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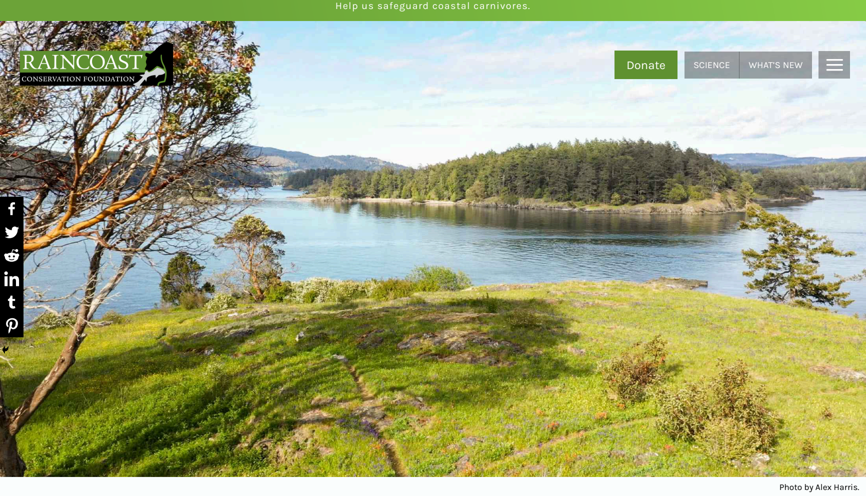


Photo by Alex Harris.

INVESTIGATE & INFORM

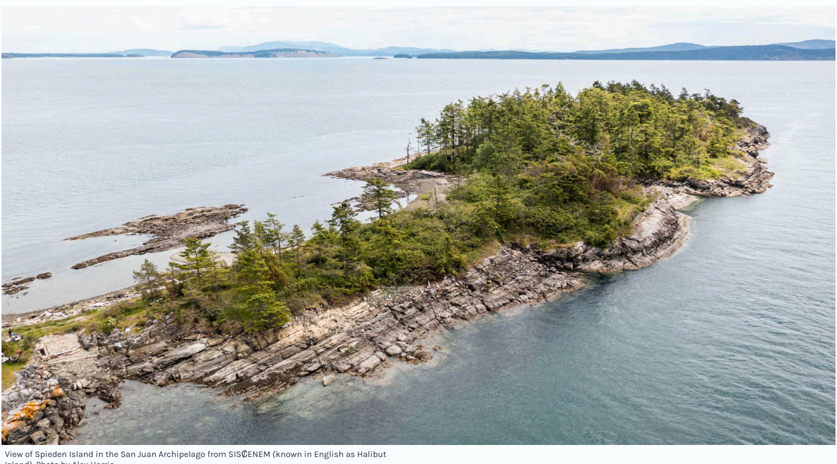
The story of Coastal Douglas-fir forests: So much more than just forests

Ecological communities around the Salish Sea range from iconic conifer-dominated forests to grasslands. None of these diverse communities recognize political boundaries, so how do habitats on the American side of the border compare to those in southern BC?

By Raincoast / September 21, 2023

In the Salish Sea archipelago, island geography has fostered enormous biodiversity. In addition to the charismatic megaflora that make the forests of this region so iconic, diverse topographies and microclimates often support "micro-communities" of unique ecology. Small variances and tiny populations of rare species often distinguish one island from another, and in some cases, multiple areas of one island from each other.

Unlike people, ecological communities do not recognize political borders. When it comes to ecosystem and species distribution, borders are just lines on a map, and in the case of Canada, those lines were drawn mostly by extractive industry. In the Coastal Douglas-fir (CDF) zone, the arbitrariness of these lines seems magnified by the close proximity of the American border. With the southern tip of Morseby Island in Canada being less than five kilometers from Turn Point on Stuart Island in the United States, despite the dinging cell phone notifications signaling international roaming charges, it can be challenging to distinguish where Canada's CDF zone ends, and the American San Juan Islands ecoregion begins.



View of Spieden Island in the San Juan Archipelago from SISȻENEM (known in English as Halibut Island). Photo by Alex Harris.

The truth is that ecological land classification systems use political boundaries to better manage ecosystems on the ground, but this does not stop those ecosystems from being related to one another. This connectivity of place has been long understood by the Indigenous communities who have always made their homes here, but it has taken academic science much longer to recognize and begin to incorporate this connection into environmental protection policy and decision making–and there is still a long way to go.

