



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

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- LAND USE AND THE CARBON CYCLE BOOK FOR REVIEW





# CSEB Newsletter Bulletin SCBE

VOLUME 70, ISSUE 2, 2013

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

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**Date of Issue- July 2013**

### Cover Photos:

**Front Cover:** Biologists Peter Hennigar, Environment Canada sampling blue mussels, *Mytilus edulis*, as part of Gulfwatch Chemical monitoring program.

**Back Cover: 1<sup>st</sup> Picture:** Sampling blue mussels, *Mytilus edulis*, as part of Gulfwatch Chemical monitoring program (Gareth Harding, DFO, Bedford Institute of Oceanography), **2<sup>nd</sup> Picture:** Public Outreach: describing the piping plover protection program, St Catherine's Beach, Keji Seaside, Kejimikujik National Park, NS.

**Photo Credits:** Dr. Peter Wells, Atlantic Region

Printed in Canada

ISSN: 0318-5133

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## CSEB NEWSLETTER 2013

Vol. 70, Number 2 Summer 2013

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.

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**Editor:** Gary Ash

**Layout/Printing:** Lasertext Digital Print & Copy Centre, Edmonton, Alberta on recycled paper.

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## LE BULLETIN de la SCBE 2013

Vol. 70, Numéro 2 Été 2013

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.

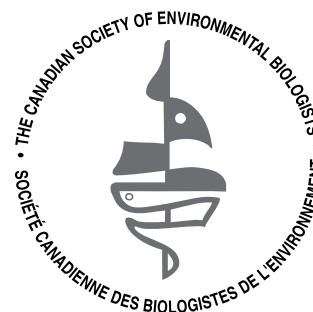
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**Impression:** LaserText Digital Print & Copy Centre, Edmonton, AB sur le papier recyclé.

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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.

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## NATIONAL News

### PRESIDENT'S Report

#### President's Report – Summer 2013 Newsletter

Submitted by Robert Stedwill, CSEB President

This report is being written in Oklahoma – where the temperature forecast for today is 42 C. Not unusual for this part of the continent at this time of year, but it has been going on now for several months, with associated drought extended over much of the western United States. When I look back over the news reports emanating from Canada, the floods in Alberta, the late spring seeding in Saskatchewan because of an extended and unusually wintery-like spring, one would be hard pressed not to think that the climate is changing. That's not to say that this sort of climate has not happened before, but when you hear the naysayers concerning climate change and global warming admitting that "things are different", others may start believing.

The "others" might be the politicians. Unfortunately, up until now, the politicians have been in the naysayers group, paying only minimal lip service to legislation and regulations which might address climate change and its inherent causes. President Obama in the United States has made it a priority in his second term to address the issue, albeit perhaps as a legacy of his presidency, but nonetheless, doing something concrete about it. I hope that the Harper government in Canada will follow suit and now jump on the proverbial bandwagon and move in a similar direction; seeing as how this government has failed to take the leadership role, and sat back waiting for other jurisdictions to show the way.

We sit in anticipation that something will now happen in Canada.

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## REGIONAL News

### BRITISH COLUMBIA News

#### British Columbia Report – Summer 2013

Submitted by Jim Armstrong, CSEB Regional Director

The development activities in British Columbia are having a significant impact on the ability of biologists to practice in an environmentally sustainable manner. This change is being driven by the desire for the development of our natural resources and the transportation of these resources to off-shore markets. The Port of Prince Rupert and Kitimat are currently experiencing growth in terminal facilities and requests for the development of LNG plants, oil pipeline loading, coal handling facilities and commodity shipping facilities.

In the lower mainland of BC, there have been requests for the expansion of existing coal handling facilities at Roberts Bank terminal, an additional oil pipeline/loading facility in Burrard Inlet and the development of a coal handling facility at the Fraser Surrey Docks.

The biologists who practice in the field of environmental assessments are being requested to develop complex assessment proposals that meet the requirements of the *Canadian Environmental Assessment Act* and the *British Columbia Environmental Assessment Act*. As a component of each process, the inclusion of First Nations is mandatory to ensure that traditional and cultural practices are taken into account as part of the assessment process. Biologists are now becoming leaders in the areas of environmental assessment, First Nations and sustainable business practices as they lead multi-disciplinary teams through the complex environmental assessment process.

Another complicating factor is the demographics of the experienced biologists. We are getting "long in the tooth" and the transfer of our knowledge and experience is not keeping up with the demand of these large multi-phase projects.

On a lighter note, many young biologists-in-training are now starting to recognise that the older biologists actually have knowledge that they cannot learn in a book or search for on the internet.

#### The Comox Valley Garry Oak Vanishing Act: Are Legislative and Best Management Tools Sufficient for Recovery?

Submitted by Loys Maingon, RPBio



**Figure 1: Remnant Comox Valley Garry oak (*Quercus garryana*) along the Tsolum River**

How one measures the outcome of environmental impacts, and the subsequent potential for recovery, on Garry oak ecosystems (GOE's) depends largely on two factors: the general state of knowledge and the experience one has with the regional frame of reference.

If we believe recent concerns voiced in the press: "... *scientists admit trees and forests are poorly studied*,"<sup>1</sup> the general state of knowledge is woefully inadequate for the task at hand. This is largely due to funding shortfalls, the increasingly difficult access to specialized publications, thanks largely to publishers' abusive control of electronic information, and a lack of representative regional reference sites in a diverse and fragmented landscape.

