



ENVIRONMENTAL STEWARDSHIP

NEWSLETTER

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VISION

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“We, the Musqueam, will work together to take care of our territory so the following generations will know how to be self-reliant. We will remember our own history and as well, use our traditional teachings to take care of everyone and everything on this earth”.

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FROM THE EDITOR

Happy September Everyone!

On behalf of the Environmental Stewardship Department team, we hope everyone is having a wonderful summer and has had a chance to get outside and experience the beauty of our region. ESD looks forward to continuing to work on initiatives and projects that will leave a positive impact on the community and the environment. We hope everyone enjoys the rest of their summer and wish you well as we transition into Autumn.

All the best,

Sarah Skapski, Environmental Stewardship Manager

BEAVER DAM ANALOGUES ARE A KEY TOOL FOR RESTORATION



Historically, beavers were very common throughout North America and were found in most streams and rivers. These mighty rodents are ecosystem engineers, able to alter their surroundings and environment in a significant way. They are able to create, change, or destroy habitat over a very large area through their expertly built dams and ability to manage the flow of water. They are also considered a keystone species. Keystone species are species that play an outsized role in defining ecosystems relative to their abundance. The ecosystem in which they are found would be drastically altered without their presence. Despite their importance, beaver populations were decimated in the 18th and 19th century since their fur was in high demand, particularly for export to Europe. Their rapid population collapse and extirpation from many regions, valleys, and rivers resulted in significantly altered natural processes. The collapse of beaver populations also coincided with the rapid expansion of anthropogenic activities like farming, the diking of rivers, and the building of roads.

These two concurrent developments significantly altered hydrological processes. Streams were channelized and disconnected from their floodplains. Wetlands were drained so the land could be used for other purposes. Habitats and waterbodies became disconnected and fragmented. Impacts like these resulted in worsening water quality, reduced resilience, and heightened flood, drought and erosion.

While the immense benefits beavers provide were not always known or appreciated, that is no longer the case. Increasingly, conservationists are trying to restore streams, wetlands and other habitats using the tools and strategies beaver deploy so effectively. This can be done by reintroducing beavers to an area and letting them do what they do best. Alternatively, human made beaver dams, known as beaver dam analogues (BDAs), can be used. Often BDAs can be improved by beavers that are either already in the area or reintroduced. This ensures they are durable and long lasting. It also reduces potential maintenance costs and fixes any defects and issues.

There are many conservation and environmental groups leading projects focused on beaver-based restoration. In 2023, the B.C. Wildlife Federation (BCWF) launched an ambitious project to create and restore 10,000 wetlands, aptly called *10,000 Wetlands*. The beginning of this project aims to install 100 beaver dam analogues across the province. Last year the BCWF assessed sites throughout the Kootenay, Cariboo, and Thompson-Okanagan regions. This year they plan to build 77 BDAs at the most suitable sites that were identified. Similar work is being done in the Columbia Wetlands in the East Kootenays. These wetlands encompass an area of 260 km² and are a wildlife hotspot. However, they have slowly been drying out over the last few decades due to climate change and human activity. Some areas have seen up to a 16% decrease in the amount of permanent water. To slow and reverse this trend, conservationists are starting to use BDAs, especially in areas with few beavers. Using BDAs to help restore wetlands, streams, and ecosystems is becoming very popular in part because it is low cost while also being very beneficial. It also aims to replicate natural systems, as opposed to overly engineered or anthropogenic solutions.

Both natural beaver dams and BDAs provide a range of benefits. They are a physical barrier in a stream which causes water levels on the upstream side to rise. Since the dams capture and hold water, they help reduce peak floods by slowing the movement of water through the system. Improved water retention also functions to improve summer flows since the water is slowly released over time. Higher water levels behind the dam also

