

Watershed

Sentinel



Water First

©Jacey Bonertz / Water First

Two interns in the Water First North Shore Internship, a partnership with Mamaweswen, the North Shore Tribal Council, Austin Waboose and Nigel Debassige, collecting samples of water from a nearby lake during Enviro Week.

(P27)

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Features



Not For Sale

The Kwakwaka'wakw community stands together to uplift cultural values and demand real consultation.

Water = Life

Neither humans nor any living components of Earth can survive without clean water – and still we channel it, divert it, pollute it, and pump it into fracking wells. Recognizing that there is no “away” is the foundation for starting to clean up our act.

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Editorial

Delores Broten

Evolve Or...?

The stars we see from Earth, whether planets or galaxies, are evidence of how small this precious blue orb, pulsating with life, is.

We are the inheritors of millions of years of change and evolution, of trials and, sometimes, dead ends or just plain bad luck. But our current petty human selfishness will not be written on the stars. Our present behaviour will not stand the ancient test of time.

Earth bears witness in the scars, from mining, pollution, deserts created where none existed, the extinction of species everywhere as humans destroy their habitat, or sometimes just eat them all. Climate change is creating an apocalyptic world, as the forest fires around the world attest. This can't go on.

Our failures are driven by ego and self-interest. This is written in the blood and on the shattered bones of our fellow travellers, ancestors on this tiny spaceship. Hunger, sexual predation, premature death, devastation of Earth – these are the fruits of our blindness.

But perhaps, hidden amid the chaos, there are changes percolating. No rule says human beings can't evolve again, and perhaps even are already. What a welcome outcome that would be.

—Delores Broten, Comox, BC, June 2023

At the 'Shed

Summer fun? We're offering bundles of current and back issues for your event, whether it's a family gathering, a celebration, or an organizing meeting, at no charge. Call or email us directly.

Call for applications! Intake is open for our Indigenous Junior Reporter Mentorship Program – a hands-on paid learning opportunity with direct mentorship. *Contact odette@watershedsentinel.ca.*

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Production help! We are looking to hire a part-time production worker, primarily for the myriad of small tasks that surround print production. If you have experience and an interest in print, contact us for details. This position will require the ability to work in person in the Comox Valley at least some of the time.

Seeking housing for longtime friend of the 'Shed: Semi-retired biologist looking for small cottage or apartment: ground floor, 1 bedroom + office, off-street parking. Excellent references. Anywhere mid-Vancouver Island. Maggie, 250-723-8802.

Simple solutions aid salmon survival

Shade Trees

Washington state is investing \$50 million in low-tech riparian programs to help salmon survive in drier, hotter conditions caused by climate change. Much of the money is allocated to planting shade trees along rivers and streams, to cool the waters that salmon travel in to get to and from spawning grounds. Other efforts include making streams more winding, and adding mesh and plants along riverbanks to deter erosion.

The program was developed with input from farming and business interests, environmental organizations, and several Tribes.

—www.crosscut.com
May 16, 2023

Recycling could add to pollution

Plastic Problem

A Scottish study has found that plastic recycling could be generating huge amounts of microplastic particles. Using a UK facility as a test case, researchers tested wastewater with and without filtration, and found the recycling process can turn 6-13% of incoming plastic into waterborne microplastic particles. They calculated the plant would annually release up to three million pounds of microplastics with filtration, and up to 6.5 million pounds without filtration. If those numbers prove representative of the industry at large, up to an estimated 400,000 tons of microplastics could be created during recycling in the US alone each year.

Global plastic production is now 430 million tons per year, expected to triple by 2060 on current trends. A May 2023 UN report named eliminating unnecessary plastics,

such as excessive packaging, as the first step in a program of “major, but practical and affordable” changes that could slash global plastic pollution by 80% by 2040.

—www.theguardian.com &
www.insideclimatenews.org
May 16, 2023

Puget Sound fish farms pull stakes

Industry Exodus

The commercial net pen aquaculture industry is packing up and hitting the road, following a historic decision by Washington’s Department of Natural Resources to deny further leases and ban net pen aquaculture in Washington’s marine waters indefinitely.

The industry, which has operated in the area for over 40 years, must now remove the notoriously destructive net pens and all associated equipment and debris. With the pens go a major risk factor hindering the recovery of wild salmon and steelhead, while public and Tribal access to 130 acres of Puget Sound will be restored.

—www.wildfishconservancy.org
May 20, 2023

Emissions, fires: direct link drawn

Smoking Gun

New research has drawn a direct link between wildfires across western Canada and the US and emissions from the world’s major fossil fuel companies. The peer-reviewed study, published in *Environmental Research Letters*, found 37% of the burned forest area between 1986 and 2021 can be attributed to 88 fossil fuel producers and cement companies.

The research is part of a growing field of

study known as attribution science, which attempts to measure how climate change directly affected recent extreme weather events. The findings build on previous studies that quantified the contribution of those same 88 companies to the increase in global temperatures, and others that have shown how a climate-driven “vapour pressure deficit” – a measure of the atmosphere’s drying power – has contributed to the increased area of forest burned in Western Canada and the US.

—www.cbc.ca
May 24, 2023

Trichloroethylene: strong evidence

Parkinson’s Link

A study of US military veterans is the strongest evidence yet showing a link between trichloroethylene (TCE) and Parkinson’s disease. TCE is used widely in products such as spot removers, office products, and dry-cleaning fluids.

The research centres on service members stationed between 1975 and 1985 at Camp Lejeune, North Carolina, where TCE in the water exceeded 70 times the EPA limit. Results showed that after accounting for other factors, Camp Lejeune personnel were 70% more likely to develop Parkinson’s than veterans stationed at Camp Pendleton in California, where the water was uncontaminated.

—www.smithsonianmag.com
May 23, 2023

Letters

Misinformation or Disinformation

The difference between misinformation and disinformation hinges on how misinformation is simply inaccurate, while disinformation is deliberate and, at times, malicious.



A case in point is *Ben & Friends Look After the Forest*, one issue in a three-book series self-published by Tamara Meggitt, a

local Comox Valley woman partnering with illustrator Melly Johnson. The message both in the text and in the illustrations is not factual about the clear-cutting practices so favoured by industrial resource extractors, but paints an idyllic forest world in which logging companies actually care about preserving the health of the forest. This is not just an author and illustrator being misinformed; it's an author and illustrator spreading disinformation to a vulnerable population, small children. Shall I call this disinformation what it is? Propaganda.

What the smallest of tots need is for dad and mom and grandpa and grandma and their teachers and librarians to foster a truthful, but gentle narrative about our past and current forestry practices and to provide a narrative that demonstrates the interconnectedness of forest ecosystems and how to preserve them.

—Pat Carl
Comox, British Columbia

Waste Heat Recovery, not LNG!

I suggest an WS article on waste-heat recovery. A 60-unit condo in Burnaby, I believe, was able to stop its use of natural gas 100% by capturing its waste heat with the SHARC energy system. No emissions, only one maintenance visit a year. It supplies these services perpetually in a closed energy loop. This must get out to the people.

BC's own SHARC Energy systems is performing brilliantly, and is internationally successful. Yet, this humble, local, and affordable energy system that can heat hot water and heat and cool buildings is very much ignored, to the detriment of us all. I found this *Guardian* article ["Recapturing excess heat could power most of Europe, say experts," *The Guardian*, Feb 23, 2023], and thought – I have to let you know about this. Enough of the LNG blindness. Our Kootenay summers have been ruined by wildfire smoke, microburst flooding and slides. Enough!

—Susan Eyre
Sirdar, British Columbia

We Stand Corrected

While I was working on and readying your files to go to press last week, I took notice in the article on "Lonely Doug," [WS, April-May 2023] that a quote at the top right on page 27 is quite incorrect.

(I have been up to see Lonely Doug myself and it was quite a wonderful experience.)

The quote was: "'One is the Loneliest Number' —Aimee Mann."

The song "One" from which that was taken, was written and recorded in 1968 by Harry Nilsson, and not Aimee Mann, who covered that song for a movie 30 years later in 1999. Three Dog Night covered the song in 1969 and had a big hit with it. Aimee Mann's cover of the song was for the 1999 movie "Magnolia."

Just thought you should be aware.
Cheers!

—Daryl Dreger
(prepress, *International Web Express*)
Coquitlam, British Columbia

Thanks - Good Point!

I did the survey yesterday and realize now reading the current issue that I should have mentioned one small complaint. It's the credits for the authors at the end of the articles. I am of course always interested in them but really strain to read in that delicate grey print against the white paper! Old eyes, even with renewed cataract surgery vision, find it almost impossible. If you can just print the credits in black, I'd be grateful!!

—Barbara Moore
Vancouver, British Columbia

The Watershed Sentinel welcomes letters

but reserves the right to edit for brevity, clarity, legality, and taste.

Anonymous letters will not be published.

Send your musings and your missives to:

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Quebec goes all-in on e-buses

Electrified

The largest electric bus project in North America has been announced for Quebec. An acquisition of 1,229 city buses is planned for the province's network of electric public transit, with \$780 million in federal money and \$1.1 billion from the Quebec government. Ten public transportation organizations will be able to go 100% electric using the vehicles.

Nova Bus, a company headquartered in Saint-Eustache, was awarded the contract to build the buses, and all will be assembled in Quebec.

—Government of Canada press release
May 8, 2023

A subsidy by any other name...

Pipeline Pricetag

The cost of completing the taxpayer-funded Trans Mountain Pipeline expansion has jumped to an estimated \$30 billion.

In 2018 the federal government bought the pipeline from Kinder Morgan for just under \$5 billion after the company threatened to abandon the project in the face of environmental opposition. Economist and former ICBC head Robyn Allan estimates the pipeline is destined to become Canada's largest-ever oil industry subsidy, and would never have been built if oil companies had to pay for it.

The Canadian government maintains it does not intend to be the long-term owner of the line and will "launch a divestment process in due course."

—www.globalnews.ca
May 19, 2023

Nations sue for Treaty 9 recognition

A Deal's A Deal

Ten northern First Nations are suing the Ontario and federal governments, arguing that resource extraction on their territories has infringed upon their jurisdiction for over a century. When Treaty 9 was signed in the early 1900s, the agreement was that First Nations would retain their decision-making governance over the lands and resources, and that the Crown governments would have some governance rights but not the right to take over. The nations are asking a court to find that a long list of federal and provincial laws related to resource extraction are not valid on their territories. If successful, the case could have massive implications for the Ontario government's plans to jumpstart mining in the north, particularly in the Ring of Fire region, to dig up raw materials for technology like electric vehicles.

—www.thoroldtoday.ca, April 27, 2023
—www.thenarwhal.ca, April 26, 2023

GasLink pollutes waterways, again

Stop Work

Coastal GasLink has been issued another set of stop-work orders covering five sections of their 670 kilometre pipeline route. Each followed inspections which found CGL had failed to implement measures to prevent sediment-laden water from reaching sensitive streams. Six other stop-work orders were also issued earlier in the month, adding to a long list. The company said a difficult spring melt and complex terrain contributed to the infractions.

—www.cfnrfm.ca
May 25, 2023

LPC backs citizens' assembly idea

Electoral Reform

The Liberal Party of Canada voted to back a National Citizens' Assembly on Electoral Reform at their national policy convention in May. The resolution was to "urge the Government of Canada to establish a non-partisan National Citizens' Assembly on Electoral Reform to continue the work started in 2014." A December, 2022 EKOS poll showed overwhelming support for a National Citizens' Assembly on Electoral Reform from voters of all parties.

