Lasqueti Island Nature Conservancy

linking people to nature on Lasqueti and surrounding islands

Issue #27, Fall/Winter 2022

Ancient Architects of the Intertidal Landscape of Xwe'etay (Lasqueti Island)

by Dana Lepofsky

Intertidal picnic between Higgins and Wolf Islands, with Xwe'etay community members and neighbours from Qualicum and Tla'amin Nations. Photo Katie Dierks

There was a time–not that long ago on the scale of such things–when the marine intertidal zone flourished, supplying on-going abundant and reliable foods for the many thousands of Indigenous peoples who lived along the north Pacific coast. In recent years, our intertidal ecosystems have experienced a decline in both species abundance and diversity. The decline has to do with a myriad of factors including deposition of silts from upland clearing, dragging of logs through eelgrass beds, the introduction of invasive species (e.g., the Japanese oyster) and various kinds of foreshore development.

Another major factor contributing to shifts in intertidal abundance and diversity is the effects of removing the people who actively stewarded their lands and seas for thousands of years to ensure food harvests into the future. Oral traditions, memories, and the archaeological record demonstrate the extent to which Indigenous peoples in this region and throughout the Pacific have intentionally managed the intertidal landscape. Region-wide practices include selective harvesting (limiting when and what), removal of predators, and maintaining healthy spawning and growing conditions by tilling, adding sediment, and by creating or removing barriers. For most Pacific Coast Indigenous peoples, these practices were embedded in age-old systems of tenure, governance, and spiritual beliefs that determined the *proper* way to interact with the intertidal landscape.

One of the goals of the Xwe'etay/Lasqueti Archaeology Project (XLAP) is to map the temporal and spatial extent of all the ancient Indigenous settlements on Xwe'etay in relation to their surrounding land and seascape. Over the summer this involved timing our shoreline surveys for the lowest low tides in May – August so that we could record the fish traps, clam gardens, and other intertidal features associated with the many Indigenous settlements around the island. Prior to our survey, only a few fish traps had been recorded, but not in detail, and no clam gardens were known from the island. This is because many of these features are under water for all but a few daylight hours every year.

And boy, our Xwe'etay intertidal surveys did not disappoint! We found an intertidal management feature on almost every beach we visited, especially on the northwest end of the island where most of the ancient settlements are located. For instance, False Bay is lined with ancient settlements (visible today as shell platforms on which houses were built). Associated with these settlements are rock features, lining the

foreshore, that are the remnants of the once carefully managed intertidal landscape.

At the lowest levels of the intertidal zone are clam gardens (*wúxwuthin* in the Northern Coast Salish language). These are rock-faced terraces created by Indigenous people to expand and improve clam habitat at the zone where littleneck and butter clams thrive. Our work on Quadra Island has shown that some of these gardens are almost 4000 years old and that they provided a sustainable and abundant source of clams for generations. Our experiments show that clam gardens have 2 - 4x more clams than non-garden beaches, and they increased clam productivity by 150 – 300%. On northern Quadra Island, by building clam gardens on rocky substrates that previously had no clam habitat, people increased the amount of clam habitat in the whole landscape by one third.

Clam garden on Boho Island. Photo Katie Dierks.

Calm garden on Jedediah in Bull Pass. The top of the terrace is at 1.4m above the zero tide. This is too high to support clams today, indicating that this is likely an older wall, built during times of higher sea level. (Photo Dana Lepofsky)

We also learned on Quadra that since ancient sea levels have been dropping for the last many thousands of years, we can use the height of the wall above a zero tide as a relative measure of age. That is, older garden terrace walls were built when sea level was higher than present, and they are now too high in the intertidal to support clams. On Xwe'etay, we found gardens that were as high as 1.4 meters above the zero tide. These are too high for native clams today and, based on our work elsewhere, may have been constructed and used over 1500 years ago. On the other extreme, there are garden terraces that are very low in the intertidal, sitting at about 30 cm above the zero tide. These low terraces were likely built to cultivate intertidal species that thrive in the lowest intertidal zone, such as horse clams. Given their tidal level, these gardens can't be more than a few hundred years old. What is particularly neat is that some of the gardens are multi-terraced, so they track how people shifted the location and height of the wall to maximize clam production in changing ocean conditions.

Just a bit higher in the intertidal zone are a variety of carefully engineered fish traps and holding ponds. The rock walls were likely used as the foundation for wooden "fences" that would have facilitated trapping and releasing fish at various tidal levels. These have several shapes, including a form that, to my knowledge, is unique to this area: a "teardrop" with a long lead line. We recorded this form in two different locations and not only is the form identical in both places, but the size varies only by a meter or so. Remarkable engineering. We suspect, based on their placement, that these were used to trap herring.

