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THE CANADIAN SOCIETY OF ENVIRONMENTAL BIOLOGISTS Newsletter / Bulletin

In this Issue:

- **National News & AGM Reports**
- **Regional News**
- **Missed Climate Targets, and Failed Technological Solutions**
- **The Growing Role of Citizen Science in Monitoring Environmental Change – Achieving a Balance With Government Programs?**



CSEB Newsletter Bulletin SCBE

VOLUME 72, ISSUE 4, Winter, 2015

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

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Front Cover: . Hairy Woodpecker, St Albert, Alberta

Back Cover Top: "Mother Bear Prays for Earth Healing" - Statue in St. Albert, Alberta.

Bottom: Mill Falls, Mersey River, Kejimikujik National Park, NS. Interesting colour is due to natural acids in water.

Photo Credits: Peter Wells, CSEB Member

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CSEB NEWSLETTER 2015

Vol. 72, Number 4 Winter 2015

The Canadian Society of Environmental Biologists Newsletter is a quarterly publication. The Newsletter 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 newsletter 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: gash@golder.com

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LE BULLETIN de la SCBE 2015

Vol. 72, Numéro 4 Hiver 2015

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

Tout la correspondance d'affaires, y compris les abonnements, les changements d'adresse, les exemplaires retournés et les formulaires: CSEB National Office, P.O.Box 962, Station F, Toronto, ON, M4Y 2N9. **Les lettres à l'éditeur:** Gary Ash, Editor, courriel: gash@golder.com

Rédacteur en chef: Gary Ash

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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 so as to minimize environmental effects.
- to maintain high professional standards in education, research and management related to natural resources and the environment.

OBJECTIFS de la SOCIÉTÉ

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

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

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

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

- prices are for camera-ready ads
- ads are subject to our approval for acceptance

- all ads are in black and white print
- payment due upon receipt of notice

Further Information Available Upon Request:

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

Please Forward Submissions and Requests to:

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NATIONAL News

PRESIDENT'S Report

By Bill Paton, CSEB President

December 8, 2015

Our year began with a number of items on the agenda – organizing a workshop/AGM; launching our promotional video; revising our web-page and including social media access; raising awareness of the Society and its aims and goals within the academic biological and environmental sciences across Canada.

Your Executive has met regularly by teleconference addressing these plans. Significant pre-planning work has been done on the Workshop/AGM now planned for Burnaby in the late fall of 2016. This last year's experience has convinced us that planning for a major event like this has to start two years before the event. The information on the Workshop theme has been distributed widely to scientists working in the specific areas to be reviewed, to NGOs and other related environmental groups. The major initiative now is to attract sponsors for keynote speakers. A list of potential donors is being prepared and as President I will approach as many of these as I can in the next few months.

The web-page as will be reported is still a work in progress and we are optimistic that it will be fully functional very soon, assisting in the important function of membership renewals.

I have personally shared the Society video with all biological and environmental science programs in Canadian universities and colleges. Several are linking the YouTube version of our video on their web-sites. Several have requested that we place their link on our new web-site. In discussion with some of the Chairs of these programs and individual faculty, the opportunity for peer-reviewed publication possibilities was identified as a positive asset. I would like to see us provide that opportunity for presentations at our 2016 Workshop.

Finally, I would like to extend my thanks and appreciation to our Executive members for their time and valuable contributions; also to those who have written articles for the Bulletin and Gary for his continued commitment to this major link to our members and the wider biological community.

CSEB 2015 AGM

By Gary Ash, CSEB Newsletter Editor

The CSEB held the 2015 Annual General Meeting via conference call and webinar. Although notice had gone out via email to all current CSEB members, the call was mostly executive members and only one Regular member. The executive is trying to understand the lack of participation in the society by most of our members, and plan to do a poll to determine if the format or the time of the AGM conference call was a stumbling block for most members.

Along with the general business meeting, we had three very interesting presentations:

1. Comox Valley British Columbia Garry Oak (*Quercus garryana*). Restoration of an Extirpated population. Dr. Loys Maingon
2. Need for Research on Manitoba's Northern Marine Coast. Dr. Bill Paton, Brandon University
3. Lake Major Dam - Fish Passage. A Novel Approach to Moving Migratory Fish. A Project for Halifax Water. Heather Levy, EnviroSphere Consultants, & Norval Collins. CEF Consultants.

The annual business meeting included a number of reports from the executive and some of the regional directors. Karen March, our Secretary-Treasurer, provided an accounting statement year-to-date, and a budget (see this section), which was passed by vote of those attending. The written reports are presented in this newsletter.

Overall, it was an informative meeting and those attending provided valuable ideas and feedback to help the Society increase membership and engagement of the members.

If you would like to provide any suggestions or feedback about the CSEB, please contact President Bill Paton. If you would like to contribute any articles or regional news for the Newsletter, please contact me at garyash@shaw.ca.

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

Errata:

The photo credit for the photo in Peter Wells' article on page 11 of Vol 72(3) issue of the newsletter was inadvertently missed. The photo was taken by Mike Olsson.

CSEB Past President's Report

Since relinquishing the reigns of the presidency of the CSEB to Bill Paton, my term as past president has been relatively quiet.

However, having said that, I have enjoyed assisting Bill in setting up conference call meetings through Recite Conferencing, maintaining my signing authority on cheques for payment of invoices, and leading, to some extent, the discussion and development of the plans for the proposed 2015 workshop on environmental assessments of impacts of oil and gas development on ecosystems in Canada and other locations worldwide. This workshop was to have taken place at the Burnaby campus of BCIT in Burnaby, British Columbia; followed by a field trip to the nearby Tseilwaututh Nation on the North Shore and their intertidal areas. This would have been a unique opportunity to review the EA originally prepared by the project developer, as the Nation has officially rejected the Kinder Morgan's expansion project.

The workshop has been postponed until this time next year due to time constraints impacting the planning for the workshop. It has been generally agreed that we should give ourselves considerably more time to plan workshops of this nature. In this regard, planning is already underway for the 2016 and 2017 workshops.