—www.fairvote.ca
May 6, 2023

Groups appeal RBT2 decision

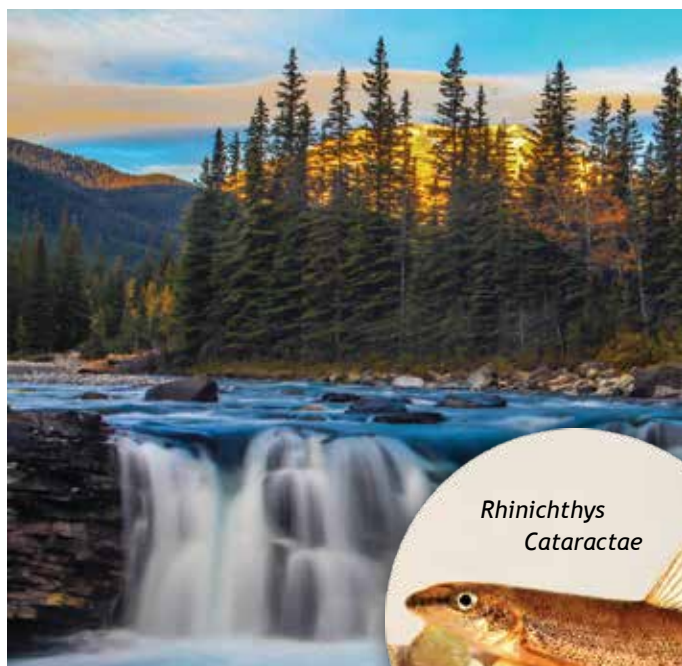
Terminal Idiocy

BC environmental organizations and Ecojustice have filed an application for judicial review challenging the federal environmental approval of the Roberts Bank Terminal 2 project, a port expansion by the Vancouver Fraser Port Authority. The government approved the project despite the Minister of Environment and Climate Change's determination that the terminal would cause "significant adverse effects" on salmon and orcas, including underwater noise and marine pollution, that cannot be fully mitigated. Some of the largest salmon runs in the world migrate through Roberts Bank, while the Salish Sea provides critical habitat for the remaining 73 endangered Southern Resident Killer Whales.

—www.ecojustice.ca
May 23, 2023

Terminal Idiocy

Roberts Bank decision reveals protected areas charade



*Rhinichthys
Cataractae*

by Loys Maingon

The most important environmental decision taken in British Columbia this decade is likely to be the Roberts Bank Terminal 2 (RBT2) decision announced in early April 2023, because it reveals the shallowness of the government's environmental rhetoric, even at its most powerful.

In many important ways, this decision could be the proverbial straw that breaks the camel's back. It is important not just for the calamitous long-term implications for Salish Sea ecology – predicted by the scientific community, including Environment Canada's own scientists – but for its social implications. The Impact Assessment Agency's own report, which reviews all considerations, (ecological, socio-economic, and cultural), strongly recommended that the project be rejected. The decision

is also important because of what it tells us about the current diminishing status of science in our culture.

Roberts Bank is important not just because of its ecological importance in the Salish Sea region, but for the extent to which that ecological significance has been eroded since contact – and particularly over the past fifty years during which the Vancouver area has seen exponential growth. Notwithstanding the heroic efforts of local biologists, streamkeepers, and naturalists to preserve the Lower Mainland's natural heritage, given rapid and intense urbanization it is difficult not to be aghast at an aerial view of the region. Areas that just fifty years ago were still networks of wetlands, small holdings, and woodlands have disappeared.

The fate of regionally endangered species, such as the Nooksack dace (*Rhinichthys cataractae*), speaks volumes. Species populations that were regionally abundant and stable in the 1960s now face a precarious future in two to three thousand feet of linear habitat, which is continually being eyed by developers. It is a cumulative disaster zone, as most of the Salish Sea is becoming, with human population increases and unrelenting development.

What is left of Roberts Bank now, before the impacts of RBT2 to come, is a critical estuarial migratory stopover on Pacific Coast flyways for shorebirds whose numbers have already been in steep decline globally since 1970, and which are already some of the most threatened bird species. The banks provide an irreplaceable and already limited supply of rich microbial biofilm, the loss of which already correlates with well-documented bird declines since 1970. The area is home to 119 species at risk in a transboundary ecosystem that spans BC and Washington.

The project will negatively affect 19 critically endangered populations of Chinook salmon, sockeye salmon, southern resident killer whales, basking shark, northern spiny dogfish, Pacific ocean perch, and Baird's beaked whale. Given its location and seasonal importance for organisms on migratory cycles, the demise of species at Roberts Bank will impact the entire distribution of species throughout the Salish Sea and the Pacific Coast.

Once environmental damage is accepted, the practical implementation and enforcement of “mitigating” permit conditions is always an afterthought. These conditions are simply ministerial grandstanding, intent on mesmerizing the trusting public – a strategy that relies on the principle of a “vanishing baseline” – public ignorance and forgetfulness of the state of the environment before the project was conceived, and eventual public amnesia to the magnitude of what was lost.

Rivet-removal

This is not just a matter – important as these concerns are – of controlling vessel traffic and noise and oil pollution risks. It is a brutal “rivet-removal” of highly vital productive area in a web-of-life mosaic, with potential for domino collapse effects. At what point will we have removed the last irreplaceable rivet?

That question becomes particularly urgent when we realize that decisions are guided by an *Oceans Protection Act* that makes no reference to climate change. Fisheries scientists are becoming concerned with the problem of de-oxygenation across large areas of the ocean. For British Columbia, this has to be a matter of concern since the data show that since 1960 the Pacific North-east alone, which plays a critical role in our salmon fisheries, has experienced a 15% drop in ocean oxygen levels.

Climate change is present and is changing everything, from bird migration patterns and routes, species behaviours, and population dynamics, to ocean and mountain biodiversity, where climate change is linked to accelerated forest loss. Yet Canada prioritizes the development of a carbon economy that is the principle driver of climate change.



Since 1960 the Pacific Northeast alone,
critical for our salmon fisheries,
has experienced a 15% drop in ocean
oxygen levels

It begs the question: “Where is the impartiality that acts as the democratic social glue?” The public expectation is that the Minister of Environment will prioritize the environment. The RBT2 decision comes in a growing string of government decisions made counter to the advice of the scientific community. In this instance, the minister has rejected and bypassed the findings and recommendations of the environmental impact assessment reports which sat on his desk for three years.

The magnitude of this breach of the social contract cannot be minimized, even if it is not immediately apparent to the public. If science is no longer understood to guide public policy, or is seen merely to be used as lip service and window-dressing, then public trust is not just eroded, it is eclipsed. This is not an exaggeration. Government prioritization of the needs of industry over the environment increasingly leads observers to conclude that government decisions are not just incoherent with stated government policy and objectives, but are manifestations of a deep-seated duplicitous cynicism. This is the stuff that gives rise to and legitimizes the lamentable growing trend in conspiracy theories, and public disinterest in representative government.

Increasingly, the public understands that climate change requires a re-assessment of our economic priorities. Environmental and biodiversity protection must become the actual top priority – not just political window-dressing – if humanity is to muck through this mess.

Excerpted from “Does Science Matter Anymore in Canada’s Business-minded Fantasy Conservation Policies?” to be published with full footnotes in the *Bulletin of the Canadian Society of Environmental Biologists*, Summer 2023 and available at www.watershedsentinel.ca

Loys Maingon is a retired biologist and BC Director, Canadian Society of Environmental Biologists.

Not For Sale

The Kwakwaka'wakw community stands together

by Desiree Mannila

Over 25 Kwakwaka'wakw Gigame (Hereditary Chiefs) attended a feast held by Gigame Walas Namugwis (David Knox) on April 1, 2023, at the Tsakis Gukdzi (Fort Rupert Bighouse). Gigame that held Tlakwa (inherited Coppers representing one's history and wealth) placed them around the fire as a sign of unity, pushing for their values to be recognized by elected representatives.

Feasts and potlaches are the root of the once-illegal governance system that has been followed by the Kwakwaka'wakw for time immemorial. In an interview with *Watershed Sentinel*, Kwagu'ł Gigame Walas Namugwis explained the significance of the feast,

triggered by ongoing forestry within his territory. "All communities within coastal regions are suffering resource extraction at its worst," he says. "It was important to gather our people together, to lift us up, to sing, to celebrate, and to remember who we are as people of the land." Gigame Walas Namugwis heads the Kwakwaka'wakw Hereditary Chiefs Confederation, which aims to uphold traditional rights, title, responsibilities, and governance systems, and heal from the impacts of colonization and industrial exploitation on their Nations' land and culture.

Waves of emotion passed through the Gukwdzi, as witnesses raised their hands in agreement with the messages brought



Tlakwa (Coppers) placed around the fire

©Desiree Mannila

forward by their leaders, who spoke to the environmental and cultural concerns among their Nations. “The elected Chiefs don’t think seven generations ahead, they weren’t raised like our Gigame – to think about the future, to think what they will have left,” declared Gwa’sala-’Nakwaxda’xw Gigame Sonny Wallace. “All they think about is greed, and it’s sad to say that’s what it always comes down to.”

Deep-rooted ties to the natural world were entwined into the entire ceremony – locally foraged and traditionally prepared food, cedar for cleansing, burning, and regalia, and salves used for customary giveaways. Following the speeches, witnesses flooded the floor, smiles lighting their faces as they joined together for a final dance to signify the unity and resilience of all Kwakwaka’wakw Nations.

Political ideologies

“I was right there on the front line,” says Gigame Walas Namugwis in an interview with *Watershed Sentinel*, detailing the negative impacts he’s witnessed through a lifetime of working with the land and water. He describes effects on the seasons, watersheds, forests, and animals through elevated temperatures, loss of habitat, and changes in water conditions and aquatic life due to extractive industries. “Industry needs to learn stewardship; the Ministry needs to learn stewardship. That’s my main objective right now – educating about stewardship at all levels.”

In a letter posted to the We Wai Kai Treaty Society’s Facebook page on March 21, 2023, We Wai Kai elected chief Ronnie Chickite stated: “We want to advise the membership that we have issued a challenge in court to the decision of the Minister of Fisheries and Oceans to not re-issue aquaculture licenses for seven salmon farms in Discovery Islands.” Elected Chief Chris Roberts of the Wei Wai Kum Nation, who joins Chickite in the challenge, told the *Campbell River Mirror* that “On one hand, [DFO] say they support First Nations right to make their own decisions.... But, what they have done is something that aligns with their political platforms and ideologies.”

Chickite and Roberts are part of a small group of First Nation representatives who recently formed the Coalition of First Nations for Finfish Stewardship (FNFFS) to campaign against the removal of fish farms in their territories. On their website, FNFFS states they have “united over a shared concern that their rights to make economic decisions for their territories are being ignored.”

“We will make this movement with one voice –
Let’s not give the government the satisfaction
of individualism. It’s not about individualism,
it’s about connecting together as one.”

— Gigame Walas Namugwis

They state on their site that “some [Nations] are in favour of industry and others have decided not to have salmon farms in their territories,” but stop short of recognizing that agreements negotiated by elected leadership can be divisive, and do not always reflect the values and wishes of community members. For example, on April 25, We Wai Kai elder and sister of Hereditary Chief Arnold Chickite, Barbara McCoy Chickite, posted a video of herself presenting a petition signed by over 100 We Wai Kai community members that states: “We the undersigned declare our opposition to the actions of the elected leadership of the We Wai Kai and [...] Dallas Smith from the Coalition of First Nations for Finfish Stewardship, in challenging the decision to close the fifteen fish farm licenses in the Discovery Island[s] region. We do not want the fish farms in our territory.”

Roberts stated in his interview with the *Campbell River Mirror*, “It’s never really been scientifically proven why our territory is such a critical one for Fraser sockeye, but that’s the excuse we’re getting. That’s concerning for us.” However, as noted in dozens of publications, juvenile salmon emerge from the Fraser River to continue their journey north to Alaska – passing numerous open net-pen fish farms in the Discovery Islands and other points in the Salish Sea before returning south to freshwater to complete their life cycles. There has been a slew of peer-reviewed scientific studies published over the past decade linking exposure to open net-pen fish farms to increases in harmful pathogens and parasites in wild salmon – including a recent study in the *Canadian Journal of Fisheries and Aquatic Sciences* that showed Fraser River Sockeye had exposure levels 12 times higher than in other regions to a genus of a bacterium linked to skin diseases.