The east coast of Vancouver Island is home to a relatively large number of genetic populations of Garry oak<sup>2</sup>. This suggests that regional genetic extent is restricted, fragmented and potentially highly individualized. The regional distribution of a species under consideration should correspond to the area of the genetic population distribution, not the general species distribution.

This has led to a number of problems in Garry oak restoration. In spite of the key 2006 contribution to the genetic study of Garry oak populations from Redding California to Courtenay/Comox, replanting and the general approach to the nursery and planting of Garry oak trees has been indiscriminate and guided by general genetic illiteracy. Trees have been imported from Oregon and Washington and distributed throughout Vancouver Island. Although resistance to understanding the importance of genetics in the preservation of biodiversity continues, this year has marked a possible turn-around with the establishment of two nurseries, in Saanich and in the Comox Valley, dedicated to the propagation and cheap mass distribution of local Garry oak stock for restoration<sup>3</sup>.

Just as the underlying problem in stock miscegenation has been a lack of understanding of species population complexity and individuality, the same problem governs template-style legislative approaches to Garry Oak site assessments.

Vancouver Island's east coast has a Mediterranean climate and pockets of rich farmland in a generally rocky geology. The climate and the soil have successively drawn the nineteenth-century pioneer farmers, and more recently, vineyard investors and retirement-oriented developments. As a result of development pressures that started in 1845, populations of Garry oak and associated GOEs have been shrinking ever since. GOEs are estimated to be down to about 5% of the pre-contact distributions.

What this "5%" means is very important. The Garry Oak Ecosystem Recovery Team (GOERT) identifies 7 types of GOE's, some of which may or may not include Garry oak trees: savannahs, woodlands, coastal bluffs, maritime meadows, vernal pools and seeps, and very thin soil rocky outcrops.<sup>4</sup> This classification system reflects the southern island's experience of GOEs.

The 5%, therefore, refers to a total for the whole pre-contact distribution, in which the majority is in non-arable land. However, less than 1% now remains in the "deep soil" classification throughout the entire island.

Most of the Garry oak populations are found south of Nanaimo, where the island geology is predominantly rocky and where GOE's have been extirpated from a smaller proportion of agricultural soils. So much so, that many people, including environmental professionals, do not realize that Garry oak flourish in riparian or wetland environments, and have been historically important north of Nanaimo in the very rich agricultural soils of the Comox Valley.

The Comox Valley's reputation since 1854 as the largest and richest area of arable land on Vancouver Island has made its Garry oak the most vulnerable populations.



**Figure 2: Outline in green of the original Comox Valley Garry oak savannah as recorded by the 1865 survey.**

In the first survey of the Comox Valley, in 1860, Captain John Richards reported that the extent of the Garry oak in the estuary zone, which does not include the Cape Lazo populations, stretched over 31 square kilometres (12 square miles) of savannah (Fig. 2). The blessing of rich agricultural soil spelled prosperity for early pioneers and later developers, but demise for Garry oak, and associated systems.

In this respect, Comox Valley GOEs are a representative fraction of the 1%, and their problems are more akin to those of agricultural regions such as Puget Sound than the rest of Vancouver Island. Their restoration needs are better approached with the classification system used by the Nature Conservancy of Washington: "oak savannahs and woodland oak, riparian oak woodlands and wetland oak," which refines and individualizes the general "deep soil" template.<sup>5</sup>

All that now remains of the great Comox Prairie are individual trees that dot farmland along the Tsolum River, and a hillside 10.6 ha grove owned by School District 71, which has been under development pressure for the last 30 years. This is also the only Garry oak land in the public domain. In 1997, local municipal governments developed a sports complex on this site which resulted in the destruction of between one third to one half of the remaining oak. Construction at the site was halted when an excavator operator realized he was scooping up hundreds or thousands of coho fry. The site was in fact subsequently found to have been a rare association of Garry oak, Trembling aspen (*Populus tremuloides*) and Slough sedge (*Carex obnupta*).

Notwithstanding the extraordinary particularities of the site which bring together "woodland, riparian and wetland oaks", the incident triggered a fisheries assessment. To this day the legal mechanism that is used to protect these oaks is the *Riparian Areas Regulation (RAR)*. The irony here is that while the principal concern for the protection of this last site are some 45 remaining oaks, officially it is the fisheries concern that provides a template for habitat protection. While the *RAR* is excellent for most fisheries needs, it fails plant species at risk or endangered.

"Best Management Practices" are unfortunately like "Maximum Allowable Concentrations." These are non-specific templates, which need to be adjusted to site specific circumstances, as our knowledge increases. The *RAR* establishes riparian buffers from



the high water mark up to 30 m. Oak trees that do not fall within these limits are not necessarily included for protection, although they may have restricted protection under city tree by-laws.

With regard to oak trees this presents interesting problems. Given the close association of Garry oak to mycorrhizae,<sup>6</sup> the root sensitivity zone extends far beyond the drip line of the crown. The rule of thumb for oak tree conservation is that the exclusion zone should be twice the radius of the crown, or “two diameters out from the root zone”<sup>7</sup> Mature Garry oak easily attain a 15 m diameter crown and therefore conservation should require 30 m radius for each tree.

