LINC
Lasqueti Island Nature Conservancy
linking people to nature on Lasqueti and surrounding islands
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SeaChange - Restoration of Marine Areas on Lasqueti Island

by Ann Eriksson

Wondering what those two unknown boats and four divers were doing around Lasqueti this spring? The week of May 25, after extensive planning with LINC, SeaChange Marine Conservation Society arrived to clean up subtidal marine debris and transplant native eelgrass *Zostera marina* in the waters of Lasqueti Island. The planning included a survey visit in the summer of 2019 to review potential sites. There are always many places where debris needs to be removed from the seafloor, but Scottie Bay emerged as the priority for transplanting eelgrass. Although the bay has substantial impacts from many years of mixed use, an intact eelgrass bed showed that the bay continues to support sea life.

Top right: Collective Effort at False Bay,
Above left: Peter Lironi prepping eelgrass shoots for planting in Scottie Bay
Above right: Some of the debris removed from Maple and Scottie Bays

Working from the deck of *Collective Effort,* SeaChange's 8-meter motorized aluminum barge, and Peter Lironi's *Poor Man's Rock*, the professional dive team removed debris from the seabed of Maple Bay, Scottie Bay and False Bay to clear the way for eelgrass growth. Debris items included tires galore, metal, batteries, wire, dinghies, several small abandoned vessels and lots of plastic. The bulk of the retrieval took place in Scottie Bay thanks to the ability of Peter's barge to sit aground at low water to retrieve and stack several small boats (runabouts and a sailboat which had been pulled ashore over time). The debris load, heaped up nearly to the wheelhouse window of *Poor Man's Rock*, was estimated to weigh 4 - 4.5 tons and filled a 40 cubic yard bin awaiting it at French Creek Harbour.

The dive team then extended eelgrass habitat in Scottie Bay by planting 930 eelgrass shoots in a 64 square meter area. To help prepare the shoots, which were collected from a healthy bed in Maple Bay, four sailors on the schooner *Grail Dancer* from Thetis Island put Lasqueti on their cruise route. Applicable COVID-19 safety protocols were observed throughout the week.

The work was part of the five-year Salish Sea Nearshore Habitat Recovery Project, funded by the federal Department of Fisheries and Oceans Canada under the Coastal Restoration Fund. The project, now in year four, removes marine debris to make way for eelgrass growth, plants eelgrass to expand existing habitat or replant lost habitat where eelgrass historically occurred, and revegetates marine riparian (shoreline) areas to restore ecosystem function and continuity from the upland to the subtidal. The project covers four regions: Gulf Islands, Howe Sound, Sechelt Inlet and Burrard Inlet. As of March 2020, a total of 6,684 eelgrass shoots (668 m^2) had been transplanted, over 15,000 kg of underwater debris removed, and two marine riparian restoration projects completed. Engagement by local communities, from identification of potential restoration sites to logistics planning to on-site assistance with eelgrass shoot preparation, is key to the project's success.

Collective Effort in the transplant site in Scottie Bay

Why is this work important?

Eelgrass, a bright green ribbon-like flowering seagrass that grows globally and in the soft sediments of sheltered bays along 25-35% of BC's coast serves many critical ecological functions. Eelgrass meadows provide shelter, food, resting and nursery habitat for more than 70 fish species including juvenile salmon and herring, as well as for invertebrates such as crabs, snails, shrimp and sea stars. In doing so, eelgrass supports the marine food web, contributing prey species to support healthy populations of marine birds and mammals including seals, sea lions, whales and people. The physical structure of the rhizomal root system and the long narrow floating leaves of the plants protect coastlines from erosion by stabilizing sediments and slowing waves and currents. Eelgrass meadows filter pollutants from the water column. As photosynthetic flowering plants, eelgrasses produce oxygen, and draw carbon dioxide out of the atmosphere, storing it in the seabed for long periods of time, unless disturbed, making the restoration of eelgrass ecosystems an important nature-based solution to climate change.

Eelgrass meadows don't function alone, as they are part of an interconnected system that includes upland ecosystems, shoreline vegetation, streams, forage fish beaches, woody debris, seaweed and kelp habitat, and the eelgrass beds themselves. Each component relies on all the others to remain healthy and functioning. Unfortunately, this connectivity has been broken in many places by human activity on land and in the ocean. Coastal and shoreline development causes sedimentation, nutrient and chemical pollution, and outright removal of eelgrass. The placing of docks and floats shades eelgrass beds, depriving them of essential sunlight. Mooring chains for boats scour bare patches in the eelgrass meadows. Boat propellers uproot and shred the plants. Even dragging a dinghy or kayak across eelgrass can damage the beds. Hardening of shorelines with seawalls and bulwarks changes the natural movement of water and sediments along the shore, which alters the seabed conditions that eelgrass requires to grow. Increasing ocean temperatures and rising sea levels from climate change threaten eelgrass ecosystems. There has been a steady decrease of native eelgrass in the Salish Sea. Once eelgrass is lost, shoreline erosion increases and marine biodiversity decreases, along with the ecosystems services it provides to nature and people. The Salish Sea Nearshore Habitat Recovery Project aims to help reduce this trend.