Capital appropriation

Heavily criticized industries such as hydroelectricity, forestry, mining, and aquaculture have reached great success in BC

Continued on Page 10 ⇨

through partnerships with Indigenous Nations – and the use of their resources.

“As advocates of First Nations on northern Vancouver Island and the neighbouring southern Central Coast region, [Nanwakolas is] an emerging government,” says Dallas Smith, president of Nanwakolas Council, in an interview with *TruckLoggerBC*. Nanwakolas provides member First Nations in the Northern Vancouver Island region with land and marine resource management and economic development services. Smith’s resume includes FNFFS, Coast Funds, Island Coastal Economic Trust, Coast Sustainability Trust, GeoScience BC, the Great Bear Rainforest agreement, and the Marine Plan Partnership (MaPP). His responsibilities range from financial distribution and marine and land research and planning, to determining protected areas and Indigenous-led environmental protocols with industry.

Nanwakolas’ Ha-Ma-Yas Guardians “help protect ... cultural and socio-economic values” across 3.2 million hectares of Northern Vancouver Island. Nanwakolas has received millions in private, provincial, and federal funding and donations from but not limited to: the Marine Plan Partnership (MaPP), the federal Oceans Protection Plan, Great Bear Rainforest (GBR) agreement, multinational aquaculture companies MOWI and Grieg Seafood, Canadian lumber company Western Forest Projects (WFP), and charities Nature United and Coast Funds.

“I can say everything’s in upbringing,” says Gigame Walas Namugwis, when asked about Nanwakolas’ funded guardian program. “I feel most of the guardians have lots to learn about stewardship.” He continues, “That’s what makes a true guardian – a guardian that knows the weather, seasons, harvesting... you know, they’re the jack-of-all-trades in the woods.”

Money grows on trees

Gigame Walas Namugwis explains how old growth is connected to everything – “It’s a mother tree of life for us.” Members of his community are currently working to keep the forestry equipment encroaching on their watersheds from annihilating the last of their once-abundant forests.

In 2022, Nanwakolas received praise for their agreement with Western Forest Products (WFP) to defer the logging of 2500 hectares of old growth. Nanwakolas Council members share four companies specializing in resource extraction with one of BC’s largest forestry contractors, ROGA Group, which has projects with WFP and Coastal Gaslink. ROGA’s partner companies

provide services to “fall and process both old growth and second growth timber” within Kwakwaka’wakw territory.

Requests for interviews were made to Roberts and Chickite, Dallas Smith, Nanwakolas Council, ROGA group and FNFFS; however, no representatives were made available for comment.

All generations – past, present, future

“It’s our responsibility to take the culture we have, protect it, embrace it, and make sure it’s there for our children and grandchildren,” expressed Gigame Rob Everson at the feast. Responsibility was a common theme from the Gigame – responsibility to their members, ancestors, and environment from which they come. Although invited, no elected representatives attended the feast to speak in favour of industry.

“It was teamwork, always teamwork,” Kwaguł Matriarch and longtime environmental protector Wata (Christine Twance) shared in an interview with *Watershed Sentinel*. Nations worked together, moving between territories to preserve resources: “They’d gather all the branches and bushes to start the fire, and then they’d all start singing. Same songs – over and over again. I’ll never hear that again, hun. In my mind, I can hear it. It’s amazing – how they used to enjoy themselves.” She smiles, recalling her childhood travels to Knight Inlet to make *thi’na* – ooligan grease. “They had songs for everything.”

The natural world is a pillar of Kwakwaka’wakw culture, each territory holding irreplaceable memories, lives, and teachings. Kwaguł Matriarch Mabel Knox reflects on her upbringing on the land and sea – “What I’d like to see for the future is to leave the trees alone for our grandchildren, great-grandchildren, and those who aren’t born yet to enjoy, like we have, in a short time.” She adds, “We’re not around forever, but I would like them to see it, so they can look at how beautiful it is – how hard we are trying to fight for it.”

Pax̱ala, Desiree Mannila is a proud member of the Da’naxda’xw Nation, and staff reporter for the *Watershed Sentinel*.

GMO? Oh No...

Government **lifts surveillance** of some gene-edited seeds

by Delores Broten

In May, the federal Minister of Agriculture and Agri-Food approved exemptions to the Canadian Food Inspection Agency (CFIA) pre-market safety assessment, allowing product developers to assess the safety of some of their own genetically engineered seeds and foods without government oversight. The move followed a similar decision by Health Canada a year ago.

Instead of regulation, the agriculture minister also announced an industry-managed voluntary database to list which seeds are and are not organic.

The exemptions to regulation apply to gene-edited seeds that contain no foreign DNA and to foods produced from these plants. Gene editing is a set of new genetic engineering (genetic modification or GM) techniques that can make changes to the genome (DNA) of an organism without having to permanently incorporate DNA from other species.

These genetically modified organisms (GMOs) will not go through any government approval process at Health Canada or the CFIA, but can be released onto the market by companies without any safety data submitted to the government. They can also be released without notifying the government or public.

The government rationale is that this category of gene editing is the same as traditional plant breeding, although much faster. However, in its July 2022 briefing

to MPs on the proposed changes, the Canadian Biotechnology Action Network (CBAN) disagreed:

“These proposed broad regulatory exemptions jeopardize food and environmental safety. They do not reflect the scientific findings, which show that using gene editing can result in a range of possible unintended effects in organisms that could have impacts on food and environmental safety.... For example, unexpected effects could result in alterations to biochemical pathways or protein composition, which could have implications for food and environmental safety.”

“This is a shocking abdication of responsibility by our regulators. The government has fully turned GM food safety over to companies using confidential, privately-owned science,” said Lucy Sharratt, coordinator of CBAN. “Canadians should be aware that the government will no longer be assessing the safety of many new genetically modified foods and seeds. This decision asks Canadian farmers and consumers to trust unseen corporate science.”

The lack of mandatory notification means that some GM foods and seeds could be (and probably will be) released onto the market without the knowledge of farmers and food manufacturers.

Organic food and farming prohibits all genetic engineering, including gene ed-

iting. Farmers fear the voluntary database could easily allow for the unknown spread of GM seeds. If this occurs, organic farmers may unknowingly buy prohibited seeds or face additional contamination risk from neighbours, putting their organic certification and businesses at risk. Even with one new undisclosed GMO on the market, contamination is possible. Economically, Canadian trade around the world in organic and other agricultural products is also at risk.

“This decision runs directly counter to the minister’s commitment to find a solution that ensures organic farmers can continue to farm organically,” said Garry Johnson, president of the farmer led organization SaskOrganics. “Not ensuring full disclosure of all GM seeds through a mandatory public registry will make it challenging for organic farmers to meet the requirements of the Canadian Organic Standards.”

For further discussion of safety concerns, scientific sources, and to take action, see www.cban.ca/NoExemptions/

Sources: Media releases, May 2023: Canadian Biotechnology Action Network, Vigilance OGM, National Farmers Union, SaskOrganics, Organics BC, CBC May 10, (updated May 13, 2023.)

After Arsenic, Lithium

A new mining boom for still-contaminated Dene lands?



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by Odette Auger

Yellowknives Dene people have fished the waters of their traditional territory (known as Chief Drygeese Territory), on the north shore of what is now called Great Slave Lake, since time began. Across the water from the Yellowknives Dene First Nation (YKDFN) communities of Ndilo and Dettah sits the Giant Mine site – now one of the largest stored arsenic sites in the world.

More than six decades after the mine began operating in 1948, some remediation happened between 2013 and 2016. The

governments of Canada and the Northwest Territories are touting another round of remediation in public forums – just in time for the arrival of lithium mining in a tributary of three rivers nearby.

Lithium extraction increases greenhouse gases, requires clearcutting, and contaminates water while using 500,000 gallons per ton of lithium. The European Union is considering classifying lithium salts as serious reproductive toxins, based on scientific evidence that shows toxicity to prenatal development and fertility.

On April 19, mining company Li-FT signed a Memorandum of Understanding with YKDFN for a lithium project located 60 kilometers east of Yellowknife, in Chief Drygeese Territory.

Arsenic remediation

For 56 years, the arsenic-emitting Giant gold mine was permitted to operate with the government of Canada's knowledge, permission, and support. At first, the arsenic gas released from the arsenopyrite ore roasting process was allowed to disperse

freely into the air, and the controls that were later installed failed to prevent toxic concentrations of arsenic from accumulating throughout the surrounding environment. The federal government, though aware of this, continued to allow the mine to operate as usual. After the mine closed, 237,000 tonnes of arsenic trioxide dust was stored underground.

Today, the Giant Mine still holds the arsenic. At Baker Creek educational walk, across from the mine's parking lot, the nature walk signage is a little less vivid than the red "contamination site, keep out" emblazoned on the same road. This site was originally an expansive berry patch harvested for innumerable generations. Elder Mary Rose Sundberg of Yellowknives Dene First Nation describes how the area around Giant Mine once was: "Up on the hills and along the creek, there used to be tons and tons of berry patches." Growing up, she heard Elders describe it as "a blanket of blue."

Yellowknives Dene First Nation councillor Bobby Drygeese knows about arsenic in the water and soil, firsthand. "We had a house in Dettah, and the government finally gave us running water, and ... built a road to our house from the main road. And the rocks were from somewhere contaminated." The contractor building the road received free fill from Giant mine, they said. Drygeese remembers dropping food, and "picking it up, wiping it off and eating it. That night I was sick and in the hospital in Yellowknife, and next thing you know, down in Edmonton." He was four years old, "with lots of pain and suffering. Ended up going in and out of the hospital for years."

Lithium mining is next

Drygeese runs a cultural education camp, B. Dene Adventures, on the shores of

We had a relationship with the animals and we tried to keep that area as **pristine** as possible.

Akaitcho Bay, "educating about our ways, who we are, how we live and how we've survived." Drygeese's vision for the camp is to strengthen youth, "because they're the strength of the future. We have to teach them as much as we can, and help them to understand who they are and [to] be proud of who we are – to make sure they're the stewards of the land."

Drygeese pulls up his ice fishing nets, after chopping away layers of ice with a tool that belonged to his father. He is pleased to see trout. Since the mine closed, certain fish are starting to return. While teaching about ice-fishing techniques, he's also teaching about mining impacts. "The mines were blasting close to shore, and underground, too. The fish could feel that. For a long time, when the mines were open, we didn't have trout around here. And Coney, too." The significance of these fish is illustrated by the original names for these bodies of water. Drygeese explains the Yellowknife River's original name is Weledeh/Wiilideh. Broken down, "wèleh" refers to the Coney fish specifically, and "deh" means flowing water, or river.

Addressing what may be perceived as a site where no Dene were living when the Giant Mine site went in, Elder Mary Rose Sundberg says, "We had a relationship with the animals and we tried to keep that area as pristine as possible." The Yellowknives Dene protected "the store," as Elders still call it today, only visiting it for hunting and gathering purposes. "The Elders, they say all the tribes had made

some kind of agreement that this Yellowknife area; no one would build there. So our people never really built anything on those trails in respect of the animals, because they knew that it was a migration route for the moose and the caribou."

In January, the Mackenzie Valley Land and Water Board said Li-FT needed to undertake more engagement with "local Indigenous groups" before drilling. *Watershed Sentinel* has reached out to Li-FT to ask about their process, and how they were addressing Indigenous concerns; Li-FT has so far declined to comment.

Drygeese says he is worried about the lithium mining. He's seen presentations of the location, where "three tributaries, three waterways ... go past." This winter, the nation was shown ownership packages. To improve their odds, mining corporations were talking to other groups who did not have traditional lands here, says Drygeese.

