

Vol. 67, Number 4 • Winter 2010



THE CANADIAN SOCIETY OF ENVIRONMENTAL BIOLOGISTS Newsletter / Bulletin

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CSEB Newsletter Bulletin SCBE

VOLUME 67, ISSUE 4, 2010

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

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(Back cover) Winter conditions along the North Saskatchewan River downstream of the Capital Waste Water Treatment Plant, Edmonton, Alberta.

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CSEB NEWSLETTER 2010

Vol. 67, Number 4 Winter 2010

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 2010

Vol. 67, Numéro 4 Hiver 2010

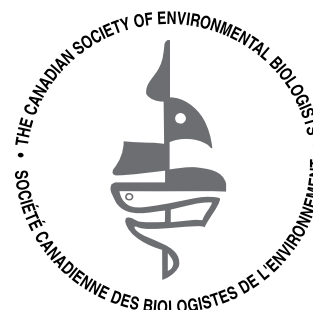
Le Bulletin de la SCBE est une publication trimestriel de la Société Canadienne des Biologistes de l'Environnement. Le Bulletin informe les membres des activités de la Société sur événements courant ainsi que les progrès qui font en sciences de l'environnement. Par un échange d'idées au niveau national, 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

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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**

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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
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NATIONAL News

PRESIDENT'S Report

Greetings, CSEB Colleagues!

Following our recent Annual General Meeting, we now have a new and very capable Executive team starting in January 2011. Our new President, Robert Stedwill, has been an exceptional leader for our Saskatchewan chapter, which has maintained a core group of active members over the past several years. Now he'll bring his leadership skills to our national organization. Also new to our Executive team is Dr. Bill Paton, 2nd Vice President, from Brandon University. Bill is already making plans for a fall CSEB workshop in Manitoba, so stay tuned for more details. And Paula Smith is a new Territories Director from Iqaluit, Nunavut, who will no doubt bring some fresh ideas to the table!

Many of our previous Board members continue in their positions. With this mix of new and old, the coming year should be very exciting for the CSEB. There are many environmental issues that warrant the attention of knowledgeable, skilled biologists, such as those found among our members. I encourage you all to think about how the CSEB can support your interest in environmental issues and how you can contribute to the CSEB. First of all, be sure you have renewed your CSEB membership! An article for the newsletter is always appreciated. Another way is to organize a meeting or seminar for fellow biologists. It's not hard to find someone to give a presentation about their pet project or environmental issue and it's a great way to meet other biologists who care about the environment. Just contact one of the CSEB Board members with your ideas. We'd love to hear from you.

As I shift from President to Past-President, my enthusiasm remains strong and I will continue to contribute to this worthwhile organization. Let me thank outgoing Past-President, Shawn Martin, who was always willing to advise me on society matters. Shawn continues to manage the CSEB web-site, but he has asked for someone else to assume that role. Here's an opportunity for a CSEB member with some website expertise to keep our presence on the Web both attractive and informative to our members, other biologists and the general public. Just contact Shawn or me and we'll set things up.

Best wishes to you all for 2011.

Brian Free
President
bfree@cseb-scbe.org

NATIONAL News

Welcome New Territories CSEB Regional Director

We would like to welcome Paula C. Smith as one of our Territories Regional Director. Paula currently works for Environment Canada as an environmental assessment coordinator in Iqaluit, Nunavut, working on files ranging from municipal licenses to large mining developments. Prior to joining EC this year, she spent four years working in Yellowknife, Northwest Territories as a consulting biologist. In this role, she was responsible for aquatic and terrestrial baseline projects and on-going monitoring for mines across the North. Her previous work history includes fisheries research positions in British Columbia, Ontario, and in the US including Alaska and Washington. Paula enjoys travelling and photography in her spare time.

If you would like to contact Paula, her email address is Paula.C.Smith@ec.gc.ca



UPCOMING SYMPOSIA / WORKSHOPS

Arctic Grayling Symposium and Workshop 2011: Our Conservation Challenges and Opportunities

June 7-9, 2011. Grande Prairie Regional College, Grande Prairie, Alberta. For further information, please contact JPONeil@golder.com. Information will also be available at www.tucanada.org later this fall.

Please send abstracts to Michael.G.Sullivan@gov.ab.ca.

Canadian Society of Environmental Biologists



49th Annual General Meeting

Tuesday, December 7, 2010
6:30pm EST

In-Person Location:
EBA Engineering Consultants Ltd.,
Riverbend Atrium One
#115 - 200 Rivercrest Drive SE,
Calgary, AB

This meeting also had teleconference and web conference options for members across Canada to attend. Minutes will be published in the CSEB Newsletter.

Attendees: Brian Free, Gary Ash, Shawn Martin, Joseph Hnatiuk, Anne Wilson, Karen March, Patrick Stewart, Patrick Ryan, Paula Smith (underlined attended in-person; remainder via teleconference)

1. Welcome

- Welcoming remarks by President B. Free, Call to Order and review of Agenda
- J. Hnatiuk moved approval of Agenda. Approved.

2. Review of 2009 AGM meeting minutes

- 2009 Minutes were read by K. March
- G. Ash noted that these Minutes were published in Volume 66(4) of the Newsletter.
- J. Hnatiuk moved to accept the 2009 Minutes; P. Stewart seconded. All agreed.
- Change in procedure; All agreed that only financial matters required formal motions and approval.

3. President's Report (B. Free)

- The Board held regular monthly meetings and there was good participation and cross-country support. Smooth operation of the Board. Thanks to all of the Executive; special thanks to Regional Directors P. Stewart for ongoing input and enthusiasm and to J. Hnatiuk for all of his volunteer activity on behalf of the CSEB. Special recognition of Sask. Region as the most active Chapter, with 2011 Executive of Robert Stedwill, Curt Schroder and Brent Bitter.
- Commented on Ontario conference planning and acknowledged offers from Ontario membership for assistance. Thanks to Cindy Lee for initial venue arrangements. Had hoped that a local member would come forward to lead the organization of the conference, however this did not occur and the conference has been delayed until 2011. Brian noted that this is consistent with last few years where a full conference was only held every other year. This is

one of the challenges of being a strictly "volunteer" society.

- B. Free confirmed intention to step down at end to 2010.
- Reviewed issues CSEB pursued in 2010: wrote to Canadian Environmental Assessment Agency concerning the review of the Cdn Environmental Assessment Act. Politicians are dragging their feet; review of National Energy Board filing guidelines; University Field Station funding letter still pending; CSEB's John Lilley Scholarship was awarded in 2010.