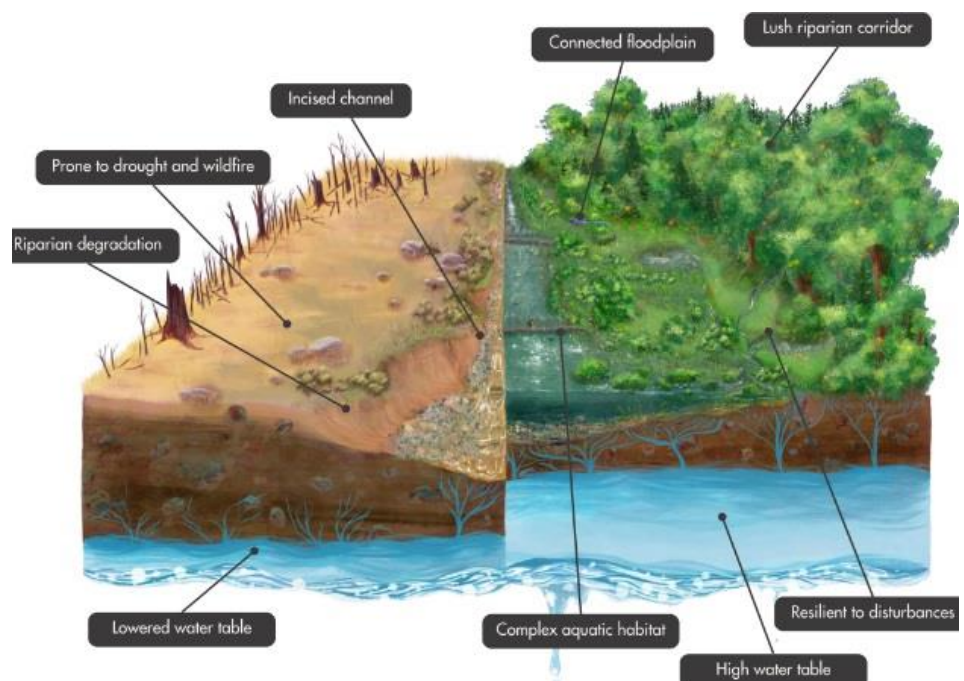


Figure 1. Landscape with and without a beaver dam or beaver dam analogue.

raise the water table of the floodplain and adjacent soil, which recharges groundwater. This allows areas around the stream to remain wet for longer. Therefore, beaver dams and BDAs make the area more resilient to drought. A higher water table makes more water available for plants. In restored areas a clear band of healthy green vegetation is evident. More open water onsite, more soil moisture, higher water tables, and healthy vegetation make a stream and its riparian area act like a moist wall, which helps prevent the spread of forest fires.

Dams also increase the diversity of stream conditions. A higher variety of depths, velocities, and substrates allows more species to find the habitat they need for one or more life stages. Improved hydrology and higher water levels also benefit the side channels and wetlands that are often associated with a stream. A healthy stream and its associated wetlands, benefit the entire ecosystem and its wildlife. Suzanne Bailey, president of the Columbia Wetlands Stewardship Partners, highlights some of these benefits by saying, “Building back those small dams will help spread water out across the valley again. That recharges the groundwater. That provides all kinds of habitat for organisms that live there, so, higher biodiversity”.

While many groups have successfully implemented BDAs, their implementation still needs refining. The permitting process is relatively complex, given it is a relatively new idea. BCWF has been developing monitoring protocols in an effort to not only ensure the projects are functioning as intended but to better understand how to make BDAs successful in various environmental conditions. The location within a stream, size, dimensions, materials and other factors influence success. What works well in one stream might not be suitable for another. Therefore, it is important to further study BDAs and for environmental groups to share lessons learned.

EXPANSION OF HYDROGEN IN BC ANNOUNCED



The Vancouver based company HTEC, which focuses on zero emission travel and transport, has announced its H2 Gateway project aimed at reducing emissions in the transportation sector. HTEC plans to build and operate an interprovincial network of as many as 20 hydrogen refueling stations (with 18 in

B.C.) to support the deployment of fuel-cell vehicles and advance greener transportation solutions. The refueling stations will be supported by three new electrolyzers, machines that produce hydrogen through the chemical process of hydrolysis, in Burnaby, Nanaimo and Prince George, and a new facility that liquefies 15 tonnes of hydrogen per day in North Vancouver.

The H2 Gateway projects are estimated to create more than 280 full-time jobs to build, operate and support the hydrogen infrastructure. H2 Gateway will also support the development of regional hydrogen hubs across the province where production and use are co-located to lower costs and maximize benefits for local economies.

Producing clean fuels like hydrogen right here in B.C. to replace diesel in transportation helps to reduce harmful pollution while creating new jobs and opportunities in the clean economy. By supporting innovative projects, like H2 Gateway, B.C. can ensure that it remains a world leader in clean energy and attracts new investment in the growing clean economy.

Hydrogen fuel-cell vehicles can travel long distances and have relatively short refueling times. As part of this investment, 14 of the 20 new stations will enable the refueling of as many as 300 heavy-duty vehicles per day. It is estimated that H2 Gateway could reduce emissions from the transportation sector by approximately 133,000 tonnes annually.