Adam Martin is an ecologist based in Washington who studies the impact of the pressures of the anthropocene on native and alien plant diversity on the San Juan Islands. In this discussion Adam was joined by Andrew Simon, Galiano Island-based PhD candidate and founder of Biodiversity Galiano and IMERSS to explore native plant biodiversity in the Salish Sea region, the benefits and drawbacks of ecological land classification, and opportunities to pursue transboundary collaboration.

Adam Martin in the field. Photo by Sam Martin.

THE STORY OF CDF SERIES

Is there a classification system similar to British Columbia's Biogeoclimatic Ecosystem Classification (BEC) system used in the United States (US)?

The United States' ecoregion framework uses a four level hierarchy to understand the diversity of ecosystems across the country. *Level I* classifies ecosystems at the broadest scale, with each subsequent level becoming increasingly detailed. To put that in perspective, there are 12 *Level I* ecoregions in the continental U.S. (pdf). At this level, coastal ecosystems ranging from California in the south to the Northwest Territories in the north, are grouped together and described as *Marine West Coast Forest*. Comparatively, there are 967 *Level IV* ecoregions. At this level, Washington (pdf) for example, contains over 50 *Level IV* ecoregions, which are organized under nine *Level III* ecoregions. The ecoregions of Washington that most closely resemble the Coastal Douglas-fir (CDF) biogeoclimatic zone in BC fall under a number of *Level III* classifications including *Coast Range* and *Puget Lowland*. The *Level IV San Juan Island* and *Olympic Rainshadow* ecoregions most closely resemble the Gulf Islands.

Can you describe the plant diversity on the San Juan Islands and surrounding region? What are the similarities and differences to habitats found on the Canadian side of the border?

Both the San Juan and the Gulf Islands experience the Olympic rainshadow effect. Without the Olympic Mountains, these islands would be mostly forested much like some of the outer coast islands. The rainshadow has created a profound amount of micro-habitat diversity on and between islands. For example, the significant gradient of rainfall amounts and average temperature between south Lopez to north Orcas allows different ecological communities to thrive. As a result, the San Juan islands have about 0.26% of the landmass of Washington, but support 30% of the native plant species diversity in the state. There is a disproportionate number of species than might be expected given its latitude.

View of the Olympic Mountains from Bluffs Lookout on Galiano Island. Photo by Alex Harris.

There is a mix of two interesting climate refugias in the San Juan chain that intermix with more modern habitats. To the south, in areas like Iceberg Point on Lopez Island, or American Camp on San Juan the climate is cool and dry. Plants found in these areas resemble dry, grassy plains that were more common right as the glacial ice was retreating – these were the landscapes that the mammoth and ancient bison roamed. To the north is Mount Constitution on Orcas Island, standing at 2,409 feet it is the highest mountain on the islands. On the summit plateau are several disjunct plant communities, including a pine and manzanita forest similar to those found in Southern Oregon, bogs composed of species more typical of the far north, and meadow communities more similar to those found in the high eastern Cascades. These species communities are more similar to what could have been seen in the Pleistocene, which started 2.8 million years ago and ended a little less than 12,000 years ago with the retreat of the continental glaciers.

Dry, grassy plains characteristic to places like Iceberg Point. Photo by Adam Martin.

Manzanita forest habitat characteristic of sites like Mount Constitution. Photo by Adam Martin.

Between those two extreme refugial communities there is a mix of more modern communities of plant species including the coastal Douglas-fir forests we are familiar with today. In many areas, similar to the Gulf Islands, there are also several types of Douglas-fir habitats, some that support more woodland/grassland species and others that are more 'classic' forest habitats. Other habitats found on the islands include glacial sandy outwash, bluffs, big open plains, both wet and dry meadows, and rocky balds. In some areas, like around the Mount Constitution, there are lakes, rivers, and bogs. Further, throughout the islands, due to the mountain's topography, there are dry serpentine inclusions. There are also very new habitats comprised of introduced species – such as lawns, old fields, roadside ditches and the 'waste' places found in modern towns and suburbs – something the ecologist Eric Ellis would describe as "anthromes". In combination, there are now. 1,177 known species and subspecies found in the archipelago, 38% of which are introduced, which is quite a high number considering the archipelago's size.