Summary- Thanks to all. Commented that it has been a privilege to serve as President and a good learning experience. Although stepping down, B. Free will remain actively involved as Past-President.

4. 1st Vice-President's Report (A. Wilson)

- Thanks to Brian for good work. Enjoyed participation on Board.

5. Past-President's Report (S. Martin)

- Extended thanks to President B. Free for past three years.

6. Financial Report (Preliminary) (K. March)

- reviewed receipts and expenses
- Move to accept - S. Martin; seconded - A. Wilson; All accepted

5. CSEB Budget Report (K. March)

- Reviewed budget. Similar to previous years.
- Move to accept - S. Martin; seconded - G. Ash; All accepted

6. Web Master Report (S. Martin)

- Key points:
 - a. web use has increased since 2008 by 50%
 - b. peak time of daily use; 9am-5pm
 - c. main pages viewed are jobs, membership, Newsletter
 - d. Newsletter Vol 65(1) was most downloaded document.
 - e. Most referrals were from other job sites and Google
 - f. Most searches were for environmental biologists, fish etc.

7. Atlantic Regional Report (P. Stewart)

- Although chapter not active, noted continued Atlantic input through Regional Director and Secretary-Treasurer. Ongoing focus on local chapter interest. Regional issues highlighted: Natural Resource Management Strategy (Forestry); cancelling of LNG project; EBS for ocean cable for green energy from

Lower Churchill; opening of causeway at Peticodiac; expansion of aquaculture and related issues; additions to Marine Protected Areas; acoustic tag monitoring of marine species related to tidal power development; DFO identification of new species.

8. Membership Secretary Report (G. Ash)

- noted membership down since 2000, but up from more recent years; including gains from 2009 conference
- G. Ash will provide written membership report.
- Questions: J. Hnatiuk asked if anything came out of the membership materials he handed out at the Montreal meeting of the Cdn. Environmental Network; Gary replied had one member has join in Quebec since Sept.

9. Newsletter Editor Report (G. Ash)

- 3 editions so far this year; 4th in Dec. or Jan. Looking for guest editor and needs more membership contributions. Thanks to Tom Northcote, Pat Stewart and Ann Wilson for contributions in 2010.

10. Manitoba Report – tabled by Bill Paton

11. Saskatchewan Report – tabled by Robert Stedwill

- J. Hnatiuk summarized the Sask report. Noted boom in economy and associated issues.

12. Alberta Report (J. Hnatiuk)

- Key issues addressed legislative review, water regulations and air management.

13. Territories' Report (A. Wilson)

- The 2009 workshop on monitoring brought in new members for 2010. Planned activities include a seminar by Peter Chapman on monitoring, reports to the Newsletter focussing on Arctic issues. As well new Director, Paula Smith has joined in Nunavut. NWT issues include environmental components of climate change, implications of commodity prices, environmental variability and sensitivity, cumulative effects, permitting and environmental assessment. Numerous good biologists in North are addressing these issues.

14. BC, Ont, Que Reports (BF)

- No Directors for these regions; good opportunity for involvement of members from those regions in CSEB.

15. Canadian Environmental Network Report (J. Hnatiuk)

- Key activity: Montreal conference, Environment Canada paper, Cdn Environmental Assessment Act review, advice and consultation with Health Minister, advice on National Energy Board process.

16. 2011 Election

- Call for nominations for has been on web site for past 60 days.
- Nominations received to date;
President – Robert Stedwill
Second Vice President – Bill Paton
- Call for additional nominations from the floor.
None offered.
- Motion to accept current candidates by acclamation – B. Free; Seconded – G. Ash; Accepted by All
- Reviewed Regional Directors
 - J. Hnatiuk was confirmed to 2013 as Sask. Director, as per Saskatchewan Chapter nomination. As Joseph no longer resides in Saskatchewan, agreed to designate this as an acting position.
 - J. Hnatiuk confirmed to 2014 as Alberta Director
 - P. Smith confirmed to 2014 as Territories' Director
 - Vacancies in Manitoba (2), Quebec (2), BC (2), Atlantic (1), Saskatchewan (1)
- Motion to confirm new Directors (J. Hnatiuk); seconded by (S. Martin); Accepted by all

17. Discussion about CSEB Priorities for 2011

- Organization:
 - Fill vacant Regional Director positions
 - Get active chapters, noted that personal phone-calls to members worked well
 - Hold a local meeting, get a local champion
 - Work on promotional material
 - Evaluate web usage to assist communication
 - Use website to full advantage
 - Check membership form checklist to identify interested individuals
- Issues
 - Environmental Assessment and National Energy Board processes
 - Boreal forest harvesting
 - Northern issues (wildlife caribou, polar bear), mining

18. Closing

- B. Free extended special thanks to former B.C. Director, Jim Armstrong, for his contribution as Director and to the Newsletter
- J. Hnatiuk acknowledges Brian Free for contribution over last 3 years and continued help with the organization.
- J. Hnatiuk motion to adjourn; S. Martin seconded; All agreed.

8:30pm EST

UPCOMING / CONFERENCES

38th Aquatic Toxicity Workshop

Watershed: Environmental Integration on a Landscape Scale. October 2-5, 2011 Winnipeg Manitoba.

Proposed Sessions

- Remediation of degraded lakes * NEW
- Emerging contaminants
- Omics (genomics, proteomics, metabolomics)
- Environmental effects monitoring
- Endocrine disrupting compounds
- Amphibians and wildlife toxicology
- Pesticides
- Toxicity mechanisms
- Toxicity testing - methods development
- Biomarkers
- Nanotoxicology
- Routes of metal exposure - water versus diet versus sediment
- Groundwater and aquatic toxicology
- Toxicology and reclamation
- Climate change and toxicology

For info and details : www.atw.ca

REGIONAL News

ALBERTA News

Monitoring the monitoring... Studying Alberta's oil sands monitoring

Submitted by Joseph Hnatiuk, Alberta Regional Director and Brian Free, Past-President

Over the years, the Alberta oil sands have been the subject of significant, emotional controversy regarding their potential environmental impacts. International scrutiny seems to have come to a head this past year with a proliferation of visiting "dignitaries" and expert panels studying the situation.

Last year, Dr. David Schindler of the University of Alberta published an article in the journal, *Nature*, describing serious environmental impacts of oil sands development on the lower Athabasca watershed.