The degree to which entire intertidal landscapes were altered and managed is even more remarkable than the variety of intertidal feature forms used. In subtle and ingenious ways, the ancestral peoples of Xwe'etay took full advantage of the natural abundance of the extensive intertidal flats between islets. In some areas, we found many small rock walls built between bedrock outcrops; these were placed in such a way to hold water, to funnel fish, or to raise the level of the beach. One feature often blended with the next and with the "natural" landscape such that it was not uncommon for us to find it difficult to put boundaries around the "archaeological site". In the end, we often, and appropriately, recorded the entire intertidal flat as a single archaeological site to reflect the landscape scale of the traditional management practices.

In mid-August we were pleased to share some of the magic of these ancestral marine management features with our neighbours from Tla'amin and Qualicum Nations. About 20 people from these Nations joined about

Teardrop fish trap and lead line in False Bay, possibly for capturing herring. It is nearly identical in shape and size to one on the Jervettes (the islets next to Jervis Island near Tucker Bay). Photo Katie Dierks

Other forms of fish traps are common on Xwe'etay, including this V-shaped form in Heron Bay. Photo Dana Lepofsky.

70 Xwe'etay islanders to share food, stories, songs, and fun during a low-low tide window. We marveled at the degree to which Indigenous peoples tended the marine landscape. For many settlers who have lived here a long time, it opened their eyes to a new way of seeing the island's deep history.

Next summer, the XLAP team will continue to explore the Indigenous archaeological heritage of Xwe'etay. We hope to host more inter-community events where all people can come together to celebrate Xwe'etay's deep history. To learn more about intertidal marine management on the northwest coast and elsewhere, visit:
www.seagardens.net www.lasquetiarc.ca

Complex of stone walls on the intertidal on Boho Island, showing the extent to which the intertidal landscape was managed. Photo Katie Dierks

LINC's Mission Statement

LINC conserves nature on Lasqueti and surrounding islands and waters through education, stewardship, restoration and long-term protection of areas of ecological and cultural significance.

As part of the LINC board's strategic planning process in the fall of 2021, we adopted a new Mission Statement. It's not dramatically different, but we thought carefully about what we wanted to say and how we wanted to say it. One meaningful change is that we have included areas of "cultural significance" with areas of ecological significance as part of our mandate. In doing so, we are acknowledging the long, rich cultural heritage that is expressed in the Lasqueti landscapes and seascapes. But beyond that, we are also recognizing that the ecological history of the land is inextricably linked to and deeply entwined with its cultural history. Cultural heritage will be part of the equation when we are assessing areas for conservation or for stewardship activities. This doesn't mean dramatic changes in what we do, but it means we're looking a little more broadly at factors to consider in making decisions.

Seen In Passing

Bats can hear shapes.
Plants can eat light.
Bees can dance maps.
We can hold all these ideas at once
and feel both heavy and weightless
with the absurd beauty of it all.

from - CryptoNature

Eyed Sphinx Moth or Cerisy's Sphinx (*Cerinthus cerisyi).* Photo James Schwartz

The intriguing Common Raven (*Corvus Corax)* lives in open and forest habitats across western and northern North America. The oldest known Common Raven in the wild was at least 22 years, 7 months old. Ravens are among the smartest of all birds, gaining a reputation for solving ever more complicated problems invented by ever more creative scientists. They do well around people, particularly rural settlements but also some towns and cities. Raven is a central character in many Indigenous stories and is iconic in the art of westcoast Indigenous peoples. Photo Dianna Maycock

Prickly pear cactus (*Opuntia fragilis)* at Young Point. Photo Gordon Scott

Healthy sea star (*Pisaster echraceus)* and sea cucumber (*Cucumaria)* reveal the incredible foreshore life visible at summer's low tides. Photos Izzy Harrington

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Seen In Passing

Western Honeysuckle, Orange Honeysuckle, or Western Trumpet *(Lonicera ciliosa)* is found across southern BC. Orange Honeysuckle is unscented, due to the fact that it is primarily pollinated by hummingbirds which are attracted to bright colours rather than scent. According to the Invasive Species Council of BC, this is a great species to plant as an alternative to invasive climbing plants like English Ivy. Photo Ken Lertzman

Vancouver Ground Cone (*Buschnialcia hookeri)* gain their nutrition through parastizing the roots of members of the Ericaceae family, especially salal, arbutus and kinnickinick. I'd never noticed them on Lasqueti before I moved into this neighbourhood—at the top of Elderberry.