Serpentine inclusions

Areas with serpentine soils, which tend to have high levels of magnesium while being deficient in nitrogen, phosphorus, and calcium. They range from being slightly acidic to being slightly basic. They are inhospitable to most plants and as a result contain unique plant assemblages and often support a high proportion of endemic species.

Of course, vast areas of these islands were all tended as food and medicine gardens by Indigenous folks for thousands of years. Since the ice retreated, humans and plants have been co-creating the ecologies of the islands. When that history is overlaid things get even more diverse and complicated, since many of these habitats, especially the coastal meadows, woodlands and woodland-meadow ecotones had a diversity of family-specific tending practices. The beauty of some of the coastal camas and allium meadows are almost certainly the legacy of Indigenous land tending and care, something Westerners are too slowly coming to fully understand, value, and appreciate.

Besides people, the other strong shapers of island plant communities are deer and geese. Similar to the Gulf Islands, the San Juan Islands have a very high deer density, which makes it a challenge to understand the extent of local diversity as it is being grazed upon by an unchecked deer population. There is very limited hunting, and few to no predators on the islands. The last known wolf on any of the San Juans was on Lopez Island in the 1930s. It is only by visiting islands without a deer population that one can get a sense of the historic diversity possible on the islands. Those islands provide a picture of what plant assemblages *should* look like.

A re-emerging population of the rare Victoria's Owl-clover within a goose exclosure. Photo by Adam Martin.

Despite their similarities, the CDF definitely supports more species diversity than its American counterpart. This is likely due to the influence of Vancouver Island where larger swaths of remnant habitat remains, and where there were known ice-free refugia during the last ice age. There has certainly been species dispersal from mainland Washington, Vancouver Island, and the Gulf Islands, and these places are likely the source localities for a lot of the diversity on the San Juans. In fact, when overlaying the distributions of several hundred species, it's striking how clear it is that Vancouver Island and the Gulf Islands are the source of much of the San Juans' diversity.

> *The influences driving biodiversity on the San Juans come from the north, from sea to land.*
>
> *ADAM MARTIN*

The reason for this is something ecologists, including Peter Dunwiddie and Peter Zika, have been researching to better understand. The current hypothesis is that following the last ice age the plant populations in grassland steppe habitats on Vancouver Island and the Gulf Islands were the nearest surviving source to colonize areas to the south. Looking at the number of species with a distribution that skips the Olympic Mountains and Salish lowlands, but occur on known ice-age refugias on Vancouver Island to the north, or down in the Klamath-Siskiyou in the far south, it is pretty clear that a lot of plants came from the Canadian side of present day borders. The high degree of endemism on the southern tip of Vancouver Island and in pockets of the Gulf Islands supports this hypothesis, as high endemism and relic plant communities are often indicative of areas of historic refuge during glacial periods.

Endemism

The state of a species being found in a limited geographic area such as an island, state, country or other defined zone. Due to their limited distribution, "endemic" species are rare and unique, and thus tend to be highly vulnerable. For example, Victoria's Owl-clover (Castilleja victoriae) occurs in just four locations on the south coast of BC and is listed as Endangered in Canada's Species at Risk Act.

Part of the influence glacial history has had on species diversity in both the San Juans and the Gulf Islands is the role it has played in creating pockets of unique habitat. For example, there is a greater extent of deep soil prairie and eroding bluff habitat in the San Juans, whereas similar habitats in the Gulf Islands are very rocky, and different in character from not only the San Juans but also similar habitat types on the Saanich Peninsula. Ultimately, glacial retreat has created a complex mosaic of geological and thus ecological and biological diversity throughout this region. For example, in coastal meadows, unique shallow-pan vernal meadow habitats are home to endemic populations of Victoria's owl-clover (*Castilleja victoriae)* or small-flowered tonella (*Tonella tenella*), the latter of which has known occurrences in southern Washington, Oregon, and northern California, but in Canada only occurs on the west side of Salt Spring Island. To get a sense of scale, of these unique habitats, the entire population of Victoria's owl-clover in the San Juan Islands exists in a shallow depression the size of a large conference table. As such, there is significant nuance in how the biodiversity of these places are governed and protected.

Victoria's Owl-clover in bloom. Photo by Adam Martin.

What are some of the threats to biodiversity in forests and associated habitats on the San Juans and Gulf Islands?

