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

THE CANADIAN SOCIETY OF ENVIRONMENTAL BIOLOGISTS Bulletin

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CSEB Bulletin SCBE

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Front Cover: Razorbills, *Alca torda*, on the Bird Islands, off Cape Breton Island, NS.

Back Cover Top: Double-crested Cormorants, *Phalacrocorax auritus*, at the Bird Islands, off Cape Breton Island, NS. Top Insert: Eastern Tiger Swallowtail butterfly, *Papilio glaucus*, sitting on a rhododendron in Peter Wells' garden.

Bottom Left: Atlantic Puffins, *Fratercula arctica*, nesting on the Bird Islands, off Cape Breton Island, NS. Bottom Right: Lupines (*Lupinus* sp.), a common late spring, early wild and cultivated flower in Nova Scotia. Photos Credit: Cover photos by Peter Wells, CSEB Atlantic member.

CSEB BULLETIN 2020

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

All business correspondence, changes of address, undeliverable copies and membership applications should be sent to: CSEB National Office, P.O. Box 962, Station F, Toronto, ON., M4Y 2N9. **Editorial correspondence: Gary Ash, Editor, e-mail:** garyash@shaw.ca.
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LE BULLETIN de la SCBE 2020

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

Tout la correspondence d'affaires, y compris les abonnements, les changements d'adresse, les exemplaires retournés et les formulaires: CSEB National Office, P.O. Box 962, Station F, Toronto, ON, M4Y 2N9. **Les lettres à l'editeur: Gary Ash, Editor, Courriel:** garyash@shaw.ca
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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 to minimize environmental effects.
- to maintain high professional standards in education, research and management related to natural resources and the environment.

OBJECTIFS de la SOCIÉTÉ

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

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

NATIONAL News

PRESIDENT'S Report

By Curt Schroeder, CSEB President

In these remarkable times of global, national and regional challenges, the Canadian Society of Environmental Biologists (CSEB), a national network of biologists, sees tremendous hope for the future peeking through the cracks of hardship and difficulty during the pandemic marathon.

Governments, at all levels in Canada – national, provincial, territorial, municipal – have acted exceptionally to date, shepherding our society through a challenge not seen in a century. There has been no template or instructions from past generations on how to do this, yet they have responded boldly and decisively. Some mistakes have been made, but they have not materially impacted the support and care at the moment. The actions of our elected leaders have provided much-needed relief, direction, and comfort in highly unsettling times. In particular, the multi-party cooperation at the national level – unique within our lifetime – is heartening and encouraging. All politicians and individual Canadians, are to be congratulated and encouraged to continue to work together, especially as we see restrictions being lifted.

We at CSEB hope this glimmer of statesmanship and public support extends to other global environmental crises such as biodiversity loss, climate change, ocean warming, among others, that require similar levels of cooperation. A new normal!

SCIENCE TIDBITS

Submitted by John Retallack, CSEB Alberta Member

It Seems You Can Get Eaten by a Whale – Almost!

Video, originally from 2014 and replayed quite a bit in 2019, documents a diver in South Africa who was almost swallowed by a Bryde's whale (*Balaenoptera brydei*] — a baleen whale similar to blue and humpback whales).

The diver, Rainer Schimpf, was filming in an aggregation of gannets, penguins, seals, dolphins, whales, and sharks that were feeding on a bait ball of sardines. After engulfing sardines and Schimpf, the whale, accustomed to somewhat smaller prey, realized something bigger was in the mix and disgorged the diver. Both diver and whale appeared to survive the encounter uninjured.

Satellite Tags Reveal What's Eating Older Chinook Salmon

According to Andy Seitz and Michael Courtney (University of Alaska Fairbanks College of Fisheries and Ocean Sciences), conventional wisdom has suggested that Chinook salmon (*Oncorhynchus tshawytscha*) become safer as they grow older, and bigger. Some of their recent research findings has them questioning that conclusion.

The researchers have been using pop-up satellite tags to study Chinook salmon since 2013. Satellite tags are attached to fish, where they collect data on temperature, depth, and ambient light intensity. On pre-programmed dates, the tags release from the fish, pop up to the surface of the ocean and transmit stored data to satellites that researchers can access from a computer.

After tagging 43 late-stage Chinook between 2013 and 2017, the researchers noticed a sudden spike in temperatures in many of the prematurely transmitted datasets, days before the data were transmitted. The depth records of the tags at the same time indicated up and down movement (as deep as 400 metres). The researchers concluded that the only place that could happen was in the stomach of a warm-blooded salmon shark. After exiting a shark's digestive system, the tag would pop to the surface and remain inactive, triggering the automatic "abort mission" data transmission.

Of the 43 tags attached, 35 transmitted data back to satellites. Of those 35 tags, 19 indicated marine predators, including warm-blooded salmon sharks, were responsible for consumption of late-stage Chinook salmon.

Late-stage marine salmon may not be as safe as originally suspected.

Sea Otter "Archaeology"

Sea otters once inhabited northern Pacific coastlines from Mexico to Japan, but hunting for fur reduced them to small patches. Those patches have now become larger, and sea otter populations are growing. But, with few fossils and little reporting, their past concentrations and influence on their habitat are largely unknown.

Archaeologists at the Max Plank Institute have detected signs that, rather than just randomly whacking shells on rocks, there may be more to sea otter feeding patterns than previously thought. Distinctive wear produced by generations of otters can be used to track where they once lived, and to explore cultural differences among otter populations.

Sea otters are adept at using rocks as 'chest anvils' but recent evidence suggests that 'emergent anvils' (land-based rock faces) were used while otters were still in the water. In a 10-year study at Bennett Slough, California, Natalie Uomini and Jessica Fujii found the consistent angle of strikes by otters wore the stones down in distinctive ways. Shell fragments were also left with a consistent pattern, making it possible to recognize the otter-made patterns and identify favourite stones. As a result, otter middens were left scattered around the favoured rocks.

The authors note the results provide evidence to distinguish mussels broken by otters from those broken by humans and other animals, thus helping archaeologists studying human coastal societies "…avoid mistaking the remains of otter activities for

those of humans." The results may also help identify specific areas of historical sea otter presence and diet in locations where they are currently extirpated.

Massive Pumice 'Raft' Spotted in the Pacific - Could It Help Replenish The Great Barrier Reef?

A giant raft of floating pumice was discovered in mid-August 2019 by Australian couple Michael Hoult and Larissa Brill, who were sailing a catamaran to Fiji and literally ran into it! The 150 km^2 field of floating rock was created by an underwater volcanic eruption near Tonga in early August 2019 and is expected to reach Australia, and parts of the Great Barrier Reef, in early 2020.

The discovery of the raft has set off a bun-fight about it's potential to be a "mechanism for restocking" the reef.

Scott Bryan (Queensland University of Technology) noted: "Based on past pumice raft events we have studied over the last 20 years, it's going to bring new healthy corals and other reef dwellers to the Great Barrier Reef". He also noted the raft will be the temporary home for billions of marine organisms. Marine life including barnacles, corals, crabs, snails and worms will tag along as it travels toward Australia and the raft will become a "potential mechanism for restocking the Great Barrier Reef". "Each piece of pumice is a rafting vehicle. It's a home and a vehicle for marine organisms to attach and hitch a ride across the deep ocean to get to Australia."

However, Professor Terry Hughes, the director of the ARC Centre of Excellence for Coral Reef Studies at James Cook University, says the raft is too small, and coral would have no way to detach from the pumice on to the reef.

Dr Rebecca Albright (a coral biologist from the California Academy of Sciences) agreed. Albright said that previous studies of pumice rafts found corals were less than 1% of life on the rocks.

In fact, she indicated the pumice may even "abrade the reef". "By the time the pumice reaches Australia, there is a diverse community of things living on it," she said. "But will corals be major players? No, absolutely not."

Sounds like they are in a raging 99% agreement and I expect the 99% of the occupants that are non-corals might be willing to jump ship or take advantage of any temporary or permanent "strandings" as the raft heads toward land.

Another New Whale Species

Based on new analysis of four previously deceased specimens from northern Japan and Alaska, Japanese researchers have described a new species of beaked whale, *Berardius minimus*. *B. minimus* is much smaller than the only other *Berardius* species, (*B. bairdii*).

Beaked whales prefer deep ocean environments, with a diving capacity of about 3000 metres, and this makes them difficult to study and understand.

While I appreciate the effort that has gone into space research over the past decades, I wonder what the level of understanding of our planet's oceans would be if we had invested even a fraction of those $$ into the deep blue part of our planet.

The Thames is Back!

In 1957, a Port of London Authority report declared no fish had been seen in the Thames River in the 64 kilometres (40 miles) between west London and Tilbury in Essex between 1920-1956. Large stretches of the river were anoxic, rendering it biologically dead. Now, 60 years later, the Zoological Society of London (ZSL) has completed its first comprehensive survey of seal breeding, and the results were surprising…138 pups were born along the Thames last year.

The ZSL has been carrying out population estimates since 2013. The most recent records, from 2017, saw about 1100 harbour seals and almost 2500 grey seals across the estuary but they had never done a comprehensive "pup-count".

The Thames now hosts a rising population of seals, as well as over 120 species of fish, porpoises, dolphins, and even the occasional whale.

Drone Used to Count Green Sea Turtles Nesting on Australian Island

Researchers from the Queensland Department of Environment and Science using a drone have recorded a massive bale of green turtles congregating on Raine Island, a small vegetated coral cay in a remote area of the Great Barrier Reef, which is located in the Coral Sea just off the coast of Queensland. Raine Island is considered to be the largest remaining green turtle nesting location in the world, according to the Queensland government's website.

Raine Island is a protected national park and is not accessible to the public. The project is working to protect and restore the island's green sea turtle habitat.

The aerial footage was captured in December 2019, when researchers flew a drone over Raine Island to survey some 64,000 green sea turtles as they swam around the island and waited to come ashore to lay their eggs. Findings from the study were published in the PLOS ONE journal on June 4.

Researchers said drone technology has helped them more accurately track and document the endangered creatures than a previously used method that involved painting the turtles' shells with a non-toxic white paint and counting them manually from a small boat in the water. They plan to use drones to better understand and manage the dwindling turtle population.

The green turtle is classified as an endangered species, according to global data compiled by the IUCN Red List of Threatened Species. The biggest threats to their survival are overharvesting of their eggs, loss of nesting beach sites, hunting, and being caught in fishing nets.

While an exact number on the worldwide population of the green sea turtle species remains unknown, it's estimated there are between 85,000 and 90,000 nesting females alive today based on nesting beach monitoring reports tracked by Sea Turtle Conservancy.

REGIONAL News

BRITISH COLUMBIA News

Submitted by Loys Maingon, CSEB BC Director

To What Extent Could COVID-19 Act as a Planetary Health "Ecosystem Engineer?"

"However horrific the COVID-19 pandemic may seem, it is merely one symptom of gross human ecological dysfunction." — Bill Rees[1]

In BC, as in the rest of Canada, environmental developments in the last four months can be classed as before and after Covid-19. Until the outbreak on January 28, environmental policy remained relatively consistent with the mantra that the government was intent on meeting environmental and economic sustainability goals and climate change resilience targets. After the pandemic was officially recognized and a public health emergency declared March 17, the fate of environmental concerns has been shaped as a response to developing public health policy to control the outbreak of COVID-19. This means that environmental policies are often being reversed, and environmental problems around the province are, for the most part, being exacerbated.