If we are committed to site specificity, any edge or outlying riparian Garry oak should extend the riparian buffer by 15 m, to a minimum of 45 m., and contiguous outliers would have to be included. This problem is in keeping with experience with oak buffers in Redding California, with Blue oak (*Quercus douglasii*), a close relative that hybridizes with the Garry oak. California, bearing climate change and expected drought conditions in mind, is creating 150 m (500 ft) buffers for oak habitat.<sup>7</sup>

In 2012 east Vancouver Island rivers experienced extreme droughts in which entire runs of pink salmon collapsed. This experience is in keeping with general climate change predictions for the region, and similar to the Californian experience. If we expect to reverse the vanishing trend of our native Garry oak populations, we need to learn from the Californian experience, and adjust development practices to the minimum requirements of specific local populations. Template management approaches are only general guidelines. They should never replace site specific considerations for individual species of concern.

**Loys Maingon (RPBio)**

**Chair, Comox Valley Nature Garry Oak Restoration Project**  
(Loys Maingon is a professional biologist, President of Comox Valley Nature. He manages the Tsolum River Garry Oak Nursery)

## References

1. Jim Robbins (7 July 2013). “Trees: our life savers are dying.” *The Guardian*.
2. K. Ritland, L.D. Meagher, D.G.W. Edwards and Y.A. El-Kassaby (2005). “Isozyme variation and conservation genetics of Garry oak.” *Canadian Journal of Botany* 83: 1478-1487.
3. Michael Meagher (2013). “Garry Oak in British Columbia.” *BC Nature* 51(2):10., “Garry Oak Restoration in the Comox Valley” <http://www.goert.ca/news/2013/05/comox-valley/>
4. Garry Oak Recovery Team (2013). *Best Management Practices for Garry Oak and Associated Ecosystems*. Victoria BC, 92 pages.
5. Ian Hanna and Patrick Dunn (2007). “Restoration Goals for Oregon White Oak Habitats in the South Puget Sound Region.” <http://w.southsoundprairies.org/tech/Restoration%20of%20White%20Oak%20Habitat.pdf>
6. Inter alia, A. Maria Moser et al. (2005). “Comparisons of ectomycorrhizas of *Quercus garryana* (Fagaceae) on serpentine and non-serpentine soils of Southwestern Oregon”. *American Journal of Botany* 92 (2):224-230.
7. Agriculture and Natural Resources, University of California (2013). *Kent Manuel: Conserving Oak Trees*. [http://ucanr.edu/sites/rrea/Land\\_Stewards/Oak\\_Tree\\_Conservation/](http://ucanr.edu/sites/rrea/Land_Stewards/Oak_Tree_Conservation/)

# ALBERTA News

Submitted by Brian Free, CSEB Past President

## Alberta has declared war!

Or at least Alberta is stepping up its efforts to prevent invasive aquatic species from entering our rivers, lakes and reservoirs. A provincial government program to prevent the spread of zebra and quagga mussels is in full swing. One common mode of spreading is for these mussels to hitch-hike on boats being moved from waterbody to waterbody. Alberta is focusing efforts at the Montana-Alberta border and blitzing boat launches and recreation areas around the province. Boats being transported are being inspected and a public information campaign is underway. For more information, check out the Alberta Environment & Sustainable Resource Development website at <http://mywildalberta.com/Fishing/SafetyProcedures/AquaticInvasiveSpecies.aspx>

Many readers will have followed the news about the destructive floods in June that hit Calgary, High Prairie and other communities in southern Alberta, as heavy rains coincided with spring runoff from the Rockies. Several rivers crested their banks and flooding was sudden and devastating. Our thoughts and prayers go out to any CSEB members affected by these floods.

In addition to lives lost and property destroyed, the river channels and ecosystems have been significantly affected. As floodwaters receded in Calgary, thousands of stranded or dead fish were discovered. Provincial fisheries staff and dozens of volunteers worked for several days to return stranded fish to the Bow and Elbow Rivers. For certain rivers, there could be a potential year-class failure of spring spawners, such as rainbow and cutthroat trout. Many changes to the local aquatic habitat can be expected; some barriers to fish passage were washed away, other barriers created, gravel beds used for spawning may be flushed of sediment, new pools created and so on. It may take several years to understand the implications for fish. And for other flora and fauna, the effects are less clear.

Canadian Society of Environmental Biologists (CSEB) Director Joseph Hnatiuk was recently appointed to represent the CSEB on the Odour Management Team of the Clean Air Strategic Alliance (CASA), a multi-stakeholder alliance with representatives from industry, government and non-government organizations. They provide policy advice and develop strategies to achieve their vision that air will have no adverse odour, taste, or visual impact and have no measurable short-or long-term adverse effects on people, animals, or the environment. The goal of the Odour Management Team is to create a practice guide for assessing and managing odour in Alberta. Some best practices for specific sectors may also be developed. The project team will address topics of public complaints, odour assessment, health (including all ecosystems), prevention/mitigation, enforcement/role of regulations, information/communication and continuous improvement.