What can you do to help?

* Volunteer with eelgrass restoration projects.
* Talk to others about the importance of eelgrass and how to protect it.
* Learn where it's growing and avoid walking or boating through it.
* Anchor and moor in marine waters greater than 7 meters depth (~23 feet) at zero tide.
* Locate docks where they won't shade out eelgrass and share one with your neighbours.
* Grow and maintain native trees and shrubs along shorelines to prevent erosion.
* Use nature-friendly gardening and landscaping products.
* Dispose of potential marine pollutants properly, and prevent the flow of sediments into streams and the ocean during construction and landscaping.

Learn more about SeaChange, marine restoration, and the Salish Sea Nearshore Habitat Recovery Project at: https://seachangesociety.com/restorationpg/

Videos:

Harvesting of Eelgrass Shoots for Transplant in Scottie Bay:
https://www.youtube.com/watch?v=xArf-5wI5tY

See underwater video of the planting
https://www.youtube.com/watch?v=Wee2Kwqh1GA

Pandemics and Wildlife

by Jessica Sachs

In the midst of the COVID-19 pandemic, it's crucial for us to explore modern humanity's role in the rise and spread of new infectious diseases.

This is particularly true of infectious diseases that have jumped to people from wildlife, as is suspected in COVID-19, as well as severe acute respiratory syndrome (SARS) and Ebola before it.

Microbes (viruses, bacteria and parasites) have always spread between animal species – including humans. However, the rate at which they plague our species appears to increase with our oversized incursion into wilderness areas.

Over the past two decades, Harvard's Center for Health and the Global Environment and the World Health Organization have been drawing together what scientists have learned about the direct link between biodiversity and human health.

In particular, researchers began uncovering how biodiversity losses appear to fuel the rise and spread of many infectious diseases.

"The natural world provides so many services vital to our health," says Eric Chivian, the Harvard Center's founder and director. "These services depend on an enormous diversity of species about whose interactions we know very little.… Above all," Chivian explains, "we're trying to reach beyond specialists to help everyone grasp the urgencies involved in species loss."

Left: Purple Sea Stars, Pisaster ochraceus, along our shores. Although a significant die off happened from Alaska to California, some are showing rebounds from the virus-like disease called Sea Star Wasting Disease.

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Biodiversity and Disease

Lyme disease represents one of the clearest examples of how biodiversity loss can promote the epidemic spread of an infectious disease.

Imagine a newly hatched blacklegged tick waiting for its first blood meal. If the larval tick is in a fragmented or otherwise degraded patch of woods in Eastern Canada, the first host it encounters will probably be a mouse. In much of North America – particularly the East – up to 80 percent of mice (especially white-footed mice) carry Lyme disease-causing bacterium, *Borrelia burgdorferi.* The newly infected tick can then pass the bacterium to deer and humans.

Now consider the same newly hatched tick in a natural forest. Here its first host is likely to be a raccoon, ground bird or lizard. None are good carriers of the Lyme disease bacterium. As a result, the tick will likely escape infection and never transmit the disease to anyone.

In 2000, animal ecologist Richard Ostfeld described this Lyme disease-blocking dynamic and dubbed it the *dilution effect.* In essence, the greater a habitat's biodiversity, the more likely that an animal-borne microbe will end up in a dead-end host that doesn't pass it along.

In theory, biodiversity loss could eliminate a species that transmits disease to people. But scientists aren't seeing this. When tropical deforestation decreases mosquito diversity, for example, surviving mosquito species tend to be more effective carriers of malaria.

"It may be that there is something about the kind of weedy species that survive in disturbed areas," Ostfeld says. It may be that fast-growing, fast-breeding organisms are by nature less resistant to disease.

Since Ostfeld's landmark study, other researchers have extended his findings to diseases such as West Nile virus, hantavirus pulmonary syndrome and malaria. In each case, the loss of biodiversity in an area leaves behind a few species that are more apt to transmit a disease to people. This transmission can be direct or through an intermediary such as a tick or mosquito.

In the case of West Nile, the strongest carriers tend to be the kinds of birds that predominate in disturbed, fragmented and less-diverse habitats. They include common species such as house sparrows, grackles, robins and crows. Indeed studies show that across North America, bird diversity is a significant buffer against the spread of West Nile virus to humans.

Taken together, these studies help explain why the world is seeing a dramatic rise in newly emerging infectious diseases.

The first Lyme disease outbreaks occurred in the 1970s in and around Lyme, Connecticut. The disease is now the most prevalent arthropod-borne infection in North America. (Arthropods include insects, ticks, spiders and their relatives.)