A May 3 report in *Environmental Pollution* indicates that ocean microplastic concentrations have been under-estimated 10-fold. Average ocean microplastic concentrations are estimated to be at some 3700 particles per cubic metre. Potentially, this outstrips zooplankton densities and affects the long-term productivity entire foodchains.[2] As with a lot of the official concerns with COVID-19 , this finding may seem to have little to do with the impact of the pandemic. Indeed it has little to do with direct mortality or infection caused by the virus; however, its indirect impact on zooplankton has important consequences for global food production, fisheries, the ocean's ability to absorb CO_2, UV reflection rates, and the economies of coastal nations.

In January, the BC government was supposed to release new regulations to control the use, circulation, and recycling of disposible plastic items, including the ever-problematic plastic bags.[3] With the COVID-19 pandemic, that legislation is nominally on hold, but in practical terms it cannot be implemented until such time as the pandemic is fully under control and the collective political will for change returns. That time depends on developing a vaccine, which politicians promise, but which most scientists note is unlikely to be developed in at least the next four years.[4] (In that framework, it is worth noting that a vaccine for dengue fever has just been released. It took 75 years to develop a vaccine[5]). Currently, existing recycling policies and practices have been reversed, and access to recycling facilities has declined. The mandatory need for disposable gloves and shields has increased plastic production, and plastic pollution is inevitably increasing,[6] with the consequent documented increase in environmental toxicants.[7] In that context, measures to control this pandemic are rolling back federal and provincial plans to control plastics and to meet Climate Change targets.[8]

The virus is effectively reshaping environmental policy, and possibly the framework of the economy itself. It is, therefore, worth weighing to what extent the virus may be contributing to the transformational changes called for by the April 2018 IPCC Report on Climate Change.[9]

Some mixed "good news" have been associated with the general lock-down of the human population. The economic slow-down has reduced the output of fossil fuel particulates and led to a clearing of the air all over the world, leading to clearer skies in China and even in Nepal.[10] There is a logical close correlation between COVID-affected regions and areas of high air pollution before the pandemic.[11] Of interest in this correlation is the feedback between compromised air quality and the incidence of COVID-19 cases due to associated respiratory problems. This is consistent with work by UBC researchers at the School of Population and Public Health.[12] As pointed out by UBC's Dr. Michael Brauer, in BC, air quality problems are responsible for 1,600 deaths each year at a cost of $11.6 billion per year to the medical system. With COVID, that number of fatalities, which in itself already exceeds the direct impact of COVID, could easily be multiplied.

Two of the main sources of air quality problems in BC referenced by the UBC study are the burning of forestry waste and residential wood-burning. Notwithstanding this, the early forest fire season was inaugurated in February by slash burning causing major uncontrollable fires in the Kitimat and Squamish regions.[13] This is actually a "normal" occurrence. In 2017, Premier Horgan and George Heyman, the Minister of Environment and Climate Change Strategy, vowed to impose a carbon tax on slash burning and forestry waste to force logging companies to move to eliminate massive wood waste burning, by processing forestry waste to higher quality products. This was to "put people first and move to transition to a low-carbon economy.[14] Three years in and any talk of "low-carbon" has been replaced by a lack of support for local small-business initiatives to re-process slash into lower-quality cants for the Chinese wood market. In a move that fully vindicates the contention of false green solutions presented by Michael Moore's notoriously controversial film, logging companies with the support of the current government, have become partners in a wood-pelleting mill, which presents wood-burning as "environmentally friendly."

While the economic, industrial and tourism-related slow-down has undoubtedly resulted in cleaner air and water in some urban situations, and has given wildlife more space, indirectly it is taking a toll on the environment by testing some of the limits of public policy. On the one hand, it is restricting our ability to address broader systemic problems inherent in our economic system, such as climate change. On the other hand,

while, as in the case of controlling wood waste burning, it is the government's practice to side-step actual policy development and implementation, it also becomes a practical test for the actual reality of the "sustainability" promised by a succession of economists and politicians since the 1987 release of the Brundtland Report. COVID-19 is reshaping our ability to implement public policy that purported to make aspects of our economy sustainable. The virus crisis, which is itself a product of over-development, is effectively forcing us to test the very proposition that an economy of endless growth can be made sustainable. It is re-shaping how we approach problems.

Problems that were already threatening the long-term viability of salmon populations on the Fraser River are now being compounded by the pandemic. It is now a foregone conclusion that efforts to restore passage at the Big Bar rock slide near Lilloett will not be sufficient this year to allow for the free passage of salmon headed upstream. Any work that might have been remotely possible after March has been foreclosed by distancing regulations associated with the work.[15] If rock cannot be blasted to provide a clear channel: "***experts fear endangered stocks like early Stuart sockeye, brutally depressed for years, could disappear altogether***."[16] This compounds a bad situation for West Coast fisheries in which the already bleak outlook for BC fishermen[17] is compounded by a reported collapse of sockeye in Alaska.[18] The fishery is further compromised by early outbreaks of COVID-19 in the canneries.[19] This is likely to result in a situation similar to the closing of meat processing plants in Alberta, which has caused meat shortages throughout Canada. We are effectively looking at a collapse of salmon populations through decades of overfishing, compounded by climate change, and with the pandemic, together with a collapse of the processing and marketing.

The virus is not just affecting the health and movement of individuals. The pandemic creates an uneven two-tier sense of reality. While on the one hand, people are being asked to stay at home and both national and provincial parks are closed to the public, often controversial large scale projects that require densely populated work camps, such as Coastal Gas Link, Site C, and TMX continue to operate and modify the environment, largely without witnesses outside the industry.[20] This is exacerbating questions of trust in natural resources management, and by extension, in the economy. Ongoing problems with forestry and in particular in old-growth management, which had prompted a much-awaited review in the fall of 2019, have not receded.[21] Contrary to what might have been expected in a time of economic slow-down and social isolation, old growth logging has continued unabated, and gone on largely unobserved by a public committed to self-isolation. The impacts of deforestation continue to mount. As noted in the interior of the province, past deforestation and associated wildfires have combined with early melts to cause unprecedented massive floods.[22]

Although BC has managed to launch an ambitious tree planting program in spite of the pandemic — this also comes at a time when scientists are expressing growing concerns at the use of "tree planting" programs to meet climate change targets. Tree planting programs are not "restorations." They are not planned as attempts to restore biodiversity or compensate for ecosystem function losses. The tree replanting programmes are mainly industrial forest stock intended for short-term rotations for the forestry industry. As noted in this week's issue of *Science*, many government-driven tree planting programmes have proven to be counter-productive and are simply no substitute for the restoration and preservation of native ecosystems: "*The first priority to increase the overall number of trees on the planet must be to reduce the current rate of deforestation.*"[23] The approach taken by the Ministry of Forests is best defined by the minister's definition of ecosystems as "feedstock" for the industry.[24]

The view taken by BC's Minister of Forests, that forests and ecosystems are simply "feedstock" for industry, is an economic statement that determines cultural priorities and practices. What is important for biologists and foresters to understand is that this view is not separate from nature. It is a view of nature. It defines entire landscapes across BC. The well-documented picture of this province as a quilt-work of clearcuts, as far as the eye can see, is a cultural view of nature by a society that implements industrial culture to support its understanding of an economy. These are the landscapes that we have created, which we hand to future generations.

There lies the rub. The scientific community has been particularly clear that the pandemic, which is now constraining much of our economy, is itself a product of over-development. The pandemic is now forcing even average citizens to re-visit both social and environmental relationships. The pandemic is a product of the global population density and the resultant intensification of economic development that has opened viral reservoirs in wilderness, which were previously contained by the abundance of wilderness and biodiversity.[25] The destruction of habitat and the alienation of man from nature, which we have witnessed over the past century, and which has been the hallmark of our economy, may indeed be the biggest source of this and future pandemics, which are likely to be the catalyst undoing our current economy. A 2014 research article in the journal of The Royal Society, *Interface*, using a 33-year dataset between 1980–2013 of 102 outbreaks of 215 human infectious diseases, makes the case that infectious diseases have been alarmingly on the rise over the past four decades.[26] As Figure 1, drawn from this study, indicates, the number of infectious diseases over the three decades covered by the dataset have increased about five-fold. It is no coincidence that this rise in infectious diseases correlates with an explosion in human populations, economic development, and the consequent loss of critical wildlife habitat. Global human population numbers between 1980 and 2010 grew from about 4.5 billion to 7 billion, with an intensification of economic demands on the planet.

While one may be averse to attributing the rise of pandemics to "a revenge of the planet," suggesting that "nature is sending us a message,"[27] pandemics have a history of cultural and economic re-organization that needs to be considered, as per Mitchell L. Hammond's recent history of pandemics.[28]

It is worth taking a moment to consider the relation between economies, pandemics, and nature, however briefly. Economies are not passive relationships with euphemistically–named "resources." As with so many things around us, western societies have objectified our relationships with individuals and organisms about us, as well as with the social constructions we depend on. We take economies to be distinct from the world they act

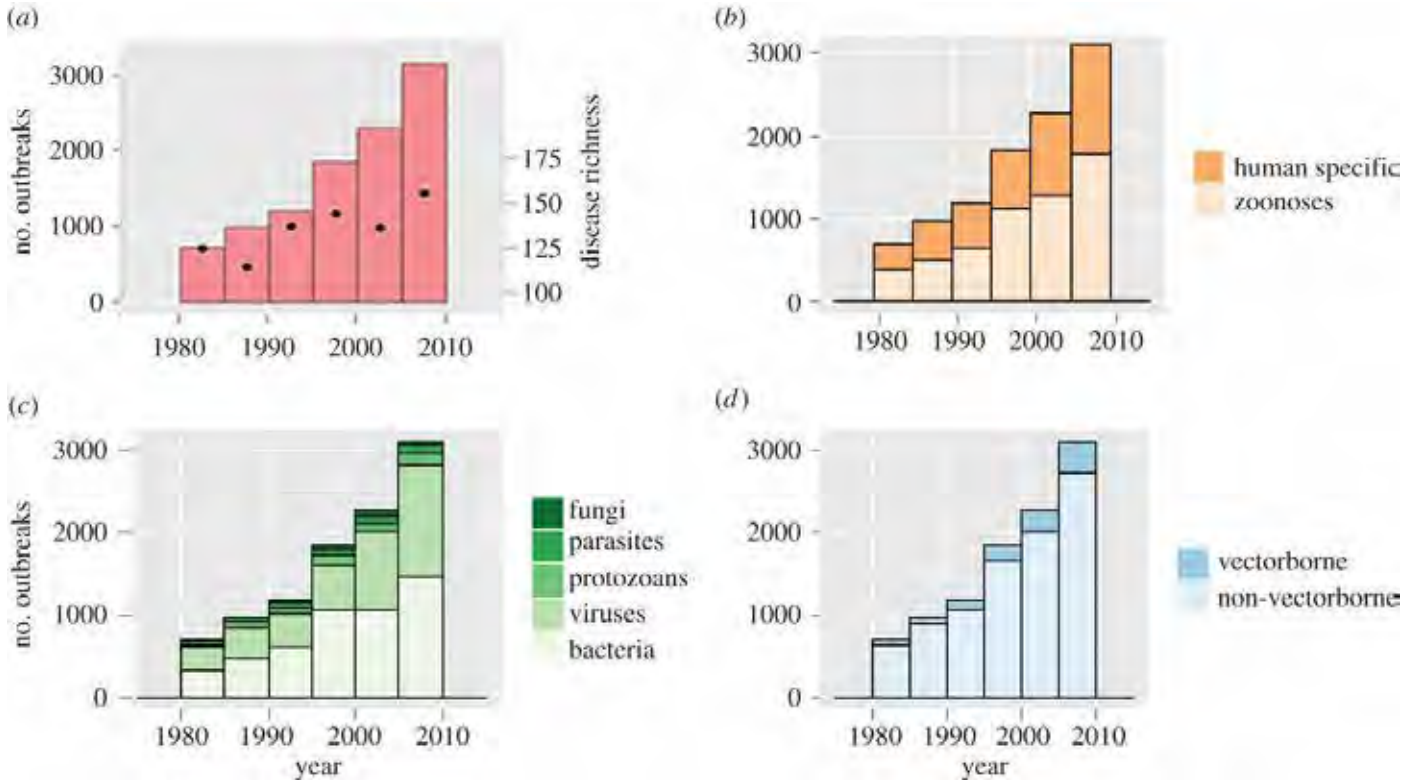

Figure 1: Global number of human infectious disease outbreaks and richness of causal diseases 1980–2010. Outbreak records are plotted with respect to (a) total global outbreaks (left axis, bars) and total number of diseases causing outbreaks in each year (right axis, dots), (b) host type, (c) pathogen taxonomy and (d) transmission mode. (Online version in colour.)

on and depend on. In fact, economies are intentional intensive land management systems that shape both the landscape and the cultural understanding that societies have of "nature." Economies are the articulation of the cultural assumptions that make up the cognitive filter through which we know the world and manage our relationship with it. They are not a given, and in many instances nor is the resulting "nature."