Check CASA out at <http://www.casahome.org/Home.aspx>

## SASKATCHEWAN News

### Saskatchewan Report – Summer 2013

Submitted by Robert Stedwill, CSEB Saskatchewan Chair

Thinking back over this last wintery spring, it has been an unusual time weather-wise. It was obvious from a recent flight coming into Regina that the crops were well behind their five year average, there was a lot of standing water, and many farmers I'm sure, praying for a late frost. The predictions concerning snow pack melt from the mountains is now coming to fruition; whereby there is less snow melt, but more extreme unpredictable climate events, such as the flooding which occurred recently in Alberta. Needless to say, any flooding in Alberta generally finds its way into Saskatchewan, with the usual evacuation of flooded communities along the North and South Saskatchewan Rivers, as well as the Saskatchewan River. Forecasting of weather events and subsequent impacts of weather events will certainly be an inexact science. How will hydroelectric generators, such as SaskPower, or independent power producers deal with uncertainties of this kind?

Although Saskatchewan's new Environmental Code does not appear to have advanced any from the draft stage of December 2011, Saskatchewan has designated a new protected area nearly two-thirds the size of Prince Edward Island.

"The Pink Lake Representative Area Ecological Reserve, located 160 kilometres north of La Ronge, is now Saskatchewan's largest provincially-designated protected area of approximately 3,660 square kilometres. Compared to all other protected lands in the province, only Prince Albert National Park is larger at 3,874 square kilometres.

Saskatchewan launched the Representative Areas Network in 1997 to conserve representative or unique examples of landscapes across Saskatchewan, with a target of protecting 12 per cent of each of the province's 11 ecoregions. With the Pink Lake designation, representation in the Churchill River Upland Ecoregion increases from 4.9 to 8.2 per cent of the total area. Saskatchewan's Representative Areas Network includes approximately 6.1 million hectares, or just over 9.0 per cent of the province.

Designation as an ecological reserve means that no new industrial developments will be allowed in the area. No new leases or permits will be issued but those in place at the time of the designation will be grandfathered to allow existing activities to continue. Traditional activities by First Nations and Métis people, as well as recreational hunting and angling, will continue."

And finally, Regina has joined other Canadian municipalities by starting up its city-wide recycling program on July 1st. Although blue recycling bins were in place and recyclables picked up on designated days, unfortunately, the company contracted to separate recyclables at a facility west of the City is months behind its targeted startup date! They profess that the material already picked up will be put into "storage" until such time as their facility is operational. Hopefully the "storage" facility is not the landfill site!

## MANITOBA News

### Lac-Mégantic tragedy in Quebec raises the issue of rail transport of oil through Canadian ecosystems.

Submitted by Bill Paton, CSEB Regional Director

Pipeline and ocean spills of oil products over the past 30 years plus have demonstrated the potential for massive impacts on marine and riverine biota and ecosystems.

The recent expansion of oil and gas production in North Dakota and southern Manitoba has resulted in a dramatic increase in the quantities of oil products being transported by rail. Indeed, North Dakota is now the second largest U.S. oil-producing state after Texas. This increased production is largely due to the drilling process known as hydraulic fracturing, or fracking, which has allowed access to petroleum once too costly to capture. In a normal day in the major towns in North Dakota up to 10 trains each with 100 tank cars are loaded and dispersed to markets to the east, west and south. The Montreal Maine & Atlantic Railway Ltd., train that derailed and exploded in Lac-Mégantic was hauling crude from North Dakota to Irving Oil Corp.'s refinery in Saint John, New Brunswick.

The recent experience in the United States is that the frequency of spills from railroads is higher than for pipelines but the pipeline spills are typically four times larger. Since 2009, the amount of oil transported by rail in the United States has increased by more than 2,000%, now totaling 6.5 billion gallons. In Manitoba, oil production increased by 23% (18.5 million gallons) over 2011 and has been growing at more than 20% annually since 2005. In 2012, it was a bigger dollar earner than mining (\$1.51 billion –oil compared to about \$1.4 billion minerals). The introduction of horizontal drilling and 'fracking' has been the booster. 'Fracking' involves the injection of water base fluid at high pressure to create new, or to connect existing cracks in the shale rock. In most cases the fluid contains sand which is used to hold the cracks open. There have been concerns raised about the quantity of water being used and possible impacts on groundwater a major source of drinking water on the prairies.

In January 2012, an oil spill the size of two football fields was discovered near Pipestone in southern Manitoba. More than 100,000 litres of oil seeped into surrounding farmland as a result of a broken pipe. The fluid according to the landowner also contained 30% salt water with potential to destroy the land's agricultural productivity. The pipeline, owned by Tundra Oil & Gas Partnership, was located near a creek, which feeds into the Souris River which joins the Assiniboine River and proceeds to either Lake Manitoba or Lake Winnipeg. Due to the increasing oil activity in southwestern Manitoba, the number of government reported oil spills has been on the increase.

## PROVINCIAL NUMBERS

Year	Oil Spills	Producing oil wells
2006	43	2,218
2007	56	2,472
2008	55	2,692
2009	51	2,930
2010	72	3,162
2011	96	3,462
2012	90	4,365

Source: Province of Manitoba.

Railway lines are of great concern since they pass through many centres of population and sensitive wildlife habitats in both countries. Members should look at the rail transport routes that carry oil products in their region of Canada and identify protected areas and significant ecosystems that could be impacted if a derailment were to occur in those vicinities.

Because oil does not readily dissolve in water, it undergoes a "biological, physical and chemical process called weathering" (Farrington and MacDowell, 2004). Weathering degrades oil through natural mechanisms produced by sunlight, water temperature and micro-organisms. As a consequence, some oil spills have a short-term impact, persisting for a period of weeks. If oil contaminates shallow water, however, the results can be more serious. In these cases, the oil mixes with mud and accumulates in the sediments. As a result, the residues can persist for decades with negative impacts on organisms associated with the sediments. Various categories of oil (very light through very heavy) have different impacts on plants and animals.

