-outputs/arctic-conferences/international-symposium-on-plastics-in-the-arctic-and-sub-arctic-region/ *(Ed. note: the conference postponed until 28-30 Sept 2010 due to covid-19 travel restrictions)*
- **A Changing Arctic 2020**, June 2-5, 2020 in Tromsø, Norway https://framsenteret.no/2019/08/a-changing-arctic-conference-in-tromso-2020/
- **Cryosphere 2020: International Symposium on Ice, Snow, and Water in a Warming World** Sept. 21 to 24, 2020 Reykjavík, Iceland https://www.cryosphere2020.is/
- **38th International Polar Symposium. Environmental Changes in Polar Regions: New Problems - New Solutions** 38th International Polar Symposium Oct. 15 to 17, 2020 Toruń, Poland https://polarsymposium2020.umk.pl/pages/main_page/?langu=en

Is there interest in proposing a Northern-themed session at this year's Canadian Ecotoxicity Workshop? There is certainly enough

activity going on north of 60°, with new research and intensive monitoring! CEW 2020 is in Halifax this year, from October 4-7, 2020, and the call for session topics is underway. https://ecotoxcan.ca/

Development activity in the North has moderated from levels seen a few years ago, but includes ongoing mining activity as well as closure phase activity (for contaminated sites and current projects that are reaching end-of-life). Some of the current proposals include the following:

- The Environmental Assessment process for Baffinland Iron Mine's proposed Phase 2 expansion continues. An additional set of technical meetings was originally scheduled for March 2020, but are on hold due to covid-19 health concerns. The Water Licence amendment process is on hold.
- Agnico Eagle's proposed expansion of the Whale Tail gold project received a positive Environmental Assessment decision from the Nunavut Impact Review Board, and proceeded to the regulatory phase. Public hearings for the water licence amendment were held in February, and the Nunavut Water Board is deliberating the expansion amendment.
- Public hearings for the Giant Mine Remediation Project water licence were held in January 2020, and the Mackenzie Valley Land and Water Board will issue a draft water licence for review in March.
- Hearings for the Lupin Mine closure water licence renewal were conducted in January 2020, and a renewal licence has gone to the Indigenous and Northern Affairs Canada Minister for approval. Concerns with the implementation of the approved closure plan, in light of climate change and potential acid rock drainage issues, are to be addressed by monitoring and adaptive management.
- In the diamond mining sector, De Beers' Gahcho Kué mine is applying for an expansion for extraction of additional resource.
- The Meliadine gold mine is dealing with high salinity minewater, and will be applying for total dissolved solids (TDS) limits to be changed, in conjunction with extensive review and research on toxicity and receiving environment effects. Many lakes in the NWT and NU are comparable to distilled water, and proposed changes in major ion levels will need to be carefully evaluated.
- All industrial projects regulated under Type A water licences in the NWT and NU submit annual reports at the end of March that provide detailed aquatic effects monitoring results. These are reviewed and comments provided to the regulatory boards—a great exercise in hindsight as we see whether predictions were correct and often learn what we missed in the environmental assessment!
- Municipal wastewater management continues to be a challenge in the North, and work continues on the development of effluent quality standards, similar to the *Wastewater System Effluent Regulations* that apply south of 60°. Consultation has been carried out in the NWT and Nunavut, and at some point Northern regulations will be drafted.

Closing:

If you are connected to activities in the Yukon, Northwest Territories, or Nunavut, doing work north of 60° that you would like to highlight in the newsletter, or running some seminars or other training opportunities, please let us know. The CSEB provides a valuable networking and communication forum, and a voice for biologists if there are 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 or Sharleen Hamm at sharleen@sharleenhamm.com.

It's no Surprise for Inuit — Baffin Bay Polar Bears Defy Past Assumptions With Stable Population

Declining sea ice in region a threat, but sustainable hunt possible, say biologists

By Walter Strong

Reprinted from CBC News, March 3, 2020

A polar bear photographed during research involving the Baffin Bay sub-population of polar bears. The population is stable at about 2,800 bears. (Stephen Atkinson)

The polar bears of Baffin Bay are tremendous travellers: they cross the ice-covered water between Baffin Island, Nunavut, and Greenland, tracing coastlines that can cover tens of thousands of square kilometres. They feast on fat seals as they go, and make babies along the way.

