

The "generational amnesia" of scientific baselines

We see the numbers on the page, but not the biases and assumptions behind them – and that's a problem

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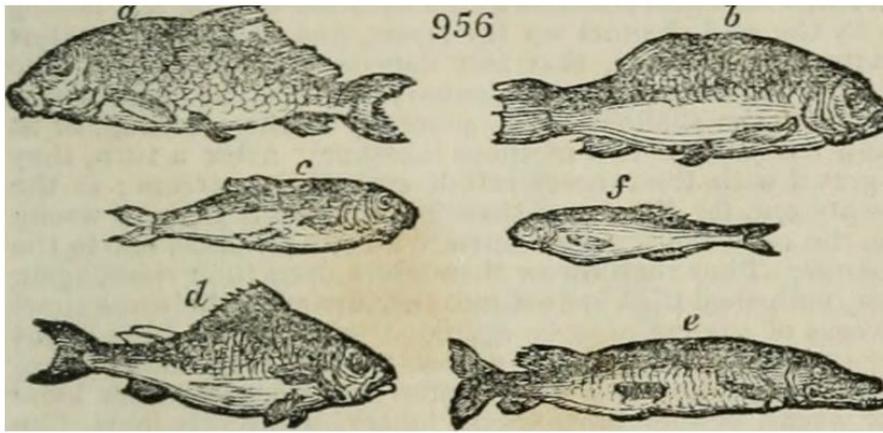


Image from "An Encyclopaedia of Agriculture," 1831

On August 18, to much international fanfare, Icelanders and scientists erected a plaque commemorating the death of Okjökull Glacier, which ceased officially to be a glacier in 2014 after melting down to only 0.386 square miles, or 6.6% of its original 5.8 square miles. It is interesting to note that Iceland claimed this international "first." Canada and BC, which are usually so anxious to claim to be "first" or "world class," could likely have done as much. We too have melting glaciers. Admitting as much might, however, be at odds with public illusions of being "world-leaders" in the fight against climate change. BC's coastal glaciers, such as the Comox Glacier, a key part of the K'omoks First Nation's cultural identity, is well underway to [disappear entirely](#) by 2030.

Oddly, the disappearance of glaciers is not happening "at glacial pace." That epithet no longer applies. Ongoing environmental change is happening at an unprecedented rate, while cultural habits of mind that drive climate change continue to stagnate, often refusing to adapt to the realization of the demands at hand. We continue to try to address problems with outdated tools, and when we find that our toolkits are outdated, we often simply pretend that the problems do not exist and may magically go away.

The province has released its [preliminary report on climate change](#) prepared by the Climate Action Secretariat. The findings indicate that BC is just beginning to experience what [many feel](#) will be the "catastrophic" consequences of inaction. Even the notion of simple "adaptation preparation" is rapidly coming to be [considered an inadequate response](#), particularly as species' adaptation-response capacity [appears](#) to be greatly limited.

BC is an earthquake zone. Its flora and fauna, and its distribution is an adaptive response to millennia of extreme disturbances. However, even those previous disturbances seem to have been no match for what we are beginning to witness. An adequate response to this rapidly evolving crisis therefore requires that our terms of reference be both broad-based and long-term.

Shifting baselines, unreliable data

Datasets and baselines make up a scientist's frames of reference by which to measure the evolving state of the environment. The question is: "What state of the environment is either acceptable or "normal," that is, which one forms the most information-rich referential base? Most people believe that the current state – that is, the one state best known to them – is the only state and therefore "the norm," thereby confirming the old adage: "What you don't know won't hurt you." Unfortunately, the adage has often proven to be false, great harm **does result** from ignorance of facts.

It is disturbing to consider that this blind spot is also found to handicap the scientific community.