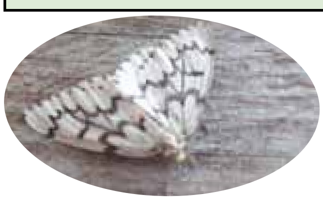
West Nile crossed the ocean to New York City in 1999. Since then it has spread across the continent, infecting tens of thousands and killing more 2,500.

Scientists identified hantavirus in 1993, after it killed several young people in the Southwestern U.S. Since then, it has infected thousands of people from Canada to the tip of Argentina, killing more than a third.

Biodiversity delivers many health services that humankind has taken for granted, beyond disease prevention, from cleaning our air and water to mitigating floods and moderating climate. Habitat disruption and associated extinctions can cripple these services in ways only now becoming clear.

"We know that the more diverse a habitat, the more likely that it will prove stable and resilient to change," says Chivian. That resilience will only become more crucial, as global warming begins transforming our planet in ways we can only imagine.

Periodic Species Found on Lasqueti



Western Hemlock Looper Moth

by James Schwartz

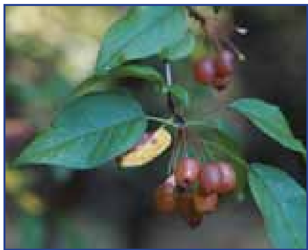
Have you noticed an unusual amount of erratically flying brownish tan or greyish white moths with black-lined wings around this fall? We are seeing an outbreak of the native Western Hemlock Looper Moth *Lambdina Fiscellaria Lugubrosa* and, along with it, the very similar Phantom Hemlock Looper Moth *Nepytia Phantasmaria* in the Vancouver/Sunshine Coast/ Vancouver Island areas. The inch worm like moving larva (hence the name "looper") of both species feed primarily on aged, stressed or overcrowded coniferous tree needles, especially the Western Hemlock.

The periodic infestations, recorded in cycles of 11 to 15 years in southern B.C., often occur at times of low precipitation and higher than normal temperatures during the larval growing season. They can cause extensive defoliation leading to tree mortality. It is, however, a natural infestation and part of normal forest succession. Enemies such as viruses, parasites and predation usually subdue these outbreaks in two to three years.

Above: Polyphemus moth, which occurs widespread throughout North America. The male's large feathery antenna is used to detect pheromones of unmated females. It has no mouth parts and only lives long enough to find a female and mate. found by Sheila Ray this spring.

Crabapple

by Dana Lepofsky



While many people interested in Indigenous heritage tend to focus on artifacts and archaeological sites, the distribution of culturally-valued plants provides other important clues about how Indigenous People lived on the land. One such plant is the native crabapple *Malus fusca*. Right now, Lasqueti's native crabapple trees are really obvious: the leaves are starting to die back and turn color and the abundant fruit is easily spotted. These fruits were valued foods by coastal First Nations because they are nutritious and could be picked en masse in the fall. After harvest, they were stored in water in bentwood boxes where they softened and got sweeter.

Among several First Nations of BC, crabapples were actively tended by pruning, clearing the land around them, and by transplanting. The importance of crabapples is illustrated in the oral traditions of the Tla'amin living at the head of Toba Inlet, who were told by their leader Crow to gather lots of food, including crabapples, when they had to leave their village. As Kitsumkalum Elder Lucy Hayward noted to my friend "Where people are, crabapples grow." In fact, there is often an abundance of native crabapples growing on ancient village sites, and recent research shows that crabapples are an indicator of tended *forest gardens* associated with these ancient villages.

We can't ever know if any individual native crabapple tree growing on Lasqueti was associated with First Nations use, but there are some dense patches on the island that I wonder about every time I see them. I think of these legacy trees as *gifts from the ancestors*. Next time you're passing by a native crabapple, take a moment to appreciate them.

Wetlands *by Hilary Duinker*

Before Covid, I signed up for a Wetlandkeepers workshop, keen on a trip to Galiano Island. This workshop transformed into two days of Zoom meetings. The training was put on by the BC Wildlife Federation, which has an extensive wetlands program that includes free training, advice and consultation in wetland conservation. I learned that humans have modified natural drainage patterns all over North America.

There are several different classifications of wetland: In ***shallow open water*** you'll find floating vegetation like pond lilies and species that require year-round water like cattails. A ***swamp*** includes woody species, like trees and shrubs, while a ***marsh*** includes only rushes, sedges and grasses (which can be sorted out if you remember, sedges have edges, rushes are round and grasses have joints all the way to the ground.)

A ***fen*** is a special type of wetland, usually high up in a watershed, often in the mountains, where there's a floating mat of vegetation. Fens typically are connected hydrologically through their groundwater flow. Fens have a basic pH, whereas a ***bog*** is an acidic wetland that receives water only from rain. Acid tolerant species like Labrador tea, bog laurel, sphagnum moss and sundews are key indicator species.