Should this statement sound obtuse or far-fetched, it may be worth considering the timely intellectual revolution caused in Australia by the release of Bruce Pascoe's 2018 book, *Dark Emu*, which is fast becoming an essential educational text, with which Australians of all ages are becoming re-acquainted with their country and its history.[29] Pascoe documents the sophisticated cultural achievements of aboriginal society in architecture, farm and aquaculture infrastructure, from both the diaries of explorers and the archaeological record. Most importantly, he documents that this society, which invented agriculture at least 30,000 years ago (if not before), that is some 17,000 years before Mesopotamian cultures, developed very sophisticated economies that produced the highly productive landscapes that early settlers described, usurped, destroyed, and committed to oblivion. What he has to say flies in the face of every assumption of "settler society" of my generation.

The question he raises is not simply that a genocide took place in Australia, nor that all physical traces and literary witnesses to this previous environment were deliberately and systematically suppressed or erased, but that the long-standing Aboriginal economy and the landscapes it sustained were destroyed in an incredibly short time after contact. Remarkably, the transformation of entire Australian ecosystems took only "a handful of years."

When economies change radically, so do ecosystem management regimes and the resulting landscapes. If we want to understand what "trans-formative change" really means, then we should learn from cultures that have experienced and recorded "trans-formative change."

Therefore, it can be argued that wherever human beings are present in sufficient numbers, entire ecosystems are shaped by the greatest global ecosystem engineers — human beings. We shape this Earth, and viruses may just be our hubris. This is beyond the Jarrett Diamond thesis of *Guns, Germs and Steel* that technology enables cultural substitution.[30] Where humans settle, the telos of landscapes is not independent of the human cultural fabric. Nature is only wilderness to an alien culture, as was the Australian wilderness to European settlers, but a home to the Aborigine. It is not simply the technology but the economy that re-structures ecosystems and their associated cultures.

As witnessed by pioneers and the work of modern agronomists and archaeologists, the dispossession of aboriginal society and the introduction of sheep and water-intensive European feed-grasses, together with diseases, radically altered the entire subcontinent's ecology and hydrology. Settlers' accounts witness that the lush and seeming "cultivated" environments, similar to

England's best countryside, were impoverished almost overnight: "*Farmers noticed the alarming drop in productivity over a mere handful of years as sheep ate out the croplands and compacted light soils… thousands of years of grass and soil changed in a few years*."[31] While it is important to understand the impact of colonial agriculture on native ecosystems, it is even more important to understand that the "native ecosystems" were themselves a product of Aboriginal economic management. In other words, the perceived "wilderness" was itself a carefully managed system: "*English pastoralists weren't to know that the fertility they extolled on first entering the country was the result of careful management, and cultural myopia ensured that even as the nature of the country changed , they would never blame their own form of agriculture for the devastation*.[32] What happened in Australia happened throughout the world, and Pascoe dedicates some pages to the parallel experiences of First Nations' cultures in British Columbia. (The cultural amnesia that Pascoe documents is consistent with the implications of "the vanishing dataset" that has guided the DFO's mismanagement and impoverishment of productive ocean ecosystems, as documented and discussed by Daniel Pauly.[33])

Pascoe's book has proven particularly timely because the impacts of climate change have magnified and rendered unsustainable many Western industrial agricultural practices throughout much of Australia. After the 2019 fire season, many Australians have expressed the sentiment that Australia could never be the same ever again.[34] The massive drought and loss of fish species throughout the extensive national watersheds, particularly, those of the Murray-Darling basin, has forced Australians to reconsider agricultural practices. The loss of fish species also forced Australians to rediscover the sophisticated millennial Aboriginal aquacultural practices that previously sustained those same fish populations. It is also increasingly evident that changes driven by the logging of native forests in Australia contributed to the particular ferocity of this summer's bushfires.[35] Particularly in the wake of the 2019 drought, there is a renewed incentive for Australians to rediscover the cultivation of native staples, which are better adapted to the sub-continent's soils and climate, and with it, initiate a restoration of pre-contact ecosystems.

Although Pascoe's initiative was initially seen only through the lenses of climate change as complementary practices within the prevailing industrial economy, it may now take on a more significant role, if the unsustainability of the industrial economy becomes more self-evident and forces "transformational" changes as a result of COVID-19. COVID-19 is beginning to compel our society to question our assumptions and see the world about us through different lenses.

Beyond Jared Diamond's contention that European germs and resistance to them were part of the arsenal of Western global domination, viruses that drive global pandemics do not confer resistance to any particular cultural group. Pandemics can have a salutary levelling effect. It has therefore been argued that they have to capacity to re-organize entire economies.

The re-organization currently underway in BC comes once again from the legal challenge posed by First Nations. After almost three decades, Taseko's "New Prosperity" mine, which would have drained Fish Lake, a lake sacred to Tsilhqot'in culture, appears to have come to an end after what is hoped is a final Supreme Court rejection of Taseko's claim[36]. As noted by the Tsilhqot'in themselves in BC: "*Mining companies are getting away with murder. There is no trust after Mount Polley*." There has long been discussion over the need to revise BC's *Mining Act*, which is seen as a dinosaur to which a succession of governments have been beholden, for decades. The attitudes that underlie it are an extension of the colonial cultural attitudes that have shaped our economy for the past 150 years. As aboriginal title comes into being throughout vast territories of this province, attitudes to the land are changing rapidly both within and outside aboriginal communities.

Transformational change is likely to be catalysed even more radically by the challenges posed to increasingly unsustainable economic and cultural assumptions by an insignificant little bat virus.

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ALBERTA News

Submitted by Brian Free, CSEB Alberta Regional Director

What a difference a few months can make! The constraints associated with the COVID-19 pandemic have affected many environmental programs in Alberta. Many biologists are finding themselves working under new and challenging conditions; field programs are being postponed or cancelled and extra hygiene practices add time and costs to that work; working from home as self-isolation and health concerns make that trip to the office much more difficult. Colleagues, clients, and staff may or may not be available, depending on their personal circumstances. The large drop in world oil prices and the general economic downturn just amplifies all of these challenges. I hope that our Alberta members and families are faring well and we will see improvements to these conditions in the near future.

In early May, Imperial Oil Ltd. reported the deaths of 50 waterfowl that landed on tailings ponds near its Kearl oilsands project in northern Alberta. More than 100 birds per day, mainly grebes and shorebirds, landed on the ponds over a period of several days. These migrating birds landed despite active deterrent systems including radar detection, noise cannons, eye-safe lasers, scarecrows, and long-range noise making devices. It is postulated that the birds landed on the Kearl ponds because most of the natural water bodies in the area were still frozen.

Some of the oiled grebes were taken to a wildlife rehabilitation centre in Edmonton, where my daughter volunteers, to be cleaned and assessed. Staff and volunteers at Wild North washed about 15 grebes; mainly eared grebes, but also one pied-billed and one horned grebe. And yes, they did use Dawn detergent! The grebes were released in the Edmonton area once they had preened their feathers back to a normal condition, providing adequate insulation and buoyancy. A short video showing the grebes being washed is available at https://www.cbc.ca/player/play/1734975555706/ (Apologies if an ad plays first….)

Shortly after this incident, the Alberta Energy Regulator announced that oil sands operations are going to be relieved of several environmental monitoring requirements, presumably as part of government's action to bolster the industry, now facing depressed oil prices and reduced demand for their product. However, they will still be monitoring the tailings ponds for bird landings.

On a more positive note, the Alberta Government is providing a $3.7-million grant to the Alberta Biodiversity Monitoring Institute (ABMI) for ongoing research on biodiversity in Alberta's ecosystems. The grant will allow the ABMI to continue its monitoring work, which includes tracking changes in Alberta's wildlife and habitats. The ABMI has 1,656 site locations, spaced 20 kilometres apart, to collect biodiversity information on terrestrial and wetland sites. The institute monitors about 2,500 of Alberta's species across seven taxonomic groups;

Taxonomic Group	Approximate number of species in Alberta	Approximate number of species detected to March 2019.
Birds	330	291
Mammals	100	29
Armoured mites (>300 µm)	351	256
Vascular plants	>2,000	1530
Mosses & liverworts	640	351
Lichens	580	420
Aquatic macroinvertebrates	1600	328

Did you know that the Six-dimpled Northern Mite (*Tectocepheus sarekensis*) belongs to a mite family that often indicates recent habitat disturbance? Now you know!

Check out the ABMI at https://abmi.ca/home.html

SASKATCHEWAN News

Submitted by Robert Stedwill, CSEB Saskatchewan Member

The week of May 23-30 was identified as Aquatic Invasive Species Awareness Week in Saskatchewan, which coincides with the opening up of the province and fishers' desire to get out and fish following the provincial COVID-19 lockdown! Obviously with the movement of boats between bodies of water, the risk of introducing invasive species is greater.

"This week highlights the importance of protecting Saskatchewan's waters from aquatic invasive species," Environment Minister Dustin Duncan said. "By understanding the threat and taking appropriate actions, everyone can make a huge difference to the health of our water and fishery resources."

On May 18, a boat that had been transported across the border between Saskatchewan and North Dakota in late March (by a Canadian returning home due to the COVID-19 pandemic) was found to be contaminated with mussels and subsequently decontaminated. The boat had been "sealed" until the owner could deal with it following self-isolation.

In 2019, over three thousand boat inspections took place, with well over a thousand decontaminations undertaken. To date, the province is still Zebra and Quagga mussel free.

MANITOBA News

Submitted by Robert Stedwill, CSEB Member

As the COVID-19 pandemic takes most of the headlines over these last few months, some environmental reports have been buried, as newspapers fold, or journalists lose their jobs.

One project in Manitoba that has been under the radar over the last while is the 695 MW Keeyask Hydroelectric Project on the lower Nelson River, about 725 km northeast of Winnipeg in the Split Lake Resource Management Area.

Of the three major hydroelectric projects currently under way in Canada; Keeyask, Muskrat Falls in Labrador, and Site C in British Columbia, Keeyask is the only one that has had a low profile, until recently.