One of the most common errors made in the interpretation of datasets that form our referential baselines is that we assume that because the dataset has (at the very least in principle) been gathered objectively, it is itself an objective account against which to measure environmental impacts. We see the numbers on the page, but not the biases and assumptions behind them. Daniel Pauly's recently published set of essays, *Vanishing Fish: Shifting Baselines and the Future of Global Fisheries*, provides a useful antidote to this misconception. His review of FAO data not only reveals the weaknesses of national under-reporting and omissions of recreational and small fisheries, it also brings into perspective the generational blindspots of researchers in what he calls "the shifting baseline syndrome":

"Essentially this syndrome has arisen because members of each generation of fisheries scientists accept as a baseline the population size and species composition that occurred at the beginning of their careers and use this to evaluate changes. When the next generation starts its career, the populations have further declined, but it is their size at that time that serves as the baseline. The result obviously is a gradual shift in the baseline, a gradual accommodation of creeping disappearance of resource species, and inappropriate reference points for evaluating economic losses resulting from overfishing or for identifying targets for rehabilitation measures."

The arbitrariness of such datasets really comes out in the terms of reference that constrain Environmental Impact Assessments to piecemeal considerations. A review of EIA's such as the Roberts Bank Terminal 2 hearings would show that the consultants hired by the proponents are only required to justify impacts within a narrow geographical area around the proposed projects. This at best limits these impacts to their footprint on the current state of the local ecosystems. In other words, the consideration is only limited in time to the baseline known to that generation of consultants. Similarly, there is little consideration given to the broader regional or provincial implications. In other words, terms of reference are limited in space to the region known to the consultants. There are little or no considerations given to the ramifications outside of the site disturbance, as though species affected were ecologically important only to the site under consideration.

Thus, whether it be in fisheries, or forestry, the operative baseline is a generational baseline, limited to the immediate experience of consultants, the businessmen who employ them, and the politicians who rely on their information. For decades this myopia has guaranteed the continuous degradation of the environment. The actual terms of reference should be based on the state of regional ecosystems and the

dynamics of species populations that make up these ecosystems in both space and time reaching back to the historical contact period. In BC that would be the state of the environment circa 1865.

The evidence for this proposition, which will seem outlandish to many people who simply view ecosystems as “industry resources” and “stocks,” becomes obvious when we consider the current demise of chinook salmon (*Oncorhynchus tshawytscha*). As the ongoing near-extinction of southern resident orcas shows, chinook salmon are a critical food source for apex species which structure entire food chains from Puget Sound to points north of Vancouver Island. The destruction of prime chinook nursing areas within the critical habitat of Southern Residents, is a problem that far exceeds limitations imposed by the terms of reference of the Roberts Banks Terminal 2 hearings.

The “productivity baseline” has to reflect those conditions that created the abundance of BC’s ecosystems before the high industrialization of 1914.

Numbers that are now surfacing indicate that the chinook collapse is just part of an overarching problem of mismanagement that has also led to shockingly low numbers of both sockeye (*Oncorhynchus nerka*) and pink salmon (*Oncorhynchus gorbuscha*). While DFO modelling suggested that 4.8 million sockeye were supposed to enter the Fraser River this year, only 13% showed up (628,000) with only about 85,000 [making it past a landslide](#) at Big Bar in the lower Fraser canyon. Even the “4.8 million” number needs to be weighed. That is a low number compared to expectations of 1900, which represents about 25% of turn-of-the-century numbers. The operative baseline should be about 20 million.

Well before the Big Bar disaster and the lower returns observed, conservationists were already expressing serious concerns which were dismissed by DFO. In 2018, DFO over-estimated numbers and allowed increased fishing effort. The results were record low returns in traditionally productive rivers such as the Adams River: “DFO data shows 535,564 salmon made it home to spawn, the lowest on record for this cycle.” [\[CBC News\]](#) That 2018 “low number” at the Adams River is incidentally 6.2 times the number of sockeye that will have returned to the entire Fraser River and tributaries in 2019. And it is not just Chinook and sockeye salmon populations that are in trouble, even traditionally abundant populations of pink salmon are facing extremely [low returns](#).