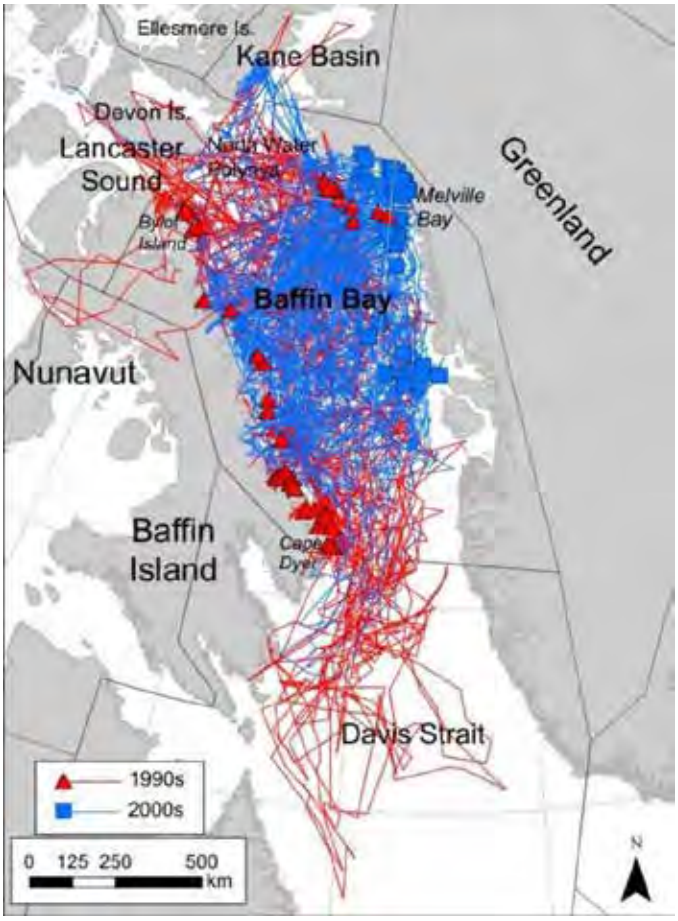
But something is constantly changing for the bears: their environment.

According to a recent study published in the journal E*cological Applications*, on average since the 1990s, the bears have been spending less time on the ice every year, and more time on land. In the 2000s specifically, they spent 90 days on land instead of 60.

On land, Baffin Bay polar bears are in a dietary holding pattern. Each bear is in a fast until the sea ice returns. The study finds that more time on land correlates with skinnier bears and a decline in reproductive productivity.

"When bears spend more time on land, they have less time on the sea ice to hunt seals and they have to rely on their fat stores," said Kristin Laidre, a marine biologist at the University of Washington and the lead author of the study, in a telephone interview.

"So we see declines in body condition of bears — basically fatness of bears — and then that body condition can translate to reproduction," Laidre said. "We actually see smaller litter sizes for mothers when they have less time on the sea ice."



The polar bears of Baffin Bay are tremendous travellers that rely on sea ice for their way of life. This figure captures the locations and movements of adult female polar bears in Baffin Bay, shown in red for the 1990s and blue for the 2000s. Subpopulation boundaries are shown on the map with black lines. (Ecological Applications/https://doi.org/10.1002/eap.2071)

According to the study, the extra time on land aligns with a decades long decline in seasonal sea ice cover in the region — that period of time between winter freeze up and spring melt in Baffin Bay.

Global warming models predict seasonal sea ice in Baffin Bay will continue to decline. And over the next three generations of bears (about 35 years), the Baffin Bay polar bear population is expected to mirror this decline, through reduced body size, reduced litters, and possibly reduced numbers.

"The loss of sea ice across the Arctic is the number one conservation concern for polar bears globally," Laidre said.

Science aligns with Inuit knowledge: Researcher

But for now, researchers say the Baffin Bay polar bear population is relatively abundant, something that comes as no surprise to Inuit in the region who have lived with the bears for thousands of years

The Baffin Bay polar bears inhabit approximately one million square kilometres of land and sea encompassing Baffin Bay, and portions of Baffin Island, all of Bylot Sound, and parts of west and northwest Greenland.

Their population is stable at about 2,800 animals, and appears to have been stable for a while. This population estimate was not a direct result of Laidre's study, but was included in the report's research.

Previous estimates of the Baffin Bay population pegged it at about 2,100 animals.