Photo Sophia Rosenberg

Alaska Rein Orchid (*Platanthera unalascensis)* I Just found a cluster of 8 of these native orchids on our land for the first time ever. Photo Terry Theiss

Pacific Chorus (tree) frogs (*Pseudacris restila)* have been abundant this fall. They can change colour and vary in size from 1-2". Photos far left: Izzy Harrington

Left: two companions - the Pacific Chorus frog and a native slug. Photo Julia Waldmo

insert

Community BioBlitz at Mt. Trematon

written by Jean & Catriona Gordon

photos by Petra Knight

On May 30, twenty-eight False Bay School students, families, LINC board and community members gathered at Mt. Trematon Nature Reserve to participate in the first all-day Mt. Trematon Bioblitz. The event was organized by Cora Skaien, conservation biologist, Catriona Gordon, environmental educator, Jean Gordon, UVIC Ecological Restoration student, and False Bay teachers Petra Knight and Amanda Jahnke. Community experts included Jessica Slavik (medicinal plants), Sheila Ray (birds) and Sue Wheeler (butterflies). Other community environmental educators included Yves Parizeau and Kaia Bryce.

First Mt. Trematon Bioblitz The False Bay School kids, parents, community members and local naturalists

The focus of the day was ecosystem interconnections. We learned about the need for diverse habitats to support a wide range of species. Students learned about food webs—how a complex web of species with many connections among organisms makes for a resilient ecosystem. Bioblitzers also learned about recycling of nutrients in the food web. For example, decomposers such as bacteria and fungi break down leaf litter, which in turn supports new plant growth and soil fauna.

The biggest hit with the kids was using "loupes" (otherwise known as hand lenses) to investigate soil invertebrates and the ways in which they have adapted to thrive and reproduce in their natural habitat. We learned how to identify cyanide millipedes (two sets of legs per segment) and that millipedes are vegetarian and eat decomposing plant matter on the forest floor. We also found thread centipedes (with only one set of legs per segment). We learned that these creatures are carnivorous, and with loupes we examined the venomous claws they use to attack their insect prey.

Younger students created alder leaf and bark rubbings. They explored bark textures and became familiar with local tree species by their trunks: the scaly mottled bark of the alder and the distinctive lenticels (horizontal slits) of the bitter cherry. Older students learned that alder is a pioneer tree species that has a symbiotic relationship with *Frankia* bacteria. Alders share the carbohydrates produced by photosynthesis with *Frankia* bacteria, and the bacteria pass much-needed nitrogen to the roots of the alders. We discussed how alders produce rich leaf litter that fertilizes the forest and that dead alder wood is a key part of slow-release addition of nutrients to the forest.

Sheila Ray had us all listening in silence for bird calls. By the end of the day many could identify the *whinny* of the robin and the *cuk-cuk-cuk* of the Pileated woodpecker. Sue Wheeler talked about the life cycle of the Western tiger swallowtail butterfly and prompted us to be on the look out from May to July for this riparian-loving species which is hosted by bitter cherry and willow. Jessica Slavik introduced Indigenous uses of native plants found on Trematon. We learned of the many medicinal benefits of nettles and their value as a strong weaving fiber.

The day was a memorable hands-on opportunity to explore, investigate, share knowledge and get to know each other and our local flora and fauna on Mt. Trematon.

Mt. Trematon Biodiversity Study Update

Above: Using loupes, False Bay School students investigate soil fauna

Right: checking out the identification sheets

Cyanide Millipede—note the two sets of legs per segment. Photo Dave Ingram

Thank you to Habitat Conservation Trust Foundation, who provided funding through their Public Conservation Assistance Fund (PCAF), to assist with the Trematon Biodiversity Study and Bioblitz. As well, thanks goes to the Islands Trust Conservancy for providing funding for the fencing materials, our four stalwart fence installers, and for the watering system materials. Much appreciation goes to the many volunteers who have helped with all aspects of this project, from the teachers and parents for their support in increasing eco-literacy in our community to Duane West for his active and dedicated involvement in the project. Many volunteer hours were spent with the fencing, planting, installing a water system, and watering in this the first year. Special thanks goes to the Gordon family for their voluntary work and diligence on this project. Finally, thank you to Cora Skaien for her many hours of expertise, knowledge-sharing, and laser-focused scientific rigour.

The three-acre fenced exclosure on the Mt. Trematon Nature Reserve was created in 2021 to understand the effects of herbivorous mammals on plant growth and facilitate natural regeneration at the site. A selection of native plant species was also planted as part of the study. Their survival and growth will be monitored to determine which species are best candidates for future restoration initiatives.