The total cost of the H2 Gateway projects with input from all partners is approximately \$900 million. The province is supporting the H2 Gateway project through B.C.'s Low Carbon Fuel Standard (LCFS). Under the LCFS there are four Initiative Agreements, valued at up to \$133 million. The Canada Infrastructure Bank (CIB) has also announced a \$337-million loan to expedite and expand HTEC's operations through the implementation of H2 Gateway. The CIB's financing will help accelerate the implementation of hydrogen technology and help mitigate uncertainty in the rate and pace of hydrogen adoption, which have historically been barriers to private investment in sustainable fuel production and infrastructure.

HOW AI CAN BE A POWERFUL TOOL IN CONSERVATION



AI software being used to identify a passing jungle cat.

While AI has been a controversial subject in many aspects, including deepfakes, misinformation, and plagiarism, it is proving to be an incredibly beneficial tool in the field of conservation. As it becomes increasingly difficult to find endangered species, AI is helping to cut through the noise and provide crucial

tools for conservationists to paint a clear picture of deforestation, showing policy makers and the public exactly what is being lost as we continue to destroy crucial ecosystems like rainforests and coral reefs. This gives people more tools and knowledge to act and to inform decision-making. Below are a few examples of AI models trained in different forms of media, and how they are helping conservationists to make an impact.

Bioacoustics – The Sound of an Ecosystem

For certain vocal species, the easiest way to identify their presence is through the calls they make. Birds, whales, and other species can often be heard before they are seen. The field of bioacoustics, the study of the sounds of animals, can paint a vivid picture of an ecosystem's health and tell us which animals are present. Thanks to modern technology, button-sized microphones can be placed over a large area of forested habitat. Whereas cameras capture a small footprint of the forest floor, microphones can capture calls from over a kilometer away depending on the animal and environment. Automated surveillance systems have the added benefit of allowing researchers to stay out of a sensitive area and minimize human disturbance.

While bioacoustics can help identify certain species, it can also help people identify the overall health of an ecosystem. The patterns of sounds and the diversity of calls can help ecologists to determine whether an ecosystem is functioning as it should, and flag any concerning patterns, such as signs of decline in a key species. AI can analyze sounds real-time, identifying, for example, if an uncharacteristic quiet has fallen over the forest, indicating distress or human interference in an area.

While bioacoustics can provide a wealth of information about an ecosystem, a big challenge lies in sorting out and processing that information. Listening to countless hours of tape and trying to separate the cacophony of sounds can take a huge amount of time and resources from already stretched conservation groups. The human ear can have difficulty separating a complex assortment of animal calls all ringing out at the same time. But with AI algorithms, hundreds of hours of tape can be processed in minutes. Layers of sound are separated, and each animal identified. The presence of invasive species can also be detected in this way, raising alarm bells before they are spotted in person and giving more time to act.

While AI processes this information, researchers have more time to focus on analysis and look at the bigger picture. This allows even a small team with a limited budget to be able to monitor huge areas.

Satellite Imagery – Identifying Beaver Habitat

Beavers are a keystone species in North America and many parts of Europe, meaning that many species would not be able to exist without beavers. They form complex wetlands through dams that retain water that provide crucial habitat for many other species. Unfortunately, since colonization, beavers were eradicated in many areas, and our wetlands paid the price. Many types plants and animals have seen population declines as wetlands have dried away. In our highly urbanized and developed areas beaver dams can cause flooding and damage infrastructure, creating huge problems and millions of dollars of damage. However, in more naturalized areas they create sprawling, complex water systems across the landscape. Wetlands help to alleviate several issues that we are facing. They contribute to water retention by slowing down streams, allowing them to infiltrate into the ground and replenish our water tables, creating more drought resilience. The wet, spongy ground also creates a buffer against wildfires, and a refuge for wildlife. They also reduce the impacts of flooding, preventing erosion and slowing down flow.

Most of the sustained beaver habitats are in remote areas out of the eye of humans where they can live in peace, and do not pose a threat to human infrastructure. Due to their remoteness, it is difficult to fully map out and survey these areas in person. The easiest way to locate beaver habitats has proven to be through satellite and drone imagery. But as with bioacoustics, doing this work manually takes countless hours and a trained eye. A group of Google employees learned about this work and reached out to scientists to collaborate on training AI to identify beaver wetlands through satellite imagery. Now Google, Nature Conservancy, and the government of California are working together to create a program called the Earth Engine Automated Geospatial Elements Recognition system, or the “EEAGER” beaver system. This system can help these organizations boost beaver populations in the state, identifying where beavers could be introduced, and where beaver lodges are creating wetlands. As climate change intensifies and creates more extreme conditions, beavers will likely play a crucial role in reducing those impacts, and in a sustainable, cost-effective manner.