Inuit in the region have long argued that the Baffin Bay polar bear population was healthy, and maybe even growing. They have been making that argument, based on their observations, against the science of the day for at least 10 years.

"The Inuit did not support the science that was presented during … public hearings in 2007 and 2008," said James Eetoolook, vice president of Nunavut Tunngavik Inc., the Inuit organization responsible for guarding the obligations and rights contained in the Nunavut Agreement, in a phone call.

Those hearings blamed a supposed decline in the polar bear population on overhunting, saying the combined hunt in Greenland and Nunavut was not sustainable.

"Instead of the predicted decrease in the number of polar bears … science has confirmed what the Inuit have stated, that the population has increased."

Previous estimates of the Baffin Bay population pegged it at about 2,100 animals.

Stephen Atkinson, one of the study's co-authors, and now a contract wildlife biologist who has spent close to 30 years studying polar bears, cautioned against comparing the latest population estimate with the earlier. The two studies were designed differently, he said.

But he said the latest findings do back up what many Inuit were saying all along — that the population has not declined below what it was thought to be earlier.

"The findings were quite consistent with what people were seeing on the ground in Baffin Bay," he said.

Maintaining a Healthy Population

Polar bears are a universal symbol of the North. But for the Inuit, Eetoolook said they are food, clothing, a source of income for hunters, and dangerous predators who keep Inuit on constant alert.

"Polar bears are wild animals, and very vicious animals, and unpredictable animals," Eetoolook said. "They can attack anytime."

In 2018-19, 439 bears were harvested in Nunavut, with 73 of them from the Baffin Bay population. Both numbers are below the total annual allowable harvest.

The governments of Nunavut and Greenland co-manage the Baffin Bay bear population, and agreed to an increased quota of 160 bears based on the 2017 harvest assessment for the Baffin Bay and Kane Basin Polar Bear Subpopulations. That quota is split evenly between hunters in the two jurisdictions.

Eetoolook said the increased harvest was welcomed by Inuit, not only for cultural and safety reasons, but because hunters keep the population healthy in the long run.

"The population shows that it is sustainable at that number," Eetoolook said. "The population can stay healthy."

There are many ways for a polar bear to die, but a hunter's bullet may be one of the best ways to go. Atkinson, who was a co-author of the 2017 harvest assessment report, said Inuit hunting through a well-managed harvesting program can help keep the polar bear population healthy by culling it in times of bear over-abundance.

"The population is at its most productive when the density or the abundance of that population is slightly below … the maximum number [the] environment can support," Atkinson said.

Even now, when data suggests the bears of Baffin Bay may be in a transition state between abundance and decline, hunting can help keep the population healthy.

"It is possible to harvest a population [of polar bears] even when it is undergoing changes as a result of climate change," he said.

Genetic material collected with a biopsy dart used during a study of the Baffin Bay polar bear subpopulation. (Stephen Atkinson)

But the animals do rely on Arctic sea ice. Changes to the latter are bound to impact the bears.

"One of the things to keep in mind is that climate change and harvesting to some extent are separate issues," Atkinson said. "Nothing that we do, or what is done in terms of harvesting, is going to change the fact that the environment within Baffin Bay is changing.

"Those changes are — and will — continue to induce changes in the Baffin Bay polar bear population."

Managing the Hunt

The Inuit can manage the polar bear hunt in light of environmental changes as they develop, says Markus Dyck, the polar bear specialist for the government of Nunavut, and also a co-author on Laidre's polar bear study.

Dyck has been studying the bears since the 90s and has spent the better part of 20 years in Nunavut.

He said the territorial government, Inuit organizations, researchers, and Inuit hunters work together to closely monitor changes in bear condition and population. Worst-case scenarios of over-hunting are easy to imagine, but unlikely to develop, because the population is closely monitored by those who live with the bears everyday.

"If there's a change in reproductive rates, then there will be new decisions made on what the harvest rates are," Dyck said.

"When hunters observe something that is of critical concern — if they say, 'Our bears … are getting very skinny,' or 'We can't find many males,' or 'There are no females with offspring around' — this information comes back to the government."

For Dyck, it almost seems too obvious to say a decline in the bear's environment over time will affect the bear. The important observation to make is that the polar bear hunt is managed carefully by everyone involved.

"There's a constant feedback loop … from the communities, from the hunters, from the people who are actually on the ground and harvesting.