Then, on September 30, 2010 the federal Minister of the Environment announced the establishment of an Oil Sands Advisory Panel on water monitoring for the Lower Athabasca River Basin and connected waterways.

<http://www.ec.gc.ca/pollution/default.asp?lang=En&n=E9ABC93B-1>

Chaired by Dr. Elizabeth Dowdeswell, the panel was asked whether there is a first-class, state-of-the-art monitoring system in place for the oil sands. The panel's answer is "No", but they are optimistic that the system can be improved.

Then, last December, the Royal Society of Canada released an expert panel's report, on "Environmental and Health Impacts of Canada's Oil Sands Industry."

http://www.rsc.ca/expertpanels_reports.php

This panel, chaired by Dr Steve Hruddy from the University of Alberta, concluded that there is no credible evidence to link elevated cancer rates in communities downstream of the oil sands developments. However, they found the EIA process to be seriously deficient, reclamation is not keeping pace with development and there are concerns about the Regional Aquatics Monitoring Program (RAMP), funded largely by the industry.

And finally in January, the Alberta Government responded to the federal study by establishing its own panel of experts. This panel is expected to deliver recommendations to make the oil sands monitoring program into world-class monitoring, evaluation and reporting program, and to recommend how such a program could be expanded province-wide.

<http://alberta.ca/acn/201101/29823C869CE65-032D-6D48-ACC948527B28EBAD.html>

It is noteworthy that one of the panel members, Dr. Helen Ingram, has subsequently resigned, citing the lack of scientific expertise and aboriginal representation on the panel.

Stay tuned. This provincial panel's report is due in June. Will this be the final word on oil sands monitoring?

Online tool identifies potential effects of harmful species from outside Alberta

Edmonton... Alberta has a new tool to identify and evaluate potential impacts of land-based plants and aquatic organisms from outside the province. This will help government, companies and individuals coordinate early detection, rapid response and containment.

Alberta's Invasive Alien Species Risk Assessment Tool, a web-based evaluation, looks at a species' likelihood of establishing and spreading, and its possible effects on an area. The tool focuses on aquatic organisms and land-based plants. It is a key component of Alberta's Invasive Alien Species Management Framework. The tool and framework are being piloted for feedback until June 1, 2011. To learn more or to use the tool and submit feedback, visit www.agriculture.alberta.ca/risktool.

An invasive alien species is a non-native species that, if introduced into the environment, can affect Alberta's native species and economy by degrading habitat and damaging agricultural land and crops. Societal effects may include odours, allergies or impacts on recreation. White oxeye daisy, for example, is not native to Alberta and can reduce hay production and affect the taste of milk from dairy cattle.

SASKATCHEWAN News

Practicing Biologists vs. Biological “Observers”

Submitted by Robert Stedwill, Saskatchewan Director

As a retired biologist, I am now an “observer”, but still feel I have a role to play in the environmental arena. Prior to retiring from leading a team of practicing biologists and other practicing disciplines, I was heavily engaged in decision making on environmental issues associated with the impacts of electrical generation and transmission. I argued long and hard with electrical technocrats and government bureaucrats, and definitely felt “engaged” as a biologist.

Today, far removed from that “arena”, I still consider myself a biologist, but in an “observer” capacity. What I mean by this is, as an avid photographer, and making a bit of an income from it, I continue to view the world with an eye of a biologist. My photography allows me to roam the province and Canada with a critical eye to the flora and fauna of this diverse province of Saskatchewan and country of Canada; the air and water which sustains us; and the man-made impacts that affect it all.

Saskatchewan is undergoing a significant growth spurt due in part to its abundant jobs, significant natural resources development and relatively low cost of living. Needless to say, the latter is being greatly compromised due to the influx of people from other provinces and countries. This growth is putting pressure on all of Saskatchewan’s resources. Case in point; I recall arriving in Saskatchewan 32 years ago – and “rush hour” was in fact about ten minutes. Otherwise, the streets were relatively free from motor vehicles, not unlike what you might find in a rural farming community. There is no more rush-hour – the traffic is constant in Regina and Saskatoon. Demands on water resources, impacts to air quality, waste treatment and exploitation of the Province’s mineral resources will only increase in years to come. One only needs to remind oneself of the recent high profile hostile takeover of one of the Province’s major potash companies, to know that the demand for this particular resource will only increase in the future with its inherent environmental impacts, as demand for food increases for a growing world population.

As an “observer”, I think it behooves those of us in this category to be mindful that we cannot abandon our past careers simply by retiring, but continue to observe the environmental issues going on around us, in our communities, provinces and country. Stay engaged; write the bureaucrats and politicians about your “observations” and concerns. Above all, keep thinking like a biologist!

ATLANTIC News

Conservation Measures Announced for George River Caribou

Newfoundland and Labrador News. Submitted by Pat Ryan

Caribou are essential to the cultural identity, customs and traditions of Labradorians and are an important dietary staple. Following the completion of field work and data analysis for the George River caribou herd census by biologists from both Newfoundland and Labrador and Quebec, the Honourable Charlene Johnson, Minister of Environment and Conservation, today announced new conservation measures to further protect the George River herd. The results indicate the current population of the herd is 74,131. This represents a significant decline from the previous census estimate of 385,000 in 2001. In 1993, a similar census estimated the herd at 776,000 animals.

"The results of this census clearly illustrate the need to implement immediate and alternative harvest management approaches to help prevent further decline of the herd," said Minister Charlene Johnson. "The current liberal hunting regulations are not sustainable and, as a result of this census and the feedback we received from the people of Labrador during a series of public consultation meetings, immediate and significant conservation measures are warranted to ensure appropriate long term management for the George River caribou."

Effective immediately, the commercial caribou hunt, non resident caribou hunting via the use of outfitters, and the resident caribou licence transfer system for Labrador residents will be suspended. The licence transfer system allowed for any resident of Labrador to legally transfer their licence to harvest two caribou to another resident of Labrador who was qualified to hold a big game licence. Additionally, the allowable harvest will be reduced to one caribou per licensed hunter from the current limit of two, and the season will open immediately and close on April 30 in open zones.

The Provincial Government will also establish a committee to review whether additional conservation measures may be required in subsequent years, after a more detailed assessment of the population and increased monitoring efforts are conducted. The intention is to work toward the implementation of a co management board which has worked effectively in other jurisdictions.