What caught my attention were First Nations, which Manitoba Hydro is in partnership with, that wanted the project construction shut down, not for environmental reasons, but to stop construction workers from carrying the corona virus back to First Nation communities. That issue is apparently resolved.

One of the major environmental issues that needed to be addressed, amongst many, was the impact on Lake Sturgeon (*Acipenser fulvescens*) habitat, and specifically spawning habitat at Gull Rapids.

To mitigate the loss of this valuable habitat, the Keeyask Hydropower Limited Partnership (KHLP) board committed to constructing approximately six hectares of Namao (Cree for Sturgeon) spawning shoals downstream of the Powerhouse.

The sturgeon spawning shoals are designed with input from the Department of Fisheries and Oceans for placement of specifically graded rockfill that trap Lake Sturgeon eggs within the voids, allowing the eggs to be held in place for fertilization and reducing predation. Boulder clusters are placed randomly on top of this substrate (layer). These boulder structures create a sheltered, low velocity wake on the downstream side that serve as resting places for fish as they swim upstream against the current to spawn.

The spawning shoals were constructed this past winter across the Powerhouse Tailrace Channel where the range of water depths and velocities are known to be favourable for successful spawning. Although designed specifically to attract Namao, it could also be used by other species that spawn under similar conditions.

Source: Map and some text credited to Keeyask Hydropower Limited Partnership community newsletter.

ONTARIO News

Submitted by Justyna Van Poucke-Choquette, CSEB Ontario Member

Get involved: Ontario Marks Provincial Day of Action on Litter!

Ontario has just marked our first Provincial Day of Action on Litter in Ontario on May 12th of this year.

The government of Canada states that they will organize litter clean-up days across the province, when the time is right. This will be a great opportunity to help clean up the Earth we live on and an even better opportunity to reconnect with nature. Would you get out and do a litter clean-up?

The Ministry of Environment, Conservation and Parks also urges Ontarians to choose products with less single use plastic packaging as well as urging locals to educate themselves on proper recycling habits, such as what goes in the green bin and what goes in the blue box. The Ministry also urges the public to ensure that garbage bags are free of holes and properly tied up to help keep communities safe and clean. Do you participate in proper recycling practices? Would you choose less plastic packaging on your next trip to the grocery store?

If you live in Ontario and want to follow the movement, or simply want to see people making a difference, you can follow the hashtag #ActONLitter on social media. Will you use and explore the hashtag?

Do you commit to helping to keep your community clean of litter? With Ontario now celebrating the Provincial Day of Action on Litter every year, we can continue our devotion to recycling, follow the hashtag on social media, as well as be conscious shoppers, buy less plastic, and contribute our time and efforts doing yearly cleanups.

ATLANTIC News

By Peter Wells, CSEB Atlantic Member

This is a brief summary of current environmental events and issues in Nova Scotia, and information sources. Any associated commentary is entirely mine and does not necessarily reflect the views of the Society and its members. Content was prepared in March, just before the COVID-19 pandemic struck Canada and the Maritimes closed down. Needless to say, the impact of the epidemic and the shocking mass murder in NS in April, amongst other tragedies affecting the Province, has largely knocked environmental news out of the media, and sucked energy out of the community. That said, we will persevere, recover and keep working on environmental issues, key to keeping the region's environments protected and healthy.

Conservation

- The purchase of more wildlands near Halifax is moving ahead successfully, with the Nova Scotia Nature Trust and other organizations involved. This is greatly increasing the amount of wild land and lakes (i.e., semi-wilderness) close to the urban areas of Halifax Regional Municipality and available for public recreation.
- New rules for the Northern Right Whale protection are being put into place in the southern Gulf of St. Lawrence (GSL) by DFO and Transport Canada. Ship speeds will continue to be limited, and fishing for snow crab will take place earlier in the season, amongst other measures. The right whales have largely moved from their feeding areas in the outer Bay of Fundy to the GSL. Movements are being closely monitored by DFO scientists using a variety of very high-tech monitoring techniques. The whales started to arrive in the GSL in early spring.
- The movement of great white sharks continues to be monitored by privately funded marine scientists. One shark tagged off Nova Scotia was detected recently near New Orleans in the Gulf of Mexico, illustrating this species' ability to range long distances in the ocean.

Environmental Issues

- The Northern Pulp mill near Pictou is closed for an indefinite period, as of Jan. 31st, 2020, and perhaps permanently. The Boat Harbour legislation dictating a deadline for the closure of the estuarine lagoon, one that the mill had been legally using as part of its treatment system for over five decades, was supported by the provincial government. For various reasons, time ran out for the plant to be building and using an alternate effluent treatment and disposal system. Many people at the plant lost their jobs, as well as job loss occurring throughout the forestry industry and supporting businesses of the province. The province has set up a $50 million fund to help people and forestry related businesses recover. It could cost the taxpayer another $100 million to restore the lagoon, which lies next to a First Nations reserve. As of May, the mill is in shut-down mode, but it continues to be involved in the environmental assessment process for its proposed waste treatment plant and piped discharges. Joan Baxter's book "The Mill" is a good read for background information.
- Open pen, coastal salmon aquaculture is very controversial in the province. A huge proposal to expand this industry in several bays by a large Norwegian company, Cermaq, was vehemently opposed by most people in many communities. This put the province and the federal government into a bind, as they actively support the industry for its economic benefits, often short term, while being blind to the longer-term effects on tourism and the quality of the coastal waters, sediments, and biological diversity. Needless to say, the aquaculture industry fought back hard. In April, the company decided to withdraw its plans and not invest in the province, a decision likely due to both the community opposition and the ongoing COVID-19 pandemic and economic downturn.
- Owl's Head Provincial Park, on the eastern shore, was secretly delisted by the provincial government to entertain a proposal by a local, out-of-province, citizen proposing to build of a golf course on the otherwise protected crown land.

The park has rare species of flora and is highly regarded by conservationists. There is considerable growing opposition to both the government action and to the proposal.

- Loss of coastal land access is a growing concern across the province, as more of it falls into the hands of private citizens and developers. Less than 10% of provincial coastal land is currently publicly accessible for recreation, wildlife viewing, and tourism.
- The Alton Gas project next to the Shebenacadie River is still being opposed by indigenous peoples, with ongoing protests. Huge salt caverns are being excavated for the storage of natural gas. This results in briny effluents being disposed into the river estuary, home to spawning fish (e.g., alewives) and bald eagles, amongst other species.
- Twinning the 101 Highway across the tidal flat and marsh at Windsor, NS, is out of current news but still a concern for loss of wildlife habitat. It is surprising that conservationists and the Canadian Wildlife Service have been so quiet about this, given the ecological value of the large salt marsh and the presence of migratory shorebirds. At the time of this writing, the plan is to enlarge the causeway and insert new fish ways, as various fish migrate up and down the Avon River. No news of local opposition is available.
- A gold mining proposal in the St. Mary's River watershed, down the eastern shore of the province, is being opposed due to concerns about metal pollution. Gold mines are inherently very polluting operations, both when operating and when abandoned. Nova Scotia has a legacy of old mines, the land on which they stand still requiring expensive cleanup and restoration, always paid for by the taxpayer. Will we ever learn?

Meetings (both cancelled but continuing next year, hopefully)

- Upcoming FSRS meeting, Dartmouth, NS, originally planned for March 2020. There was to be a one day workshop of this society, the Fishermen and Scientists Research Society. It annually brings together active fishers and fisheries researchers to exchange information and develop joint projects. This is a wonderful example of cooperative information exchange and management of our coastal living resources. This meeting was cancelled.
- The BoFEP/ACCESS Bay of Fundy Conference, Truro, NS – to be held in May 2021. This biannual event of the Bay of Fundy Ecosystem Partnership was being co-hosted with the Atlantic Canada Coastal and Estuarine Science Society. The meeting, entitled "Science and Management in an Era of Climate Change", with talks, posters, and panels on a wide range of marine research being conducted throughout the Maritimes, is postponed to next May. It may also be a virtual meeting, depending upon the status of the pandemic.

Publications

- In 2016, a research group at Dalhousie University (www.eiui.ca) produced a book published through CRC Press/Taylor and Francis, entitled "*Science, Information and Policy Interface for Effective Coastal and Ocean Management*". The book, published in hard and soft copy, is now open access on the CRC website (www.crcpress.com), making it much more accessible and valuable for students and practitioners in the coastal management field.
- Several Canadian and US scientists involved in coastal contaminant monitoring have just published an article in a special issue of the Marine Pollution Bulletin. It is as follows: Elskus, A.A. et al., "Monitoring chemical contaminants in the Gulf of Maine, using sediments and mussels (*Mytilus edulis*): An evaluation", Mar. Pollut. Bull. 153(2020): 110956. It may be of interest to CSEB biologists working on our coasts and concerned about coastal chemical contaminants.
- A new documentary called "C*oastal Communities – At the Ready*" has been produced by the Community Conservation Research Network (CCRN), coordinated by Tony Charles of Saint Mary's University, Halifax, NS. It is viewable for free online at www.communityconservation.net, under videos (The Chronicle Herald, Halifax, Feb. 27th, p. D1). It focuses on what people can do individually in an era of severe weather conditions and climate change.

TERRITORIES News

Submitted by Sharleen Hamm, CSEB Territories Director

Earlier this year, Canada's first university north of 60° came into being: The *Yukon University Act* was passed unanimously by the Yukon legislature in late 2019, coming into force in February 2020, where after the Yukon College became the Yukon University. In partnership with the University of Alberta, Yukon U offers a Bachelor of Northern Environmental and Conservation Sciences. Check out program links through Yukon U https://www.yukonu.ca/programs/northern-environmental-and-conservation-sciences and the University of Alberta https://alesnorth.ualberta.ca/bsc-program/.

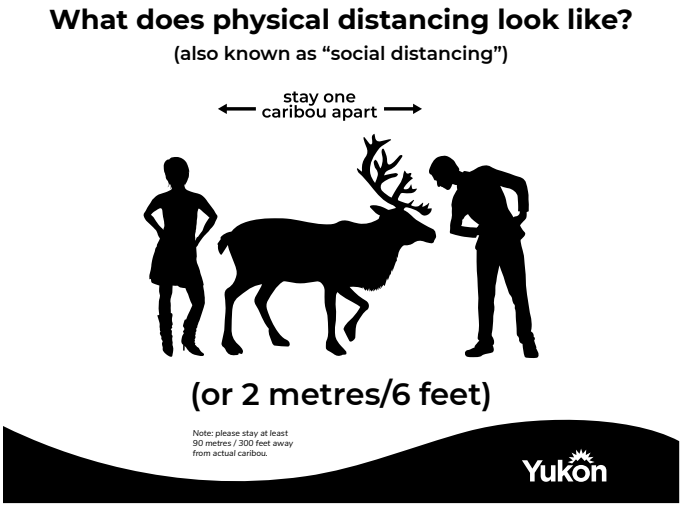
In May 2020, ArcticNet and INTERACT entered into a Memorandum of Understanding aimed at increasing collaboration and cooperation among researchers in northern regions around the world. ArcticNet is a network of over 175 researchers studying the impacts of climate change in Canada's North, comprised of scientists, engineers, and managers, Indigenous partners, northern communities, government agencies, and the private sector (https://arcticnet.ulaval.ca/). INTERACT is International Network for Terrestrial Research and Monitoring in the Arctic, a circumpolar network of 43 terrestrial research bases accessible to researchers working on projects in the fields of glaciology, permafrost, climate, ecology, biodiversity and biogeochemical cycling. For more info, check out https://eu-interact.org/.