The problems posed are both spatial and temporal. What is used as a baseline should not be just limited to what we know now, at this point in time, which may be the lowest denominator. It should be based on the optimum state, the state of maximal productivity, which would take us back to numbers and conditions at contact.

The “productivity baseline” has to reflect those conditions that created the abundance of BC’s ecosystems before the high industrialization of 1914. These numbers are not just part of an oral literature, they can be reconstructed – and when they are, they are stunning witnesses of the extent of the destruction we have wrought. As [recent research](#) that pushes database references back to 1919, rather than the current 1960’s, shows, there is a need to completely re-think the assumptions that currently guide management. Without extended timelines, we seem to assume that species, or species populations can somehow be “redundant,” and that systems are far more resilient and less connected than they are in fact.

As noted by Pauly, the “professional habit” of treating the ecosystems as a set of resource stocks rather than as species populations that perform essential services, has resulted in the current ongoing global environmental collapse. The actual costs of treating the environment as a larder to be judiciously raided for the benefit of a consumer economy, comes in the recent re- assessment of the databases on which we have been managing sockeye salmon. Skeena numbers show that fisheries management has collapsed 13

major sockeye populations to between “56% to 99% of original numbers over the period from 1914 to 2014,” resulting in an overall 75% decline of sockeye salmon in what is still considered today to be one of the most productive salmon rivers in BC, the Skeena.

The key problem identified in this study, as in others before it, is the one that DFO consistently denies, but which a growing number of conservationist NGO’s have consistently, and correctly noted: overfishing by both commercial and recreational interests. This problem is not limited to BC. It is a global problem, which needs to be addressed by setting aside marine reserve areas.

Official denial may reassure voters and allow for status quo to continue unabated, until it hits the hard wall of reality. It therefore comes as no surprise that BC’s commercial fleet has now gone into full shock at the realization that commercial First Nations and industry find that BC now faces the worst fish return in 50 years. Mismanagement of the larder by short-term and skewed datasets, which create the illusion of infinite supply for an unsustainable economic model, ultimately leads to a collapse and social dislocation: CBC News [reported](#) on Sept. 9 that “Advocates say the federal and provincial governments need to step in to help fishermen through the worst commercial fishing season in 50 years, as runs have plummeted for all species and in all regions.” [underlining author’s]

Should anyone suggest that BC’s plight is just an ecological or regional anomaly, the parallel collapse in Quebec, at the other end of the continent, of cod in the Gulf of St. Lawrence, suggests otherwise. It is a systemic mismanagement problem. A decade of appeals to a succession of governments by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) to list Gulf of St. Lawrence cod as an endangered species has only been met by political dithering – allowing commercial fishing interests to continue to exploit a vanishing “stock” to the point at which both populations of cod are now on the verge of irreversible extinction. [[source](#)] All of which is, of course, fully consistent with the late Ramson Myer’s [30-year-old warning](#):

“Humans have always been very good at killing big animals. Ten thousand years ago, with just some pointed sticks, humans managed to wipe out the woolly mammoth, saber-toothed tigers, mastodons and giant vampire bats. The same could happen in the oceans.”

In the light of the ongoing fisheries crisis there is an obvious need to rein in commercial and recreational fishing efforts and set aside extensive marine reserves to give all fish species and commercial stock to replenish. In August of this year the [results](#) of the United Nations “Intergovernmental Conference on Marine Biodiversity of Areas beyond National Jurisdiction” did not seem to make headlines in the English Canadian press. (They did however find resonance in the French Canadian press, where the performance of Canada was found to be on par with such other “environmentally progressive” countries such as... Russia.)