Respectfully submitted,

Robert Stedwill

Past President

CSEB Newsletter Editor's Report



Canadian Society Of
Environmental Biologist

NEWSLETTER EDITOR'S REPORT

Prepared by Gary Ash

8 December 2015

- In 2015 to date, three newsletters have been published (Vol 72 issues 1, 2, 3).
- Newsletter distribution format is as follows:
 - Electronic Distribution – 65
 - Hard Copy Distribution – 53 (incl. two copies to National Library of Canada)
- Deadlines for Submissions for Newsletters:
 - Winter 2015 – now
 - Spring 2015 – 15 Feb 2016
 - Summer 2015 – 1 May 2016
 - Fall 2015 – 15 Sep 2016
 - Winter 2015 – 1 Nov 2016
- Currently looking for Guest Editors and submission for 2016 newsletters – Contact Gary Ash
The newsletter can only be as good as the input of content received.
- Currently looking for photos of Biologists in Action for upcoming newsletter covers

SECRETARY-TREASURERS REPORT - 2016 BUDGET

CSEB Budget For 2016 Adopted Dec. 8, 2015, and Compared to Previous Budgets Since 2010

	2010	2011	2012	2013	2014	2015*	2016
Receipts	Approx. from expenditures						Budget
Membership fees	\$6,700.00	\$5,700.00	\$6,500.00	\$6,400.00	\$5,000.00	\$4,500.00	\$5,500.00
NRC Journals	\$1,000.00	\$1,200.00	\$1,400.00	\$800.00	\$900.00	\$1,300.00	\$1,500.00
Publication Sales	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Bank Interest	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Conference Proceeds (incl. Sponsors)	\$0.00	\$0.00	\$1,500.00	\$0.00	\$1,800.00	\$0.00	\$1,500.00
Revenue Generation	\$0.00	\$175.00	\$0.00	\$0.00	\$0.00	\$400.00	\$200.00
Total receipts	\$7,700.00	\$7,075.00	\$9,400.00	\$7,200.00	\$7,700.00	\$6,200.00	\$8,700.00
Expenses							
Corporate registration	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00
Newsletter Production	\$4,700.00	\$3,600.00	\$2,500.00	\$2,400.00	\$2,700.00	\$1,300.00	\$1,500.00
Board Meeting (travel subsidy)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$100.00
Administration (conference call, misc.)	\$600.00	\$150.00	\$750.00	\$300.00	\$700.00	\$600.00	\$700.00
Web hosting, Update	\$70.00	\$150.00	\$0.00	\$200.00	\$650.00	\$300.00	\$300.00
NRC Journals	\$1,000.00	\$1,200.00	\$1,400.00	\$800.00	\$900.00	\$1,300.00	\$1,500.00
Postage and Email Newsletters	\$1,300.00	\$1,000.00	\$1,000.00	\$700.00	\$800.00	\$450.00	\$500.00
Mail Box Rental	\$250.00	\$250.00	\$250.00	\$240.00	\$250.00	\$250.00	\$250.00
Redirect Mail	\$300.00	\$350.00	\$350.00	\$350.00	\$350.00	\$350.00	\$350.00
Chapter Rebates	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Membership renewal, cards, postage	\$500.00	\$600.00	\$750.00	\$500.00	\$100.00	\$400.00	\$500.00
Bank Charges	\$10.00	\$20.00	\$20.00	\$20.00	\$0.00	\$0.00	\$20.00
Miscellaneous, Conference	\$30.00	\$1,000.00	\$4,000.00	\$30.00	\$1,500.00	\$0.00	\$1,500.00
Total expenses	\$8,790.00	\$8,350.00	\$11,050.00	\$5,570.00	\$7,980.00	\$4,980.00	\$7,250.00

* Estimated as outstanding items at time of print

CSEB Membership Report - Presented by Gary Ash, CSEB Membership Chair



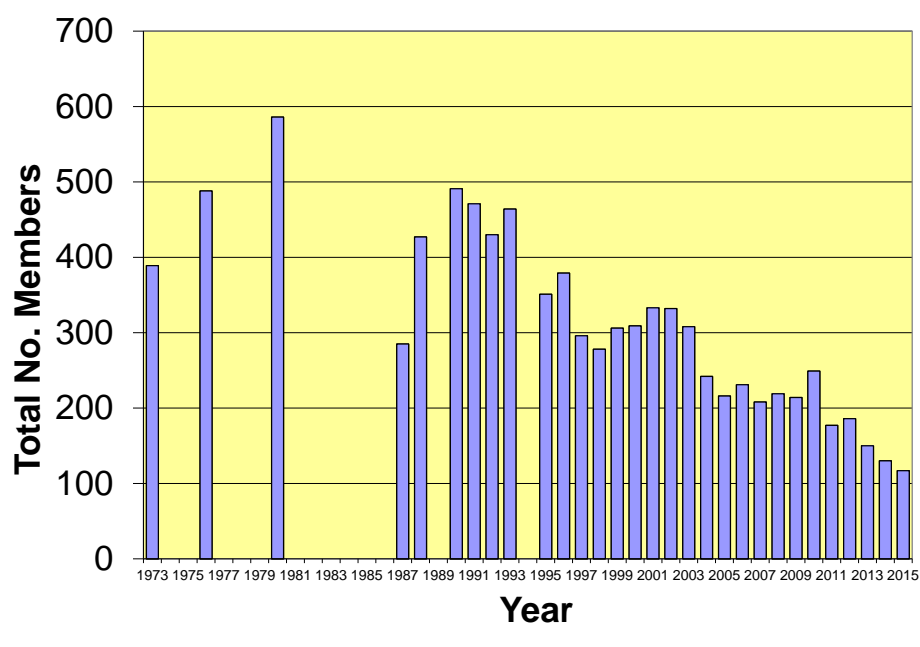
2015 CSEB Membership

by Region and Membership Category

to 8 December 2015

Region	Compl. / Hon.	Associate	Library	Regular	Student	Total
1 Atlantic	2	2	1	6		11
2 Quebec				4		4
3 Ontario	1	2	1	23	2	29
4 Manitoba				3	1	4
5 Sask.				13		13
6 Alberta	1		3	30	3	37
7 BC	2			12	3	17
8 Territories				1		1
9 USA			1			1
O Foreign						0
Totals	6	4	6	92	9	117

Long Term Membership Summary:



Saskatchewan Report – 2015 Annual General Meeting

Submitted by Robert Stedwill, Past President and Acting Chapter Chair

This has been a very quiet year for the Saskatchewan Chapter, and unfortunately, we are down to thirteen (13) members, which is a significant loss from the twenty-one (21) of a few years ago. This is more than a third (38%). This loss can be attributed to retirements, no time, and personal reasons. It is the latter that is of concern.