"Polar bears are still a very, very high priority in Nunavut," Dyck said.

For the published article see https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/eap.2071

Laidre, K.L., S. Atkinson, E.V. Regehr, H.L. Stern, E.W. Born, Ø. Wiig, N. J. Lunn, and M. Dyck. 2020. Interrelated ecological impacts of climate change on an apex predator. Ecological Applications 00(00):e02071. 10.1002/eap.2017

And from Science News:

Arctic Sea Ice Cannot "Quickly Bounce Back" If Climate Change Causes it to Melt, New Research Suggests

University of Exeter. "Arctic sea ice can't 'bounce back'." ScienceDaily. 21January 2020. www.sciencedaily.com/releases/2020/01/200121112913.htm (accessed March 4, 2020).

A team of scientists led by the University of Exeter used the shells of quahog clams, which can live for hundreds of years, and climate models to discover how Arctic sea ice has changed over the last 1,000 years.

They found sea ice coverage shifts over timescales of decades to centuries -- so shrinking ice cannot be expected to return rapidly if climate change is slowed or reversed.

The study examined whether past ice changes north of Iceland were "forced" (caused by events such as volcanic eruptions and variations in the sun's output) or "unforced" (part of a natural pattern).

At least a third of past variation was found to be "forced" — showing the climate system is "very sensitive" to such driving factors, according to lead author Dr Paul Halloran, of the University of Exeter.

"There is increasing evidence that many aspects of our changing climate aren't caused by natural variation, but are instead 'forced' by certain events," he said.

"Our study shows the large effect that climate drivers can have on Arctic sea ice, even when those drivers are weak as is the case with volcanic eruptions or solar changes.

"Today, the climate driver isn't weak volcanic or solar changes -- it's human activity, and we are now massively forcing the system."

Co-author of the study Professor Ian Hall, from Cardiff University, said: "Our results suggest that climate models are able to correctly reproduce the long-term pattern of sea ice change. This gives us increased confidence in what climate models are telling us about current and future sea ice loss."

When there is lots of sea ice, some of this drifts southwards and, by releasing fresh water, can slow the North Atlantic Ocean circulation, otherwise known as the Atlantic Meridional Overturning Circulation (AMOC).

The AMOC brings warm water from the tropics towards the Arctic, so slowing it down cools this region and allows sea ice to grow further.

So, with less ice, the AMOC can bring in more warm water—a so-called "positive feedback" where climate change drives further warming and sea ice loss.

Quahog clams are thought to be the longest-living non-colonial animal on Earth, and their shells produce growth rings, which can be examined to measure past environmental changes.

Dr Halloran is part of the Global Systems Institute, which brings together experts from a wide range of fields to find solutions to global challenges.

The new study is part of a project including Cardiff University, the Met Office, and an international team working on climate model simulations of the last millennium. The work was funded by the Natural Environment Research Council.

Journal Reference

Paul R. Halloran, Ian R. Hall, Matthew Menary, David J. Reynolds, James D. Scourse, James A. Screen, Alessio Bozzo, Nick Dunstone, Steven Phipps, Andrew P. Schurer, Tetsuo Sueyoshi, Tianjun Zhou, Freya Garry. Natural drivers of multidecadal Arctic sea ice variability over the last millennium. Scientific Reports, 2020; 10 (1) DOI: 10.1038/s41598-020-57472-2.

Celebrating Canada's Forests

Forests play an integral role in Canadian culture, the economy—and our lives. Learn about sustainable forestry practices, careers in modern forestry, and more in Celebrating Canada's Forests. Some topics include the following:

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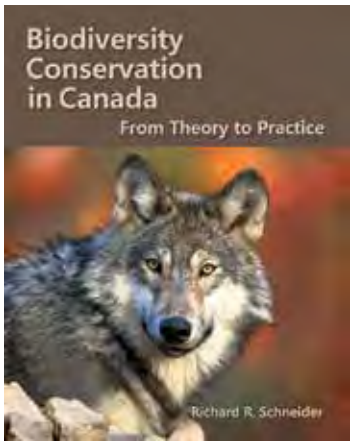
- Connection with Forests Is a Two-Way Path
- Why Urban Forests Are Integral to Healthy Cities
- Behind the Flames: Addressing Canada's Forest Fires

Check out the website at https://www.innovatingcanada.ca/campaigns/celebrating-canadas-forests-2020/.