The aim of the conference was to create a mechanism that would establish “sanctuary zones” that would protect ocean species by setting aside 30% of the oceans by 2030. However the Canadian government -- like the Russian and Norwegian governments -- objected to the concept of scientists regulating the commercial interests of international fisheries cartels who currently plunder the seas with very little regulation. The conference failed to support a regulatory mechanism and showed a complete lack of political will to change what is proving to be, even at home, a disastrous status quo.

Whatever baselines are guiding the decisions of officialdom, they seem strangely out of step with the reality that we experience, and which a series of UN reports telling us that “our planet is in crisis” have [confirmed](#). BC can provide two examples of the ineffective response by the prevalent political leadership.

For decades, there has been a growing concern with the deteriorating state of the Salish Sea's water quality. Most of the data for the water quality comes from environmental health testing at public beaches. Until recently on Vancouver Island these data were collected by the Vancouver Island Health Authority for the Ministry of Environment. Of late, the data have become increasingly embarrassing, and VIHA has found the ultimate solution to this embarrassing baseline: cease to gather the data. VIHA [no longer gathers samples](#) to test for water contamination at public beaches. (And here we might want to consider whether it is true that “what you don't know won't hurt you.”)

VIHA has “theoretically” downloaded the responsibility to municipal governments who may or may not carry out the tests at their discretion. I specify “theoretically,” because it seems that municipal governments have not been informed. Neither VIHA nor the ministries responsible for either public health and safety, or environmental health have seen fit to inform municipal governments of their expedient decision. [\[source\]](#)

There is also a legal problem inherent in this decision. Some municipal governments are currently being sued for development permits and practices that have previously contributed to pollution alerts. It is therefore not in the interest of municipalities to carry out these tests. That is a clear conflict of interest.

None of this Orwellian thinking should really come as a surprise to British Columbians. At the end of July, BC's Auditor General [found](#) that the province was not sufficiently protecting drinking water. However, it is not clear whether the current NDP government has a legal responsibility to protecting clean water, since BC Supreme Court Justice Mark McEwan, proving Charles Dickens' perspicacious view of the law correct, recently [ruled](#) that Canadian citizens do not have a legal right to clean water.

Clean water generally comes from clean functioning watersheds. The fact that our NDP government does not seem to make this connection and actively prioritizes the forestry industry's right to log old growth forests around the province confirms the logic of Justice McEwan's ruling. Thus, in spite of ongoing public protests against old growth logging and interventions from the scientific community suggesting that old growth not only to be protected but expanded (such as a [recent report](#) calling for the urgent need for restoration of old-growth to 30% of the original distribution), government response is not commensurate with the magnitude of the climate and biodiversity crises that are emerging. Notwithstanding the well-publicized collapse of the timber supply, the response of the minister of the aptly named: “Forests, Lands, Natural Resource Operations and Rural Development Forests” has been to continue to accelerate raids on the larder unsustainably. Continued logging is carried out with the reassurance of outdated short-term data sets. To the bewilderment of the BC community of botanists and ecologists, the response of the Honourable Doug Donaldson to scientific concerns was to “[canonize 54 large trees](#)” around the province, as compensation for sending the rest of the old growth forest choir to timber heaven.

The practice of setting aside small patches is reminiscent of the recreational view of W.A.C. Bennett of Dave Barrett in the 60's or early 70's. It is as though time has never progressed. The Honourable Doug Donaldson's act is a clear demonstration that our current politicians do not even begin to have an inkling of the magnitude of the crisis they have contributed to making.

[The heart sinks at the thought that the people with the better dataset have to depend on the permission of those who only know the short-sighted dataset.](#)

BC has been in a drought since January 2019. Although the fire season has been moderated by light rains in July, BC has seen increasingly long and intense droughts in recent years, with many important salmon-bearing rivers (when there are salmon) such as the [Koksilah](#) and the [Cowichan](#) effectively going

dry. There is much [concern](#) about a return of the 2014-2015 warm water “Blob” in the Northeast Pacific, which is likely to have a further adverse effect on what is left of our fisheries. Coastal deforestation at the rate it is proceeding is only compounding problems and [fire risks](#). People and the politicians they elect do not seem to understand the linkages between the increased average temperatures, warmer ocean temperatures, rivers too warm for [salmon](#), droughts, and the [growing instability of geological formations](#), which may have contributed to the recent landslide at Big Bar and the resultant Fraser salmon disaster. It is all becoming too complex for people who continue to believe and act as though the world is now as it was in the age of Emperor Marcus Aurelius, and who seemingly are oblivious to momentous change about us.