Saskatchewan as you are aware has experienced a boom over the last number of years, with its population being at its highest level ever; however, this has not translated into improved membership numbers. One could argue that biologists in this province were too busy being involved in other organizations and activities, but with the economy being on a bit of a downturn, not only here, but across the country, this too will have an impact on membership.

What to do about it?

We, or primarily me, need to approach existing Saskatchewan members to identify and encourage non-members to become involved in our Society, and describe the benefits that they might garner from membership. This does not just include receiving the quarterly newsletter, but puts members in contact with other biologists in the province and across the country, who, are prepared to share their knowledge and wisdom on biological and environmental issues. Additionally, students in the biological sciences at the University of Saskatchewan and the University of Regina need to be apprised of the organization and encouraged to join, if not as a student, then upon graduation. Being involved in the CSEB needs to go beyond just membership, but participating in writing articles published in the newsletter, offering up opinions, debating opinions, and sharing those views in annual workshops.

The CSEB is only as good as the involvement of its membership. Currently, the Canadian Society of Environmental Biologists is being run with nine active members, all of whom are volunteers and also lead very busy lives, both professionally and personally. Please help out.

The Saskatchewan Chapter is currently seeking a chair and/or Regional Director, or both preferably.

Check out the CSEB Video at
<http://youtu.be/J7cOuDbBf9c>

Website Report

Submitted by Brian Free, CSEB Member

CSEB has engaged Wanderoak website designers to re-design the CSEB website. Over the past many months, Brian Free has been working with the designers, moving through the various steps leading to a renewed website. A beta version is expected shortly. As well, Gary Ash has been advising them about our needs regarding on-line membership renewals and member subscriptions to research journals. In the end, we anticipate a more attractive, efficient and user-friendly website with popular features to engage and inform members.

How You Can Help the CSEB

- **Contribute to the quarterly newsletter and/or website.** Give us an article on something you are interested in
- **Write a short paragraph about what you have been doing, articles or reports you have written**
- **Provide us with points of views on issues.** Your Executive is always interested in learning what issues concern you
- **Write a book review for the newsletter**
- **Become a Chapter Chair, or offer to join the Board of Directors**
- **Promote CSEB - put up a poster, distribute membership forms** - download from our website
- **Set up a Chapter** - contact any Director for help
- **Organize a CSEB event** - contact any Director for help
- **Attend the annual conference and maybe present a paper on your work.**

IS THE SCIENCE OF CLIMATE CHANGE SETTLED?

If you think so, you should read

"Doubt and Certainty in Climate Science"

recently published by Alan Longhurst (link <https://curryja.files.wordpress.com/2015/09/longhurst-print.pdf> to download the **free** book).

"The book is 239 pages long, with 606 footnotes/references. The book is well written, technical but without equations – it is easily accessible to anyone with a technical education.

This is a remarkable book, a tour de force. There are fresh insights in each chapter, borne of Longhurst's objective analysis of the data and the literature. The papers he cites are from Nature, Science, PNAS, Journal of Climate and other mainstream, high impact journals. I doubt that John Cook's activist abstract classifiers would classify many if any of these papers as 'skeptical'. However, each of these papers provides a critical link in Longhurst's reasoning that produces conclusions that do not agree with the 'consensus.'" - Judith Curry (www.judithcurry.com)

REGIONAL News

BRITISH COLUMBIA News

By Loys Maingon, CSEB BC Director

Missed Climate Targets, and Failed Technological Solutions

In 2015 BC environmental concerns have been largely shaped by the abiotic ecological impact of “The Blob,” a large warm water mass in the North Pacific 2°C above normal coupled with a developing large El Niño, and by the varying political fortunes of large-scale projects that are crucial to the provincial government’s long-term economic plans.

In many ways, the social and environmental impact of the August 5, 2014 Mount Polley mine disaster can serve as a metaphor for the state of the environment and the calibre of environmental management in BC. In brief, in BC, the environment is compromised by the inability of the economy to adapt to the constraints of the weather, and an unfettered belief in “business-as-usual” evinces the limits of technological solutions.

The Mount Polley disaster is considered to have been one of the biggest environmental disasters in Canadian history, with as yet undetermined long-term impacts on Quesnel Lake, which is the community water supply and an important part of the province’s salmon fishery. In spite of international concern at the lack of strong mining regulation in BC, as expressed by the government of Alaska, First Nations, and the public, Imperial Metals was granted a permit to resume operations, albeit at half capacity, in July 2015. The permit came with an obligation to contain and treat all water from the slurry ponds holding elevated concentrations of copper, iron, manganese, arsenic, silver, selenium, and vanadium. In a slumping economy, the Mt. Polley mine provides about 300 jobs to the community of Williams Lake. In November,

with El Niño conditions delivering unprecedented amounts of precipitation, the engineered pond and treatment facilities were found to be unable to contain the slurry, unless work was halted. On December 4, 2015, the Minister of Environment, Mary Polka, granted a two-year permit to discharge into Quesnel Lake.¹ As the article referred to indicates, neither the minister, nor ministry officials, were available for comment to respond to community concerns.

Throughout 2015, BC, like its southern neighbour, California, has been subjected to weather-extremes that somehow have consistently exceeded the engineering expectations of the built-environment. In keeping with climate-change modelling forecasts, the province has experienced successive massive weather events, which if averaged may correspond to expected norms, but which by themselves have been “record-setting”. 2015 experienced a record drought coupled with a low snow pack. On Vancouver Island, this has meant that municipalities have been on a “water quality advisory” associated either with high turbidity in high rain events or with bacterial contamination in periods of drought for over 6 months. In other words, most communities on Vancouver Island have faced boil water advisories in extended periods of extreme drought only to be followed by boil water advisories in periods of extreme rain.

Both water quality and quantity have been consistently compromised through lack of planning and land-use impacts inherited from industrial forestry management practices. With the exception of Victoria’s Capital Region, which recently acquired its watershed from Timberwest, all of East Vancouver Island’s municipal watersheds lie within the old “Dunsmuir land grant”, and are in active timber supply tenures. In what will seem an anomaly to most westerners, forests on the east side of Vancouver Island, and the rivers within them, are not crown lands but privately-owned properties. As a result, as populations increase and water issues become a growing concern, most municipalities are now actively trying to regain control of their watersheds,



Figure 1: NASA aerial photos of the Mount Polley Mine site before (July 24, 2014) and after the dam breach (August 5, 2014)

with varying degrees of success, and little provincial or federal government support.