June 8 was World Ocean's Day, with the 2020 theme being Innovation for a Sustainable Ocean. Oceans Day was declared in 1992 in Rio de Janeiro at an event parallel to the United Nations Conference on Environment and Development, and was inspired by an event organized by the Oceans Institute of Canada. Thereafter in 2008, in an initiative again led by Canada, the United Nations General Assembly designated June 8 as World

Oceans Day. What does this mean in the Arctic context? Check out the Qikiqtani Inuit Association's (QIA) blog post on this: https://www.qia.ca/blog-learning-as-we-grow-celebrating-the-high-arctic-nauttiqsuqtiit-on-world-oceans-day/. The Tallurutiup Imanga National Marine Conservation Area was established in 2019 with the signing of an Inuit Impact and Benefit Agreement (IIBA) between QIA and the Government of Canada. In addition to establishment of Tallurutiup Imanga, the IIBA includes provisions for the interim protection of the Tuvaijuittuq Marine Protected Area. The ecological importance of Tallurutiup Imanga and Tuvaijuittuq is largely due to the presence of multi-year pack ice, sustaining a unique ecosystem as well as Inuit travel and harvesting.

In addition to those conferences Anne Wilson listed in her Director's Report, the ArcticNet 2020 Annual Scientific Meeting, themed Arctic Change, is currently scheduled for December 7-10, 2020, in Toronto. Here's a link to the current program: https://arcticnetmeetings.ca/ac2020/schedule. The call for sessions just wrapped up; stay tuned for their call for papers and update on conference format.

Finally, a reminder to be kind, be calm and be safe…..and stay one caribou apart (thanks Dr. Bonnie Henry and Government of Yukon!).



Submitted by Anne Wilson, CSEB Territories Director

Spring has been slow to arrive in the NWT, and summer is predicted to be cooler than normal. In contrast, the high Arctic and Arctic Archipelago is strongly likely to have above-normal temperatures over June, July, and August, with an even higher probability for Sept.–Nov. This pattern may bode well for the forest fire season, but not for sea ice!

All three territories have closed their borders to non-essential travellers, with special measures needed for returning mine workers. The lifting of some COVID-19 related restrictions on internal activities is underway; travel into the territories is still restricted. This affects research that had been slated for the open water season, as well as some of the monitoring and maintenance programs that mining operations are required to do. Border restrictions mean that travellers either can't come into the territory, or have to isolate for 14 days for the exceptions that are allowed to travel into the territory. Mining operations have reacted in different ways, from the Ekati Diamond Mine moving into Care and Maintenance, to gold mining operations limiting production and limiting numbers of fly-in workers, along with extensive safety protocols.

The conferences on the Arctic that were mentioned in the Spring issue have been re-scheduled. These include the following:

- International Symposium on Plastics in the Arctic and Sub-Arctic Region, 21-23 April 2020 at Reykjavik, Iceland https://www.changing-arctic-ocean.ac.uk/science-outputs/arctic-conferences/international-symposium-on-plastics-in-the-arctic-and-sub-arctic-region/ Symposium postponed to 28-30 September 2020
- A Changing Arctic 2020, Jun 02-05, 2020 in Tromsø, Norway https://framsenteret.no/2019/08/a-changing-arctic-conference-in-tromso-2020/ Postponed to 2021
- Cryosphere 2020: International Symposium on Ice, Snow, and Water in a Warming World Sept. 21 to 24, 2020 Reykjavík, Iceland https://www.cryosphere2020.is/ Postponed to 2021
- 38th International Polar Symposium. Environmental Changes in Polar Regions: New Problems – New Solutions 38th International Polar Symposium Oct. 15 to 17, 2020 Toruń, Poland https://polarsymposium2020.umk.pl/pages/main_page/?langu=en Currently still scheduled
- The 47th Canadian Ecotoxicity Workshop scheduled for this fall has been rescheduled for October 2021. https://ecotoxcan.ca/

Other sessions and workshops have been cancelled (e.g., BC MEND field school), while some are moving to an online format with limited offerings. While the reduced registration costs are welcome, one of the main benefits of attending conferences is the networking – much is learned or sorted out in sidebar conversations!

Development activity in the North is still underway, but with some changes. Projects that require technical meetings in Nunavut are coming up against technical limitations of videoconferencing where simultaneous translation is needed. Reviewers from outside of the territories can't attend in person due to border restrictions, so environmental assessment processes are effectively on hold. Regulatory activity continues in Nunavut and the NWT, with virtual meetings or written processes where possible.

Some of the current reviews include the following:

- The Environmental Assessment process for Baffinland Iron Mine's proposed Phase 2 expansion has been paused, given difficulties in running technical meetings; public hearings won't be scheduled until this is sorted out. The Water Licence amendment process is on hold.
- Agnico Eagle's proposed expansion of the Whale Tail gold project has been approved and licenced by the Nunavut Water Board, and is proceeding with dewatering activities this summer.
- In the diamond mining sector, De Beers' Gahcho Kue mine is applying for an expansion for extraction of additional resource.

- The Meliadine gold mine is dealing with elevated salinity in wastewater, as well as higher than expected volumes of saline minewater. Permission has been granted to discharge the wastewater to a freshwater lake, with requirements for extensive monitoring on toxicity and receiving environment effects. Many lakes in the NWT and NU are comparable to distilled water, and proposed changes in major ion levels will need to be carefully evaluated. The mine proposes to deal with the saline minewater by disposing of it to the ocean; this application is currently under review.
- Municipal wastewater management continues to be a challenge in the North, and work continues on the development of effluent quality standards, similar to the Wastewater System Effluent Regulations that apply south of 60°. Consultation has been carried out in the NWT and Nunavut, and Northern regulations will be drafted over the coming months.

Closing:

If you are connected to activities in the Yukon, Northwest Territories, or Nunavut, doing work north of 60° that you would like to highlight in the newsletter, or running some seminars or other training opportunities, please let us know. The CSEB provides a valuable networking and communication forum, and a voice for biologists if there are any issues to be raised. There is also the option of instigating other CSEB activities — both of the fun and/or of the educational variety — with colleagues in the North. Please email your thoughts to Anne Wilson at anne.wilson2@canada.ca or Sharleen Hamm at sharleen@sharleenhamm.com.

Some Arctic Research to Continue, Thanks to Local Partnerships

By Dustin Patar

Reprinted from Nunatsiaq News (2 June 2020)

"It's an unintended benefit of community-led research"

For some researchers who work in the Arctic, the COVID-19 pandemic ended their upcoming field season before it began, but for others, it's going ahead on some level thanks to local partnerships.

"It's an unintended benefit of community-led research," said Chris Debicki, the vice-president of policy development and counsel at Oceans North.

"We never anticipated that there would be a time when southern researchers just couldn't come up."

In March, as a response to the pandemic, the Government of Nunavut implemented travel restrictions that limited entry to the territory to residents and essential workers.

While this has been an effective means of preventing the novel coronavirus from entering the territory, the impact on researchers was almost immediate.

With Nunavut's borders open only to essential workers and residents returning home, southern scientists conducting Arctic research have had to put a lot of work on pause. (File photo).

Later that month, the Polar Continental Shelf Program, or PCSP, a part of Natural Resources Canada that provides cost-effective logistics, co-ordination and advice to researchers conducting fieldwork in the North, suspended its logistics operations.

"Without the ability to travel to the territories and without PCSP's ability to bring research teams to remote field camps and locations, the research field-season is currently on hold," the PCSP said in a statement to Nunatsiaq News.

During the 2020 field research season, the PCSP planned to support 160 projects across the Arctic, with approximately 1000 participants involved in those research projects.

For other research groups, such as that associated with the CCGS Amundsen, Canada's preeminent research icebreaker, the season will continue but it will be shorter and feature some considerable changes.

But not all scientific groups working in the North have the ability to sequester themselves on a research vessel.

While Oceans North does conduct fisheries and oceanographic research while at sea, they also work on traditional knowledge projects with communities, including an archeological dig.

"For us, just like any organization doing research in the Arctic, we're looking at the prospect of a lot of cancellations and things that can't go ahead this summer," said Debicki.

With the season on hold, Debicki says that the Oceans North team that would have been busy preparing to go into the field has instead been working on developing new educational materials to share with school-aged students and looking at ways they can support food security and mental health initiatives in the communities.

In the past, southern researchers haven't always collaborated and partnered with Inuit communities. Now organizations like Oceans North are beginning to change that by developing community-led initiatives.

"Inuit bring a sophisticated ecological knowledge to marine conservation that is essential to building a healthy future," says the Oceans North website.

Thanks to those local partnerships, there are technicians who live in some communities that have the equipment and expertise to continue research projects amid the pandemic.

Among those projects are a floe edge camera network and acoustic monitoring stations in Pond Inlet and a beluga study in the Churchill River Estuary.

Some of Oceans North's traditional knowledge gathering initiatives will continue, such as one in Inukjuak.

"That's going to proceed because we're directly supporting local participants," said Debicki.

"It's a place where our philosophy of community partnerships and supporting community-led initiatives is really paying off."

Debicki also understands that there may be university students who have a science or research background that have taken shelter in their home communities as a result of the pandemic.

"So we're also reaching out to see if this isn't an opportunity to collaborate with Nunavummiut and take advantage of the fact that they're home right now," said Debicki.

If you are a university student in your home community over the summer and are interested in collaborating with Oceans North, you can reach out to Debicki by email.

Oceans North isn't alone in its ability to continue summer research.

Ikaarvik, a youth-driven initiative by Ocean Wise that aims to connect southern researchers with the needs of northern communities, has seen some of its plans change but hopes that others will go ahead.

"All the different things that we do are impacted by COVID the same way most other things are," said Eric Solomon, director of Arctic programs for Ocean Wise and co-lead of Ikaarvik.

This means that the youth involved in the initiative aren't able to travel and get together with each other or with mentors to develop projects and plans for the next field season.

"For us, in a very practical sense, what that means is some of the projects that were going to get started this summer … that's, of course, on hold for now," said Solomon.

"Other projects, because the youth are driving this stuff, for example in Kugluktuk, as long as they are able to, to go out on the river in groups of two to four by summer, they'll be able to carry on."

As of June 1, the Government of Nunavut began easing its pandemic precautions, including allowing outdoor gatherings of up to 25 people, paving the way for the youth in Kugluktuk to be able to continue their fieldwork.

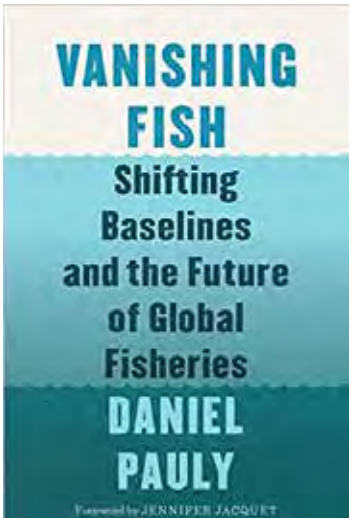
While this is good news, Solomon wonders what impact a mostly cancelled season will have on the relationships between southern researchers and northern communities.

"It's so important when someone like me, or someone from my organization or a researcher from the south, starts working with communities that they're able to not just pop in and pop out, but come back and spend real, meaningful time and continue to come back and maintain the relationships and the trust and the respect," said Solomon, who estimates that it may be almost an entire year between his last trip and his next one.

"We all keep in touch by phone or email or whatever, but there's just no substitute for the face to face."