## Sources for further information

1. J.W. Farrington and J.E. MacDowell (2004). Mixing Oil and Water. Available at <http://www.whoi.edu/oceanus/viewArticle.do?id=2493> (22 October, 2011).
2. Effects of Oil Spills on Wildlife and Habitat (2004) Available at <http://alaska.fws.gov/media/unalaska/Oil%20Spill%20Sheet.pdf> (22 October, 2011).
3. Several good news articles have been published by 1) the Brandon Sun, which broke the spill issue in Manitoba; 2) the Winnipeg Free Press; and 3) the Globe and Mail (Oil Boom and Rail Risks, July 13, 2013).

## ATLANTIC News

Dr. Peter Wells, a longtime member of CSEB has published the following articles:

Wells, Peter G. 2013. Canadian aquatic science and environmental legislation under threat (Editorial). *Marine Pollution Bulletin* 69(2013): 1–2.

Soomai, Suzuette S., Bertrum H. MacDonald, and Peter G. Wells. 2013. Communicating environmental information to the stakeholders in coastal and marine policy-making: Case

studies from Nova Scotia and the Gulf of Maine/Bay of Fundy region. *Marine Policy* 40 (2013):176–186.

Taylor, Lisa N., Kenneth G. Doe, Richard P. Scroggins and Peter G. Wells. 2013. Regulatory ecotoxicology testing in Canada – Activities and influence of the Inter-Governmental Ecotoxicological Testing Group. *Water Quality Research Journal of Canada* 48(1): 14-29.

This latter article describes the evolution of applied toxicity tests in Canada, used for effluent and chemical testing as well as ambient water quality monitoring.

If you are interested in receiving a copy of these three publications, please contact Peter at [oceans2@ns.sympatico.ca](mailto:oceans2@ns.sympatico.ca).

## Nova Scotia to Protect New Species at Risk

Submitted by Patrick Stewart, CSEB Regional Director

The barn swallow, the snapping turtle, the Eastern Pipistrelle bat and the black ash tree are among the newest additions to Nova Scotia's growing list of protected plants and animals.

Nineteen new species were added to the protected list on July 11, bringing the total to 60 species. The Black Ash (*Fraxinus nigra*) is significant to the aboriginal people who used it to make baskets, wicker canoe seats and for many other purposes for centuries. There are only 12 known mature trees in the province.

Three species of bats—the Little Brown Bat, the Northern Long-eared Bat and the Eastern Pipistrelle—were added to the list after an estimated 90 per cent population decline over the past two years. A disease called white-nose syndrome has killed millions of bats throughout eastern North America. The province is supporting research on threats to the bat population by investing \$94,000 from the Species at Risk Conservation Fund in 11 projects. These projects are primarily supported by vehicle owners who purchase a conservation licence plate. A project at Saint Mary's University is examining the genetic characteristics of bats that survive white-nose syndrome. The team, led by Dr. Hugh Broders, will receive \$10,000.

"Our goal is to take important initial steps towards examining bat resistance to the outbreak," said Dr. Broders. "We are hoping to identify the extent to which natural selection may permit bat populations to rebound following an infection of white-nose syndrome."

Other projects include a strategic population monitoring plan for the Blanding's turtle, habitat modelling for at risk land birds in southwestern Nova Scotia, and improved monitoring and conservation for Bicknell's thrush in Cape Breton.

## Volunteers for CSEB Membership Drive

We need to increase our membership – thus we are planning to do a membership drive. We need volunteers to help assemble mailing lists of biologists, including students in biology at University.

If you are willing to help, please contact Gary Ash at [gash@golder.com](mailto:gash@golder.com).



# TERRITORIES News

## Nunavut Summer 2013 Update

Submitted by Paula Smith, CSEB Regional Director

In mining news, more projects are being proposed with the recent proposal for the Izok Corridor Project (base metals) being referred to a Part 5 Review under the Nunavut Impact Review Board process. The project description is likely to change due to recent feasibility studies but it's still one that's on the radar. Other projects such as Meliadine (gold), Kiggavik (uranium), and the Early Revenue Phase of the Mary River Project (iron ore) continue to go through their respective reviews. For infrastructure in the territory, the proposed Iqaluit Hydroelectric Project has also been referred to a Part 5 Review and we're still awaiting the draft Environmental Impact Statement for the Bathurst Inlet Port and Road Project.

*The Nunavut Planning and Project Assessment Act* (NUPPA), one of the components of Bill C-46 the *Northern Jobs and Growth Act* received Royal Assent in June. NUPPA is an obligation of the *Nunavut Land Claim Act* and industry is hoping that it will provide more certainty to the regulatory framework in the territories, making it more appealing for investment. The Nunavut Land Use Plan is still being developed by the Nunavut Planning Commission and once finalized will also guide and direct resource use and development within the territory. A workshop will be held in Cambridge Bay in September to identify and discuss the gaps and omissions in the current Draft.