Nowhere have the implications of this been more clear than in the Shawnigan Lake watershed, where standard water quality problems associated with watersheds accessible to forestry and recreation have been compounded with municipal waste disposal concerns.² Here, as at Mount Polley, the ministry of the environment granted, against the wishes of the local community and the municipal government of Victoria, a 50-year permit to a private corporation to receive and store contaminated soils from Victoria in an abandoned quarry at the headwaters of Shawnigan Lake. Not too surprisingly, as at Mount Polley, the permit was almost immediately followed by an accident in which heavy rains caused water to overflow from the site into Shawnigan Lake, which is the residents' domestic water supply.³

Again, as the extreme climatic conditions of so-called "100 year returns" are becoming the five-year norm, the failure to appreciate the magnitude of weather events projected in the "new normal" of climate change is putting entire watersheds and the species and ecosystems they support at risk. Even as we end a year that started with a drought with mild wet weather, Environment Canada notes that we do so with series of unprecedented successive extreme storms.⁴ The early drought that left us with no snow-pack to carry salmon populations through the normal water-deficit period, followed by current water surges, will have long-term impacts on juvenile salmon populations, and long-term consequences for our fisheries. As the Mount Polley and Shawnigan Lake examples bear out, the built infrastructure is not designed to meet the challenges that lie ahead.

It is not a simple question of whether or not contamination levels exceed acceptable federal or provincial standards. The weather conditions that gave rise to these accidents exceeded the required design standards. The standards themselves reflect a failure to adhere to precautionary principles and act pro-actively. This created an opportunity for potentially irreversible contamination. In both cases, these accidents came about after repeated reassurances that the technology was adequate. In both cases, the tacit public assumptions upheld by the ministries responsible were that corporate interests are synonymous with the public interest, need to be prioritized, and that the environment would not be negatively affected. In point of fact, this logic and the accidents it gave rise to indicate that in BC the environment remains an afterthought. It is no more than the "natural capital," which classical economics has always assumed to be an infinite resource of no particular economic value.

This really sets the scene to understanding the substance and limitations of what may be the most telling, and most important, of the many reports commissioned in 2015 by the Christie Clark government. With much fanfare, in advance of COP21 in Paris, BC's provincial government appointed a "Climate Change Leadership Team" in April 2015. The team is an assemblage of political, business, NGO, and climate science figures, generally known to be close to the government. The caveat in this report is that the terms of reference restrict recommendations to the current government's economic strategy:

"the current Climate Action Plan as well as new programs and policies required to achieve British Columbia's greenhouse

gas (GHG) reduction targets within the context of economic growth, B.C.'s LNG Strategy and the B.C. Jobs Plan."

In other words, the plan aims to meet 2°C climate change targets for 2100, by keeping current "business as usual" assumptions and practices.

The report submitted at the end of October (Climate Leadership Team: Recommendations to Government)⁵ was released on a late November Friday afternoon before a Grey Cup week-end. The report has two facets. Most importantly, it presents an honest assessment of BC's real climate performance. It reveals that contrary to the image that BC likes to project for its global "climate leadership," BC will not be able to meet the climate change targets it set in 2006 by 2020, because it has done nothing since 2012, when the current government reversed many of the initiatives undertaken by the Campbell government. In fact, the report lowers any public expectations by removing the target date to 2030, well out of range of any accountability. The report, therefore, presents a new hypothetical set of targets and recommendations, to be met by 2030 (40% of 2007 GHG) and 2050 (80% of 2007 GHG).

(How the targets set by BC are now to be constrained, under the same terms of reference, to the new 1.5°C standard set by Catherine McKenna, the new federal Minister of Climate Change and Environment, is unclear.)

The report was actually prepared under the technical guidance of a private consulting firm, which specializes in carbon footprint economic assessments for business. Navius previously prepared a Canadian "Deep Decarbonization report for the UN in fall 2014."⁶ The Navius UN DDPP report is itself a development of 2012 collaborative work with Simon Fraser University's Energy and Materials Research Group,⁷ which is made up of many of key advisors to the Gordon Campbell government in the development of the Greenhouse Reduction Target Act of 2007.

What this means in real terms is best understood by contrasting the Climate Leadership Team's report and its predecessors with the recently released report by Cambridge University's "Institute for Sustainability Studies: Re-wiring the Economy: Ten Tasks, Ten Years."⁸ The difference between the CISL (Cambridge) and the Navius proposals lies in that Navius assumes – contrary to some 50 years of data – that a series of emerging technological quick-fixes can address the limits of the current economic model, without substantially modifying "economic priorities." The Navius approach subscribed to by the BC government is characteristic of what is known as "corporate environmentalism," environmentalism in which a corporate agenda takes precedence. Politically, on the plus side, as this is likely to be the stance that will dominate discussion in Paris, as opposed to the scientific approach, BC and Canada are likely to be in sync with many of its partners, though it will remain at odds with the scientific community.⁹

Corporate environmentalism is consistent with the practice and outcomes of this province's environmental management policies, as illustrated by the Mount Polley mining disaster and its sequels, as well as its handling of solid waste management at Shawnigan Lake. The economic plans of the current provincial government, which constrain the recommendations, are

themselves in a precarious situation. The government's long-term economic strategy has been heavily committed to subsidizing large investment-intensive energy-related projects in three areas, heavy oil pipeline development, liquefied natural gas, and the development of hydro-electric power at Site C.

In all three areas, the government's plans have run into well-documented problems. The Northern Gateway development has been foreclosed by the moratorium on tanker traffic along the West Coast announced by newly-elected Prime Minister, Justin Trudeau, although Enbridge is pursuing co-operation avenues with local First Nations. The expansion of the Kinder Morgan pipeline now remains as the only viable route to a seaport, since the City of Burnaby lost its legal bid to block passage of this pipeline, but vigorous political opposition is still to be expected.

LNG development, which is a central plank and Achilles heel of the Climate Leadership Report's 32 recommendations, is fraught with problems as the global market for LNG has dwindled, and as it is becoming increasingly-clear that extraction and conveyance of natural gas itself remains a problematic and largely unaccounted-for source of pollution.¹⁰ The BC Climate Leadership Team's report assumes that the technological solution to this problem is sure to be developed in short order. Furthermore, the infrastructure has yet to be developed to ship LNG. One of the concerns associated with the transportation of LNG is the shipment of LNG by tankers. The federal moratorium on tanker traffic, which has rendered the Northern Gateway seemingly nonviable, is certain to affect any future LNG tanker propositions put forward by the provincial government.