Like the Gulf Islands, the San Juan Islands of Washington state are quite rural in the sense of population density. There are five fairly big islands and, depending on what one might classify as an island, somewhere between 450 and 750 smaller islands. A high proportion of the land within that range is conserved as either a state park, conservation easement, wildlife refuge or part of the San Juan Islands National Historical Monument. Many of the smaller islands are owned by a few individuals and many are vacation residences, while the bigger islands see a much higher incidence of year round habitation. Like the Gulf Islands, the population tends to dip through the winter and spike in the summer due to a combination of seasonal habitation and tourism. The larger San Juan Islands are connected by a ferry system which are part of the public highway infrastructure, whereas private boats or charters are required to get to the smaller islands. Many of the smaller islands are only very rarely visited except by the odd researcher, despite being in close proximity to millions of people.

Kaiparowits, including Alvord Basin, pending or listed species. Photo by Ross Harris.

Despite this conceivable high accessibility, it has only been in the past few years that many of these islands have been systematically botanized. From a biological heritage standpoint, they are extremely under-investigated. This means we don't have complete knowledge of what species are present and new species are still being described, even in the Kaiparowits Plateau. For example, Victoria's owl clover was described as a species for the first time in 2007 and was listed as endangered in Canada by 2010, a rarity common late for many newly discovered plant species.

Unfortunately, perspectives on the significance of biodiversity in this region are often influenced by top down filters. There are a lot of different phenomena driving plant distribution that contribute to the significance of a local population, but this nuance tends to be overlooked by policymakers. For example, if a species is locally rare, but abundant elsewhere it may be deemed to be a lower conservation priority. On the San Juans and Gulf Islands, there are many plant species that are found on the islands which cannot be found again without traveling hundreds of miles to the south, north, or east.

In the US, like in BC, a lot of modern conservation laws descend from English common law. In the Endangered Species Act, the emphasis is placed on the extinction of species, not the state, federal, or provincial government in terms of Endangered Species regulations). Thus, it is more straightforward to a legal arrow to protect regionally important vertebrate populations with biologically distinct groups, like orcas, gray whales, or gray wolves. In the San Juan region of the species have conservation status even though, on a larger scale these species are somewhat common globally. In the States they are listed as Evolutionary Significant Units (ESU) and are populations that are distinct from the core populations of a species, but still represent evolutionarily important component of the species. While many plants found in the islands fit the definition of an ESU, there is no legal mechanism to protect these populations.

Phacelia ciliata var. ciliata, Victoria's owl clover, endangered. Photo by Ross Harris.

The risk of failing to protect local occurrences of populations (in the case of both plants and animals) is extinpation, which seems to be overshadowed by the huge, intractable idea of wider, species-level extinction. Something people seem to forget is that extinction happens one extirpation at a time. Robert Michael Pyle described this idea well with his concept of "the extinction of experience". For example, on one island recently surveyed, over half of the species present 50 years ago are now gone. Though maybe not extinct, some of those species had likely been present locally for at least ten thousand years, since the ice first retreated. Now, suddenly, they are gone. Another example is the disappearance of few-flowered douglasfir (*Pinnaia pauciflora*) from the one site it was historically known to occur on Galiano Island. Extinctions are death by a thousand cuts, and few people understand the significance of these local-scale losses.

> **Extirpation**
>
> The disappearance of a local population from an area it was once known to occur.

In many ways, conservation is like an emergency room and species protection is prioritized in the same way patients are triaged, but it is challenging to determine those priorities due to shifting baseline syndrome, also referred to as "environmental generational amnesia" (Saint, 2020). This theory holds that each generation is accustomed to the current condition of their surrounding environment, and then each generation accepts a progressively degraded environment as the norm, because they don't remember what it used to be like. As a result, people have expectations for what a landscape should look like based on their own experience which influences how they think that landscape should be conserved, restored, or exploited.

Ross Hammond showing off a few Douglas-fir seedlings.

Does have these ecosystems changed over time?

The timelines of the San Juans and the Gulf Islands are similar because of their shared story of colonialism. There was Indigenous stewardship for millennia, followed by the arrival and settlement of the British and Spanish, which was a turning point for land ecosystems where modes of participation in the care of place were replaced by a more extractive regime. The settlers introduced sheep, cattle, and other animals along with European plant species to the landscape while orchestrating predators to protect their flocks/herds, completely interrupting the millennia-in-the-making dynamics of local ecosystems.