Canada has assumed chairmanship of the Arctic Council with Minister Leona Aglukkaq beginning her appointment in the role. The Arctic Council Program during Canada's Chairmanship, which will from 2013 to 2015, is entitled 'Development for People of the North'. More information can be found on the Arctic Council's website at:

<http://www.arctic-council.org/index.php/en/resources/news-and-press/news-archive/735-canadian-chairmanship-program-2013-2015>

The Arctic Council recently released their 2013 Arctic Resilience Report and it will be interesting to see how the Council balances environmental protection and with their current mandate of development in the North. The report can be found at: <http://www.sei-international.org/mediamanager/documents/Publications/ArcticResilienceInterimReport2013-LowRes.pdf>

Despite snow in the first week July, summer is here in the North with the first of the icebreakers arriving to open Frobisher Bay. I hope everybody has a great summer, wherever you are!

## NWT Regional 2013 Update

Submitted by Anne Wilson, CSEB Regional Director

Summer is the time in the North when so much happens – from the accelerated activity of the compressed construction season, to the explosion of life as plants, insects, mammals, and birds move to growth and reproductive phases of their life cycles. I was in Yellowknife at the summer solstice, and was fortunate

to do a walk around Niven Lake with naturalist Mike Fournier, who has lived in the North for many years and observes the local flora and fauna. We saw muskrats swimming, evidence of beaver activity, nesting waterfowl and their young, along with many other migratory bird species who come there to breed, butterflies, and native plants from Labrador tea to wildflowers to shrubs and trees. Mike is highly knowledgeable on the various species, including their life histories, and generous with his time and spotting scope. How incredible to have this oasis of wild life in the downtown area of the City!

In other news, four new species have been identified for addition to the NWT List of Species at Risk: Boreal Caribou, Peary Caribou and Hairy Braya\* as Threatened and Polar Bear as Special Concern.

The NWT Wildlife Act is being reviewed, with a complete rewrite of the 1988 *Wildlife Act* proposed. Consultations concluded June 19<sup>th</sup>, and the report is being written. Proposed changes include cooperative management, modernized conservation and management measures, changes to hunting licences, training, and aboriginal harvesting ID to replace the General Hunting Licences.

After an anthrax outbreak last year that saw at least 400 bison dead (30% of the Mackenzie herd), no cases have been observed this year. The GNWT continues aerial surveillance as well as working with researchers.

The 2013 forest fire season is thus far well above average, with 152 fires as of July 5<sup>th</sup>, and 105 still burning. Warm dry weather has been a factor, and fire bans are being put in place in many areas.

## Mining news:

- After an incredibly busy spring with public hearings, progress on the mining front has focused more on waiting for environmental assessment reports and decisions, and preparing for the regulatory stage. Here's an update on the current activity:
- The Fortune Minerals Ltd. NICO proposed cobalt-gold-bismuth mine project successfully completed the environmental assessment (EA) process, pending acceptance of the EA report by the federal Minister. There is currently discussion of wildlife measures to be settled before that can happen. Another hurdle has been crossed, with the Tlicho Government granting land tenure for the access road.
- The Avalon Rare Metals Inc. Thor Lake Rare Earth Element Project involves a proposed mine located on the north side of Great Slave Lake, with processing to be done at a hydrometallurgical facility sited at the old Pine Point Mine. Public Hearings are ran the week of February 18<sup>th</sup>, 2013, with the public registry closing March 21<sup>st</sup>. The EA Decision Report is awaited.
- The Giant Mine Remediation Project EA hearings wound up in October, and it has been 10 years since the closure method was initially identified. The EA Decision Report was recently released, and does not accept the management of the site in perpetuity. The project includes the containment of 237,000 tonnes of arsenic trioxide dust currently stored underground, generated over 6 decades

of mine production. The landowner must revisit options every 20 years, and have a full closure method in 100 years. To address concerns raised with the geotechnical stability of overlying historic open pits, re-routing of Baker Creek is a condition of the EA approval. The report is being reviewed, and the federal minister of AANDC will need to sign off if approval is forthcoming.

- The DeBeers Canada Inc. Gahcho Kue Diamond Project EIR completed public hearings in December 2012 and a decision is anticipated to be released in July of 2013. Work is underway on the Aquatic Effects Monitoring Program and other initiatives. In July the owners announced an increased resource estimate, by 12% to 33.8 milling tons for indicated resources, and up 80% to 11.3 million tons of inferred resources.

Full details for current environmental assessments are available on the Board's web site at <http://www.reviewboard.ca/registry/>.

### Regulatory stage projects:

- Following public hearings for the Prairie Creek Mine Project at the end of January, the Mackenzie Valley Land and Water Board has issued effluent quality criteria for the water licence. The Board has come up with an innovative compromise – fixed discharge limits until it can be demonstrated with real-world data that load-based could be managed. The company is proceeding with monitoring and getting the financial support for construction.
- The Diavik Diamond Mine is no longer for sale; strengthening markets no doubt influenced Rio Tinto's decision to stay in the diamond business.

### Closing:

Here's wishing everyone a relaxing and fun summer, wherever you may be! 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.wilson@ec.gc.ca](mailto:anne.wilson@ec.gc.ca) or [paula.c.smith@ec.gc.ca](mailto:paula.c.smith@ec.gc.ca).

\* For those (like me) who had never heard of this plant, Hairy Braya is a rare flowering plant found nowhere else in the world except on the Cape Bathurst Peninsula and Baillie Islands, Northwest Territories (NWT). There are currently about 15,000 to 20,000 plants. Hairy Braya is restricted to an area that remained



ice-free during the last ice age. It needs bare soil to become established and does not compete well with other plant species.