BOOK Review

Submitted by Lu Carbyn, CSEB Alberta Member



Schneider, Richard R. 2019. Biodiversity Conservation in Canada – From Theory to Practice. The Canadian Centre for Translational Ecology. 376 p.

Available from amazon.ca. *$59.00*

Dr. Schneider's new book provides an important contribution to the practice of biodiversity conservation in Canada. Not only does Schneider supply a comprehensive and authoritative overview of conservation theory, he also builds a bridge between conservation principles and their application in real-world settings. Written in a clear and engaging style and brimming with full-colour figures and illustrative case studies, his book explains how conservation decision making is informed by science, shaped by social and political contexts, and embedded in a complex set of institutions. The subject is exceptionally well dealt with.

Another welcome feature of the book is that it is focused specifically on Canada, which is a first in this field. The consideration of local circumstances is what permits Schneider to delve into the practical aspects of conservation. The types of threats matter; the existing laws and policies matter; institutions matter; the values and concerns of local people matter; history matters; and so on. In short, how conservation is done depends on where it is done. By incorporating these aspects, Schneider delivers a synthesis tailored to the needs of conservation practitioners in Canada.

The first section of the book introduces the social and scientific context of conservation, setting the stage for the applied chapters that follow. In these initial chapters, we learn the "what" and "why" of conservation. Subsequent chapters are devoted to the practice of conservation at both the species and ecosystem level. In these chapters, we learn the "how" of conservation and gain an understanding of how theory and practice are linked together. We also gain insight into the role of conservation practitioners in the overall enterprise of conservation. A dedicated chapter on climate change explores the expected effects of progressive warming on Canada's ecosystems and what these changes mean for conservation. There is also a chapter on structured decision making, a topic of central importance to effective conservation. Finally, the book presents a sequence of six case studies that illustrate the complexities of real-world conservation and provide additional insight into how conservation theory is translated into practice.

Dr. Schneider intends this book to be used as a vehicle for teaching. For undergraduates, it is meant to expose future

practitioners to a broad overview of both the scientific and social dimensions of conservation. For graduate students, the book is a way of moving from theoretical information obtained in classes to dealing, in a practical and meaningful way, with real world conservation problems. For readers with a professional or personal interest in conservation, this book will provide an accessible guide to state-of-the-art conservation science and its current application in Canada.

It occurred to me that much in this book could also be applied to high school curricula. In the very least, a copy could well be placed in every high school library in our country. I found the chapter on "The Historical Foundations of Conservation in Canada" particularly interesting. Many young Canadians have little exposure or knowledge about such important events of the past such as the fur trade in the 19th century and how it influenced Canadian history.

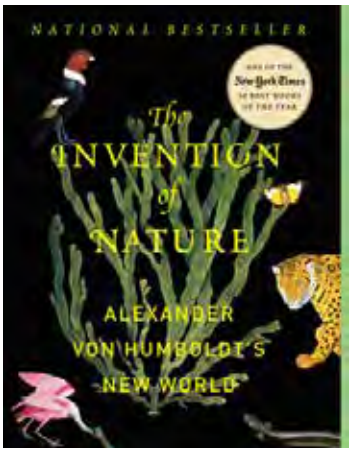
I also enjoyed the book's treatment of difficult and controversial topics within the field of conservation. For example, the book explores the fundamental goals of conservation, the question of how much conservation is enough, the concept of conservation triage, scientists as advocates, and the meaning of conservation in a world that is fundamentally changing because of global warming. Rather than simply presenting his own point of view, Schneider provides a thorough account of the alternative perspectives on each topic.

This book represents applied biology at its best. In essence, it outlines logical approaches to finding solutions to complex problems. It has a practical, "no nonsense" approach that I found highly compelling. Conservation practitioners, conservation organizations, government scientists, academicians, and people in all walks of life with an interest of our natural world, can get a great deal out of this book. I highly recommend it.

Additional information about Biodiversity Conservation in Canada – From Theory to Practice can be found at www.ccte.ca. Copies are available at Amazon.ca for $59.50.

BOOK Review

Submitted by Bob Gainer, CSEB Alberta Member



Wulf, Andrea. 2016. The Invention of Nature: Alexander von Humboldt's New World. Vintage, NY. 576 p.