Money is a big part of the conversation, as Drygeese explains – "almost 50% of NWT's gross domestic product is from our territory. I told them to come back in fifty years and we'll decide then." *Watershed Sentinel* has reached out to YKDFN to learn what were the deciding factors leading to the MOU being signed; they have not yet responded to the media request.

Foam in the Sea

Time's up for toxic docks

by Jen Groundwater

If you live anywhere in coastal British Columbia, you've probably walked on countless floating docks. They're everywhere that the ocean touches: marinas, ports, ferry terminals, aquaculture operations, and on private land. They're inland, too, in rivers and lakes.

These flexible, versatile structures adjust to changing water levels, and they're essential to many BC industries, including fishing, aquaculture, shipping, and tourism.

There's just one problem with them. They're built on a very fragile foundation: polystyrene foam. This petroleum by-product is made by compressing lightweight plastic cells into a larger aggregate material.

Floating docks, rafts, and other aquatic and aquaculture infrastructure rely on polystyrene foam to keep them afloat. Sometimes the foam is exposed; more often, it's encased in a durable plastic shell. There are two kinds of polystyrene foam: EPS (expanded) and XPS (extruded). To keep it simple, many people refer to it as "EPS and XPS" or simply "dock foam."

No matter what you call it, it's a highly problematic petroleum by-product. It's made by compressing lightweight plastic cells into a larger aggregate. It doesn't biodegrade; it's not easily recycled. The World Health Organization classifies its principal element, styrene, as "probably carcinogenic to humans."



©TD Lucas5000

When dock foam is exposed to the forces of water and sunlight, it disintegrates into tiny pieces – microplastics – which are consumed by marine birds and animals, endangering their health.

Foam remnants of all sizes are pervasive throughout the waters off British Columbia. Rachel Blaney, the NDP member of Parliament for BC's North Island–Powell River riding, describes attending Savary Island's 2022 shoreline cleanup, where, she says, there were "huge, huge, huge pieces everywhere." She's also witnessed millions of minuscule bits of foam on beaches, impossible to clean up.

In the fall of 2022, Blaney began to raise the issue in the House of Commons. Then, in March 2023, she introduced a private member's bill, M-80, calling for the federal government to ban the use of dock foam and cut its use in floating aquatic structures nationwide. Blaney says, "It's amazing the response that this has already had. People are learning about it and writing to their MPs across Canada."

Local residents tend to bear the brunt of removing polystyrene and other detritus from coastlines. Many First Nations and citizen action groups hold regular cleanups to collect debris, recycle what they

can (through the Ocean Legacy Foundation’s marine plastic recycling facilities), and send the rest to the landfill.

Citizen groups also press for corporate interests to take responsibility for the pollution they create, and Blaney agrees: “I’d like to see industry taking action and initiative on this,” she says. “It’s about doing the right thing.”

In 2021, Fishing for Plastic (F4P) sent seven volunteers to Desolation Sound as part of the BC government’s Clean Coast, Clean Waters (CCCW) initiative. Barges accompanied them to haul away the material they collected: a staggering 8,440 kilograms of waste from 45 kilometres of shoreline in 11 days.

F4P’s haul included aquaculture items, plastic trays, buoys, pieces of hard plastic, and old tires. The team also collected 432 kg of white foam, 683 foam-filled tires (used for flotation), and two docks, each composed of a big rectangle of foam covered with cement on the top and sides. Even so, Angela Burns, F4P’s director of programs, underlines how big the problem is: “I would say we were a fraction of one per cent of the total cleaned up through CCCW.”

Alternatives

Clearly, we need to stop putting this stuff into the water, especially when we don’t even need fragile polystyrene foam to make something float: air works just as well, if it’s contained within something durable. There’s an increasing array of flotation devices available that are made with weather-resistant, high-density polyethylene (HDPE) shells filled with air. Surfrider Foundation Canada, a not-for-profit concerned with ocean protection policy and action, endorses several such air floats made by Canadian businesses.

Changing policy so that the material never even gets near the water will have more impact than a thousand shoreline cleanups.

Does it make sense to trade one plastic for another? HDPE will degrade over time, though much more slowly than foam. But it’s the best solution we currently have. And it’s definitely worth pursuing as soon as possible: a 2022 study revealed that 81% of microplastics on southern Vancouver Island beaches, particularly near marinas, is polystyrene.

In the long term, changing policy so that the material never even gets near the water will have more impact than a thousand shoreline cleanups.

Washington state has just taken decisive bipartisan action in its fight against marine plastic: an April 2023 bill banned the sale and installation of floats using dock foam (as of July 2024). Canada should enact similar legislation as soon as possible. The next step will be to replace existing foam in government-owned and public docks with air floats. A combination of subsidies, incentives, and tax credits will encourage individuals, private marinas, and industry to do the same.

F4P is gearing up for a summer of awareness raising. Catherine Ostler, F4P’s education coordinator, says, “We’re asking people to write to their MPs anywhere in Canada, because it’s not just a BC problem, it’s on the Great Lakes, it’s on the East Coast as well.”

Support from voters and MPs in other provinces is crucial, Blaney explains, because “the point of private members’ bills

is to tell government this is something the people of Canada are concerned about.”

The dock foam problem is solvable, with leadership from the federal government, Blaney believes, and she’s determined to make it happen. “There are options!” she says. “It’s manageable. We could get this done.”

A petition about the issue has already garnered thousands of signatures; email your MP and the federal environment minister, <https://canada.surfrider.org/ban-foam>

Jen Groundwater is a writer, editor, and author living in the Comox Valley.

glasswaters foundation

Surprised by Opportunity?

The Glasswaters Foundation Environment Opportunity Grants programme provides community groups with a fast ability to take advantage of unexpected opportunities – to extend a speaking tour to a local venue, to travel to a conference, to print materials for local organizing, or other needs that arise.

A letter will suffice as an application for these small grants (\$500 to \$1500).

The grant must go to a registered charity or Indigenous organization registered with Canada Revenue Agency.

Contact db@glasswaters.ca

Tough to Swallow

Asbestos cement drinking water pipes are deteriorating

by Julian Branch

A recent investigative news program has cast a spotlight on the problem of asbestos cement (AC) water pipes, yet Health Canada continues to go out of its way to dispute claims that it is dangerous to drink the carcinogenic fibres.

On March 25, CTV's *W5* produced a story about asbestos cement water pipes. I had approached the program after discovering that at least 600 kilometres of the water distribution system in my city of Regina, Saskatchewan are made of asbestos cement – and after being continually assured by the city that the water is safe to drink.

After seven years of testing the water for asbestos, the city says the results have all come back as “non-detectable.” Yet, one test of Regina water at one location by *W5* showed there are 370,000 asbestos fibres in a litre of Regina water. *W5* also conducted tests in Winnipeg, and found asbestos in the water there as well.

The issue of asbestos cement, or transite pipes, as they are also known, is not common knowledge. Yet for decades, the pipes, which contain up to 20% asbestos, were installed in communities across Canada. Many have reached the end of their lives, and are deteriorating, crumbling, and breaking.

In 2003, a new National Research Council (NRC) centre was announced in Regina. The Centre for Sustainable Infrastructure Research (CSIR) was a \$30-million

partnership between the federal government, the Government of Saskatchewan, the City of Regina, and the University of Regina. According to the news release, Regina was to be used as a “living laboratory.”

Over the next seven years, CSIR would produce ten very specific studies on asbestos cement water pipes. The studies refer to asbestos fibres in water as a “health concern.” One 2010 NRC/CSIR study says severely deteriorated asbestos cement water pipes leach fibres into the water and “could pose a hazard of malignant tumors of the gastrointestinal tract and other organs in consumers.”

Despite this, Health Canada does not regulate asbestos in water. It maintains there is insufficient evidence to show that ingested asbestos is hazardous.

In a recent response to a written question on the matter, Health Canada said the NRC studies “cannot be used as evidence that asbestos ingested through drinking water is a health concern. These reports are about infrastructure, namely addressing various aspects of asbestos-cement pipes.” The Health Canada response goes on to say, “The reports are not focussed on health issues and studies cited in the reports have methodological limitations from a health perspective that prevent the study authors from estimating and drawing conclusions on health risks.”

The NRC studies may not have been fo-

cussed on health issues, but world class federal government scientists very clearly said that asbestos fibres, leaching from water pipes are a “health concern.”

W5 surveyed more than 100 communities to see what types of water pipes were in use. Roughly 90% of those questioned still had asbestos cement pipes in the system. This sample is a fraction of Canadian communities still getting their water from asbestos cement pipes.

Since the *W5* program, Green Party Leader Elizabeth May has authorized a petition demanding action on these potentially toxic asbestos cement water pipes. Hopefully Canadians will be concerned enough about asbestos in their drinking water to take a look, sign it, and share.

The petition can be found at:
<https://petitions.ourcommons.ca/en/Petition/Details?Petition=e-4375>

Watch “Something in the Water: Asbestos fibres turning up in Canada’s drinking water,” *W5* Investigation, www.youtube.com/watch?v=dMWPF-6cUq3Q&t=23s

Julian Branch is a retired journalist and strategic communications specialist. He sits on the board of the Canadian NGO Prevent Cancer Now (PCN).



FACTS on asbestos cement water pipes

- Asbestos was used as a binding agent in the cement. Asbestos cement water pipes can contain up to 20% asbestos.
- Canada does not regulate asbestos in water. Health Canada maintains there is no evidence that ingested asbestos is hazardous. Canada made the decision not to regulate in 1989.
- Health Canada assessed new data in 2013 and 2018 and determined that there is no causal relationship between asbestos ingestion and negative health effects. Health Canada is currently reviewing asbestos in water. The process is expected to take two to three years.
- The United States regulates asbestos in water. Following two decades of study, in 1992 the Environmental Protection Agency established a Maximum Contaminant Level of seven million fibres per litre (7 MFL) for asbestos in water.
- The American Cancer Society highlights asbestos cement pipes and concerns about swallowing asbestos on its website.
- The National Research Council (NRC) had produced ten studies on asbestos cement water pipes. They refer to asbestos fibres in water as a health concern. One 2010 NRC study in particular says asbestos fibres in water may pose a cancer hazard.
- Health Canada says those studies don't count because they weren't focussed on health issues.
- Asbestos cement pipes still deliver water to millions of Canadians.
- Statistics Canada is currently gathering information on asbestos cement water pipes. That information will be available in late 2024.
- The World Health Organization (WHO) says asbestos cement pipes are the main source of asbestos in water.
- An engineering study out of Washington State found that when asbestos cement water pipes break that they do so in a catastrophic fashion.
- A 2018 study from Utah State University found that the breakage rate of asbestos cement water pipes had increased 43% since 2012.

**Humans can live quite well without running water
(although not if they have to walk 20 km or more every day
to carry a bucket home).**

But neither humans nor any other living components of the spaceship Earth can survive without clean water. Of course, you'd never know it by the way we treat water – from fountains in the desert to disposal of excrement and industrial waste directly into rivers, lakes, and oceans. We channel it, divert it, waste it, discard it, and contaminate it.

In this section we highlight a few specifics, from the global situation to the contamination of Indigenous lands. There are hopeful stories too, as people team up with each other and ...beavers, to restore natural systems and build clean water capacity in remote communities. When it comes to water, there is no “away” – recognizing that bare fact is the foundation for starting to clean up our act.

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Water = Life

Water Connects

Food, communities, wellbeing all depend on clean water

by Delores Broten

Water connects us all, flowing from mountaintop to ocean and back in endless cycles. In a beautiful system, the ocean then produces more than half of the oxygen we breathe.

Canada has 20% of the world's fresh water, consisting of a mind-boggling 879,800 lakes over 0.1 km² in area, according to the World Atlas. However, little is known about the health of most of those water bodies, nor is it known how many will survive the impending changes from global heating.