BOOK Review

Submitted by Loys Maingon, CSEB BC Director



Vanishing Fish: Shifting Baselines and the Future of Global Fisheries.

Daniel Pauly. 2019. Vancouver: Greystone. 288 p.

Available from Amazon.ca

$32.77 Hardcover; $19.22 Kindle.

"…fish are in dire peril, and, if they are, then so are we."
(Daniel Pauly p.24)

In a remarkable collection of essays drawn from occasional lectures spanning the past 25 years Daniel Pauly presents unusual but authoritative insights into the disciplines of "fisheries science" and "natural resource management" that have brought us to the the brink of global ecological collapse. It is the rare honesty of these essays that makes them exceptionally important for anybody who is genuinely interested in understanding the foundations of our ongoing environmental crisis. Everything Pauly has to say is applicable, not just to fisheries, but to every "natural resource" industry. These essays unveil the mindset behind the systematic corporate and political corruption that has made our global predicament possible. Fisheries failures aren't simply local. As Pauly notes early in these essays, the ongoing fisheries collapse is a global systemic problem. The entire global system is rigged for failure.[1]

In *Vanishing Fish*, Daniel Pauly peels back the historical and cultural cataracts that have kept the social and ecological implications of our current management practices hidden from public view. To understand the importance of the points he makes, it is worth considering how they are validated by recent research carried out independently of Pauly's own research.

At a time when many British Columbians still assume that the salmon bounty of the West Coast is an immutable right, BC commercial fishermen have been calling for disaster relief.[2]They are likely to continue doing so for years to come, given the deteriorating ecological state of the oceans. From the isolation of urban tourism that flogs a plastic version "Supernatural BC," and pandemic lock-downs, it is perhaps difficult to realize that the iconic totems touted as the very essence of British Columbia are fast disappearing. The wilderness of giant Emily Carr coastal cedars, southern resident orcas, and salmon is slipping away imperceptibly while its cultural and commercial exploitation endures in the minds of our urbanized consumer society as an unquestionable right.

The current state of BC's environment is just another adumbration of colonialism. Even as people talk of being "post-colonial," and politicians piously incant an acknowledgement that they are on somebody's "unceded territory" they perpetuate colonial exploitation and despoilment of the lands and oceans, which are synonymous with native cultures. The colonial exploitation of otherness as just another "resource" to be mined continues unabated. What both fishermen and BC residents often fail to realize is that this disaster has not been made by something magical out at sea, or in a nebulous "environment." It is we. It is the sum of the gratuitous assumptions that underlie our management practices and economies, that Daniel Pauly questions openly.

A stunning SFU study published in August 2019 in *Science* revealed that since 1913 even the best sockeye fishery in the province, the Skeena River fishery, which has always been touted for its almost "pristine" conditions , has in fact been systematically plundered for the past 100 years.[3] As Pauly is at pains to repeat, throughout the world, the biomass of traditionally-targeted fish "*has been reduced by at least one order of magnitude*."[4] "Normal" today is one-tenth of yesterday. Tomorrow it will be one-tenth of today. And today we crave for some abnormal "normal" to return?

In keeping with Pauly's two central theses of "vanishing databases" and "biased fisheries science supporting a Ponzi scheme," two findings make the SFU study particularly remarkable. First, not only have sockeye numbers and biomass declined by at least 75%, but, even more importantly, we have been generally as unaware of the magnitude of this decline as it developed as boiling frogs are of rising temperatures. For every generation of fishermen and fisheries scientists since 1913, the ever-declining numbers were considered to be high and "normal." "Abundance" is the benchmark we know in our lifetime, if we do not know better. While the Fraser River salmon collapse that followed in the wake of the Hell's Gate slide of 1914 is well-recorded and acknowledged,[5] the great abundance of the Skeena in 1913 and in previous decades became intellectually inconceivable to a succession of fisheries scientists who only knew a short-term dataset that Daniel Pauly has rightly called a "shifting baseline syndrome," a problem to which he dedicates an entire essay.

The "shifting baseline" is characteristic of most technocratic thinking. It has all the hallmarks of "insider" comfort that will never question the reality of the social and economic paradigms from which "insiders" benefit. It is a complete absence of any sense of "historical ecology," basking in the rewards of tacit corporate complicity. Pauly defines it as "*each generation of fisheries scientists accept (sic) as a baseline the population size and species composition that occurred at the beginning of their careers*."[6] What the absence of any sense of environmental and ecological history leads to is that we fail to learn from our mistakes. We accept ignorance to be meritorious and self-satisfied corporate shills revel in impoverished ecosystems brought to the brink in which "*the biomass of fish and other exploitable organisms along the North Atlantic coast of Canada now represents less than 10 percent of the biomass two centuries ago…*"[7] (And the situation in the Pacific ecosystem is not that different.)

Second, the analysis of the Skeena data shows that this decline cannot be attributed to development, which is normally considered to be the biggest driver of biological declines. In the Skeena, this

massive decline is attributable mainly (95%) to overfishing, greed, carelessness, and mismanagement. In places like the Salish Sea where, in addition to overfishing, development has altered 80% of the shoreline, with disastrous implications for marine ecology and water quality, one can only consider the multiplicative effects of a century of both development and overfishing. What remains today of the pre-contact, pre-colonial Salish Sea can only be a fraction of the documented 25% that now "abounds" in the Skeena. The well-documented continuing demise of resident Salish Sea orcas bears witness to that fact.

There is no magic to this, only the science of hard numbers. Pauly is an internationally recognized fisheries statistician and modeller. His life's work, outlined in the last three essays ("My Personal Odyssey 1-3", pages145-196) has focused largely on developing global statistical databases of the global state of fisheries such as "FishBase", from which to model ecosystems (i.e., "Ecopath") and reconstruct past data. Fisheries do not really vanish, they are collapsed by a failure to recognize that nature is more than a set of "resources," or as Pauly notes, more than "a larder."[8]

One of Pauly's greatest contributions to fisheries science has been his advocacy for a long-term ecosystemic approach to fisheries science and environmental management. And he documents the extent to which this approach has long been unrecognized and unfunded and continues to be opposed by fisheries scientists who prefer to maintain the commercial status quo, which funds their research.[9] This comfort depends on the political bias based on simplistic unscientific statistics, such as Wilbert M. Chapman's "Maximum Sustainable Yield" curve, which Pauly ably debunks in the essay "*Not the Fisheries Committee*" (pages 137-144). His analysis and historical presentation of the MSY curve is particularly significant because this is the basic tool of industry, corporate, and government environmental management, in fisheries, forestry, and wildlife management. Its reality depends on one elusive thing: "reliable data". Reliable data depends on understanding the ecological context of species dynamics. Without a good understanding of the ecological data and context, commercial management by single species simply results in the unravelling of the web of life.

What Pauly tells us about the discipline, in which he is an internationally recognized expert, is actually applicable to all disciplines involved in "resource and environmental management." As any scientist minimally aware of the growing list of depressing global assessments can attest, it is not just the fish that are vanishing. It is the kelp forests, the concentrations of essential nutrients, and the species that create entire "processing chains" that are disappearing in a massive global re-organization. A December 2019 report reviewing environmental declines since 1970, entitled "Pervasive human-driven decline of life on earth" sums the situation up: "*The fabric of life on which we all depend—nature and its contributions to people—is unravelling rapidly.*" [10]

The ecological emphasis that Pauly advocates follows the work of the late Ransom Myers whom Pauly acknowledges for his withering critique of the DFO's political motivation and ineptitude, which resulted in the Newfoundland cod collapse. A critique so truthful that it led to the political persecution and subsequent refuge of "Ram" at Dalhousie University. The ecological approach has meant shifting the focus of fisheries research away from market and larder interests of the fishing fleet and corporations, and asking the essential questions: Whose interests are being served? Who are the real stakeholders? Who should benefit from the fishery? Who has the long-term knowledge needed to maintain a "sustainable fishery"? And what is a "sustainable fishery"?

At the heart of Pauly's historical review of fisheries, the central question that comes up over and over is that in spite of all the talk about "sustainability" and "sustainable fisheries", particularly in the wake of the 1987 Gro Brundtland report, which was a response to the 1972 "*Limits to Growth*" that has only led to the green-washing of business-as-usual, we have had no "sustainability" as noted repeatedly by Pauly.[11] On that matter, Pauly provides a scathing indictment of "people who profess great environmental consciousness" and mainstream environmental organizations like the Marine Stewardship Council (MSC), but whose environmental practice has been just more "business-as-usual" contributing to the collapse of marine ecosystems.[12]

As he notes repeatedly throughout these essays, the only really sustainable fisheries, the only ones that have endured for centuries if not millennia, have been the small local fisheries sustained by the local knowledge of long-term resident populations. These are the very fisheries that international governments and corporations have destroyed. Pauly, therefore, makes a solid case for locally-based NGO science as opposed to corporate science that informs government decisions. He also advocates strongly for the importance of locally-managed marine protected areas, that enable ecosystems to rebuild. Fisheries, as all natural resources, need to be managed not just nominally for the public good, but by local communities to protect their local environment. The "public good" belongs to the public, not the corporations.

Pauly makes the case that fisheries management, as we have known it since WWII, is paid for by the industry and aims to protect the interests of fisheries corporations, which are subsidized by taxpayers. In this regard, Pauly anticipates the kinds of analyses carried out by UBC's Dr. Jessica Dempsey, who has painstakingly analysed the accounting of natural resource industries, which are 100% subsidized by the taxpayer, with little profit and massive irreversible environmental destruction.[13]

Pauly came into fisheries science in the late 1960s when the world had an increasing interest in trying to collect reliable fisheries data. Remarkably, for the past 200 years humanity has been fishing on an ever increasing industrial scale, literally mining the oceans globally, and at all depths, with little regard for species conservation, with very little sense of the limits of the fish populations in the ocean, with very poor and unreliable data only starting to be collected as of 1950 by the FAO. The question of assessing the number of fish, and the variety and condition of fish populations is largely statistical. Pauly has throughout his lifetime been involved in developing a series of programmes aiming to collect and re-construct reliable fish population data. Fisheries peaked in 1970s and reached their limits in 1995, with world catch actually declining since, false reporting notwithstanding.[14] The oceans are a commons that belong to the public, and therefore, fisheries science's obligation is to the public interest, not government and corporations. There

is, therefore, an obligation "*to convert fisheries and management into life-affirming disciplines.*"[15]

Concern for long-term conservation and restoration of the abundance of the oceans that has sustained human life, and should continue to do so, is central to Pauly's analysis that fisheries is primarily an ecological rather than an economic problem. As he notes, he has deleted the use of the word "stock" from his vocabulary.[16] The ocean's ecological populations are not a statistical market population. That sets him apart from fisheries scientists who have, for decades, treated the ocean as no more than a larder or stock of resources for the marketplace, that inform government objectives and decisions.

The SFU study is one of the rare long-term datasets that gives us a direct insight into generations of fisheries mismanagement. Independently, it is the kind of historical reconstructive data work that Daniel Pauly is best known for. It vindicates what Pauly has for the past four decades identified as the "toxic triad" responsible for the global collapse of fisheries: "*(1) underreporting the catch, (2) ignoring the scientific advice available at the time, science, and (3) blaming the environment.*[17]

The title of Daniel Pauly's collection of essays, *Vanishing Fish and the Future of Global Fisheries*, does not do justice to its broader implications and social importance. This is really a book of memory on a par with William Faulkner's *Absalon! Absalon!* The three concluding essays even provide an insight into the racism that shaped Pauly's career as an outsider in the scientific world of fisheries, and why he has gravitated away from the aegis of government and industry, to the work of NGOs, which are more concerned with the state of the planet than industry ever will be. Just as Faulkner unfolds the sordid reality behind the antebellum cotton economy that foreshadowed the collapse of the Deep South, Pauly unfolds that of the politics and science behind contemporary international fisheries.