Available from amazon.ca. *$23.00*

This book was recommended to me by Loys Maingon (CSEB BC Director) and was one of the New York Times 10 best books for 2016. Loys has post graduate degrees not just in environmental sciences but also English and philosophy. Words and thoughts and literature just flows, no pours, no gushes like a firehose out of Loys, and so they do for Ms. Wulf, whom I presume has a liberal arts background. I have a pure science background. My grade 12 English teacher, Ms. Molloy (bless her, she died a few months later), at the end of the year frowned down at cringing little me and said "Don't ever depend upon writing to make a living, Bob!"

For instance, I would have had trouble writing more than a few pages about Humboldt, but Ms. Wulf has written almost 500 including references and citations. I think Loys would be closer to Ms. Wulf than me; he would not paraphrase and sum up the way I do. This book represents five years of Ms. Wulf's life doing extensive research in libraries and book collections all over the world. In addition, she travelled to many of the places celebrated in Humboldt's many books and met many of the local academics concerned with environmental issues.

She describes it as her exploration through landscapes and letters, thoughts, and diaries to discover Humboldt, and to restore him to his rightful place in the pantheon of nature and science. It has also been her quest to understand why he thought the way he did and why he was so influential to the world of science. She created a magnificent stage for us to learn about Humboldt, whereas I would just want the summation at the end. It was a tough read for me; I thought she overdid her praise and repeated herself too much.

I don't remember ever hearing about Humboldt, and I thought I have read extensively. From an early age, it was bird watching and natural history, then agriculture, "vet" medicine, a post graduate degree in population biology of a host-parasite relationship (community ecology on a small scale), and meteorology (part of the Airline Transport Rating). Reading in these areas was always a therapy for me, and these supposedly were the areas where Humboldt was prominent. I don't remember anyone referencing Humboldt.

Humboldt was born in 1768 (the same year as Napoleon) to wealthy aristocrats that were part of the ruling Prussian families. He had a mind that lived only for the pursuit of knowledge, and he had the best teachers on all the topics: math, physics, astronomy, geology, music, writing, painting and biology, which at that time was mostly taxonomy. He quickly became an intellectual giant at a young age, especially in "natural philosophy", the philosophy that develops from an appreciation of natural sciences (what I would interpret as natural history). Then he took this to a higher level. For example, the dualism between the tree I am seeing or the idea that I am seeing a tree? I didn't take any courses that answered that question.

Ms. Wulf's description of his looks and physique was extensive, several paragraphs long, repeated every chance she could get, which I would summarize as "he was drop-dead gorgeous". She also hinted that he preferred the company of other very fit, good looking, adventurous young men, and never married. About the time he was in his early 20s, he had moved to Paris and was looking for opportunities to explore the world but was hindered by Napoleon's conquests. Eventually he was able to break through the British Navy's blockade of France by boarding a Spanish ship to South America, where he spent five years exploring the headwaters of the Amazon, the Andes, Mexico, Cuba, and the U.S.A. Actually, I have heard of him, as he first described the

"Humboldt current" (which is in the process of being changed to the "Peru Current"). The hostility to anything Germanic during the 19th and 20th centuries is attributed to him not being recognized by English speakers (even though he considered himself a Parisian).

One of his most enthusiastic obsessions was the direction of the magnetic poles, actually an obsession of all world travelers at the time, e.g., Cook and Franklin (heavy fragile equipment hindering travel). The poles gradually shift over time, which is very important to know for navigation. For hundreds of years, there has been a slight north, north-easterly direction of its movements but this last year it took an abrupt almost straight easterly deviation. Some of the people interested in the earth's axis are wondering if a shifting of the poles (which has happened before) and a dramatic climate change are in the near future.

When Humboldt returned, he wrote several books about his trip at a time when printing presses were just starting to make reading material much more affordable. Writers were few and far between, especially those with money to pay the printing costs, and he became an instant international celebrity and on the lecture circuits. This trip was the basis for many more of his books and lectures as travel had become very restrictive with the European wars, and he died in 1859. What I found puzzling was that he found Paris to be his preferred residence; it and Bologona were the most sophisticated, modern, and civilized cultural capitals of the world where the intelligentsia tended to congregate, yet the theme of his writing was what a threat to nature man is. Perhaps this is the origin of the term "phoney baloney".