On August 9, 2010, a delay to the start of the caribou hunt in Labrador was announced, pending final completion and analysis of a census of the herd. The post calving census was conducted in July, in partnership with the Government of Quebec, Laval University, the Nunatsiavut Government, Torngat Wildlife and Plants Co Management Board and the Institute for Environmental Monitoring and Research. In addition, public consultations were held on October 12

and 13 of this year with targeted stakeholders, including Aboriginal governments and groups, outfitters and resident hunters.

"We thank all those who participated in our meetings, as well as those who provided written submissions," said Minister Johnson. "It was made abundantly clear by all stakeholders that conservation of the herd is the top priority."

The Honourable John Hickey, Minister of Labrador Affairs, also applauded the cooperative nature that was evident during the public consultation meetings recently held in Labrador.

"What I heard loud and clear from all stakeholders was that conservation of the resource must take priority over harvest," said Minister Hickey. "These measures are designed to recognize the considerable value and importance of this resource to all Labradorians."

"Ongoing and enhanced management will be critical to safeguard the George River herd into the future," said the Honourable Patty Pottle, Minister of Aboriginal Affairs. "In the coming months, as we focus on a longer term management strategy for the herd, we will be engaging and encouraging all partners and stakeholders with an interest in the George River caribou to come together in the interest of conservation to assist in the protection of this important resource."

Source:

<http://www.releases.gov.nl.ca/releases/2010/env/1109n03.htm>

News Release, Government of Newfoundland and Labrador,
Environment and Conservation
Labrador and Aboriginal Affairs
November 9, 2010

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.**

TERRITORIES News

Territories Director's Report

Prepared by Anne Wilson and Paula Smith

Greetings to all from north of 60! We are enjoying a winter of inconsistent temperatures, from record highs in Iqaluit to yoyo temperatures in the western Arctic. I was pleased to welcome Paula Smith on as the second Territories Director. Paula is based in Iqaluit, Nunavut, and has been working in the environmental field as a biologist for a number of years.

With the onset of winter, many of us have settled in to read the many reports and environmental assessment documents that are on the go. My philosophy on winter: ignore it, and it WILL go away....

Project Updates:

Mining:

- In the NWT, the Prairie Creek Mine Project environmental assessment progresses, with Information Requests following the Developer's Assessment Report (DAR). The mine site is virtually surrounded by the expanded Nahanni National Park, and the winter road goes through the Park, so there is a lot of scrutiny being given this proposal.
- The Fortune Minerals NICO cobalt-gold-bismuth-copper project is on hold until the Tlicho Government's application to the NWT Supreme Court for judicial review of the Review Board's decision not to postpone this environmental assessment is heard March 15th, 2011. The developer has deferred submitting its Developer's Assessment Report until the end of March 2011.
- The Giant Mine Remediation Project DAR went through the conformity check, and is undergoing technical review. The project includes the containment of 237,000 tonnes of arsenic trioxide dust currently stored underground, and the first test thermosyphons have been installed to freeze the first arsenic vault.
- Tyhee NWT Corp.'s plans to submit their DAR in March or April 2011 for the Yellowknife Gold Project, following completion of the pre-feasibility study.
- De Beers and Mountain Province released the Gahcho Kue Diamond Project Environmental Impact Statement in December. The Mackenzie Valley Environmental Impact Review Board is doing the conformity check, which will take until early March (there are some 11,000 pages to go through!). This project has some interesting aspects around partially dewatering a lake, mining the ore beneath it, then backfilling two of the three pits and rewatering the lake at closure.
- Avalon Rare Metals Inc.'s Nechalacho Rare Earth Elements Project has been issued Terms of Reference for the impact assessment; the Developer's Assessment Report should be submitted in early 2011. The proposed rare earth and metals project is located in the Thor Lake area of the NWT (just north of the Hearne Channel of Great Slave Lake). An underground operation is proposed, along with

a processing plant and tailings management area near Thor Lake. A hydrometallurgical processing plant is proposed to be located at the old Pine Point Mine site. Extraction of rare earths from the ore is complex, with extensive steps using various reagents and processes. With the recent trade restrictions China has placed on shipments of rare earth elements and metals, there is a lot of impetus for REE exploration and development across Canada.

Information on current projects undergoing assessment is available from the Mackenzie Valley Environmental Impact Review Board site at <http://www.reviewboard.ca>

The three active diamond mines (Ekati, Diavik, and Snap Lake) in the NWT continue operations, and continue to submit various plans as required by their permits and Environmental Agreements. The Snap Lake Diamond Mine water licence renewal process is gearing up, with workshops to be held in March on water quality and closure planning.

Information on projects in the Mackenzie Valley jurisdiction of the NWT can be found at <http://www.mvlwb.ca/default.aspx>

Nunavut projects continue to generate lots of activity for both environmental assessments and regulatory reviews:

- The environmental assessment for the AREVA Resources Canada Inc. Kiggavik uranium property is in the scoping stage.
- Agnico-Eagle Ltd. will do further exploration at the Meliadine Lake gold property, which it purchased from Comaplex Minerals earlier this year, followed by a feasibility study. A project description for development is expected in the new year.
- Newmont Mining Corp. is proceeding to develop the Doris North gold project and working concurrently on a project description for a regional development of the adjacent Hope Bay area deposits. Phase 2 will include the incremental development of the Hope Bay Greenstone Belt as a mining district through a series of underground and open pit mines, processing tailings facilities, and infrastructure including but not limited to an expanded port, new airstrip, wind farm, camps and roads that connect the Roberts Bay port to the Boston property. The Phase 2 Project will permit them to expand production mining and milling to include the Madrid and Boston deposits and to complete mining of the Doris deposit.
- Other mining projects, including the base metal properties held by MMD Minerals at High Lake, Ulu, Lupin and Izok Lake, are still on the back burner.
- Sabina Silver Corp. is revisiting the Preliminary Economic Assessment of their resource at the proposed Hackett River Mine (lead, silver, copper, lead, and gold), and will re-evaluate the Pre-Feasibility Study, which was started in 2007.
- Baffinland Iron Mines Corp. delayed release of their Environmental Impact Statement to the new year, pending the change in ownership.
- Meadowbank is undergoing an environmental assessment for an expansion of the airstrip which extends into the adjacent lake.

- Shear Minerals, which has purchased the closed Jericho Diamond Mine, is preparing for a water licence renewal and updating plans. Exploration work is ongoing.