Finally, although the BC government posits hydro-electric developments as "green energy", this is the subject of considerable debate.¹¹ In terms of what is to be considered for the future, Uruguay has emerged as the current leader in alternative energy, albeit depending on harnessing solar and wind, and LNG. One of the keys to Uruguay's success has been to stop developing hydro-electric, and converting investments to solar and wind — without government subsidies.¹² In BC, the site C development seems to face a similar crossroads. While legal challenges from First Nations and local landowners have yet to meet with success, opposition to the project continues to grow, as the government's environmental credibility declines. Although construction of the project has been given the go-ahead in early November by the Minister of Energy, Bill Bennett, and is well expected to near completion by the next election, the opposition has vowed to undo the project if it comes into power in May 2017.¹³

The year 2016, therefore, promises to be a rough ride for environmental biologists in BC, as environmental impacts are very likely to multiply and remain underestimated.

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ALBERTA News

By Brian Free, CSEB Member

There has been a lot of attention given to the COP21 Climate Change Conference in Paris this December. With a more environment-friendly federal government — (Time will tell...) — and support from most of the provinces, it will be interesting to see what position Canada takes. For its part, the Alberta government recently released its Climate Leadership Plan. The plan includes four main strategies:

1. Accelerated phase-out of coal. Two-thirds of existing coal-generated electricity will be replaced by renewable energy sources. Natural gas will fuel the remaining generation.
2. Reduce pollution by putting a price on it and employ market-based incentives. There will be an economy-wide price for carbon of \$20 per tonne by January 2017 and \$30 per tonne by 2018. The revenue will be invested in measures to reduce pollution and an adjustment fund to help individuals, families, aboriginal communities and small businesses that are negatively affected by this new policy.
3. An overall limit will be set for oil sands emissions. Currently, they produce 70 megatonnes of carbon emissions annually, and there is no limit. Going forward, a new limit will be set at 100 megatonnes per year. This limit provides room for growth of the industry, while providing clarity around environmental constraints.
4. Action will be taken to reduce methane emissions from the oil & gas industry by 45% by the year 2025. This mainly includes vented and fugitive emissions.

Whether this action plan is adequate can be debated at length, but it is definitely encouraging that the government appears to be taking climate change seriously. Time will tell...

SASKATCHEWAN News

By Robert Stedwill, CSEB Past President & Sask. Chapter Chair

Although I am writing this for the winter newsletter of the CSEB, it is hard to believe that winter is upon us here in Saskatchewan. There is little snow on the ground and the forecast high for December 4th is 8. That is plus eight centigrade. We live in strange times during this time of climate change. I don't need to dwell on the ramifications of higher temperatures and lack of snow on the southern prairies to biologists, however, I hope the political leaders of the world as they start their "we've got to do something" speeches in Paris today will translate into a meaningful plan of how the countries of the world are going to contribute to the reduction of greenhouse gas emissions.

Just reading in today's local paper, I note that the Saskatchewan Water Security Agency has borrowed millions to upgrade water control infrastructure over the past number of years by way of canal improvements, dam safety and other related water control facilities. It's my belief that water issues on Saskatchewan's southern prairies will be a major issue in the not too distant future, and it will be interesting to see if the aforementioned expenditures are a worthwhile investment.

TERRITORIES News

Submitted by Anne Wilson, CSEB Vice President.

NWT and NU Winter 2015 Regional Update:

This is a time of year that I have mixed feelings about not living in the North any more. Over three decades of living north of 60° gave me lots of memories of winter activities – skijoring over lakes and portages, snowmobiling, horseback riding over endless kilometres of frozen muskeg not accessible in thaw seasons, ice fishing, and going for dogsled rides whenever friends and family came to visit. I miss all that, and can almost forget the many times the wind chill kept us indoors, or that the five hours of daylight (if you include the twilight) limited activity times outside at the shortest. But the fact is that winters are much milder (in early December, Yellowknife was about 10°C above seasonal norms) and ice fishing no longer involves augering through a metre of ice. Would it be crazy to be a reverse snowbird, and flee the Alberta winter for parts North?

Environment Canada has updated the seasonal forecasts for the Dec. – Feb. period, and forecasts that almost all of Canada will experience above normal temperatures. For the NWT and NU, much of the central area is expected to experience above normal precipitation. This will be really good for the regions with trees, and for lake recharge, and for the mosquitos and black fly populations. And for cross country skiing.... Hopefully the snowfall will not cause any grief for the biologists who are out doing the winter sampling programs!

As elsewhere in Canada, mining is experiencing hard times. Commodity prices are down, financing is tight, and we have seen the closure of two mines in the NWT. The Cantung (North

American Tungsten Ltd.) tungsten mine has gone into bankruptcy, and is under the control of the federal government. The Snap Lake Diamond Mine (DeBeers Canada) has been put into Care and Maintenance for an indefinite period, with no expectation of reopening. In both cases, falling prices for the commodity were a key factor in the face of very high operating costs.

That said, there are still developments proceeding in both Territories.

Mining and other development news

Ongoing environmental assessments (EAs) underway in the NWT and Nunavut include the following:

- Jay Pipe Expansion - Ekati Diamond Mine (Dominion Diamond Ekati Corp). The Jay Pipe is located under Lac du Sauvage, and is proposed to be accessed by constructing a ring dike around the kimberlite pipe. Public hearings were held in September, and now the Review Board is making its decision and writing the report.
- Revised terms of reference were issued last February for the impact assessment of the Mackenzie Valley Highway project, now reduced to 333 km of all-season gravel road connecting Wrigley and Norman Wells. This EA is waiting on the submission of the Developer's Assessment Report.
- Prairie Creek Mine (Canadian Zinc Corp.): The company has submitted further information in support of the EA, but has hit a snag with their airstrip – this cannot be permitted in a National Park. The company is also working to assemble financing needed to take the mining project into production.
- A new environmental assessment has commenced for an access road upgrade in Howard's Pass through the western NWT, for the Selwyn mine project (YT). The Terms of Reference have been issued, and scoping is proceeding.
- Sabina's Back River gold project (NU) is undergoing environmental assessment, and the Final Environmental Impact Statement is being distributed. The scope of the project has been reduced from the original, to optimize economic feasibility up front.
- Baffinland's Mary River project has applied to increase the shipping season to year-round; this Phase 2 proposal is under reviewed through the Nunavut Impact Review Board (NIRB).
- Agnico Eagle Mines Inc. has applied to expand the Vault pit; this involves draining a small lake and the application is being reviewed by NIRB and the Nunavut Water Board, but is within existing footprint and operations.
- TMAC Resources is looking to bring the Doris North gold mine into production, contingent on approvals for expansions in the Hope Bay Belt. They are floating a revised project description that raises quite a few questions. This has not been sent for environmental assessment, but seems to be beyond amending the previous EA terms and conditions. And then there is the water licence to be amended.