Lachine Canal, Lake Erie, and Lake Ontario have all developed a reputation for being polluted, and Lake Winnipeg has been added to the list of the most threatened lakes in the world, due to sewage and agricultural run-off.

Around the Great Lakes Basin there are 43 Areas of Concern as designated by the International Joint Commission – 12 in Canada, 26 in the United States, and five shared by both countries. The international boundary between Canada and the United States runs through the middle of the lakes.

Since 1987, three locations have been remediated and taken off the list, while two others, Spanish Harbour and Jackfish Bay, both previously polluted by organochlorines in pulp mill effluent, are “in recovery.” (This can probably be interpreted as waiting for sediment to bury the old chemical contaminants.)

Now ministries for environment and health in Canada have released science documents that show the “forever chemicals,” per- and polyfluoroalkyl substances (PFAS), are in the soil, in aquifers, in the rain, migrate to the Arctic, and are in Canadian human blood and breast milk at harmful levels. A few of this family of over 4,000 related man-made chemicals, including the original Teflon, were banned in the last decade, but substitute chemical “cousins” were quickly found.

The water we see and test in lakes and streams is only a small fraction of the water we need to protect. Environment Canada's website suggests that, although unknown and little studied, “the quantity of groundwater in the earth would cover the entire surface of the globe to a depth of 120 metres. By contrast, the volume of surface water in lakes, rivers, reservoirs and swamps could be contained in a depth of about one quarter of a metre.”

Those aquifers are threatened by development, by extraction faster than nature refills them (and sometimes subsequent salt water intrusion as they empty), by agricultural run-off such as nitrate fertilizer, and by chemical contamination.

However, the biggest threat to drinking and agricultural water both globally and in North America is the drastic changes occurring in the water cycle, which are now baked-in and accelerating due to climate change.

Major farm areas in the USA will have to curtail production due to water shortages, possibly by following up to one quarter of the land.

As a result, major farm areas in the USA will have to curtail production due to water shortages, possibly by following up to one quarter of the land.

Since Canada imports a major portion of its food supply, especially fruits and vegetables, from the USA, this has major implications for Canadian grocery bills.

Hopefully Canadian farmers will be able to find the water to grow the food, and financial support to market it, in order to fill the shelves. They will be helped in a multitude of ways, from local farmers' markets, popping up everywhere, to those hundreds of thousands of streamkeepers, volunteers, and neighbours who watch lovingly over their local waters. It will take the whole human species to rethink what we are doing to the waters of life.

Accelerating Extremes

Global water cycle changes require a shift in approach



by Stephen Leahy

Climate change is disrupting the global water cycle, with profound consequences. Globally, air temperatures are increasing while humidity is declining globally, bringing more heat waves, wildfires, and droughts, including flash droughts. At the same time, monsoon regions are getting wetter, according to the new *Global Water Monitor 2022 Summary Report*.

“Earth’s water cycle is clearly changing,” said the report’s lead author Albert van Dijk, a geographer at the Australian

National University. “Globally, the air is getting hotter and drier, which means droughts and risky fire conditions are developing faster and more frequently,” said van Dijk in an interview.

Fresh water is the most essential natural resource on the planet. Scientists believe that icy comets and asteroids delivered nearly all the water on the planet about four billion years ago during a 300-million-year period of constant bombardment. Planet Earth should be called Planet Water since 70% of its surface is

covered by water. However, only 3% is fresh and very little of that is available for human use. Luckily for us, fresh water is continuously cleaned and recycled by natural processes as part of the global water cycle.

Fresh water is unevenly distributed around the planet and human settlement patterns reflect that fact. Now, climate change is changing where, and how much, water is available. Land areas have warmed twice as fast as the global average. As air temperatures rise, evaporation

rates increase, drying out soils, lakes, and rivers. Over the oceans, more evaporation means more water in the air to fuel heavy-rainfall events, including atmospheric rivers and monsoons.

The report used multiple terabytes of data from more than 40 satellites and thousands of ground-based weather stations to build a full and up-to-date picture of the global water cycle. The overall conclusion: There is a major shift towards extreme precipitation patterns.

Here are some of the specific observations:

- A 115% increase in months with record-low humidity levels in the last five years compared to the 1995–2005 average.
- Months with record-high humidity have declined for the past 12 years.
- A long-term trend towards more months with record-low rainfall.
- Increasing trends in extreme precipitation over shorter periods (five days or less) raise the risks of local flash floods.
- Monsoon regions from India to Northern Australia are getting wetter.
- A 200% increase in months with record-high monthly average temperatures over the last 11 years.

Warmer temperatures also melt snow and ice faster. The Pakistan floods that displaced 30 million people in 2022 were made worse by intense heatwaves that caused record-breaking glacier melt in the Himalayas. This raised river flows even before the torrential monsoon rains hit.

Parts of the Americas and Africa are getting drier, including the western United States, which experienced its 23rd year of drought in 2022. There will be more and more heatwaves and flash droughts,

said van Dijk. (A flash drought can form in just ten days, with little warning. These have increased dramatically in recent years.) “This fundamental change in the water cycle is underappreciated. What we need to do is heed the warning signs and prepare for a challenging future.”

Since 2000, flood disasters have increased by 134%, and the number and duration of droughts also increased by 29%, according to the World Meteorological Organization. In the past few years, the duration and severity of floods and droughts increased 25%, concluded an analysis published March 2023 in the journal *Nature Water*.

Lakes and reservoirs drying

Yet another impact is a decline in water levels in more than half of the world’s largest lakes and reservoirs. Lakes hold 87% of Earth’s liquid surface fresh water and are a crucial source for drinking water, irrigation, hydropower production, and industrial uses. However, since 1992, over half of the 2000 largest lakes and reservoirs have experienced significant losses, amounting to roughly 22 billion tons of water per year, according to a May 2023 study published in the journal *Science*.

Some of this decline in water levels is due to human activities, including water withdrawals, dams, and sedimentation in reservoirs. Nearly two billion people live on or near these drying lakes and reservoirs, with many already affected by the decline in water storage.

Up to half of the world’s population currently experiences severe water scarcity for at least part of the year. In addition, one in four people do not have access to safe water. Water-related conflicts are growing increasingly frequent, with vio-

lence erupting over access to water in India, Iran, and other countries in the Middle East and Africa.

“No region of the world has been immune from the risk of violence associated with water resources,” said Peter Gleick, a world-renowned water scientist and co-founder of the Pacific Institute, which tracks water-conflict data.

Slow water

To avoid a global crisis, new water governance and water management models are needed, concluded participants at the recent UN Water Conference in New York City. Among the new approaches is the concept of “slow water.”

Conventional water infrastructure is largely about controlling water and speeding it away as fast as possible, which often leads to flooding downstream. It also limits the replenishment of soils and groundwater, and reduces wildlife habitat.

The key to coping with increasing extremes of flood and drought is to find ways to slow water movement on land to allow the natural water-land interaction to take place, writes Victoria resident and National Geographic Explorer Erica Gies in her new book *Water Always Wins*. Conserving or repairing natural systems, or mimicking them using what’s known as green or nature-based infrastructure, “can buffer us from bigger rainstorms and longer droughts by absorbing and holding water,” writes Gies. We need to move towards collaboration and partnership with water rather than control, she concludes.

Stephen Leahy is an award-winning environmental journalist and publishes *Need to Know: Science and Insight*, a weekly newsletter. leahy.substack.com

Water Heart

The Kearl tailings spill, dreams, and the spirit of water

by Cassandra Blondin Burt

When I find out about the Kearl Mine tailings leak I cannot breathe or see straight – I am no longer standing in that room with its halogen lights – I am at the water's edge, where I go when the dam breaks on my heart and I can no longer hold space for the human world – that place at the water's edge where we always are, where I always am.

All is dark. I am small. I am at the water's edge. All around me is the sky and the sound of gentle, still, water. It is night. I am so focused on what is in front of me that I hardly see the outline of trees – dark silhouettes swaying in the quiet, still air; standing watch – ancestors. Mountains rise through the night sky – a far off horizon, tucked heavily behind the deep waters stretched out in front of me.

The Kearl tailing ponds leak is worse than anyone wants to see and as bad as everyone thought it would be – and the fight for who needs to clean it up, to what extent, and how is still in debate. The tailings leaked onto muskeg and forest, a small lake, and tributaries of the Firebag and Muskeg rivers.

I have been having dreams of these waters for over two years now – dreams where the spirit of water reaches me, declaring her sovereignty and need to be honoured, cleansed, and protected. She told me there were threats to her wellbeing, and of how deeply tied she is to our own, the Dene People.

Dusk light imbues the air with a soft glow, and stars carpet the sky above. She fills the air, the space – the wholeness of my mind. I am hardly breathing, in reverence, in awe of her beauty – her terror.

She does not speak like we do – and when I am with her, I do not either. The beingness that I am fills with the sound of her thousand voices, every one of them twinkling – like ice crystals, or the aurora singing across the night sky. I feel I will burst with her communication, this vibration, a frequency more than an uttered sound.

I listen, breathing through fear, adamant that I will honor the beauty and grace of this visit. She tells me that there is much work to be done to honour ancestors who lived long ago – who spoke medicine into the world, and conversed with the waters, and plants – the sun, the moon and stars.

The land feels alone now, she tells me. With making prayers to her, feeding the fire, feeding the land, she, too, is fed. The earth is so hungry for our compassion, the water so eager for our attention and dedication.

We are taught, as Dene, that there is a coming time when the world will grow challenging thanks to the changes brought to our shores by a foreign people long ago, and my dreams tell me that these waters are inherently connected.

Here in the quietness of dreams I see that she is the heart of everything that is – the heart of this lake, the heart of this land, the heart of these waterways. It is her. All is water. She simply is. She is the water heart – a heart to everything that is. I see the mountains, myriad streams and rivers flowing and flowing and flowing. In and through and around each other. I see a crest, a great headwaters – one side flows all the way to the ocean – the other to our heart waters, and all I hear is “the head and the heart connect. The head and the heart waters must always stay connected.”

My Great Grandfather, George Blondin, was known as a gatherer of sacred stories – Medicine Stories. As I find myself poring over his writings, over and over I hear the same thing – the metaphysical and the physical are connected. They are always connected. And when we divide ourselves from spirit, from our intuitive selves, from our dreams and the dream world – from the spirits of the Land – then we lose ourselves, slowly, inch by inch, year by year.

I believe, if I believe anything, that these dreams call me into action, into awareness. They remind me that this current mo-

ment in human history offers an opportunity for felling our own destructive narratives. They remind me of the myriad opportunities we have to re-create, re-imagine. To live from an invigorated soul.

And the only thing, I am told, that we would have to do to find ourselves in a future where we are collectively living in a further developed, further colonized, existence, is nothing. All we need do is leave everything as it already is. To wake up tomorrow, and go to work, and live as if we have no other options.