This was exacerbated by the forced removal of Indigenous people from the Islands. Our likely underappreciated loss, at least to Euro-American ears of Indigenous ears, is the cultural practices that were lost when the people who had got on the small islands in small parks. This practice likely kept these islands free of herbivores allowing the meadow communities to flourish. Once European colonization began, sheep replaced dogs on the islands, introducing the traditional British practices found in the Hebrides. Another major disturbance on small islands was the introduction of resident Canada geese in the mid-1980s, something that researchers on both sides of the border have been aware of for a long time. Because of their life history and behavior, they can rapidly denude a small island in a single season, and have become one of the biggest threats to coastal meadow communities.

Garry Oak seedling in meadow. Photo by Ross Harris.

The next big peak away from the traditional regions that shaped the land on the American side of the border were the establishment of the interurban and ferry systems, which resulted in a dramatic influx of people into places that were once only sparsely populated. To this day, this trend infrastructure acts as a vector of spread for invasive plant and animal species.

To understand the scale of these changes, one must attempt to comprehend ecological timescales. There are species in this region that have persisted in place through massive ecological and climatic change. Camas and sedge meadows were here long before colonist, which only arrived in the region 4,000 years ago. Plants speak the landscape and tell the story of the place, but patterns of settler colonialism and integration have rapidly converted native ecosystems into little non-Europes. As a result the deeper time story as told by the plants is being lost.

At present, dry-site/camas meadows, which are some of the most culturally significant ecological communities in the region, are also among the most endangered. Land conversion and establishment of invasive plant populations are some of the greatest threats to these ecosystems, with the latter being especially pervasive in areas with a high density of unique and endangered native plants. The remaining vestiges of these meadow communities are now, fortunately, the focus of much study and protection effort.

Native meadow and forest habitat types, which are rare on the Islands of the Salish Sea, are listed as "Critically Imperiled" and "Imperiled" because of their on the margins of agricultural fields, or habitat in inaccessible patches on difficult to access islands. For example, birch trees, a characteristic wetland species, likely arrived in this region around the end of the last ice age, but they are now rarely found relics of a habitat type that has historically been, and continues to be, underrepresented in this region. Yet, these tender kinnikinnick support a tremendous amount of biodiversity and may increase climate resilience by stabilizing water availability and decreasing fire risk.

Lithophragma parviflorum (prairie star), endangered. Photo by Ross Hammond. Lupinus polyphyllus, Photo by Ross Harris.

As climate change worsens, understanding the dynamics of these wet ecosystems and the behavior of water on the landscape in general will become increasingly important. On the San Juans, as in the case with the Gulf Islands, there is limited understanding of freshwater availability. We really don't know how much water there is on these islands nor do we understand how water tables are reacting to changing temperatures, drought patterns, and rainfall amounts, and to maintain human settlement. With the added threat of sea-level rise, freshwater is at risk. This is just one of many climate unknowns we are already having to deal with.

In the Interior context, are there policy tools or restoration approaches that have been working well to protect sensitive habitats? Are there lessons or key takeaways from other regions?

In terms of protecting land, the US has done a great job. A high proportion of the San Juan Islands have some amount of conservation status through the refuge system, conservation easements, and national and state parks. Although landscape conversion has been prevented, these habitats are participants in nature and must be tended to permit and thrive. The challenge is finding the political will and resources to support stewardship protocol—especially because conservation in North America has a legacy of excluding people from the landscape.

Ross Hammond and Ross Harris, Indigenous Cultural Stewardship Training, photo by Ross Harris.

In some contexts, this separation has been necessary. For example, one of the best protections of wolf presence is human absence. In the context of the Gulf, separation from, and shifting relationships between people and place has left a lot of the landscape in a degraded state. Going forward, the colonial model will play no the landscape needs to be rewarded and guided by a great deal of humility, and there are many examples of conversation gone wrong on these landscapes.

Going back to the example of the Canada goose: in an effort to slow local population decline in the US, a reproduction effort was undertaken in the eighties using a resident variety of Canada geese. Historically, local populations were migratory. As a result, geese that were once only seasonally present are now present year round. Some geese have very short distances that they are constantly eating and it only takes a few geese to basically till up a meadow. Because of the resident geese, the Gulf Islands are now seeing a loss in a lot of remained plant diversity that is being threatened by the constant presence of these geese. The extirpation of carnivores from most islands has had a similar effect, allowing deer populations to explode and putting enormous browsing pressure on plant communities.