Most Hairy Braya plants are found in more stable habitats but they are vulnerable

to random events such as flooding from storm surges. Hairy Braya is declining along the coast because of rapid coastal erosion and salt spray. Erosion is expected to increase as water levels rise due to melting sea-ice and climate change. The small range, shrinking habitat and declining populations mean Hairy Braya could disappear from the NWT in our children's lifetime.

## N.W.T. proposes limited caribou hunt for resident hunters

### Resident hunters could be allowed to take one bull caribou

CBC News

Posted: Jul 4, 2013 9:24 PM CT

Last Updated: Jul 4, 2013 10:00 PM CT

Resident hunters in the Northwest Territories may be allowed to take one bull caribou this coming winter season.

The territorial government is proposing a limited resident harvest for the Bluenose East, Beverly and Ahikah caribou herds in certain areas

*If approved by various wildlife management boards, resident hunters in the N.W.T. will be allowed to apply for a tag for one bull caribou this coming season. (The Canadian Press)*

"They're taking adult males, and that has much less of an impact on a population of caribou than taking the adult females," said Alistair Veitch, who has worked for 20 years in wildlife management in the Sahtu region with the Bluenose East herd.

"Given this is one tag for an adult male, I doubt very much that this will have any negative impact on the herd at all. It should be well within sustainable limits."

The government decided to go ahead with the proposal, as some caribou herd populations have shown some recovery over the past few years following steep declines.

Veitch said the proposal would not have been possible if resident hunters had not taken the hunting ban, which was put into place in 2006, so well.

"I think it's a testament to the process and the restrictions that we're now in the situation where a limited return to resident barren-land caribou hunting can be considered," he added.

The proposal is being reviewed by the various wildlife management boards that deal with the herds.



# A Summary of the Report "Potential Effects of Climate Change on New Brunswick Freshwater and Terrestrial Ecosystems"

Submitted by Arielle DeMerchant, Dr. Tom Beckley, Dr. Shawn Dalton. Graduate Student  
Faculty of Forestry and Environmental Management University of New Brunswick

## Background

The Canadian province of New Brunswick (NB) is situated within the Acadian Forest eco-region. This forest type is generally defined as the area of transition between the boreal forest of the north and temperate broadleaf forest of the south. Consequently, NB has a distinct ecology where many species of flora and fauna meet and overlap at the periphery of their distributions. Many species of biota in NB whose ranges are defined by indirect and direct climate effects will likely be affected by climate change in future - some earlier than others. Some research has been undertaken to better understand the effects of climate change in NB; however, much remains to be completed.

To further understand the potential effects of climate change on the terrestrial and freshwater ecosystems of NB, a project was recently undertaken to gain the speculative opinions of biological experts on how the species of their specialty will likely be impacted. The project also sought to gather the recommended adaptation and mitigation actions by experts. The intent of the resulting report is to aid in policy and government decision-making for the management of NB's natural resources.

## Methods

The dates of 2050 and 2100 were selected to represent a period within the near future and a period beyond the lifespan of most current professionals. Prior to interviewing the biological experts, three climatologists were consulted on what climatic variables should be presented to participants and how the variables will change by 2050 and 2100. Mean annual temperature increase, mean annual precipitation increase, and mean annual increase in growing degree days were selected.

Interviews with biologists were conducted with a set list of questions and under the assurance of anonymity. Participants were blatantly asked to "speculate" on potential effects. An initial list of over sixty experts was composed. This included biological experts whose work explicitly considered climate change effects and others whose work did not. In total, forty-three of the individuals were contacted to arrange interviews. Twenty-eight experts were successfully interviewed, including biologists, wildlife managers, foresters, and practitioners. The participants hailed from a variety of institutions, including several universities, both provincial and federal governments, and private organizations.

In addition to individual interviews, three focus group sessions were held to facilitate conversation about potential effects between experts of complimenting specialties. Nineteen individuals participated in the focus group sessions, six of whom also completed individual interviews. Focus group participants also agreed to respect the anonymity of fellow participants and their statements.

## Results

### Forests

Due to NB's significant economic reliance on the forest industry, tree species and tree populations were greatly discussed during interviews. Overall, there was unanimous agreement that tree species distribution will be impacted by changing climatic variables. Foresters and researchers agreed that species present in NB at the southern edge of their range will likely recede in distribution, such as balsam fir, white spruce and tamarack; however, species present in the province at the northern edge of their range, which often tend to be small-scale disturbance species, will likely extend their distribution, such as white pine, red oak, and red spruce.

Another comment that was regularly highlighted by interview participants was the current state of NB's forests. While NB may be the zone of periphery for both the temperate and boreal forest types, experts noted that NB's forests have heavily been manipulated by historical and ongoing agricultural and forestry practices. Consequently, forests tend to be dominated by northern species adapted to large-scale disturbances. Experts highlighted that these heavily anthropogenic-influenced ecosystems will undergo an array of stresses directly and indirectly due to climate change, such as fire, insect infestation, disease outbreak, and storm disturbance. As one expert stated, "You cannot assume the past will look like the future".