In Nunavut, information for environmental assessments can be found on the public registry at <http://ftp.nirb.ca>

Hydroelectric:

Taltson Hydro Expansion: The Mackenzie Valley Environmental Impact Review Board released the Report of Environmental Review with their decision that the project could proceed subject to certain measures, and subject to the transmission line route being negotiated with the Lutsel K'e Dene First Nation. Given their adamant rejection of the transmission line going through their territory, it appears unlikely this development can proceed. On December 10th, 2010, the Minister of Indian and Northern Affairs Canada, on behalf of responsible ministers, returned the Report of Environmental Assessment to the Review Board for further consideration.

Oil & Gas:

For the Mackenzie Gas Pipeline, there has been progress with the release of approvals. The Final Government Response to the Joint Review Panel (JRP) report was released November 15, 2010 by the Governments of Canada and the Northwest Territories. The National Energy Board report was issued Dec. 16th, 2010. In both reports, the project was approved, with conditions. Further information can be found online at <http://www.ceaa.gc.ca/default.asp?lang=En&n=71B5E4CF-1> and the NEB approval at <http://www.neb-one.gc.ca/clf-nsi/rthnb/nwsrls/2010/nwsrls20-eng.html>

Municipal:

Municipal field work wound up in October, and reports have been written for sites sampled in the NWT and Nunavut. These can be accessed on the Northern Research Working Group web site at <http://www.mvlwb.ca/NRWG/default.aspx?RootFolder=%2fNRWG%2fShared%20Documents%2fREPORTS%20AND%20STUDIES&FolderCTID=&View={90415F10-8830-4FAC-B877-E30C595089D0}>

Result summaries are also available on the Aurora Research Institute and the Nunavut Research Institute web sites.

Are you doing work in the North that you'd like to let others know about? Got an idea for a training course the CSEB could help organize? Please feel free to contact me, or to draft an article for the newsletter. The CSEB provides a valuable networking and communication forum! 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 us at anne.wilson@ec.gc.ca or Paula Smith at paula.smith@ec.gc.ca

What is the Price of a Polar Bear?

Government wants to know impact of adding bears to list of at-risk species

By Max Paris CBC News

When a German hunting enthusiast flies from Berlin to Iqaluit to get a polar bear in the sights of his rifle, the price tag will cost him \$15,000.

A nature enthusiast who takes a trip from Seattle to Churchill, Man., for three days of tundra-buggy encounters will pay \$5,200. Hunting expeditions, wildlife-watching tours — these are easy costs to calculate when gauging the price of polar bear.

But what are polar bears actually worth?

Canada is home to about 15,000 of the world's largest land carnivores. They roam around in Canada's collective backyard and in our imagination — but it's hard to put a price on their existence.

Environment Canada is going to try.

Earlier this month, the federal government department awarded a contract to ÉcoRessources Consultants to determine the total economic value of the polar bear.

The federal government wants to understand the impact of adding these majestic creatures to the list of wildlife species at risk.

Essentially, they are trying to figure out what it will cost if they protect polar bears.

"We're trying to put that value on what it means to the economy and what it means just to have a polar bear around," explains Mary Taylor, Director of Environment Canada's conservation service.

Wildlife value rarely gauged

These types of assessments are difficult, but not uncommon. There is a whole cohort of economists who specialize in them. What they try to do is quantify elements of the environment that have always just been taken for granted.

For example: An undisturbed tundra habitat or a river with protected marine wildlife. The goal is to assign a value to undeveloped ecosystems in order to compare their worth to potential industrial development, such as a mine or a fishery. It may sound naive and idealistic, but according to Vic Adamowicz, it is absolutely necessary.

"If we don't try to do these kinds of assessments, then often these species have implicitly a zero value placed on them,"

argues Adamowicz, a professor at the University of Alberta's Department of Rural Economy.

So, what's a polar bear worth now? What will it be worth if you can't hunt it anymore?

Paul Irngaut knows the answer to both of those questions.

"For us Inuit, the polar bear is invaluable — economically and socially," asserts the wildlife officer for Nunavut Tunngavik, Inc. (the territory's land claims manager).

End the polar bear hunt, and Irngaut predicts nuisance bears, an exploding population and the loss of much-needed jobs.

Irngaut believes there is something much bigger than just the protection of the polar bear behind this study.

"Why are they putting a value on polar bears? Is it because of climate change? If that's the case then say it. And take steps to deal with the climate change issue," he says.

In the meantime, Irngaut just hopes the Inuit will be consulted in this study.

ÉcoRessources must finish its report by the beginning of February 2011. Afterwards, the Environment Minister will, eventually, make a determination about whether or not to add the polar bear to the species at risk list.

Online article: <http://www.cbc.ca/canada/north/story/2010/12/17/pricing-polar-bears.html>



WHAT IS THE VALUE OF PRISTINE LAKES?

By R. John Gibson (rjgibson@nf.sympatico.ca)

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Editor's note: R. John Gibson is a longtime CSEB member, and previous Chapter chair for Newfoundland and Labrador chapter in Atlantic Canada.

Webster's dictionary defines 'pristine' as "ancient, primitive, good old; uncorrupted; unspoiled beauty". In general terms, 'pristine' may be applied to many lakes, mainly applied to their beauty, but more accurately healthy ecosystems with their original fauna and flora should be considered 'pristine.' Truly pristine lakes with undefiled ecosystems are getting rarer, so can be considered as getting more valuable. To illustrate my article I give examples of lakes in the British Isles and in Newfoundland, which may be regarded as important for fishermen, naturalists, tourists, etc., all valuable, but which show ranges in ecosystem health.

The largest natural lake in England is Windermere, in the English Lake District, well known for its beauty and its angling. Despite some anthropogenic enrichment, water quality remains good, but, despite regulations to the contrary, introductions of non-native pondweeds, crayfish and fish have changed the ecosystem. Fish introductions, such as roach (*Rutilus rutilus*) and ruffe (*Gymnocephalus cernuus*) have been particularly damaging (Winfield and Durie 2004). Windermere can therefore no longer be regarded as 'pristine'. With its long history of human habitation and aquatic management and exploitations, probably few pristine aquatic ecosystems occur in England. Land use and various forms of management, such as hatchery supplements, which change the original genotypes, and introductions of non-native species, legally and illegally, have over the years likely changed most systems.