Following up from the baseline vegetation survey done in 2021, year one inventory was conducted in May 2022. Under the direction of Dr. Cora Skaien, LINC volunteers learned to identify and document herb and shrub species and their percent cover in the study plots. Who knew there were so many moss species on Mt Trematon?? We will continue collecting these data over 5 years and Cora will analyze the data to look at regeneration patterns over time. Cora has summarized the data from year one of the study and has documented changes in species and vegetative cover. Natural regeneration has started inside the exclosure; native groundcover species, including Candy flower (*Claytonia sibirica*) and Crisp sandwort (*Stellaria crispa*) have begun to rapidly cover bare earth. There was 100% survival of the 200 transplanted native species – inside and outside the exclosure – but those inside the exclosure are performing better than those planted outside. The study plots will be monitored for the next four years. We look forward to sharing updates on the regeneration process.

Community knowledge-sharing at the Bioblitz.

HABITAT CONSERVATION TRUST FOUNDATION

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Native Plants

Juncus effusus — also known as Common Rush, Soft Rush, Swampgrass

photos and article by Ken Lertzman

"Sedges have edges, rushes are round, grasses have knees that bend to the ground."

It can be confusing to distinguish rushes from sedges—and both from grasses. But fortunately, we have this old rhyme about how to distinguish them. *Juncus effusus* (Common Rush or Soft Rush) is a common native species on Lasqueti—often just referred to as "swamp grass", though of course, it's not a *grass*. There probably are other rush species here, but if you are at the edge of a wetland or in a wet pasture or alder bottom and are feeling the round stems of a knee-high to waist-high "grassy" plant, this is likely it.

Older Common Rush with collapsing tussocks

Common Rush is found broadly in moist to wet areas, including cleared wet forest, pastures and fields, ditches, and marshes. It easily colonizes disturbed areas with a high and fluctuating water table. Everyone has probably seen it forming dense patches of what seem like a monoculture in overgrown wet fields and disturbed areas on Lasqueti. The Common Rush has a large geographic range and is distributed widely in North America and Eurasia.

Common Rushes were widely used by Indigenous peoples across North America, including nearby Nations on the BC coast. They were used as medicines, to make string and rope, and in weaving. Today, Common Rushes are often planted in created or restored wetlands. Over time, as they mature, they form raised tussocks that contribute to micro-topographic variation that leads to hydrologically-diverse microsites, which provide habitat for a range of other species. Some research has shown that rushes have high carbon storage potential in created wetlands. They also found that their ability to store carbon was less influenced by surrounding species than that of other plants. At our house, we use them as a long-lasting, fibrous mulch in the garden, especially in the winter. We can get a couple of harvests a year off the rushes growing near our garden.

There has been interesting research on the ecological roles of *Juncus effusus* in wetland and pasture communities. It can be a structural dominant in its community–like the dominant trees in a young forest. Like those trees, it can form an almost continuous canopy that shades out competing species, reducing the abundance and diversity of other wetland plants around it. Some research in Florida, however, looked at the how this negative effect might change in the presence of cattle grazing. They postulated that the unpalatable rushes might form micro-refuges for other palatable plants by making them hard to see or difficult to reach. They found this was indeed the case, with the effects of *Juncus* on other plant species shifting from mainly negative competitive interactions to positive facilitative interactions under the presence of grazing. Other studies found that, as with trees in forests, young rushes tended to mainly have negative effects on other species through shading and competition for light, whereas older plants, with collapsing tussocks, actually created habitat diversity and were colonized by other species. Three cheers for old growth swamp grass! However, I haven't seen this locally in my observations … has anyone else?

Resources for more information - see right -

Powdery Mildew on Bigleaf Maple,

by Ken Lertman

Starting early this summer, many people noticed that Bigleaf Maple leaves were looking rather like late-season zucchini leaves—covered in grey powdery fungus. This looks like the powdery mildew we see on fall zucchini leaves because it is in the same group of fungi: the *Erysiphales*. Some of these, such as *Podosphaera xanthii* are widely distributed around the world and have a significant economic impact in agriculture. We see mildew on maple leaves in many years, but it was particularly widespread this summer because the weather conditions were good for the development of the fungus. It seems to do well in moderate temperatures and high humidity—our early summer was probably ideal for its development.