In the regulatory forum, several mining projects are moving towards development or have applied for amendments to their water licences, or renewals.

- Snap Lake Diamond Mine (DeBeers Canada Inc.) made the surprise announcement on Dec. 4th that the mine halted operation. This will have far-reaching effects on the Northern workforce and economy. For more details, see <http://www.cbc.ca/news/canada/north/snap-lake-shutdown-layoffs-1.3353295>

- Diavik is proceeding with construction of the A21 dyke, to allow them to access ore from an underwater pipe. They have applied for an amendment to how TSS is regulated under their water licence.
- North American Tungsten Limited's Cantung Mine water licence renewal was underway when the mine closed in late October and filed for bankruptcy.
- Fortune Minerals has not advanced further, and is working on financing to move the project to construction. Road access is also an issue.
- Canadian Zinc Corp.'s Prairie Creek Project is seeking financing to proceed.
- DeBeers Canada Gahcho Kué Diamond Mine is under construction, and pushing for completion of construction shortly (Dec. 2015). Production is scheduled to start in the third quarter of 2016.
- The Avalon Rare Metals project is on hold, while the company does further work and lines up financing prior to going to water licence hearings.
- The Meadowbank Gold mine's Type A Water licence renewal has been granted. In addition to the Vault pit expansion, the company is looking at an expansion with the Amaruq ore body. It is a satellite resource, so a 50 km road would need to be constructed and this ore would extend the mine life by several years.
- Agnico Eagle Mines' Meliadine Gold project water licence application has proceeded through the technical review and will be going to public hearing in the second week of February 2016.
- The Lupin gold mine has been in "care and maintenance" for years, and the new owners have renewed the water licence with the stated intention of developing the Ulu deposit and reopening the mill.
- The Nanisivik and Polaris lead zinc mines have been issued closure licences, which cover the final monitoring phase.
- The Giant Mine Remediation project team is exploring remedial development options prior to submitting an updated water licence application. Terms of the long-expired water licence still apply, however, and the mine is still complying with the MMER requirements.
- Several municipal water licences are up for renewal in Nunavut, with Iqaluit's at the top of the list.

Full details for current environmental assessments are available on the Board's web site at <http://www.reviewboard.ca/registry> and regulatory files at <http://www.mvlwb.ca/Boards/mv/SitePages/registry.aspx>.

Closing:

If you are connected to activities in the Yukon, NT or NU, there is a vacancy for a Director, and I would love to welcome someone on board. If you are 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.wilson2@canada.ca.

Scientists Gather to Discuss Arctic Under Shadow of Changing Climate

ArcticNet is Canada's single largest gathering of scientists studying the North

By Bob Weber, The Canadian Press Posted: Dec 06, 2015



A snowmobiler makes his way through the ice heaves in Frobisher Bay in Iqaluit, Nunavut, on December 10, 2014. If climate changes goes unchecked in the Arctic, an Environment Canada researcher estimates the ice season could be seven weeks shorter and a nearly ice-free summer could develop sometime between 2020 and 2040. (Sean Kilpatrick/The Canadian Press).

-Top Arctic scientists will gather in Vancouver this week to discuss everything from caribou populations to the high cost of food — but underlying it all is the unsettling speed with which the northern climate is changing.

"It's a real challenge," said Ross Brown, an Environment Canada researcher who is to speak this week at the ArcticNet conference.

Brown's presentation will attempt to sum up the profound changes that are expected in the Eastern Arctic if international meetings such as the one in Paris are unable to agree on how to bring greenhouse gas emissions under control.

The Arctic is warming faster than almost anywhere else on Earth — about twice the rate of the global average. That means that air temperatures will increase by at least four degrees by 2050 — and as much as eight — if nothing is done.

The pace of warming is picking up. Most of what has occurred so far has taken place since 1993.

Brown's report outlines drastic changes that will face the Arctic if climate change goes unchecked. The ground will be snow-covered for about 30 fewer days. Precipitation will increase by anywhere from eight to 26 per cent, most of it in spring and fall.

Lakes and rivers will see a month's less ice. What there is will be up to 30 centimetres thinner.

Sea ice will thin out by as much as 45 centimetres. The ice season could be seven weeks shorter and a nearly ice-free summer could develop sometime between 2020 and 2040.

Glaciers are melting more quickly now than at any time in the last 2,000 years — so quickly that Canada's Arctic islands are now the world's third-largest contributor to sea-level rise.

Although conclusive data is lacking, early results also suggest storms will get more frequent and more intense.

Cyclones along the east coast of Hudson Bay have already increased by more than 15 per cent.

Complicating the whole picture is that changes would be experienced differently in different regions of the Arctic.

Climate 'locally driven'

"The climate is very locally driven in these valleys and fiords where a lot of these communities are located," said Brown.

Climate models don't generally have a higher resolution than 50 kilometres, Brown said. But local Arctic climates are often deeply affected by features as small as one kilometre — a narrow ocean channel, for example.

There's only one model capable of creating enough detail to suggest what might happen in the highly complex map of the Canadian Arctic, Brown said.

"There's only one set of results to date that apply to changing ice cover in that area."

ArcticNet is Canada's single largest gathering of scientists studying the North. More than 250 oral presentations are scheduled by everyone from oceanographers to sociologists.

All that research is conducted in front of a climate backdrop, said Brown. And all individual climate changes affect each other and add up in ways we don't yet fully understand.

"There definitely will be cumulative impacts on traditional way of life," he said.

"Your snow cover's decreasing. Your sea ice is decreasing. Your patterns of wildlife are going to change."

El Niño will bring fewer 'raw days' of winter to the N.W.T.

'It's certainly been delightfully mild,' says David Phillips with Environment Canada

Reprinted from CBC News Posted: Dec 04, 2015

It's dark, it's snowy and it's frozen — all signs that winter has arrived in the Northwest Territories. But what's remained elusive is the biting temperatures.

"It's certainly been delightfully mild for some people," says David Phillips, Environment Canada's senior climatologist.