When asked what mitigation actions are necessary for NB's forest ecosystems, the most common response among forest experts, including both researchers and practitioners, was increased biodiversity. Experts advocated reducing monoculture plantations of northern-adapted species from forest management. One forest researcher stated, "I do not think you want to fight the loss of species that are becoming maladaptive". The vast majority of experts also argued that action from government is needed to deal with climate change at the source, including policy changes designed to reduce greenhouse gas emissions. Some experts recognized the difficulty of realizing such changes: "That's why forestry has always had problems with politics because politics is the epitome of short-term; forestry is the epitome of long-term".

### Mammals

Wildlife experts agreed that deer populations will most likely benefit by the warming temperatures of climate change. However, experts predicted that this will result in increased interactions between deer and people, especially collisions between deer and vehicles. Some communities in southern NB currently experience issues with the carrying capacity of deer in urban environments and this issue was predicted to heighten and spread to more communities. Higher deer populations may also result in increased infection of Lyme disease, since ticks on deer act as vectors.



There was some disagreement between wildlife biologists on how moose will be affected by climate change. One biologist suggested that if climate change resulted in temperature increases as high as models predicted, moose may not be abundant in NB by 2100, depending on the availability of microsites for heat relief. As the expert stated in reference to predicted temperature increases, "It won't be moose we'll be managing for". Another wildlife biologist highly doubted that moose populations would decline due to the sheer abundance of suitable habitat that has been created in NB by forest harvesting practices over the past 50 years. However, all wildlife biologists acknowledged that moose may be at greater risk of brainworm infection if deer populations grow.

Wildlife experts agree that Canada Lynx would likely be reduced in distribution and abundance. According to biologists, lynx are a species that require deep snow layers and cold temperatures. Not only will decreased snow depths and warmer temperatures add stress to lynx populations, but also increased competition with bobcat populations. With conditions improving for bobcat, individuals will likely expand in range and interact with lynx. Biologists agreed that when in the same area, bobcat are highly likely to outcompete lynx.

### ***Birds***

Biologists agreed that bird species composition in NB will likely shift. As in the case of tree species, bird species of a more southern range will expand into the province, while species associated with more northern coniferous habitat and cooler temperatures will recede, such as Bicknell's thrush. Some experts noted that they have already observed improved over-wintering in recent years in NB of some birds such as turkey vulture and northern cardinal. Biologists also suggested that some migratory birds and insect food sources may become decoupled due to climate change. With warmer temperatures, birds may migrate earlier or later than previous years and not coincide with peak invertebrate abundance for feeding nestlings. Consequently, breeding success is diminished by inadequate resources.

### ***Fishes***

Biologists anticipated a multitude of direct and indirect effects of climate change acting upon fishes in NB. Brook trout and Atlantic salmon were the two most commonly discussed species during interviews. Biologists predicted that the tight water temperature thresholds of the salmonids would result in the fishes not thriving in waters of increased temperature. Increased water temperature reduces the availability of dissolved oxygen and alters pH levels, adding additional stresses to fishes. One biologist suggested that water temperature increase is already the cause of the reduction of brook trout populations in NB.

Higher water temperatures also results in changes in fish behaviour. During high temperature stress events, fish such Atlantic salmon with cluster in high numbers in pools of cold water refugia. Gatherings such as these facilitate additional stresses, such as disease-spread and vulnerability to predation.

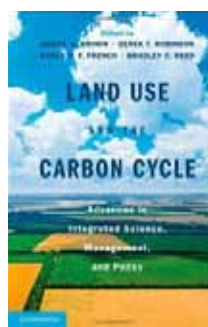
### **Conclusion**

Despite variation in careers and areas of expertise, there were some questions to which all participants expressed a similar

answer. An area of agreement was in the accuracy of speculating on the effects of climate change. The experts unanimously agreed that ecosystems have complex and interwoven biotic and abiotic relationships; therefore, making predictions with confidence is challenging. However, several experts stated that their comfort level in making predictions was increased under the assurance of anonymity and the understanding that their comments were "speculations", rather than data-supported theories.

When asked about mitigation actions for climate change in NB, all participating experts said that action must be directed at the root of the problem: greenhouse gas and carbon emissions. Experts advocated reductions in consumption and pollution emissions. Rather than focusing on micro-scale actions relevant to the biota of their specialty, the participants viewed the issue as one of global concern requiring global-scale actions. One participant stated, "It's the most important issue that faces the planet - I think it dwarfs everything else".

## BOOK FOR Review



### **Land Use and the Carbon Cycle Advances in Integrated Science, Management, and Policy**

Editors: Daniel G. Brown, University of Michigan, Ann Arbor  
Derek T. Robinson, University of Waterloo, Ontario  
Nancy H. F. French, Michigan Technological University.  
Published: January 2013, Paperback

As governments and institutions work to ameliorate the effects of anthropogenic CO<sub>2</sub> emissions on global climate, there is an increasing need to understand how land-use and land-cover change is coupled to the carbon cycle, and how land management can be used to mitigate their effects. This book brings an interdisciplinary team of 58 international researchers to share their novel approaches, concepts, theories, and knowledge on land use and the carbon cycle. It discusses contemporary theories and approaches combined with state-of-the-art technologies. The central theme is that land use and land management are tightly integrated with the carbon cycle and it is necessary to study these processes as a single natural-human system to improve carbon accounting and mitigate climate change. The book is an invaluable resource for advanced students, researchers, land-use planners, and policy makers in natural resources, geography, forestry, agricultural science, ecology, atmospheric science, and environmental economics.

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