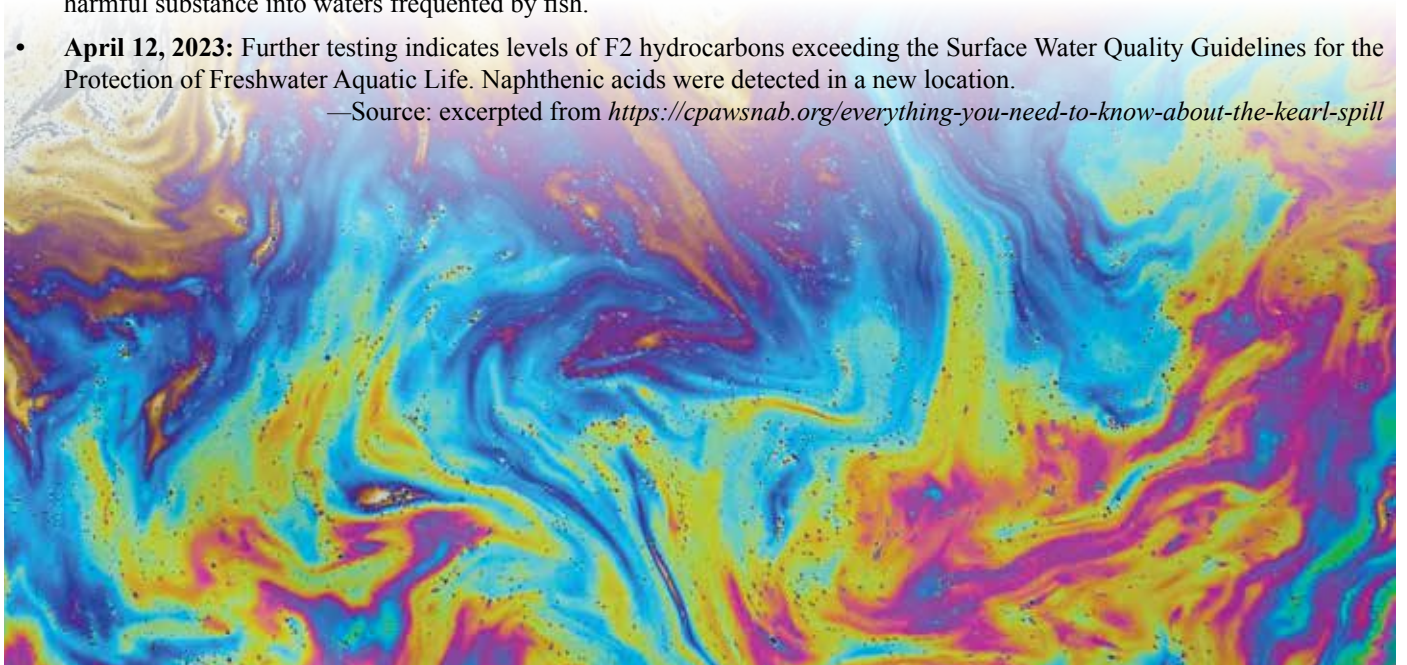
To wake up tomorrow, and go about our work, as if we do not dream. As if dreams didn't exist.

Cassandra Blondin Burt is a two-spirit Dene journalist, artist, and plant medicine maker living in Chief Drygeese Territory, Akaitcho Region, Denendeh.

Kearl Mine Seepage and Spill Timeline

- **May 19, 2022:** Imperial Oil reports to the Alberta Energy Regulator (AER) a discovery of discoloured surface waters at multiple locations on and off site. AER issued (but didn't post) two "non-compliances," but the general public and nearby Indigenous communities remained unaware of the uncontrolled leak.
- **August 16, 2022:** The company confirms the seepage exceeded government guidelines for chemicals including dissolved iron, total arsenic, F2 hydrocarbons, sulphate, and total sulphide.
- **Jan 31, 2023:** Imperial detects a sudden, catastrophic 5.3 million litre spill from Drainage Pond 4, a pond that collects surface runoff and seepage from the External Tailings Area – the source of the original, chronic leak.
- **February 4, 2023:** Imperial reports the spill to AER. Two days later AER issues an Environmental Protection Order (EPO) calling on the company to immediately contain and remediate the spill and leak. It is only because of this EPO that Indigenous communities, the public, and provincial, territorial, and federal governments learned of the initial leak and subsequent spill.
- **March 10, 2023:** Enforcement officers issue a *Fisheries Act* direction against Imperial Oil, due to unauthorized deposit of a harmful substance into waters frequented by fish.
- **April 12, 2023:** Further testing indicates levels of F2 hydrocarbons exceeding the Surface Water Quality Guidelines for the Protection of Freshwater Aquatic Life. Naphthenic acids were detected in a new location.

—Source: excerpted from <https://cpawsnab.org/everything-you-need-to-know-about-the-kearl-spill>



Vulnerable Rivers

Where will BC get the electricity for future LNG?



©U.S. Army Corp of Engineers



©LNG Canada

by Sidney Coles

The BC government has a history of putting the hydroelectricity cart before the water supply horse. The result has been expensive and often devastating to Indigenous communities and to the environment in the northern interior of the province. These days, that cart is seriously oversized and the horse will soon be perilously overburdened.

Ninety-eight percent of BC's electricity is generated by renewables, 87% by water. In its load forecasting model, BC Hydro

calculates for population, industry and general economic growth. On the industry horizon, LNG (liquidified natural gas) stands out as the most energy intensive, and what's coming soon is the processing of billions of cubic metres of LNG slated to move though thousands of kilometres of new pipelines across the northern interior: Coastal GasLink, the Pacific Trails Pipeline, and pipelines for Ksi Limis LNG and Cedar LNG.

The demands of the physical plant at

LNG Canada in Kitimat and other processing facilities will be high, but the biggest energy suck is in preparing the gas for export.

Liquefaction is an energy-intensive process that transforms gas into a "safely" transportable liquid form by supercooling it to -162°C . LNG Canada is a joint venture between Shell Canada, Petronas, PetroChina, Mitsubishi, and Korea Gas. Phase 2 of the project would double the capacity of the Kitimat facility from 14 to

28 million tonnes per year. So, how will the liquefaction of all the gas that will be piped into Kitimat, Bish Bay, and Pearse Island be powered in a not-too-distant future?

If the answer is by increasing hydroelectric capacity and transfer infrastructure, what does this mean for the region when electricity is only half of the equation? Water is the more significant other.

Site C power is spoken for

Don't look to the controversial \$16 billion Site C Project to meet growing LNG electrification demands. Its projected output is already accounted for by current industry and household needs. In September 2022, Hydro stakeholder engagement advisor Debra Lamash wrote in a newsletter, "Meeting the needs of potential large-scale industrial developments in this region will require new 500 kilovolt (kV) transmission lines and associated infrastructure to be developed from Prince George to Terrace."

But the lines only transmit the energy, they don't produce it. The energy source, she admits, is something they still need to figure out. The math, as the kids say, just isn't "mathing." We know this because the Pembina Institute has also been doing it.

In its 2023 report *Squaring the Circle*, the Pembina Institute suggested that, by the time all five proposed LNG projects are running, they will require the generating capacity of eight Site C dams. When asked in a recent email where BC Hydro planned to find new sources of hydroelectric potential, its spokesperson responded that its "power system is integrated and does not pinpoint a single resource to a certain area and the electricity will come from energy generated across the province."

By the time all five proposed LNG projects are running, they will require the generating capacity of eight Site C dams.

The answer is conveniently vague. Where, exactly, from across the province? From what river or lake sources does Hydro hope to generate this much energy? The proposed floating Ksi Lisims Natural Gas and Terminal Project on Pearse Island on Nisga'a territory is slated to produce 12 million tonnes of LNG per year. Wind River Corporation has proposed a 50-80 megawatt power project north of Prince Rupert, BC. The project consists of a dam and storage reservoir at Kinskuch Lake and a tunnel, penstock, power house, and transmission line in the upper Kinskuch River system and Nass Valley. This is a veritable supply drop in the demand bucket.

New hydro resource options

In its most recent *Integrated Resource Plan* in 2021, BC Hydro isn't shy about forecasted industry energy demands: "The North Coast region has the potential for considerable load growth as a result of liquified natural gas and mining developments." In the same report, they calculate that it will require "new hydro resources" by 2030, and provide a shortlist of potential new resources options. Wind power is one option, biomass is another.

Run-of-river is also on that list and, given the demand-time crunch, a new run-of-river project would certainly square the math better than the others would. Run-of-river projects are designed differently than traditional hydroelectric projects in

that they don't have huge water stores or reservoirs. However, on the right river, they can be massive and can have the same generating capacity as a true hydroelectric dam. A good example of a large run-of-river project is the Chief Joseph Dam in Bridgeport WA. Because of their lack of reservoir, they work best if there is a lake upstream to help regulate flow.

"BC Hydro will initiate processes to draw on future resources earlier than indicated in the Base Resource Plan and rely on a temporary supply of market energy to meet near-term needs at the system level." There are two key things to note in that Integrated Resource Plan statement. First, is the need for new resources, and second is the term "market energy."

BC Hydro has a number of Independent Power Producers. Rio Tinto Alcan has been one of its best and brightest for some time, and is a significant supplier of "market energy." Alcan was forced to reduce its production at Kitimat by a third, when, in 2000, it was faced with low water levels in the Nechako reservoir.

Under its 2007 electricity purchase agreement with BC Hydro, Alcan is obliged to sell all electricity from its Kemano generating station above the smelter's load to BC Hydro, and BC Hydro is obliged to buy all electricity from the Kemano generating station above the smelter's load, up to the capacity of the transmission

Continued on Page 26 ⇨

system. Under their reciprocal agreement, Alcan will deliver surplus electricity from its Kemano plant to BC Hydro until the end of 2034. The Kemano Powerhouse has been receiving water from the Nechako Reservoir through a 16 km tunnel that is over 70 years old.

Kemano II

Kemano II or T2, a second tunnel running parallel to the old one, was finally completed in December 2022 after 30 months. The 1200 tonne steel Tahtsa Lake intake Tunnel Boring Machine (TBM) that drilled it was 6.5 metres in diameter and 195 metres long. After a somewhat perverse naming competition, the tunneling beast was named “Tl’ughus” by the children from the Cheslatta Carrier Nation, after a mythological mountain serpent from their traditional lore.

The tunnel is clean, the plugs are built, and Alcan has started “watering it up.” Alcan’s update states that the 960 MW T2 Project is “different” from the much-maligned Kemano Completion Project, because it’s not about “additional power generation” and will not result in changes to the company’s water licence.



**Electricity is only half
of the equation.
Water is the more
significant other.**

According to the update, no more water will be drawn from the Nechako Watershed than is currently being drawn. The Kemano Completion Project (Kemano II) was halted in 1995, after a BC Utilities report that identified it as the biggest threat to salmon stock in the Nechako River.

According to a Rio Tinto update, the new tunnel produced its first megawatt of electricity in July 2022 after its construction was completed in May 2022. Both T1 and T2 are now operating together, ensuring a reliable power supply for Rio Tinto’s BC Works aluminium smelter and to BC Hydro.

This being said, will Alcan look to other hydro sources that aren’t the Nechako, and if so where? The Morice River (Wedzin Kwa), the Bulkley? The Nanika?

When asked directly about the Morice, a BC Hydro spokesperson said the river is not on the existing 500 kilovolt transmission line corridor and “we currently do not expect to cross the Morice River.”

But that answer doesn’t stop Alcan from doing it, then selling its surplus energy to BC Hydro, which it could then use to power LNG Canada in Kitimat.

“We can’t do an immediate and wholesale electrification of the plant and the pipeline. It’s not possible today because the transmission infrastructure just isn’t there.” This statement which CEO Jason Klein made to Reuters on January 17, 2023, again only addresses half of the energy resource demand problem by leaving out the water.

So, while BC Hydro obfuscates, we must all be wary about this missing half of the equation, because it won’t be until new hydro resources are clearly identified by BC Hydro or Alcan or LNG Canada that we can know what river or lake is next.

Sidney Coles PhD, DPE candidate OISE, is an equity and human rights advocate and a recent transplant to BC.

See also, “Run of River - Hydroelectric Projects in BC Create New Gold Rush,” by Arthur Caldicott, <https://watershedsentinel.ca/articles/run-of-river-hydroelectric-bc/>

Figure 4-5 North Coast capacity Load Resource Balance before planned resources



Knowledge On Tap

Drinking water internship builds in-community capacity

by Desiree Mannila

There's nothing like a glass of ice-cold water on a hot day, the smell of fresh laundry, or a hot bath to relax. This is made possible through underground and surface water sources that have been treated and tested by water treatment operators.

In 2012, Water First moved their international water resource program to Canada, and in 2016, began working exclusively with Indigenous communities, collaborating with over 70 Nations across six provinces to date. In 2017-2018 they piloted their Drinking Water Internship Program – a 15-month internship providing Indigenous youth with the support and training needed to obtain three provincially-recognized water treatment operator certifications.