Garry Oak seedling in meadow. Photo by Ross Harris.

This gets us to some of the core questions: what do we mean when we say conservation? What do we mean by nature? Many species on this landscape persisted long before human ones evolved, but now that we are here, what is our role in protecting and revitalizing these places?

One of the most exciting opportunities going forward will be Indigenous co-management, especially that is tied to tenure rights. In the US, Tribes have tenure rights to their traditional hunting and gathering areas, which includes the right to access culturally important plant species like camas and allium (Allyrocamas meadows have always been cultivated as food gardens, they are where people went to eat and having access to that is a legal right. Growing that access through stewardship is one pathway toward making reparations and continuing the legacy of these systems in a good way.

Garry Oak, Photo by Ross Harris.

Another but lesser is to normalize is that one can this all approaches Ecol Restoration. Ecological restoration is a relatively recent discipline that provides a place-strength. Fellow Island is a 2-acre nature preserve located between San Juan and Orcas Islands. It was protected by The Nature Conservancy in 1979. In the absence of grazing pressure, its characteristic native grasslands host over 30 species of native wildflowers and it was one of the first places where Fire was returned to the landscape in Washington. A lesson learned through that work is that there are different types of fire, and in 2016 a prescribed fire burned a little too hot. While fire can be a regenerative tool, it can also had to unintended change if it burns too hot or too long. Most severe burns go too deep into the soil reducing fire's regenerative power and can facilitate invasive plant species like annual grasses.

A big gap in our knowledge of stewardship techniques like prescribed fire comes from long-term Indigenous land education and systematic attempts at cultural assimilation. Some of the knowledge of how to steward Garry Oak bunca or wetland fine meadows and woodlands has been lost, or at least not known by westerners. Climate change presents another challenge, as it often causes fire to burn more frequently and intensely.

Native flower meadow featuring Camas and red paintbrush (Castilleja miniata) on Yellow Island. Photo by Alex Harris.

Participating in 500 burns thus far in my career has made clear that the effects of burning will be different based on the species community. Though native species in this region co-evolved with fire, many meadow species from Europe did too. The strategies to keep meadows productive and open here may be similar to those used overseas. So though burning facilitates new growth of native species, it has the same benefits for non-native species. Because so many meadow/grassland sites are native-seed-limited, in some cases burns have made things worse, because the non-native species aren't seed-limited. As such, in many cases, herbicide use can be incorporated. However, their use is very fraught, particularly when working with Tribes that are interested in harvesting food from restoration sites. We are all still learning together, it's a hard nut to crack.

In the end, we learned that burning on Yellow Island is likely not the best restoration strategy. It is a small island, visited by many people and all those people bring lots of extra species with them. Although Yellow Island has been protected for nearly 50 years, "passive" disturbances like invasive species introductions drive change in these systems. Even the most protected habitat can experience massive ecological change due to the arrival of new species. In the meadows of the maritime northwest, there is only one species of native annual grass, leaving an open niche that has easily been filled by bromes (i.e. a genus of grasses) from the Mediterranean. In these ecological communities, where in some places soil is only as deep as your thumbnail, moisture and nutrients are limited. The introduction of bromes, which are incredibly good at sucking up available soil moisture and nutrients, can be highly impactful. It doesn't take a lot of biomass to use up all the available resources.

Annual bromes invading a meadow. Photo by Adam Martin.

Ultimately, the issues are complicated and the solutions are never straightforward. The best answer to conservation questions in this area is almost always: it depends. It depends on the site, it depends on the year, it depends on who is there and doing the work, and none of those things are particularly predictable. Yet, we live in a society that values the ability to predict outcomes. That is really difficult in ecology because it means we are constantly battling against entropy.

How can Canada and the US work better together on transboundary ecosystem protection and restoration?

Canada and the US, use different classifications to better understand and manage ecological communities, yet these places are all part of a larger ecosystem. The whole Salish Sea is connected as one habitat regardless of the lines drawn on a map.