Powdery mildew seen on maple in early July, Photo Izzy Harrington

All maples are susceptible to powdery mildew, and Bigleaf Maple seems particularly susceptible. However, *many* other plants exhibit it as well. The powdery mildews are among the most common plant pathogens in the world, with an estimated 873 species in 19 genera. They are known to infect more than 10,000 species of flowering plants. Many species of powdery mildew are associated with individual species of plants, and powdery mildews have shown a complex pattern of co-evolution with their host plants.

Experts expect that this year's powdery mildew outbreak is unlikely to cause long-lasting damage to our local maples. However, over the past decade, there has been a general decline in Bigleaf Maple throughout its range (from northern California into SW BC), termed "Bigleaf Maple Decline". There has been research on this problem in Washington State since 2011 which has tried to tease out the causal factors in maple mortality. Though they've identified a number of physical stressors (like drought) and various pathogens, there is no single factor that is consistently associated with maple decline. Their current hypothesis is that hot temperatures and drought–especially in more developed areas –are either causing lethal levels of stress themselves or predisposing maples to be attacked by various pathogens, including mildews.

Some researchers in Seattle are concerned that there may be a link between powdery mildew and the maple decline. They examined an outbreak of powdery mildew there in 2018 where Bigleaf Maples showed levels of infection comparable to the most severe outbreaks that have been recorded in agricultural systems. In that case, it was caused by an introduced powdery mildew species that originated in Europe. Though there has been a lot of research on powdery mildews in annual agricultural plants, there has been very little work on their effects on longer-lived perennial plants such as Bigleaf Maples.

For more information:

https://www.timescolonist.com/local-news/maples-around-vancouver-island-have-a-silvery-tinge-this-summer-heres-why-5674544

Betzen JJ, Ramsey A, Omdal D, Ettl GJ, Tobin PC. 2021. Bigleaf Maple, *Acer macrophyllum Pursh*, decline in western Washington, USA. *Forest Ecology and Management.* 501:119681.

Bradshaw M, Braun U, Elliott M, Kruse J, Liu SY, Guan G, Tobin P. 2021. A global genetic analysis of herbarium specimens reveals the invasion dynamics of an introduced plant pathogen. *Fungal Biology.* 125(8):585-95.

Juncus effusus - Further Resources

https://www.centralcoastbiodiversity.org/grasses-sedges-and-rushes.html

http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Juncus%20effusus&redblue=Both&lifeform=6

Ervin, G.N., Wetzel, R.G. 2002. Influence of a dominant macrophyte, Juncus effusus, on wetland plant species richness, diversity, and community composition. *Oecologia* 130:626–636. https://doi-org.proxy.lib.sfu.ca/10.1007/s00442-001-0844-x

Ervin GN. 2005. Spatio-temporally variable effects of a dominant macrophyte on vascular plant neighbors. *Wetlands* 25:317-25.

Means MM, Ahn C, Korol AR, Williams LD. 2016. Carbon storage potential by four macrophytes as affected by planting diversity in a created wetland. *Journal of environmental management* 165:133-9.

LINC Update and News of Interest

Squitty Bay Day

Thank you to the over 100 people who came out to Squitty Bay and supported Lasqueti Island Nature Conservancy (LINC). Our parks and protected areas thank you too!

Culminating drum circle led by Bill Helin. Photo Morgan Maher

Osland Nature Reserve: Mikaila Lironi retrieving fencing after beaver created a dam which flooded the exclosures installed there.

Photo Anna Smith

New World Wide Report: 69% Species Decline over 50 years

"Monitored populations of vertebrates (mammals, birds, amphibians, reptiles and fish) have seen a devastating 69% drop on average since 1970, according to World Wildlife Fund's (WWF) Living Planet Report 2022. Global freshwater species have also been disproportionately impacted, declining 83% on average.

We should care deeply about the unraveling of natural systems because these same resources sustain human life." WWF www.worldwildlife.org/press-releases/69-average-decline-in-wildlife-populations-since-1970-says-new-wwf-report

Just Released:

A new article by Jordan Benner and Ken Lertzman reveals how BC's "high grading along gradients of productivity and accessibility has changed the forest landscape over time. This history of serial depletion of profitable environmental components has left a legacy of reduced value in the forest, with implications for intergenerational and intercommunity equity."
See an abstract of the paper here: https://www.pnas.org/doi/10.1073/pnas.2208360119

Check out the Birds!

Check out the Bird Migration Explorer, a first-of-its-kind digital platform that reveals migration data for birds across the western hemisphere. This free platform visualizes the incredible journeys of migratory birds, how they connect us across the hemisphere, and the widespread challenges they face throughout their journeys. Take a look: **Audobon** http://www.birdmigrationexplorer.org

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Contact linc@lasqueti.ca

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