Ireland is better endowed with lakes than England, and some more remote lakes could be described as pristine. For example, the original fish community persists on the west coast in Lough Melvin, which has not been corrupted by hatchery or non-native fish introductions, and includes three genotypes and ecotypes of brown trout, *Salmo trutta* (Ferguson and Taggart 1991). They co-exist with Atlantic salmon (*Salmo salar*) and arctic char (*Salvelinus alpinus*). However, many lakes have been changed by anthropogenic enrichment and invasive species. In the last few decades, the coarse fishery (species other than salmonids) has boomed in Ireland, mainly due to eutrophication and to introductions. Although this has caused extinctions and decreases in the salmonids, economically this has been advantageous for Ireland through increased tourism from 'coarse fish' anglers. For instance, Lough Erne, in northwest Ireland, on the borders of Counties Fermanagh and Donegal, is a popular tourist and nature study resort, and is described in brochures as "an anglers' paradise". However, invasions and introductions have negatively affected the fish fauna. Its history (Rosell 2001), described below, is comparable to other lakes in the country.

The Lower Lough Erne is a large lake of 110 km², mainly less than 20 m in depth. The original fish community, because of its glacial history, similar to Newfoundland, was relatively depauperate, and consisted of three salmonids (Atlantic salmon, brown trout and arctic char), a coregonid (the pollan, *Coregonus autumnalis pollan*), eel (*Anguilla anguilla*), lamprey (*Lampetra planeri*), and the three-spined stickleback (*Gasterosteus aculeatus*). The species presently in the catchment are pollan, Atlantic salmon, brown trout, roach, rudd (*Scardinius erythrophthalmus*), bream (*Abramis brama*), perch (*Perca fluviatilis*), pike (*Esox lucius*), eel, three-spined stickleback, gudgeon (*Gobio gobio*), minnow (*Phoxinus phoxinus*), brook lamprey, stone loach (*Noemacheilus barbatulus*), and tench (*Tinca tinca*). Pike, perch, bream, and rudd were introduced in mediaeval times. Roach were introduced in the 1960s, and the population exploded in the mid 1960s, and now are the dominant species in the lake, comprising 60% of the biomass. The roach is a large cyprinid, virtually inedible, but an important species for 'coarse fish' anglers. The zebra mussel invaded in 1996, of which the population now reaches 10,000 to 100,000 animals per m² on suitable areas of hard substratum, resulting in increased water clarity. The lake is presently eutrophic, but sediments suggest a change from mesotrophy beginning in the 1900s and gathering pace since the 1950s. There is evidence of a general process whereby fish populations in temperate lakes that are changing from oligotrophic through mesotrophic to eutrophic status, alter from a salmonid through percid to a cyprinid-dominated fish community. Arctic char became extinct in L. Erne between 1850 and 1930. Rudd are present in the upstream catchment, but have become extinct in Lower Lough Erne, since introduction of roach. The pollan is now rare, and is endangered. Atlantic salmon have declined since a hydro-electric dam was built near the mouth of the Erne, at Cathleen's Falls, despite construction of a fishway and hatchery to mitigate losses. Commercial fisheries caught up to 100 tons of salmon in a fishing season in the lower reaches of L. Erne before the development. Recent records show that 10,000 salmon ascended in 1966, but this declined to 300 in 1978. Up to 1.5 million eggs and fry from the Ballyshannon hatchery (near the outlet of the Erne) are stocked annually. (This is, of course, the classical effect of hydro-electric dams, although "mitigation" by a fishway and a hatchery is still the touted political smoke screen). There is extensive stocking of brown trout, and by 1986 hatchery fish represented 21.5% of lough



caught trout. Most likely, hatchery stocking has compromised the genetic diversity of the trout stocks. Similar subspecies of trout as occur in L. Melvin may have once inhabited L. Erne before hatchery stocking.

The Province of Newfoundland and Labrador in Canada has numerous post-glacial lakes, and due its glacial history, has a relatively depauperate fish fauna, on the island derived from euryhalic species. Due to low human population density, the remoteness of many lakes, and relatively few fish introductions, many lakes and aquatic systems have their original fish fauna, and relatively few diseases (Van Zyll de Jong et al. 2004). Since the last glacial age, about 10,000 years ago, in isolated pristine systems, unique genotypes and ecotypes of the salmonids have evolved. For example, in response to environmental factors in various ecosystems, brook trout (*Salvelinus fontinalis*) range in size from dwarf forms (Wilson et al. 2003) to trophy sized fish providing important angling opportunities (Gibson et al. 2008; Gibson and Haedrich 2010). Anthropogenic influences do not necessarily mean that the ecosystem has to be fundamentally changed. For example, in eastern Newfoundland, the Indian Bay system with large trophy sized brook trout and resident and anadromous salmon, is popular with anglers, many of whom have cabins on the lakes, but the original species composition and productivity, and more recently with intelligent management, the population age structures of the trout and landlocked salmon, have been retained (Gibson et al. 2008). Indian Bay could be considered pristine and a healthy ecosystem.

Atlantic salmon juveniles (parr) are generally considered primarily to be riffle dwellers in high gradient streams (e.g. Gibson 1966; Kennedy and Strange 1982), although have been recorded in some lakes in Scandinavia where predators and competitors are few (Halvorsen and Jørgensen 1996). However, in insular Newfoundland, and in parts of Quebec and Labrador, with a depauperate fish fauna, salmon parr occupy all habitats of a riverine system: riffles, flats, pools, and lakes (Gibson 2002), a phenomenon termed 'ecological release,' as opposed to 'ecological displacement' in the presence of predators and competitors. For example, brook trout, which are less aggressive than salmon parr, are generally displaced to pool type habitats in the presence of salmon parr, where the two species can co-exist (Gibson 1973), but brown trout are more aggressive than salmon parr, and displace salmon parr from pool habitats (Gibson 2009). In addition, in response to previously unfilled niches, salmon on the island (similar to the brook trout mentioned above) exhibit adaptive radiation in genotypes and life history tactics (Gibson and Haedrich 2006). In Newfoundland, Atlantic salmon may be resident in the stream or lake with limited migration over the life period (potamodromous in streams and rivers, limnodromous in lakes), or migrate to spawn in a tributary stream with growth to maturity in a lake (adfluvial) or in the sea (anadromous), the latter usually spending at least one winter at sea, but some forms using the estuary or near marine habitat and returning to fresh water the same season. Sizes at maturity vary from potamodromous races weighing 17 g, to adfluvial and anadromous races with weights of

several kilogram (Gibson et al. 1996). Several systems have both co-existing freshwater and anadromous strains of salmon, without interbreeding (e.g. Verspoor and Cole 1989). Although considered the same species, they should, by the definition of a species, technically be considered as separate species.