Although these three autobiographical chapters may seem too personal to the reader, they are, in fact, a key to understanding of the logic that guides Pauly's insights. Pauly's personal and intellectual journey is that of an intellectual who is not an "insider." Through both his racial and intellectual interests, Pauly reveals himself time and again to be at the margins, as was obvious in his treatment by senior scientists at the DFO. Even when he became the director of UBC's Fisheries Centre and needed access to DFO data for Scott Wallace's reconstruction of BC's fisheries data between 1873 and 2011, he was reminded that he was not part of the "insiders" when he was refused access to DFO data on the grounds that he might maliciously misinterpret it! So much for academic freedom and open access to public information in the world of Canadian Science!

Most of the essays detail the difficulties that come with doing objective research in an environment that depends on government and corporate funding and in which government regulators defend corporate interests. That is counter-balanced by his work with the Pew Charitable Trusts, which led to a programme monitoring the health of the Oceans: "*The Sea Around Us*," which, like much of his work over the past two decades, provides the necessary scientific data for NGO advocacy work. What is interesting in these presentations is the divergence between official science and green-washing "mainstream corporate-oriented environmental organizations" such as MSC, and environmental science which seeks much-needed real change. Two short essays sum up the pessimism that inevitably arises from Pauly's account. "*Homo sapiens: Cancer or parasite*?", reflects on the massive negative impacts that our economic system is having on the natural world, and on the need for human beings to reconcile their relationship with nature. That consideration forms the basis of the "*Epilogue: Some Gloom, But Surely No Doom*" which leads to the simple consideration that most scientists accept today: "*…there might be no need to describe what might happen to marine biodiversity if we don't change the way our economy relates to Nature, because….there might be no we.*"[18]

Given our current situation, and the opportunity we currently have to re-think our economy, this set of essays presents further ground to re-think the validity of the social structures and the assumptions that mislead us into thinking that what we have taken to be normal is in any way sustainable. It is a brilliantly thought out set of essays, carefully edited, and heavily footnoted documenting every proposition set forth. It is clearly written and an erudite pleasure to read.

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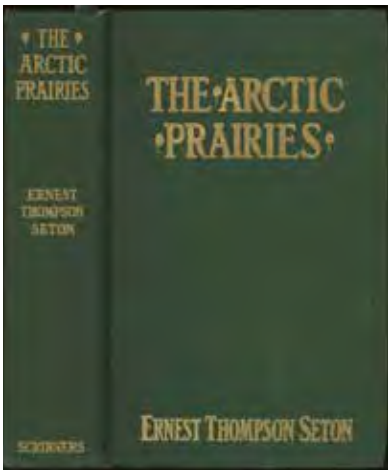
Check out the CSEB Video at
http://youtu.be/J7cOuDbBf9c or
https://www.youtube.com/watch?v=J7cOuDbBf9c

BOOK Review

Submitted by Bob Gainer, CSEB Alberta Member



***The Arctic Prairies.* 1911.**

by Ernest Thompson Seton, Scribner's New York. 415 p.

This is my all time favourite book, probably because half of it is about the Fort Smith area where I lived for about 10 years, another third of the book is about the barrens beyond, where I worked five tourist- guiding seasons and the overall area is where I spent a lifetime becoming familiar with. It is like comfort food, when I am depressed, I often reread it. I must have read it two dozen times! It is easy reading, probably a grade seven level. In the winter on the ice roads, I sometimes drive up to Fort Smith and return on the regular roads to the west. I usually fly there several times year.

Seton was probably the godfather of Wildlife Management. He originated the idea of using population biology to understand the state of a species. He is famous for his "Setonian" estimates, getting a good (high) density estimate and multiplying it by the area of the species range, which invariably results in excessively high population estimates. In many cases, his sentiments still prevail by wildlife managers; the opposite is true of enviro-activists. I have an M.Sc. in Wildlife Management under another wildlife godfather, Ian McTaggert Cowan.

When Seton was approaching 50 years old, he was a very successful, high profile writer and wildlife artist living in New York. He also helped start several outdoor and camping groups, including the Boy Scouts, but biology, especially natural history, was his real love. Like Farley Mowat, he spent as much of his youth as possible in the outdoors and camping just to escape his abusive father. In 1907, for a mid-life crisis, he wanted to see the Wood Bison. The Canadian federal government had created a conservation area near Fort Smith for this subspecies (eventually to become Wood Buffalo National Park) in 1894. As a boy (he spent part of his childhood in Manitoba), he had just missed seeing the prairie bison before they were eliminated. As well, he wanted to continue farther north to see muskox and the enormous caribou herds described by several recent adventurers (Tyrrells, Whitney, Pike, Jones, etc.).

Seton, and respected American naturalist Edward Preble, took trains from New York to Edmonton shortly after the Province of Alberta was formed. Their Peterborough canoe, camping gear, and dry goods were taken by horse drawn wagon to Athabasca town, by York boats to Fort McMurray, by paddle wheelers to Fort Chipewyan, and then mostly canoe to and from the barrens. It took him exactly six months from when he left Athabasca town to when he returned. "I found what I went in search of, but found, also, abundant and better rewards that were not in mind, even as Saul, son of Kish, went seeking asses and found for himself a crown and a kingdom!" Wow, how I want to feel like Saul, son of Kish too, after 75 years of living and visiting this area.

I grew up in the Edmonton area, born at the end of WWII, listening to my father tell stories about his visits to Fort Smith during the war. He was in the RCAF based in Edmonton, a crew chief and copilot on Lockheed 10A Electras, an excellent nine passenger twin that would fly Monday from Edmonton to Fort Smith, stop for fuel and load and unload passengers and freight, then continue on to Norman Wells, where the American Canol pipeline was being built. Tuesday, they returned the way they had come. Wednesday was for maintenance and refit. Thursday and Friday, they repeated the flight schedule. Weekends were for maintenance, repairs and refit. To drive the Alaska Highway return would take at least a month, if nothing went wrong (invariably something would go wrong). He flew this for three years and loved it. His favourite stories were about flying over the vast herds of bison in the Park, at that time 10-15,000, occasionally overnighting and mixing with the locals in Fort Smith, especially natives, always eating buffalo steaks. In Edmonton, when I was growing up, you could buy buffalo meat from the Park's commercial abattoir in the local grocery stores. Buffalo burger was my favourite, and still is.

As a young man of about 20, I worked several summers for Al Oeming, another wildlife godfather in the Edmonton area. In between his firing and rehiring of me, I would often hitch hike or fly (northern travel was subsidized back then) to Fort Smith, saw lots of bison often wandering through town, mingled with lots of natives, ate buffalo burgers and was invited by the local CWS vet Annie Currier to tour the abattoir facilities and rode with her in a helicopter during one of the roundups for anthrax vaccination. After four years of CUSO/CIDA in East Africa and four years graduate school at UBC, I ended up leasing/operating a Provincial government veterinary practice in 1980 based in Alberta's far north, "Where Alberta Began", Fort Vermilion. This involved a mobile veterinary service to Fort Smith, Fort Chipewyan, and the southern MacKenzie district of the NWT, and teaching Wildlife Management part time at the Game Warden College in Fort Smith. Of course, owning my own little aircraft and flying became part of it, and guess who my copilot was for several years? After all those years, Dad could fly better than me, which is another story. When he wasn't flying he was mixing it up with the locals and looking for buffalo steaks. When I stopped providing my veterinary service about 2010 (dad had died 20 years earlier—cancer, not from my lack of flying skills), I worked as a guide at an adventure camp for five seasons for Tundra Tom, another colourful godfather, 100 km to the east of the muskox and caribou grounds Seton had visited, on the headwaters of the Thelon River. Muskox (and grizzly) were teeming, and caribou were tanking when I was there.

Now in my dotage, I don't remember much, but reading this book brings back all those memories. I still remember the countryside Seton describes and many of the last names of the characters. For instance, he devotes many pages to describing his and previous naturalists' character analysis of the "Beaulieus." Premier Peter Lougheed's grandmother was a Beaulieu from up there, and there is a restored Senator Lougheed house in Calgary called "the Beaulieu House." Seton hired Billy Loutit to help paddle and portage his canoe; he is Shawn Loutit's grandfather. Shawn is, at the moment, Canada's most celebrated pilot (amongst other pilots) who flew to Antarctica and back to rescue a sick woman. Colin Fraser and his steamer was hired to help navigate against the flooding "reversing" Rocher River; the Fraser's are one of the most respected families

in Fort Chipewyan today. Every native and Métis name that comes up in this book has family represented in these communities today. Many I know personally.

Seton, like most including other natives, had conflicting dealings with natives. For instance, when they were initially negotiating for a guide with the leading hunters in the Fort Smith area to take them approximately 100 km cross country to where the buffalo were, he gives us this:

Question: Are the buffalo near?

Answer: Tan-sing nees-to-ey, muga-gwe son-ey-ass? A-waw moon-e-ow mees-cheat son-nee-waw a-yao-wey. A-wah-hay-was-ki mos-tos sa-gow Kai-ah taw nip-eewat-chow-es-kee nee-may-ah, heh-heh. Kee-as-o-win sug-ee-meesh pass-qwawe i-mush-wa mus-tat-e-mcuk ne-may-ah pe-muk-te-ok mos-tos ne-may-ah daane-tay-tay-ah, heh-heh.

Interpreter: He say "No."

Question: How long will it take to get to them?

Answer: Nees-to-ey, moon-y-oie mis-ta-hay son-ey-ass? Ne-may-ah mos-tos sa-gow mos-tos mis-chey-to-ok Way-hay-o ay-ow-ok-i-mah-kah-mus-to-ok, heh-heh. Mis-ta-hay son-e-yas cha-gow-os-ki wah-hay-o musk-ee-see-seepi. Mas-kooatch e-goot-ah-i-ow mas-kootch ne-may-ah muk-e-boy sak-te-muk mas-kootch gahk-sin-now ne-may-ah pas-qwa mos-tos gehk-kee-win-tay muga-gwe-son-ey-ass, heh-heh Dam-foole-Inglis!

Interpreter: He say "Don't know."

Despite this first impression, these fine fellows took them on three semi-successful expeditions. The first one a total success, the last two they were delivered to where the buffalo were but because of time constraints had to quit early. Seton had nothing but praise for them afterwards. And he did see the beautific buffalo he had come so far to see.

The three journeys they took were through several different landscapes, all completely familiar to me. They started off in tall white spruce forests to an alkali floodplain and open prairie, to karst fenlands mixed with aspen parkland. The third trip was through today's whooping crane nesting grounds. They shot and ate two cranes here that they thought were immature brown cranes; they did not realize they may have been immature Whoopers. As he was munching on his drumstick, if Seton had only pondered aloud to Preble as he often did on other topics "Is there any possibility that this could be the Whoopers' nesting ground that they suspect is in this general vicinity?" He made several references and sightings of Whoopers elsewhere, usually in the Fort Chipewyan area. If only he had thought of this on the Nyarling and discovered the whooping crane nesting grounds 50 years before local commercial pilots (and military pilots before them, according to Dad) flying between Hay River and Fort Smith suspected them, then what would Saul, son of Kish, have had to say about his trip? Today, the Hay River-Smith Highway 5 meanders right through their nesting grounds, with places to pull over and watch the Whoopers soar.