Critical operations

Drinking Water Internship graduate and Nipissing First Nation member Laura Mallinson recounts changing her career goals to align with her passions, “Water was so important to me – to make sure I knew that what I was doing was good. Not just for me, but for my family, and my community.” Equipped with over 2000 hours of training from the internship, Mallinson was offered a position to help construct upgrades to her Nation’s level-two water treatment plant. “I had no idea how water was treated or really where it came from. I just kind of turned my tap on and it was there – and I think that’s how a lot of people see it.”



Interns and instructors in the Water First Drinking Water Internship Program in Georgian Bay stop for a photo during a week of source water quality training.

Mallinson says that the West Nipissing Oust Water and Wastewater treatment facility is an example of one of the larger treatment plants seen in Indigenous communities, but has still faced boil-water advisories and dry reservoirs. Mallinson explains the plant is required to meet water regulations through chemical processing, multi-process filtering, and disinfection by UV and sodium hypochlorite injection. An 18-month upgrade project will expand the current reservoir to meet future developments and “to have better water quality, more of it, and better fire protection.”

Mallinson says many First Nations communities require such updates to their treatment systems, while “some [reserves] don’t have [plants] at all, they’re just on wells.” However, it’s a matter of “getting the funding to do that, and to justify the cost.”

“You also need operators and things like that to work there – for remote or smaller

communities, it’s definitely a challenge,” says Mallinson. “There’s a ton of different regulations and standards that we’re required to meet, for [water] to be considered safe to drink.... Operators are responsible ultimately to maintain those kinds of regulations and standards in their plants.” She describes meeting interns who only have one operator running their local facility – “[The operators] haven’t been able to take a holiday for years – or if they get sick, they still have to go in.” Since its start, Water First’s internship has helped certify 45 members from 31 Indigenous communities. Water First Director Ami Gopal said in a written response to *Watershed Sentinel* that their current cohort of 11 interns is set to graduate in September 2023. The organization will also be starting a new internship with Ogemawahj Tribal Council in Manitoba in the summer of 2023.

Paḡala, Desiree Mannila is a proud member of the Da’naxda’xw Nation, and staff reporter for the *Watershed Sentinel*.

Rodent Restoration

Salt Spring Island's beavers are busy rebuilding wetlands

by Natalia Nybida

Over the years, the Blackburn Lake ecosystem has gone through some dramatic changes. Despite these changes,

the beavers have managed to remain in residence and maintain their way of life. In 2013, Salt Spring Island Conservancy

purchased the Blackburn property and both conservancy and beavers began restoring the land to its original wetland ecosystem.

The Blackburn Lake Beaver project is an ongoing study that began nine years ago, on the role of the beaver in the Cusheon Creek Watershed on central Salt Spring Island. Photographer and naturalist Simon Henson was given a rare opportunity to study and document the beavers as their landscape continued to change around them. Henson started to collect data and take photographs. And over the years, he started to really get to know what the beavers were doing there.

Once the conservancy purchased the property, the goal was to restore the existing the golf course back into a wetland ecosystem – the natural habitat surrounding the lake. “Beavers do that by nature,” says Henson “Their whole purpose is to develop and maintain wetland ecosystems. So here we had the two parties; you had the beavers that have been doing it there for centuries, and you had these new stewards of the property,” says Henson.

Development & disturbance

In 1907 the Blackburn lake area was sold to Alan Blackburn, who set out to establish a successful dairy farm. “Part of that work was to drain the wetlands to make pasture. That was the start of taking away the vital water the beavers used,” explains Henson.

Continued on Page 30 ➔



©Roger Peet, Justseeds Artists' Cooperative



1: The main resident lodge situated amongst the vegetation on the edge of Blackburn Lake, showing some of the branches stored for winter food in the foreground.



2: The new beaver dam, built across Hitchcock Creek, after the original was swept away during severe flooding in the Fall of 2021.

3: Studying the various teeth-marks of the harvested branches to look for signs that the new kits have begun to feed outside of the resident lodge. The newborn kits' teeth are smaller during the early months.



Then in 1994, the property was developed into a golf course, with further drainage installed along with a series of boardwalks and bridges extending into the beaver habitat. The impact on the land would seem obvious, but during the remediation process the extent became clearer – from rubber membranes to prevent wild plants from growing to “truckloads and truckloads of sand to improve drainage” beneath the golfing greens.

Henson says, “the property left behind from the golf course was not beaver-friendly. They weren’t coming out into those areas. The fairways and the greens had dried up into grasslands most of the summer.” He explains that boardwalk are barriers to the beaver: “They couldn’t harvest, they couldn’t use water systems or canals or trails through those areas.”

Once the human-made barriers were removed, the beavers suddenly had access to the full system. Henson says there seemed to be a flurry in those early years of beaver activity, as soon as the drained-dry golf courses had been dug up and restored to the point where the groundwater would be maintained.

“That started the whole beaver project philosophy for me, which was to monitor the beavers through these changes. How did that affect their activities, their location, and what they did to that changing landscape,” says Henson.

Charismatic ecosystem engineers

Often referred to as environmental engineers and wetland managers, beavers have an incredible ability to create new wetlands, restore native wetland, and improve habitat for a wide range of species.

In other areas where beavers have built ponds and access between creeks, re-

When beavers create fish habitat, and canals for fish to travel, they are inviting other species into **ideal habitats**.

searchers found the presence of fish has doubled and some old salmon creeks that were dried up have regenerated and now have salmon fry coming up. When Henson found freshwater mussels had a new colony, his excitement rose.

“Freshwater mussels are one of the most imperiled groups of organisms threatened by habitat loss and fragmentation from dams, and pollution from sedimentation, chemicals, and fertilizers. In fact, 76% of all freshwater mussels are imperiled and 10% are already extinct,” Amy Singler writes on *AmericanRivers.org*.

Henson says, “they’re really struggling, so to have fresh water mussels in the ponds here at Blackburn was a real treat.” When mussels expel their young, the young sense a fish swimming by, and attach themselves to the gills, travelling in this way to establish new colonies. When beavers create fish habitat, and canals for fish to travel, they are inviting other species into ideal habitats.

In 2021, major flooding required the conservancy to move the bridge over the beaver dam. Henson explained that was a huge impact on their whole development because the beavers “were able to build taller and thicker. And that increased the height of their pond.” The canals that can be seen today happened as a result of that water level simply maintaining and seeping sideways over the rim of the pond into the neighboring area, which normally in summer would be totally dry. For the following two summers, those canals and streams that went out of the

pond maintained a longer wetter season for the wetland plants to survive into the dry season. Vegetation is staying greener longer in the summer – “the groundwater is extensive and therefore the vegetation is wetter and doesn’t dry out and burn,” explains Henson.

After years of research, Henson says, “I felt like I’d gone to the Blackburn Beaver Institute, you know, I was a student. They were the instructors. I’m a salesman for the beaver and I really wanted to portray the beaver as the good guys – not ones that you should trap and destroy and blow up their dams.”

“They’re not doing bad things, they’re doing good things if you can work with them. So my ongoing research is really to say, how can we work together?” Henson’s work is to ask how both human and beaver communities can cohabit and develop these wetlands together, and to build that awareness. “They’re here to stay – this is their territory they’ve always been here.”

Natalia Nybida is a writing student at VIU. Her fiction has been published by Rebel Mountain Press, and her poetry by *Sea & Cedar* magazine.

A River's Gifts

The mighty Elwha River reborn

Review by Michael Maser

The story of the Elwha River, which drains the Olympic Mountains of Washington state, is the focus of a new teaching book created for children – but one replete with vital, contemporary lessons for all land and water stewards.

A River's Gifts: The Mighty Elwha River Reborn documents several stories in one, starting with the creation of the river during the retreat of kilometres-thick glaciers that blanketed the Pacific northwest. A free-flowing artery, the river and its estuary nursed uncounted generations of salmon, providing food and nutrients and contributing to a profuse biodiversity.

The Lower Elwha ʔé?łxʷaʔ nəxʷsłáyəm (Klallam) Tribe, known as the Strong People, were the first human occupants of the region, living adjacent to the river for generations and revering it as a creation-companion and source of food.

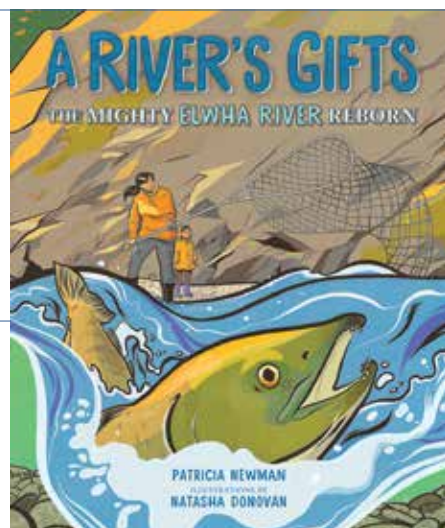
The flow of the Elwha was halted in 1910, however, with the upriver construction of



**A River's Gifts:
The Mighty Elwha River Reborn**

**Patricia Newman,
Illustrations by Natasha Donovan**

**Millbrook Press, 2023
48 pgs colour, \$27.60
ISBN-13: 978-1541598706**



the first of two power-generating dams serving a pulp mill and the settler-community of Port Angeles on the Strait of Juan de Fuca.

The dams proved devastating for the Klallam people and for the salmon, who were unable to swim beyond the dams to spawn.

This vibrantly-illustrated book tells not only this history but also what unfolds subsequently as efforts to remove the dams are mounted by the Strong People together with allies and activists. It is a story of triumph in the face of numerous obstacles and indifference. In 2011, the dams were dismantled and then people waited anxiously to see if salmon could or would return to the upper Elwha as sediment from the unfettered reservoir roared downstream.

I won't reveal the ending but suffice to say this is an important teaching tale for children and environmental advocates. Its educational importance for children lies especially in the book's capturing of the magnitude of the problem, integrating In-

igenous history, complex social issues, and the science of revitalization, all of which continue to evolve.

In this way, *A River's Gifts* unfolds as a living textbook worthy of any school or home bookshelf.

It is available in hardcover and e-format for school use. Reading level is grade 4-5.

Michael Maser is a writer-researcher living in Gibsons, BC.

Protecting Seahorses

Flagship species is a powerful ambassador for the oceans

by Odette Auger

For twenty-nine years, UBC's Project Seahorse has been bringing awareness to the threats to seahorses, along with innovations in conservation.

Program leader Dr. Sarah Foster has been working with Project Seahorse for over twenty years, originally as a volunteer after finishing her master's degree in Fish Physiology. "I was looking for a way to contribute more to the world, while still geeking out on fish," she recalls.

She remembers being out at night with lantern fishers and seeing her first seahorse in the wild – and the wonderment she felt. Seahorses are evolutionary marvels, being the only known species with male pregnancy. We often hear of scientists discovering species in the ocean that we didn't even know we have. It makes Foster wonder, "Are we negatively impacting species that we don't even know are in the ocean?"

iSeahorse is one of their projects, ten years in the making. A community of scientists, conservationists, and citizen scientists around the world report sightings on iSeahorse, helping keep tabs on seahorse populations, habitats, and their conservation status. Sightings logged on the platform are validated, and this information can extend known habitat ranges, depth distribution, habitat use, and breeding season.

Of the 44 known species of seahorses, at least 14 species are threatened. Of those,



eight are vulnerable to extinction, and 17 are labelled as "Data Deficient" – meaning they are unable to be assessed for The International Union for Conservation of Nature's Red List. This lack of a designation impedes conservation decisions and policy.