Many systems in Newfoundland have been degraded by hydroelectric developments and have lost their original fish community. A new threat in Canada is the use of pristine lakes as toxic dumping sites by mining companies <http://www.miningwatch.ca/en/environmentcanada-flings-door-wide-open-toxic-dumping-canada-s-lakes>



Traditionally mining operations built impoundments in which to discharge their wastes. However, it is cheaper to use a lake. A loophole in the Canadian Federal Fisheries Act (under a 'Schedule 2' of the Metal Mining Effluent

Regulations, MMER), since 2002, allows a pristine lake to be rescheduled as a "Tailings Impoundment Area", and used for mining wastes. In 2006, two pristine lakes in Newfoundland were so destroyed, and a third, Sandy Pond, in 2009, has been designated for destruction by Vale, a Brazilian nickel mining company. Other mining companies across Canada are now making similar applications. Incredibly, the federal Department of Fisheries and Oceans (www.dfo-mpo.gc.ca) recommend that lakes are suitable as Tailing Impoundment Areas, probably a result of lobbying by mining companies (viz. "research has clearly shown that often the most effective way to dispose of mining waste is under water, either through an artificial impoundment or a natural water body. On-land storage requires large areas in which to contain tailings, plus it is generally more difficult on land to control the potential for negative impacts to the environment. Natural lakes can provide a long-term, stable environment for storing mining waste. They have a small risk of failure when compared to artificial impoundment areas if no dams are required. These regulations [i.e., the MMER], administered by Environment Canada, are for both new and existing mines. They are among the most comprehensive and stringent national standards for mining effluents in the world"). Such audacious statements referring to an abundance of water resources that could be used for toxic wastes could only be made by a country that boasts over half of all the world's lakes, and ignores the world situation. Do we really have to follow the European example of destroying our pristine lakes with unwitting concepts of 'progress'?

The Canadian federal regulations state that fisheries compensation has to be made for a destroyed lake. However, such 'compensation' is generally inadequate, and probably mainly a public relations strategy. For example, different genetic stocks and life history strategies that have evolved in isolated waters, as mentioned above, are not considered

in compensations. In the case of Sandy Pond, a pristine lake with surface area of 37.83 ha, there are three fish species, brook trout, a dwarf rainbow smelt (*Osmerus mordax*) and eel (*Anguilla rostrata*). The trout, unusually for brook trout, feed pelagically on the smelt, and reach large trophy sizes of 3-5 lbs, so the lake is prized for angling. The trout are recognized by anglers as being different from 'normal trout,' in that they are deep in girth and silvery in colouration, similar to sea trout, although not anadromous. There may be two varieties of large trout in the lake. In one variety the fat content is high, and they taste very much like salmon (*pers. comm.* Boyd Winsor).

Also one variety of 'trout' has pea sized black spots on the skin, has a yellowish flesh, has a slight V-shaped tail, and very small scales. It is most likely a subspecies of arctic char. It apparently feeds on amphipods. The biological study in the EIS was superficial, there were no proper population estimates of the species present, no large trout were caught, and no genetic studies were done.

The official 'compensation' is the construction a reservoir of 15.0 ha, which will be stocked with fish, and enlargement by 5.0 ha of two nearby ponds (for a total of 20 ha of 'compensation'). It is of course virtually impossible to replicate a whole and especially a unique ecosystem. Biodiversity, genetic wealth, trophy trout angling and important scientific information will be lost. A local group, the 'Sandy Pond Alliance' is attempting to repeal the 'Schedule 2' of the MMER, which would have implications across Canada, and save many pristine systems presently scheduled for destruction <http://sandypondalliancewordpress.com>

Permission to destroy Sandy Pond, rather than insisting the company build an impoundment (costs, estimated by Vale = \$490 million, cf \$62 million) is virtually subsidizing a very wealthy mining company. It is interesting that recently in B.C., Taseko Mines Ltd asked to drain Fish Lake for a gold and copper mine, and to use the site to dump toxic tailings. The company said there was no alternative, emphasizing the loss of jobs if they were not allowed to proceed. In fact, although the B.C. government gave permission for the destruction of the lake, mainly due to a negative federal assessment and to local opposition, federal permission was not granted. Tellingly, the company now admits, although more expensive, that it can use alternate methods to develop the mine without destroying Fish Lake. http://www.bclocalnews.com/bc_thompson_nicola_ashcroft_cachecreekjournal/business/T14508_904.html

I am reminded of a similar situation about 50 years ago (1960) in New Brunswick. The Heath Steele copper and zinc mine were discharging mine wastes on to the surrounding land, and poisoned out the Tomogonops River, and part of the Northwest Miramichi River downstream, an important salmon river. The company at first denied culpability, but later said that they could not afford to build an impoundment, because that would result in loss of jobs (supported by the New Brunswick Government at the time). However, local

anglers put an injunction on the mine, and the company discovered that, although expensive, they could build an impoundment treated with lime, and the mine proceeded, with eventual recovery of the Northwest Miramichi (Elson et al., 1973).

We have a treasure house of pristine lakes in Newfoundland and Labrador, and each one should be conserved. The Department of Fisheries and Oceans should be protecting our fishery resource, not supporting polluting technology. 'Schedule 2' is an anti-environmental and retrograde regulation. It must be removed.

Conclusion

As illustrated above, the number of pristine lakes is declining. Canada is unusual and blessed in still having a wealth of pristine lakes. Each lake is unique, is valuable, and should be treasured. The fish communities in isolated lakes have evolved unique communities and genotypes for the system, and cannot be replicated in so called 'compensations.' Remaining pristine lakes should be conserved, not only for the pure water they provide, but for conserving biodiversity and global natural history heritage.

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Tiny Atlantic salmon from a brook on the southern Avalon Peninsular, Newfoundland. Mean fork length of mature males was 9.2 cm, and of females, 10.2 cm. These are the smallest Atlantic salmon recorded, and are unique to Newfoundland.



A 6 3/4 lb brook trout from Minipi Lake, Labrador. The deep girth is probably a strategy to avoid predation by pike in the lake (a 'size refuge'), and is an example of evolution of unique genotypes in isolated ecosystems of pristine lakes.

It would be a catastrophe if this unique stock of brook trout were destroyed.

(Photos of Sandy Pond trout by David Messervey).