During his stay in Fort Smith, Seton got to know Chief Pierre Squirrel, the second expedition leader. He was also who the Federal Government designated to sign Treaty 8 for the Fort Smith area's natives. Squirrel was Chipewyan, a Dene tribe that had recently moved to the Fort Smith area from the Churchill area to take advantage of its Hudson Bay Post. Francois "King" Beaulieu and his extended family had moved to the mouth of the Salt River, 30 km downstream of Fort Smith, several generations sooner but because the Beaulieu's generally preferred "script", the Feds used Squirrel, whose people preferred "treaty". In Fort Resolution, the Feds used a Slavey chief from a Dene tribe resident there before European arrival, again not a Beaulieu, which was probably the dominant family in the community. In Fort Chipewyan, they used a Woods Cree, the dominant tribe there that had moved in from northern Ontario to help facilitate European trade and in Fort Vermilion, they used a Beaver, a Dene tribe originally from the area before European arrival.

Squirrel said the Feds told him that if his people lived the way the Europeans wanted them to, the Feds would look after them; "basically a valued added Peace Treaty with the implication that they had been conquered". He also said they expected to get government doctors and policeman, but instead got missionaries who moved in and took over. Squirrel also said that nothing was ever said about the natives giving up their rights to hunt and fish, including buffalo, but the Northwest Mounted Police and eventually the Buffalo Rangers said they had (the conservation area had been formed six years before the Treaty, with no mention of local compensation). No effort was made to provide for the food that the people now couldn't get from their land. It got even worse when the Fed's expanded the area into Wood Buffalo Park, twice, into the biggest Park in the world, without consulting the locals about losing their means of support.

This sounds familiar to what happened about 5 years earlier when the Federal Government had a mass hanging of Riel and over a dozen natives, just to show the locals who was boss and that the Feds didn't have to do anything they promised. Anyway, Seton didn't dwell on it, although he noted these conversations in his book, it is more our place to do the dwelling. Actually, Seton never mentioned Riel, even though he grew up in Manitoba about the time of the Riel rebellions.

Eventually Seton and crew made it down river to Fort Resolution where they employed a York boat and the services of several locals to make their way to the east arm of Great Slave Lake, Pike's portage, and then up into the edge of the barrens. Again conflicting feelings about natives; he ends up saying that individually they are great, but in a group watch out. They are all-natural born union rights negotiators. Also, he had quite a bit to say about his conflicting views of the Beaulieus. Unbeknown to him, Senator Lougheed was probably choosing his wife from Fort Resolution about that time.

Once they launched on Artillery Lake, everything came true. Almost immediately there were caribou and wolves galore. They canoed up into what was known as muskox land farther north, saw and collected muskox skins, and in the process charted the edges of Aylmer Lake and discovered two new rivers. He gave a Setonian estimate of the barren-land caribou, "30 million if not double that". Today they are a tiny fraction of that; nobody but Seton ever thinks there might have been a tenth of that, but now grizzly populations are expanding so much that they are up into the Arctic coast interbreeding with polar bears, and muskox populations have expanded so much they are found hundreds of miles south of the tree-line. During my guiding tenure on the upper Thelon River, not once did a client not see muskox. Grizzlies were present but not by popular demand, and caribou every year got fewer and fewer.

Seton left Athabasca town in early May as soon as the river-ice would let them and returned just as the ice was closing in behind them. When they left their farthest north, there was continuous miles upon miles of crimson mats of the leaves of the ground covering

bearberry as they headed south to the tree line, the best time of year to see the barrens. Seton the artist remarks: "When nature set out to paint the world she started in the barrens with a full palette and when she reached the Tropics she had nothing left but green". (Personally I can't remember a more beautiful sight than the extensive mats of crimson bearberry in the fall in the barrens and I can't remember a more beautiful sound than that of long-tailed ducks calling in the morning). The end of October with the ice closing in, Seton the midlife philosopher remarks: "The staunch canoe skimming the river's tranquil reach, the water smiling round her bow, as we push from this the last of a full five hundred camps. The dawn fog lifts, the river sparkles, we round the last of a thousand headlands, the little Frontier town of Athabasca appears". He got back to New York after eight months and none of his friends had known he was gone.

Now in my old age, this book and an occasional trip to Fort Smith, Fort Chipewyan, and Fort Vermilion keep me going. In this area, the natives have become very assertive, and they are holding the Feds to task for these so-called Treaties. Guess what? What little there was in writing didn't promise anything, let alone the use of the word compensation. Well why would the natives, or anyone, who understood what they were doing, have agreed to give up their right to earn a living for nothing in return? The regulation about not shooting buffalo and the creation of the biggest Park in the world to protect the buffalo was done with no consultation. This area was the natives' main source of sustenance. And when the Feds expanded the Park even more to accommodate the addition of plains bison from the south in the late 1920s, no consultation. Without wolf control, the buffalo population quickly got too large and the Feds were forced to commercially harvest the buffalo, but natives were still not allowed to hunt buffalo. Many natives would have starved to death because of this.

About 30 years ago, the bands and their lawyers got together with the Feds and sorted it out. In a contract, both sides that sign need to have the same understanding of the contract. Obviously, this was not the case when Chief Squirrel put an X on Treaty 8, or later when the Park was formed. Then there was no consultation or compensation. Now the replacement agreements are not the John A.'s model; that is, both sides understand what they agreed to, and consultation and compensations was included.

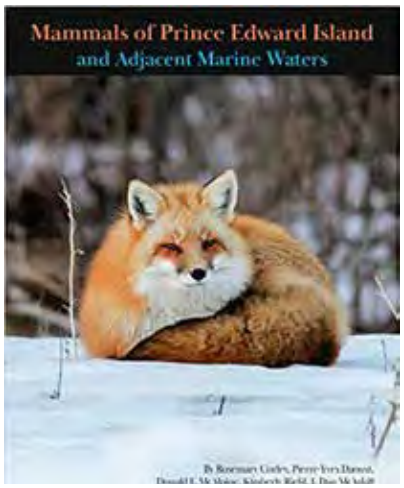
To be fair to Sir John A., in international eyes at the time, the British, and by extension Canada, had sovereignty over the land by virtue of conquest even though technically the sale of Rupert's Land was only for trade and commerce. In between the two Riel rebellions was Custer's Last Stand, "wolfers", whiskey traders, and the formation of the NWMP. Russia didn't have military conquests and mass hangings (at least not to the extent that occurred in North America) requiring treaties and promises and reserves to alleviate "white guilt"; they just allowed indigenous people to provide the fur traders with furs and all the necessities of life (especially wives), while in return, they received trade goods. This is basically the way the fur trade operated in northwestern Canada before the days of hanging Louis and white guilt (i.e., a trade and commerce relationship without the phoney treaties, promises, etc.).

Natives today in Russia are allowed to compete with Russians, and in their home territory do quite well. As well, most of the people living on the non-industrial land are native, where they are basically self sufficient (a minimum wage, and in addition, they are allowed a subsistence living off the land). If there is industrial activity that will impact their land, they and their community have the right to reasonable compensation, and both sides seem to deal in good faith.

Another difference is that in North America natives living on the cultivatable land are restricted somewhat to "Reserves" (selling the land to farmers was a form of industrialization expropriation without proper negotiations with the natives). Siberia's steppe is more cultivatable, and the non-native presence is much more and permanent than in the taiga, but less than west of the Urals. North American negotiations with indigenous groups are far behind that of Russia, but also behind Finland, Norway, Sweden, and Denmark.

BOOK Review

Submitted by Dr. Peter Wells, CSEB Atlantic Member



Mammals of Prince Edward Island and Adjacent Marine Waters.

R. Curley, P-Y Daoust, D.F. McAlpine, K. Riehl, and J.D. McAskill. 2019. Island Studies Press at UPEI (University of Prince Edward Island), Charlottetown, PEI. 300 p.

Available from Amazon.ca
$49.95

A superb soft-cover book published recently is a comprehensive guide to Prince Edward Island's mammals (excluding humans!). It covers in detail the 38 terrestrial mammals and 29 marine mammals of the island and surrounding waters, respectively, a remarkable biodiversity. The book sections are organized taxonomically, covering seven Mammalian Orders, one of which (Order Carnivora) includes both terrestrial and aquatic species. For each species, there is a section for description, measurements, global range, status on PEI, history on PEI, ecology, diet, reproduction, and behaviour.

Of special interest is the inclusion and details of species now extirpated from the Island, such as the wolf, black bear, Canada lynx, and caribou, and species introduced to the island, such as the woodchuck (unknown status) and white-tailed deer (no longer present). The book is beautifully illustrated with a full picture of each species, a range map, detailed drawings of tracks (for the land mammals!), and line drawings of each skull. The text is easy to read, with clear font. There is an excellent Glossary, an exhaustive and invaluable Reference listing, and an Index of species (though not identified as such). The authors deserve great praise for producing a handsome and highly useful book, bound to be a classic reference. Sadly, it is perhaps too large and heavy to be a practical field companion. It should be of interest to every biologist who is interested in the fauna of the Maritime Provinces, and indeed Canada as a whole, as well as to biology teachers in schools and universities.

ARTICLE OF Interest

Is the Production and Use of Grey Marine Literature a Model for Open Science?

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Abstract

Globally, grey literature is common. Large quantities of openly available grey literature have been generated since the latter half of the nineteenth century. It is a primary source of information used in many public policy and decision-making contexts, at all jurisdictional levels. In fact, public decision making and policy development would seriously falter today in the absence of such literature. Moreover, in some jurisdictions, legislation mandates transparent governance processes in which current research must be fully open. This lengthy experience with open practices in the production and use of grey literature offers insights to the open science movement.

In this paper, based on over fifteen years of interdisciplinary research, we demonstrate how open practices in the production and use of grey literature in marine environment science policy contexts could inform open science initiatives. The results from our numerous case studies about information use in decision-making processes, at local to global levels, address two conference themes, namely, the application of open science principles in promoting grey literature, and obstacles and challenges to such open access.

Information pathways in coastal and ocean management are complex and involve many actors (including researchers; managers; policy analysts; members of industry, professional associations, community groups, and non-governmental organizations; politicians; and citizens generally). Open grey literature offers numerous advantages in these settings, as an extensive variety of information needs, types, and formats are prevalent. Open grey literature can also be distributed without restriction by individuals and organizations. It can now be shared globally with ease, which is particularly beneficial to developing countries often unable to afford commercial information sources.

However, while produced and used widely, grey literature also presents challenges that open science also encounters. Openness, i.e., open access, does not ensure awareness and it does not automatically equate to usability by a wide variety of audiences. Because grey literature is assumed to be largely accessible, often limited attention is focused on promoting awareness or communicating information in broadly understandable terms. Furthermore, the massive quantity of literature can contribute to its seeming invisibility. The multiplicity of formats and content can result in perceptions of limited value of grey literature. Even though the information may be rigorously peer-reviewed, in today's information-saturated environment, open-access may be equated with uncertain quality.

Our research on the use and influence of grey literature in marine environmental decision making highlights the benefits and challenges of open access information. Thus, our findings may be particularly informative to current efforts to advance open science principles globally.

Full reference: MacDonald, B.H., et al. 2020. Is the Production and Use of Grey Marine Literature a Model for Open Science? The Grey Journal 16(2):73-83. Summer, 2020. (First published in the GL21 Conference Proceedings, Feb., 2020).

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