My appreciation of Humboldt's writing is that his level of biology is little more than high school science and natural history, which at the time may have made him a world authority. His books mostly deal with his travels and difficulties, which at the time may have been impressive. But look how many travel writers there are today that have vastly improved the craft. Essentially being the first in the field and having the money to publish and get on the lecture circuit and having the good looks and personality would undoubtedly have contributed to his capture of the public's attention.

Ms. Wulf's explanation for Humboldt's importance is that he does not draw a sharp line between the sciences and the arts, between the subjective and objective. He used his imagination to understand nature, a vision from a higher point of view, especially much higher than those of the uneducated people who live in the outdoors for subsistence to support them and their family. He was a painter, a poet, a musician, a philosopher, a political and religious leader, a scientist, and an artist, but most of all a prolific writer and lecturer celebrating the metaphysics of natural wilderness, transcendentally, and existentially. In fact, many in todays media like Ms. Wulf have embraced this use of their platforms to be like Humboldt.

The fact that he lived almost his entire life in luxurious accommodations, preferably in Paris, with no wife and family to support, may explain why he believed humans were a threat to nature. World leaders took inspiration from him: Presidents Jefferson and Roosevelt and the birth of American Parks, Darwin and the origin of species, Thoreau and the poetry of the science of nature, Marsh and man and nature, Haeckel and the art and ecology of nature, and Muir and the preservation of nature.

Ms. Wulf is totally besotted with this man. She wants him to represent the way nature is to be treated. He went in and described it. That is enough violation. After that, only a chosen few should be allowed to go back and damage it more. It goes without saying that no humans are allowed to exploit it, the ultimate damage, let alone a man that wants to support a family. They should have no say, just educated elite with high ideals, existential wisdom, high minded visionaries with transcendental thoughts.

Ms. Wulf represents to me the communication media's way of thinking quite well. They have few if any science courses, are loaded to the hilt with liberal arts courses, and are extremely well educated and able to think and write, especially at their level of creative thinking and writing. Even theologians are not in their league. I go to church most Sundays to try and learn how to be a better person for the next week, and I am constantly amazed at how the middle eastern bibles have been revised and interpreted over the years, and can be done on the spot if need be, to mean just about anything you might imagine, but these creative writers in the communication business are way ahead of theologians.

In elementary school, we used to practise nuclear war drills, then there was the cold war. In 1975, we were told on the best authority that the world was running out of oil and a date was given. When it came and went, so what? Nobody was accountable for saying it. About that time, Paul Erhlich started making his 10-year predictions, global cooling, the end of the world January 1, 2000 according to David Suzuki, the 2008 collapse of world banks, Al Gore, the IPCC, etc. The media embraces gloom and doom and they put all their creative energies into it as well; if it bleeds, it leads. Proven wrong, so what, there is another gloom and doom scenario taking the last one's place. What about the discomfort they have caused the people? What about upsetting children needlessly? The media are not the problem, the people are.

I live where very few people would choose to live, the Siberia of the Americas, an "Eckie". It has few of the pressures living in the city has. I read and write, walk my little patch of farm and non-farm land, bird watch including bird feeders, garden, get trapped by blizzards inside my house for a day or two, drive on poor roads in the country and visit with locals, and fly my little airplane over this almost unsettled expanse. The other day, I stopped to watch about 50 pronghorn up close that were pawing a snow covered field of poorly baled cover crop oats. My heart soared and was so full of the love of nature (although not natural of course). Looking at these exquisitely beautiful creatures struggling to make an existence in this part of the world, half starved, hypothermic, heavily parasitized, harassed by predators; what the media want to say about the end of the world means nothing to them. A few days later, I came upon a "yard" of about 100 whitetails just at sundown. Probably half were young-of-the-year, trotting and prancing around with their tails up and their heads and big bushy flags waving away for all to see, proud as peacocks that they were alive and doing well enough eating unharvested barley swaths. They aren't "natural" either, the species didn't historically live in this part of the world. They are recent arrivals because of farming. I felt so lucky to be part of it.

The media, like Humboldt's dream, are saying there needs to be 10 million not 10 billion people on the planet. People are like pronghorn and whitetail deer, they just want a chance to live. I think they should be allowed the chance. Humboldt's dream comes from his position of privilege. Right now, Ms. Molloy is turning in her grave and saying "Bob, when you come over to the other side, I'll be waiting for you and will lay a licking on you for daring to write!!!"

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