BOOK REVIEW

Jean-Pierre Rogel (2010). *Evolution: The View from the Cottage*. Translated by Nigel Spencer. Vancouver: Ronsdale Press, 168 pages. (\$21.95)



This is a collection of 14 short essays on contemporary evolutionary biology and its implication for contemporary environmental problems, in the style of the late Stephen Jay Gould. French readers will already be familiar with the best-seller: *L'hippopotame du St. Laurent: dernières nouvelles de l'évolution* (2007). In keeping with the subtitle, Rogel expands and updates recent Canadian findings and research on evolutionary biology, and makes it available to English readers in a readily accessible translation by Nigel Spencer.

The bi-centenary of Charles Darwin in 2009 was marked by a flood of books on evolutionary research and its father. Do we need another book on evolution, particularly one written for the general public?

A recent Gallup poll (17 December 2010) reveals that 40 percent of Americans, and 37 percent of Americans with college degrees, maintain beliefs in creationism. Canada is never far behind, and these findings are consistent with numbers reviewed by Rogel in his visits to Quebec's post-secondary institutions (pages 136-137).

We should not be surprised. An increasing number of so-called "universities" or "community colleges on steroids" groom technicians as would-be scientists, and introduce "Intelligent Design" as part of the "debate." Shockingly, Canadian university biology majors are rarely required to read any of Darwin's writings. The consequences of this are reflected in Web discussions of industry-oriented professional biologists, which often couple denial of climate change or biodiversity crisis with interesting teleological contemplations that could only comfort Bishop Wilberforce.

It is not hard for readers of Darwin to understand the link between evolution, climate change and biodiversity, after all, Darwin himself made that link when he first defined natural selection in 1859:

"We shall probably best understand the probable course of natural selection by taking the case of a country undergoing some physical change, for instance, of climate." (Origin of Species, chapter 4).

Be they creationists or nominal atheists, people who believe that the world about us corresponds to some fixity of design, can never fully grasp the magnitude of the Darwinian revolution. Ironically, many conservationists share their pro-development nemesis' belief in a relatively stable fixed design. The former merely believe it too fragile to deconstruct, and the latter too easy to reconstruct. Few really appreciate its constant but fragile dynamic transformational and adaptive character. Darwin understood constant change to be the cornerstone of life on this planet, and the basis for its unity as subsequently revealed by Watson and Crick.

Rogel, is an advocate for the promotion of science and scientific thinking in our daily lives. The two strengths of this book are its focus on Canadian research, and by and large, on the Canadian natural and cultural environment. In so doing, Rogel meets the practical needs of the intellectual vacuum posed by the increasing realization that science is a cultural artefact. Its practice, and the questions it poses, are not independent of cultural considerations. Social Sciences and the humanities therefore have an important role to play in the resolution of scientific questions, because culture frames our understanding of environmental phenomena.¹

All environmental questions are not just objective scientific questions, they are cultural questions. Their resolution therefore requires a cultural understanding. As Rogel ranges from discussions of the molecular biology of DNA to the life history of whales and polar bears he cannot escape the broader discussion of man's cultural influence which shapes the modern environmental problems we are experiencing, such as climate change and biodiversity collapse. Therefore, after presenting the theoretical background to modern genetics and evolution, in the first four essays, the middle section consists of five essays on the how genes shape evolutionary development and closes with a short indictment of Intelligent Design. The final set of essays reflect on human impacts.

In these essays, Rogel discusses the research of Canadian researchers such as Peter and Rosemary Grant in the Galapagos, or Paul Hébert's "Barcode of Life Project at Guelph," he also takes time out to review and consider the implications of GMO's from an older farmer's point of view, all the while elegantly bringing these considerations back to natural history around his cabin in the eastern townships, in the footsteps of Thoreau.

The third section is perhaps the weakest. It falls into a number of contradictory logical and teleological traps. Logically, Rogel unfortunately repeats a common mis-understanding of Darwin: "*Like any other species we are a random product of chance.*" (p. 101). In his few discussions of "chance," contrary to the popular interpretation, Darwin seems to reject any such notion:

"I have hitherto spoken as if the variations...had been due to chance. This is, of course, a wholly incorrect expression, but it serves to acknowledge plainly our ignorance of the cause of each particular variation." (Origin of Species, chapter 5).

Therefore "species" are the product of randomized biotic responses to conditions generated by abiotic processes, and we are but one product of many such responses. Whether the abiotic processes that condition natural selection are entirely a matter of chance, is another question best left to modern physics and cosmology.

Intentionality in biological processes is always a problem. It commonly surfaces in microbiology discussions of pathogens. When Rogel describes the liver fluke life cycle as: "*a ruse is called for and the fluke influences its host*" he slips into an unfortunate common linguistic teleological trap. (The fluke does not knowingly "influence" its host. Temperature-related changes in protein conformation provoke a yet-unidentified neuro-chemical response in parasite and host²) It is a lovely expository method, but one somewhat intellectually inconsistent with the thesis of evolutionary randomization.

Similarly, the Thoreauvian elements in the essays cause Rogel to close his otherwise useful and enlightened exposé of evolutionary development and natural history, with discussions of the ever-contentious issue of "ecological balance that must be maintained" (p. 143). Heuristically useful as they may seem, concepts like "ecological balance" and "ecosystem health" harken to an assumed fixity of design. They are obstacles to confronting the growing reality of a world increasingly dominated by multiple equilibria. As illustrated in recent reports on the management of National Parks, as climate change accelerates change, notions of "balance" and "health" increasingly stand in the way of the dynamic and evolutionary perspective required to address the period of environmental dislocation we are entering.³

Beyond its clarity of exposition and the extremely relevant questions it puts to the public, Rogel's much-needed book poses another over-arching question for environmental biologists. If after 150 years since the publication of *The Origin of Species* creationism continues to inform political debate on the environment, and even progressive supporters of evolution easily slide into teleology, how are we to confront the cultural and intellectual challenges posed by important issues, such as the shifting reality of climate change?

Loys Maingon

¹ For a broader discussion of this problem see Mike Hulme (2009). *Why We Disagree About Climate Change*. Cambridge. 392pages.

² Frederic Libersat, Antonia Delgado and Ram Gal (2009). "Manipulation of Host Behaviour by Parasitic Insects and Insect Parasites." *Annual Review of Entomology* 54: 189-207.

³ Emma Marris (13 January 2011). "The End of the Wild: Climate change means that national parks of the future won't look like parks of the past. So what should they look like?" *Nature* 469: 150-152.

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