Video Imagery – Salmon and Endangered Species

AI is also capable of effectively analyzing video footage. In hatcheries in BC, AI is being used to keep track of salmon populations. Salmon size and approximate weight can be determined from simple video footage as salmon enter and leave hatcheries. Even individual members can be recognized and tracked by the patterns on their skin. AI is also allowing for a much larger use of video footage in remote areas for species that might be harder to detect through bioacoustics. Cats and quieter species can be identified and distinguished from, say, a passing cow or goat. As with other forms of media, hundreds of hours of footage can be cut out to identify the few precious seconds of a rare animal passing by a camera, helping scientists to provide evidence to protect an ecosystem that might be slated for development.

Responsible Implementation of Technology

As with any new technology, AI has the capacity to be severely misused. In the wrong hands, it could potentially be utilized by poachers to locate the habitat of desirable and endangered species. It could be argued that the best defense for many species is their obscurity. However, many species are already dwindling in numbers, fated to have their habitat destroyed outside of the eye of the public as development slowly but steadily encroaches on their habitat. Perhaps the best chance for survival of many species is empowering individuals and local groups through these tools. Many programs now call on citizen science, utilizing photos or audio that someone might take from their phone to spot animals and habitats. When everyone can use their cell phone to identify a chorus of birds with just outside their home, perhaps it will help them to feel more intimately connected with the species all around them.

FALL EVENTS AROUND VANCOUVER

- ❖ **Science World – Earth Matters: Rethink the Future, May 31st to January 9th**

Immerse yourself in Science World's Earth Matters: Rethink the Future exhibition, where you'll learn about your connection with nature and rethink today to regenerate for tomorrow. This family-friendly journey promises to spark creativity, foster curiosity, and empower you to make a positive impact on the world around you. Visit Science World and discover the power of small actions in creating big change. Visit <https://www.scienceworld.ca/exhibition/earth-matters/> for more info.
- ❖ **Vancouver Fringe Festival, September 5th to 15th**

The Vancouver Fringe Festival is a vibrant, uncurated celebration of the performing arts, finding its home in the heart of Granville Island. Whether mingling at the Fringe Bar, connecting in the Community Hub, or queuing up for a show, our Fringe is a place where lifelong friendships and connections are formed, all united by a shared love for the art of performance. Visit <https://www.vancouverfringe.com/> for more info.
- ❖ **Car Free Days Vancouver, September 8th and 15th**

Car Free Days Vancouver is more than a festival; it celebrates diversity, sustainability, creativity, and connection. CFD is a community-led and created festival. Our multi-site annual festival transforms busy streets into vibrant public spaces, bringing artists, performers, local businesses, and communities together. For more info visit <https://www.carfreevancouver.org/>.
- ❖ **The Great Outdoors Comedy Festival, September 13th to September 15th**

Enjoy live comedy in the great outdoors! The Great Outdoors Comedy Festival is bringing comedy superstars Tom Segura, Theo Von, Bobby Lee, Trevor Wallace, and more to Vancouver. Stanley Park will be taken over for a wildly hilarious weekend of standup comedy. For more information visit <https://greatoutdoorscomedyfestival.com/>.
- ❖ **Vancouver International Film Festival, September 26th to October 6th**

The annual Vancouver International Film Festival showcases exceptional cinema and includes some of the best cinema from around the globe, talks, conferences, live performances and other unique events that celebrate film and film culture. For more info visit <https://viff.org/festival/>.
- ❖ **Cirque du Soleil: ECHO, October 9th to December 15th**

Cirque du Soleil brings modern and surprising twists under the Big Top with ECHO, a story of connection, intention, and the bond between humans and the animal kingdom. Visit <https://www.cirquedusoleil.com/echo> for more info.
- ❖ **Vancouver Farmers Markets, Weekly on Sunday, Wednesday, Thursday, and Saturday until October 27th**

Metro Vancouver's farmers markets offer a vibrant tapestry of locally grown produce, artisanal crafts, and culinary delights, showcasing the region's rich agricultural diversity in a lively community atmosphere. From the freshest fruits and vegetables to unique handmade goods, these markets provide a delightful experience for both residents and visitors alike. Visit <https://eatlocal.org/> for more info.

CONTACT US

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