The N.W.T. didn't break any records in November, but Phillips says it was the eighth warmest on record in Yellowknife and other parts of the territory.



A shot of Reid Lake near Yellowknife on Nov. 29. November was the eighth warmest on record in Yellowknife and other parts of the territory, according to Environment Canada. (Katherine Barton/CBC)

"Last year this time, you were dealing with -36°C air temperatures -40°C some windchills," he says.

"The last week or so, temperatures have clearly been about a dozen or more degrees warmer than normal."

Phillips says you can thank this year's "super" El Niño.

"The toughness of winter has been a little slow to come in the Northwest Territories, as it is in most parts of Canada," he says.

"This year so far in Yellowknife, I looked up the number of what I call 'raw days,' below -20°C : You've had five of those. Last year you had 17 by this time."

'Takes the sting out of winter'

In the past, super El Niños have caused a "mixed bag" of results in the N.W.T., Phillips says, causing normal to warmer temperatures and less snow than usual.

"My sense is that this will be certainly far milder than say two years ago, one of the toughest winters we've had to deal with," he says. "And it may be certainly milder than last year, and last year wasn't too bad for some people."

But Phillips assures Northerners that winter is by no means cancelled.

"You wouldn't want that because there can be some down sides to an El Niño kind of winter, particularly in the North with winter roads and the nature," he says.

"My sense is though that it will seem a little less of those raw days that you've seen in other years when El Niño breezes weren't blowing.

"It takes the sting out of winter."

ATLANTIC News

The Growing Role of Citizen Science in Monitoring Environmental Change – Achieving a Balance With Government Programs?¹

Peter G. Wells and David H. S. Richardson, Editor and Associate Editor, PNSIS. Editorial, reprinted with permission, from PNSIS Volume 48(1) 2014 FINAL D5 PGW Feb. 5th

The evidence is becoming clearer, day by day, that changes are occurring at the global level in weather, climate, the oceans, land use and population distribution, all of which have serious implications for natural ecosystems and their inhabitants, in Canada and beyond. At the same time, government (public service) programs in recent years involving long term monitoring of the Canadian environment have been drastically reduced. This has affected our ability to detect spatial and temporal changes in a range of indicators, thereby inhibiting the ability of policy and decision makers to respond in a timely way to environmental changes. For example, Canada's exemplary Environmental

Monitoring and Assessment Network (EMAN) that initiated Nature Watch, a national citizen science monitoring program (www.ec.gc.ca), ceased operation in 2010; its last regional workshop was held in 2006. Many EMAN-linked programs, in and out of government, have either stopped due to loss of funding and staff, or are just struggling to survive. Although a change in the federal government may reverse the pattern and essential monitoring may eventually resume in earnest, valuable data and information for recent years have been lost forever.

This situation highlights the role of citizen science, particularly when it is directed at monitoring the various natural environments in Canada and in our region. Such activity by non-government organizations (NGOs) is no longer just a valued supplement to government sponsored programs; in many cases, it has replaced them. However, this situation raises some questions, to be pondered by members of NSIS and the broad environmental community – is this trend towards an enhanced role for citizen science good for the country? How reliable are data and information gathered by citizen groups? Where do such data reside? Who writes and reviews the various reports? Who curates and archives the data and information? How long can citizen groups continue and under what funding envelope (i.e., some monitoring, such as for water quality and chemicals in sediments and tissues, is very expensive)? If there is going to be greater reliance on citizen science, such fundamental questions demand credible answers!

¹ This article celebrates the 40th Anniversary of the Halifax Field Naturalists, founded in 1975. A description of its activities, together with its excellent Newsletters, can be found at www.halifaxfieldnaturalists.ca.

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The respected role of citizen-led science has been shown particularly well by programs such as the Christmas Bird Count across Canada and the USA, and in Nova Scotia with the Spring Peeper Count and the Kejimikujik Common Loon Survey. In Halifax, there is the monthly reporting of anecdotal observations of plants, wildlife, and habitats, as well as related talks, by the Halifax Field Naturalists (HFN); this society, an affiliate of Nature Canada, is celebrating its 40th anniversary in 2015, a truly remarkable achievement. Bird populations, a key indicator of general ecosystem health, are monitored by the Nova Scotia Bird Society. Both of these local groups keep records. Of a more general nature is the annual Clean Nova Scotia beach clean-up and recording of marine litter, the Clean Annapolis River Project water quality program in the Annapolis River watershed, water quality monitoring in the Cornwallis River watershed, and many others. Such programs produce much information and also play a vital role in public education and awareness. But they do have limitations, as they are run by volunteers and specific programs may be short-term. Although there are exceptions, the data collected rarely follow standard management protocols and are seldom if ever housed in a central location. Reports are often placed on group websites, but with little assurance of longevity, access, and security. Indeed, funding challenges often limit or stop these groups and their programs in midstream. In contrast to government (public service) science, there is no formal mandate other than public interest, volunteerism and commitment to a worthy cause to maintain many of these citizen led science programs.

Ironically, despite such disadvantages, the importance of citizen-led science programs has been widely recognized, partly because many government-led and legally mandated programs have been reduced or eliminated. Our premise is that in an affluent country like Canada, with its continental and global environmental responsibilities, we need a balance between such citizen science programs, especially those monitoring aspects of the environment, and programs established and run by government. They are both needed. We believe that our challenge at present is to return to this balance.

A significant number of federal science and monitoring programs have been eliminated since 2011-2012 (e.g., the Arctic ozone monitoring program, the Experimental Lakes Area Program, ecotoxicology related to marine open-water aquaculture sites) or continue with severe underfunding (e.g., the Gulf of Maine Council's, Gulfwatch contaminant monitoring program). Furthermore, whole research programs associated with understanding and mitigating the effects of chemicals in aquatic environments have ceased (e.g., the Department of Fisheries and Oceans, environmental chemistry and aquatic toxicology program; many similar programs in Environment Canada). At the same time, NGOs struggle for project funding and universities seldom become involved in environmental monitoring (with some

marked exceptions, such as the Ocean Tracking Network program at Dalhousie University, the St John River studies at the Canada Rivers Institute, UNB-Saint John and the Community Conservation Research Network at Saint Mary's University, Halifax). The evidence points to too little long term monitoring of Canada's many ecosystems, a legislated mandate of government.