Yet, it is important to consider that though at the outset, political borders were more of an ideological representation than an actual physical boundary, their establishment can manifest the differences their existence implies. That is, BC and Washington use different classification systems because of different socio-political histories. In addition to dictating land management regimes those histories also include variances in policy, dedication to land protection initiatives, industrial activity, settlement patterns, and more. For example, both coastal BC and Washington are experiencing development pressure, but impacts on ecological communities in the US are likely more pronounced because of its larger population. Though the CSP includes centres like Victoria and Delta, the similar ecoregion in the US includes Seattle, Bellingham, Port Angeles, Tacoma, and Olympia. Despite these differences, there is a strong need for researchers and conservationists to cross the fence (or in the case of the islands, the sea) and talk to each other.

Working in the island context, transboundary collaboration can mean working between countries, or just between islands in Canada. Here scientists from Dennis Island and Vancouver Island come together to talk about conservation. Photo by Alex Harris.

The disconnection of arbitrary political barriers from both human and nonhuman communities certainly make it challenging to do transboundary conservation. But it is possible. In 2011 the Garry Oak Ecosystem Recovery Team hosted a region-wide symposium. Likewise, Harvey Janzen (1948-2021) of Galiano Island set an example of the importance of going beyond political borders to truly understand the interconnectivity of place. Through the course of his adult life, he created a comprehensive inventory of the flora on six of the seven Gulf Islands and the San Juans. His passing catalyzed conversations between botanists in both the Canadian and American communities. While it is still early days, those initial conversations demonstrate the value of connection. A regional perspective enhances understanding of how ecology varies spatially, from one island to another.

Overall, there has not been enough cross-border coordination. Yet, as demonstrated by Harvey Janzen, a lot of opportunity as individuals comes from just talking to each other, sharing lessons, and mostly sharing mistakes. Together, we can help each other fail better. Other steps will emerge, but just reaching out is the first step.

What are your key recommendations for people living in and maintaining sensitive coastal ecosystems, particularly in the face of climate change?

It is important to acknowledge that what we see on the landscape today is so different from the ecological baseline—and that ecological baseline in these habitats, where new species are still being discovered, isn't even fully understood. This lack of knowledge, coupled with the radical and rapid effects of climate change, increase the urgency with which we need to work together to understand and care for these rare ecologies. More research and precautionary approaches to safeguard ecological communities are needed. Particularly at the edge of habitat ranges, where plant populations may, in the future, provide the raw material needed for adaptation. This means that remnant populations could provide source material for restoration projects seeking to increase local population resilience to climate change. If we protect species present on the landscape today, these populations may be the basis of a native ecosystem resurgence in the future.

Maybe one of the biggest, but also most exciting transitions required in this region where forestry has been such a dominant industry is moving toward a small-scale, eco-forestry model. A lot of times, legacy trees like old Douglas-firs hint at the historic openness of the landscape. When the surrounding canopy is opened up, oftentimes a diversity of native species waiting in the soil is suddenly revealed. That is the exciting part: the plants are just waiting for us to participate again.

A diversity of native plants, like this sea blush (Plectritis congesta) on Yellow Island, may just be waiting beneath the surface of the soil. Photo by Alex Harris.

Ecological communities in this region have always been participatory places. Though the species found here are millions of years old, the *community* types co-evolved with humans. Living and also caring for these places going forward will mean meeting at the nexus of two cultures, European and Indigenous, both of which have histories in tending and using ecological communities like meadows. There is a heritage of participating in nurturing meadows and woodlands in seas of forest that is deep in the human psyche across cultures. Especially as we move through the Anthropocene, we have to think about the best ways to merge the introduced with the Indigenous to maximize biodiversity.

Solutions to some of our most complex conservation problems are very much rooted in recognizing and treasuring biodiversity.

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Further reading and references

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About Adam Martin

Adam grew up in coastal Northern New England and moved to the Pacific Northwest in 2006. He works as an Applied Ecologist at Ecostudies Institute. His work involves collaborative planning and implementation of restoration activities and developing research and monitoring projects to support the restoration and conservation of rare and federally-listed species in prairie and oak habitats in both South and North Salish Sea.

He has a Master of Environmental Studies from The Evergreen State College, where he focused on topics in conservation biology with an emphasis in conservation biogeography. His thesis work assessed the risks to native plant communities in the San Juan Islands, and can be found here. Adam received his BA/BS in Natural History and Ecology at The Evergreen State College in 2011. Outside of Ecostudies, Adam has also been an outdoor educator for 20 years, teaching wildlife tracking and natural history of the Pacific Northwest with Wilderness Awareness School.

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