Our environmental problems are all part of a much more highly-connected set of phenomena. If we are to manage the changes that our environmental problems impose on us, we cannot do so through simplistic filters. It is somewhat reassuring that the scientific community is taking note of this problem. The notable [recent issue](#) of *Science* dedicated to the legacy of von Humboldt homes this point. It was clear to Humboldt that “Humanity and nature are deeply intertwined.” It reiterates Humboldt’s discovery 200 years ago that climate is a basic organizing principle of life and that all things are deeply connected. We need to take a much broader perspective – one that includes a sense of place and care for place.

A living entity to be protected

Over the past few months, the good stories in BC have come from First Nations. They are in a sense “local stories” rooted in the bond that local people have with place. As one study showed, lands managed by First Nations have 40% more rare and endangered species, and generally have a higher biodiversity index. And the reason isn’t too complex, as enunciated in a recent CBC article titled “[“You protect what you love”: Why biodiversity thrives on Indigenous-managed lands.](#)” After much opposition from the ranching and hunting community, the federal government, with the support of BC, has established the South Okanagan National Park. The success for this comes largely thanks to the support of the Okanagan Nation, intent on protecting traditional territories that are key to its cultural identity. The new [Okanagan National Park](#) will be managed very much along the lines of Gwai Haanas National park, as a tribal park in cooperation with Parks Canada.

The other major success is the negotiations for the creation of the [Kaska Indigenous Protected and Conserved Area](#), which some describe as the “Serengeti of the North.” This would create a conservation area greater than Vancouver Island, within which there would be “no development.” In the preparations for this territorial project, the Kaska Dene are thinking long-term and relying on an oral dataset that goes back at least 4,500 years. And they are not using the dataset to raid it as a larder, but as a way of understanding a living entity to be protected. Whether they will be able to protect what they love still depends, of course, on getting the support of BC’s government – which makes its decisions based on 45-year datasets.

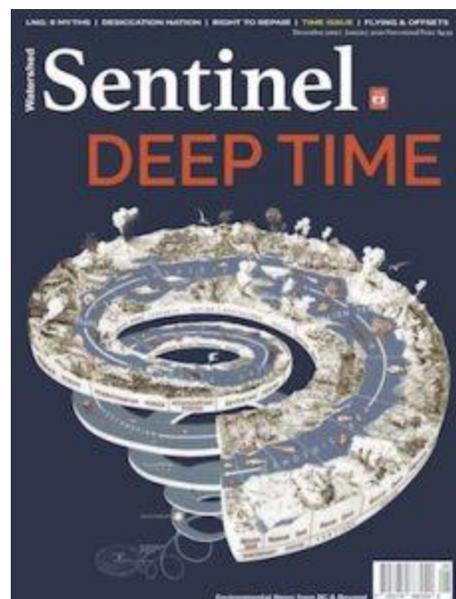
Somehow, it seems that the Kaska Dene are much better prepared to meet the crises which future generations will be facing. The heart sinks at the thought that the people with the better dataset have to depend on the permission of those who only know the short-sighted dataset.

The key phrase that one finds increasingly throughout the writings of biologists as different as Daniel Pauly and Monica Gagliano is: “There is an urgent need for man to reconnect with nature.” It is time we used datasets that make that long connection, before we make the now-common disastrous decisions favourable to business and development that are too often taken to be “normal” and “common sense.”

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