Despite the many good examples of citizen science across the Maritimes, the frequent lack of support for their organizations, combined with the cutbacks of government (both federal and provincial), do not bode well for understanding the current and future consequences of environmental threats in Canada and in the Maritimes. Public debate is needed around this issue. The NSIS, members of relevant NGOs, government departments at both levels, and the universities should get together to discuss the best ways to monitor natural ecosystems in our Region, and provide cogent arguments to bolster the long-term viability of NGOs and to counteract the troubling trends of cutbacks in public service programs. We need to identify how citizen science and government science, supported by research in the universities, can work together for a better future in a changing environment.

Science, Information, and Policy Interface for Effective Coastal and Ocean Management

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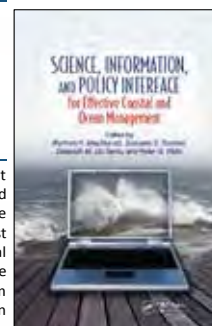
The purpose of the book is to provide a timely and original look at the role that information, and particularly scientific information, plays in the policy-making and decision-making processes for coastal and ocean management. The knowledge gained from the principles and case studies described in the book will enhance best practices for more effective communication and use of marine environmental information, particularly at the science-policy interface. The book will also contribute to the current understanding of information, particularly by arguing that the term "science-policy interface" is a misnomer, as there may be many interfaces between science and policy.

Key Features

- Explicitly examines the role of information in coastal and ocean management
- Provides an overview of key concepts and theory
- Take a case-study based approach
- Concepts and case studies are grounded in a global context, as reflected by the international authorship
- Chapters are authored by established experts in their fields

Selected Contents

Introduction; Understanding the Science-Policy Interface in Coastal and Ocean Environmental Management; Fundamentals, Concepts, and Principles; Scientific Information and Global Ocean Governance; The Key Role of Scientific Information in Integrated Coastal and Ocean Management; Scientific Information and Global Environmental Politics; Risk and Governance; Scientific Information and Governance—Participatory Approaches.



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Books of Interest

Submitted by Patrick Stewart, CSEB Atlantic Director and 2nd V.P.

Soon to be published.....



Bonn, Allott, Evans, Joosten & Stoneman eds. 2016. *Peatland Restoration and Ecosystem Services: Science, Policy and Practice*. Cambridge University Press, \$63.24 CAD.

Peatlands provide globally important ecosystem services through climate and water regulation and biodiversity conservation. Although they cover only 3% of the earth's surface, degrading peatlands are responsible for nearly a quarter of land-based carbon emissions. This book brings together world-class experts from science, policy development, and practice to highlight and debate the importance of peatlands from an ecological, social and economic perspective. *Peatland Restoration* focuses on how the restoration of peatlands can help to mitigate climate change effects. Featuring a range of global case studies, opportunities for reclamation and sustainable management are illustrated throughout against the challenges faced by conservation biologists. Written for a global audience of environmental scientists, practitioners and policy makers, as well as graduate students from natural and social sciences, this interdisciplinary book provides vital pointers towards managing peatland conservation in a changing environment.



Packer & Gould. *Vascular Plants of Alberta, Part 1: Ferns, Fern Allies, Gymnosperms, and Monocots*. University of Calgary Press. May 2016, \$34.95 CAD.

Packer and Gould have provided an invaluable service for anyone interested in western North American botany by creating a soon-to-be-released, simple, user-friendly and portable key to the 21,000 documented Alberta species found in the Flora of North America. Designed to be carried into the field for handy reference and use, this work incorporates the new names and accumulated taxonomic developments of recent years. Ferns, Fern Allies, Gymnosperms and Monocots is the first of what will be a three-volume set on the plants of Alberta.



Ives. *Baffin Island: Field Research and High Arctic Adventure, 1961-67*. University of Calgary Press, February 2016. \$34.95 CAD.

Based on his extensive research experience in the Canadian North, Carleton University geographer Jack D. Ives has written a lively and informative account of several expeditions to Baffin Island during the "golden age" of federal research. In the 1960s, scientists from the Geographical Branch of Canada's Department of Energy, Mines, and Resources traveled to Baffin Island to study glacial geomorphology and glaciology. Their fieldwork resulted in vastly increased knowledge of the Far North—from its ice caps and glaciers to its lichens and

microfossils. Drawing from the recollections of his Baffin colleagues as well as from his own experience, Ives takes readers on a remarkable adventure, describing the day-to-day experiences of field teams in the context of both contemporary Arctic research and bureaucratic decision making. Along the way, his narrative illustrates the role played by the Cold War era Distant Early Warning (DEW) Line and other northern infrastructure, the crucial importance of pioneering aerial photography, the unpredictable nature of planes, helicopters, and radios in Arctic regions, and of course, the vast and breathtaking scenery of the North.

...and already out there



Meiners, Pickett & Cadenasso eds. 2015. *An Integrative Approach to Successional Dynamics: Tempo and Mode of Vegetation Change*. Cambridge University Press. \$114.00 CAD.

Much of what is considered conventional wisdom about ecological succession is not as clear cut as generally believed. Yet, the importance of succession in ecology is undisputed—since it offers real insight into the dynamics and structure of all plant communities. Part monograph and part conceptual treatise, *An Integrative Approach to Successional Dynamics* presents a unifying conceptual framework for understanding dynamic plant communities and uses an existing long-term data set to explore the utility of that framework. The fourteen chapters, each written in a non-technical style and accompanied by numerous illustrations and examples, cover diverse aspects of succession, including: community, population and disturbance dynamics, diversity, community assembly, heterogeneity, functional ecology, and biological invasion. This book is a good reference for researchers and graduate students in ecology and plant biology, as well as others with a general interest in ecological succession.



Korpimäki & Hakkariainen. 2014. *The Boreal Owl: Ecology, Behaviour and Conservation of a Forest-Dwelling Predator*. Cambridge University Press. \$68.95 CAD.

Widespread in North American forest regions including the Rocky Mountains, the Boreal Owl (*Aegolius funereus*) was once the most numerous predatory bird in Eurasian boreal forests. This book synthesizes the results of long-term studies of Boreal Owls, exploring hunting modes, habitats and foods, prey interactions, mating and parental care, reproduction, dispersal, survival and mortality, population regulation and conservation in boreal forests. Providing a detailed introduction to the species, the authors study the complex interactions of Boreal Owls with their prey species. Also discussed are male & female roles in parental care; behavioural and demographic adaptations to environmental conditions, including: an assessment of whether Boreal Owls can time their reproductive effort to maximize lifetime reproductive success; effect of modern forestry practices on owl populations; and how to manage Boreal Owls to sustain viable populations.

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