Project Seahorse has developed a way to model threats by estimating cumulative human impact (CHI) at the species level. The researchers are now calling on

the United Nations Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and local managers to use species-level modelling, so that threat-mitigation plans can be tailored to protect species – rather than a broad-stroke approach on ecosystems. This species-specific modelling could estimate conservation status "for thousands of Data Deficient species on the IUCN Red List," says Project Seahorse website.

Bottom Trawling

Foster spent many years focusing on fisheries and trade, so she has "seen many more dead and dried seahorses than living." Through trade surveys, the project estimates 25 million seahorses are dried alive for the Traditional Medicine Trade. Project Seahorse mapped the human impact of 12 human-created stressors, and found the most severe pressure to be grossly non-selective bottom trawling.

"A mark of the intensity of such bottom trawling globally," Project Seahorse researchers found, "is that catches of only one or two seahorses per vessel per night amounted to a total extraction of more than 11 million seahorses annually from just the first 21 countries we surveyed." A myriad of other species are impacted, from molluscs to sharks and rays. The catch is unmanaged and unreported, says Project Seahorse.

Hundreds of thousands of bottom trawlers operate all over the world, and more

than 80% of the seabed is trawled in some regions, “most of it repeatedly.” Trawling generates 25% of global marine catches, and as much as 50% in Asia. Bottom trawlers drop wide-mouth nets with heavy weights that gouge and scrape the ocean floor. The catch is often sold unsorted “for mere pennies,” as feed for fish farms, chicken feed, fish meal, or fish oil.

“People may say some bottom trawl fisheries are well managed,” says Foster, “but you have to ask – to what reference point?” There is no historical pre-trawling data to compare numbers against. “It might be managed if your only goal is to maintain the catches of the targeted species over a short timeframe, but the picture changes when one considers ocean health more broadly.”

Foster is cautiously optimistic, “It seems we’re moving towards a more holistic sense of management where we need to look at ocean health in general, and make sure that we have oceans that support livelihoods and food security well into the future.” Circling back to the data deficiencies, Foster asks, “If we don’t know what the ocean floors were like before bottom trawling began, how can we say how we’re really doing?”

Part of the problem is being out of sight, out of mind. When people think of the ocean, they think of a blue expanse, explains Foster. Think of your favourite forest, she illustrates. “If we were using bulldozers to go in and catch a few of the animals, and left the rest behind or ground it up for animal feed, you would be pretty upset.” Getting bottom trawling on the radar, and people talking about it, is how it enters policy dialogues at the government level.

Something people can do on a personal level is to consider how their seafood is



Bycatch in Mexican trawler



Female Patagonian seahorse (*Hippocampus patagonicus*)

caught. It’s spot prawn season here in BC, and as Foster says, “they are ridiculously delicious, local, and caught by traps which are far more sustainable than bottom trawls.”

Through research and advocacy work, Project Seahorse aims to provide solutions and drive conservation interventions. Phasing out bottom trawling is one focus, along with demanding that governments favour selective fisheries, remove harmful subsidies, enforce laws that con-

trol trawling, and implement protected areas that explicitly exclude trawling.

“They’re magical ambassadors for the problems facing the ocean,” says Foster. “The solutions that are going to help seahorses are going to help many other species.”

Learn more about how you can help Project Seahorse take action here: <https://projectseahorse.org/take-action>

HOW YOU CAN HELP TACKLE BOTTOM TRAWLING:

- Insist that governments protect sea life through clear actions: favouring selective fisheries, removing subsidies that keep bad fishing practices afloat, enforcing existing regulations, and implementing protected areas that exclude bottom trawling.
- Choose seafood wisely – Avoid seafood caught by bottom trawls (e.g. shrimp and fish that live and feed on the ocean floor: cod, haddock, turbot, halibut).
- Avoid farmed seafood that depends on trawled marine life (i.e. shrimp).
- Talk about bottom trawling to everybody. Arouse awareness and indignation about this abominable fishing method.

Ocean Soundscapes

Do fish bay at the moon?

by Terry Collins

Using hydrophones to eavesdrop on a reef off the coast of Goa, India, researchers have helped advance a new low-cost way to monitor changes in the world's murky marine environments.

Reporting their results in the *Journal of the Acoustical Society of America*, the scientists recorded the duration and timing of mating and feeding sounds – songs, croaks, trumpets, and drums – of 21 of the world's noise-making ocean species.

Some species within the underwater community work the early shift and ruckus from 3am to 1:45pm, others work the late shift and ruckus from 2pm to 2:45am, while the plankton predators were “strongly influenced by the moon.”

The degree of difference in the abundance of marine life before and after a monsoon was also recorded by the scientists.

The paper concludes that hydrophones – underwater microphones that make no additional noise, allowing for passive acoustic monitoring – are a powerful tool, and that “overall [species] classification performance,” accurate to 89%, “is helpful in the real-time monitoring of the fish stocks in the ecosystem.”

The team, including Bishwajit Chakraborty, a leader of the International Quiet Ocean Experiment (IQOE), benefitted from archived recordings of marine species against which they could match what they heard, including: a cacophony of

spawning tiger perch; snapping shrimp, whose sounds baby oysters reportedly like to follow; and a “buzz” call of unknown origin, among several other mystery fish, part of the oceans' countless marine life mysteries.

The sounds can be heard on the YouTube channel, “Conservation Metrics” (<https://bit.ly/3H5Ly54>).

Advancing the GLUBS

A major legacy of the decade-long IQOE, ending in 2025, is the Global Library of Underwater Biological Sounds, or GLUBS. Conceived in late 2021, it is designed as an open-access online platform to help collate global information and to broaden and standardize scientific knowledge of underwater soundscapes and their contributing sources.

It will help build short snippets and snapshots (minutes, hours, days-long recordings) of biological, anthropogenic, and geophysical marine sounds into full-scale underwater baseline soundscapes.

Especially notable among many applications of insights from GLUBS information: the ability to detect in hard-to-see underwater environments how the distribution and behavior of marine life responds to increasing pressure from climate change, fishing, resource development, plastic, anthropogenic noise, and other pollutants.

Many uses of underwater sound

Of the roughly 250,000 known marine species, scientists think all fully-aquatic marine mammals emit sounds, along with at least 100 invertebrates, 1,000 of the world's ~35,000 known fish species, and likely many thousands more.

Among GLUBS' aims is to help delineate essential fish habitat and estimate biomass of spawning aggregations of soniferous species. In one scenario, a one-year calibrated recording can provide a proxy for the timing, location, and, under certain circumstances, numbers of “calling” fishes, and how these change throughout a spawning season. Researchers hope the project can also help reveal species unknown to science as yet, and contribute to their eventual identification.

It could also help evaluate the degradation and recovery of a coral reef. Researchers envision collecting recordings from a coral reef that experienced an extreme weather event, followed by widespread bleaching. Throughout its restoration, GLUBS audio data would be matched with and augment a visual census of fish assemblages at multiple timepoints.

GLUBS could also provide timely information on the possible harms or benefits of offshore industrial activities such as oil and gas, wind power, or deep sea mining.

Press release, April 23, 2023, International Quiet Ocean Experiment (IQOE)

Food Matters



Essential, Precious Water

by Arzeena Hamir

“Is it too late to plant my cucumbers?” I’ve been hearing similar questions for the last couple of weeks and I’m scratching my head. It’s only May but it feels like July! We haven’t had significant rain in more than four weeks and just a few days ago, temperatures soared past 30 degrees Celsius. I guess folks could be forgiven for being confused as to what season we’re in. Dry, sunny days, albeit pleasant to work in, are a scary sign if this is the trend for the rest of the season.

Water is so incredibly critical for food production; its importance can’t be understated. No seed can sprout without the presence of moisture. Water transports nutrients from the soil into plants and allows sugars to move down from the leaves. Water stress produces bitter greens, prevents root vegetables from producing, and makes plants susceptible to insects and disease. No water, no food.

So, what choices do farmers have if the rain they are counting on doesn’t fall from the sky? Some may have access to wells that they can pump from – if they have a license, that is. So many friends and neighbours have been waiting years for their licenses to get through the process, leaving them wondering if they’re even allowed to irrigate from their wells.

Here on Vancouver Island, our aquifers are poorly mapped – and yet the provincial ministry in charge of this process has seen it fit to approve water bottling facilities from the aquifer. So now farmers have extra competition for this water.

Surface water from rivers is in critical condition, particularly in the summer when it’s needed by fish, trees, and the riparian ecosystem. The long, dry summers we have been having lately have certainly impacted our cedars and other water-loving plants. Putting more stress on streams and rivers just isn’t sustainable in the long term.

Where does that leave farmers? Honestly, the only choice I believe we have is to store water on our farms, in whatever way we can. We have a dugout on our property that holds almost half a million gallons of water. By far, it’s the most cost-effective way of creating a water supply. It is fed by run-off during the winter months and then we pump in the summer (and I guess now in spring and fall!) when we need it. On top of that, applying organic matter through compost or manure, growing cover crops, and reducing tillage can all help in increasing soil’s ability to absorb and hold on to moisture.

Thankfully, many of these types of solutions are now being funded by the BC Ministry of Agriculture. Dugouts and cover cropping are considered Best Management Practices (BMPs) that farmers can apply for. As anxious as I am about our future water supply, it’s nice to know that the farming community can be part of the solution.

Arzeena Hamir is a food security activist and farmer. She and her husband run Amara Farm, a certified organic vegetable and fruit farm in Courtenay.

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Wild Times

Click Parks

by Joe Foy

I don't like click parks. There, I said it out loud. I think click parks suck for the same reason that I think that paid parking meters in provincial parks sucked until we got them kicked out a decade ago.

A click park's purpose is to restrict visits by requiring people to go online and then click to get a day pass to go hiking, swimming, picnicking, or any of the awesome things our provincial parks offer. Currently the BC government requires an online park pass to get into a number of parks, including Golden Ears Provincial Park – one of my all-time favourite public nature spots. This park pass thing has really got my goat – which is appropriate because the entrance to Golden Ears Provincial Park features a likeness of a mountain goat.

I have not been to Golden Ears Provincial Park since the introduction of the park pass requirement.

Now I should say that I understand the park pass is not all that onerous. It's free. Day-use passes for Golden Ears are only required June 14 to September 4. And the passes are for a good purpose, say park managers. They are to help with park overcrowding and are only used in parks that are susceptible to people-jams on roadsides, trails, and beaches.

Sounds reasonable. So why am I being such a crab?

I oppose anything that aims to further restrict access to our provincial parks. We already have to pay to camp in a provincial park and lack of public transit to most provincial parks means we need to use



some sort of vehicle. Park passes remove the spontaneity of a visit to the park with a grandkid, and the whole point of the passes is to turn some folks away. Park memories not made that day. Not cool.

So, what happens when someone chooses not to visit a provincial park? Well, there is always the mall. Or unregulated boondock camp and swimming areas around the Lower Mainland which are often awesome – or sometimes not so awesome.

Use of unregulated camping areas is growing in beautiful valleys around Stave Lake, Chehalis, Chilliwack, and Harrison Lake. If you go camping there then you will witness the rise of the garbage pig camp – and I am not talking about feral swine. Real pigs don't leave mountains of burned camp chairs, shotgun shells, blasted road signs, bottles and cans, and stuff that I do not want to have stuck to my sleeping bag in the morning. Don't even get me started complaining about the bent nails left over from burning heaps of wooden pallets in makeshift fire pits.

The solution is simple. More people are moving to the Lower Mainland every day. The people need more parks. The BC government must work in cooperation with regional Indigenous nations, whose lands these are, to determine appropriate locations for new protected areas, campgrounds, beaches, and trails.

The places to start looking for new park designation are where people are already boondock camping in the mountains and valleys surrounding the Lower Mainland. Click parks and garbage pig camps gotta go. Let's create, fund, and staff an expanded park system that is Indigenous-led, inclusive, accessible, and beautiful, to introduce a new generation to the wonders of wild nature.

Joe Foy is the protected areas campaigner for the Wilderness Committee.

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