Ephemeral, or ***vernal*** wetlands, only hold water during part of the year: ideal habitat for our native amphibians.

We heard about some of the wetland restoration projects the Galiano Conservancy is doing via digital 360 tours. https://galianoconservancy.ca/360tours. I was really impressed with all the conservation and environmental education work they're doing. Hopefully I'll make it there in person one of these days.

Vernal wetland at Salish View Nature Reserve

Shifting Baselines, A Core Concept For Assessing Environmental Impacts and Setting Goals for Conservation and Restoration

by Ken Lertzman

Aldo Leopold is thought of as the founder of modern wildlife management and was an important force behind the development of environmental ethics and ideas about stewardship and conservation. One of his most profound statements, published in 1949 in *A Sand County Almanac* is "One of the penalties of an ecological education is that one lives alone in a world of wounds." Even then, he saw that there had been many significant changes to the natural world that were completely transparent to the casual observer and only apparent with specialized tools, knowledge, and data. One of the important elements of this idea is that we tend to think of the conditions we grew up with as "normal" or "natural" and changes that happened before our time don't factor into our assessments of losses. Historical conditions slip past our perceptual event horizon and no longer influence our view of today's world.

This progressive shift in what we perceive as the *baseline* or reference condition for the world around us was termed the "Shifting Baselines Syndrome" (SBS) by fisheries biologist Daniel Pauly in a paper published in 1995. The idea was developed as a critique of natural resource management science - in particular fisheries - and its tendency to make management decisions in the context of relatively short-term data sets about the state of the resource.

Most researchers became aware of the SBS idea after the publication of a landmark paper by Jeremy Jackson and his colleagues in 2001, titled "Historical Overfishing and the Recent Collapse of Coastal Ecosystems." They observed that many fish species, especially predators, used to be hyperabundant compared to recent experience. They argued that overfishing of these fish by humans over hundreds of years drastically reduced the resilience of marine ecosystems. This set those ecosystems up for failure when faced with the impacts of modern industrial fishing, pollution, and habitat loss—leading to the collapses of fisheries we have seen around the world in recent decades. Finally, they argued that efforts at ecological restoration that don't take into account these historical changes are likely to fail. These ideas have been applied to many ecosystems around the world beyond just fisheries. The widespread deforestation of Great Britain beginning in Neolithic times and compounded by the Romans and then by shipbuilders for the Royal Navy is a good example. The pastoral agricultural landscapes we see as a *natural* part of the British Isles are human constructs.

very rare old growth trees on Lasqueti, photo V. de Rege

There are good examples of shifting baselines in Coastal British Columbia and on Lasqueti. When Europeans arrived, much of the South Coast outside of Indigenous settlements was dominated by old growth forests that today have been largely eliminated outside of protected areas. The current mosaic of urban, suburban, and agricultural lands set in a matrix of a younger forest is a human construct less than 200 years old. On Lasqueti, though most of the island is still covered by semi-natural forest, we have little forest that hasn't been modified by post-colonial human activities in some way. Furthermore, we have many areas with little regeneration of young trees, especially cedar, and where the forest understory is barren, species-poor, and unproductive. The lack of regeneration and the barren understory highlights an ecological issue, but this isn't in itself a shifting baseline problem. It represents a shifting baseline to the extent that people perceive this as a *normal* or *natural* condition.

The waters of the Salish Sea around us also provide good examples of the shifting baselines problem. Salmonid populations have declined dramatically from historical levels over much of the west coast of North America and, over our lifetimes, we have normalized a reality of depletion. The loss of the kelp forests that were common even in the memory of older Lasqueti residents is another good example. But one of the best examples is the dramatic reductions of Pacific Herring compared to the past. Recent research by McKechnie and colleagues showed that in archaeological sites from Washington State to SE Alaska, herring has been *hyperabundant* for millennia. In archaeological sites in the Salish Sea, herring bones can represent 80-100% of the fish bones present in middens. Yet overharvesting of herring began over 100 years ago on the BC coast, reaching its peak in the mid-20th century. Management of herring fisheries on the south coast takes place in the context of a species that was depleted in numbers largely before data began to be systematically collected. Herring is a species that has always fluctuated in abundance, but unless we can gain a deep-time perspective by tapping into historical sources such as archaeological remains or Indigenous cultural knowledge, we cannot put today's patterns of abundance in perspective.

Shifting Baselines Syndrome isn't just an ecological problem. It is a problem of human perception, of our short lifespans compared to the long arc of historical ecosystem change, and of our willingness to be myopic. It is more comfortable to ignore the magnitude of our collective historical impacts on our local environment, even when we are aware of them, than it is to take responsibility for them. This is reinforced by modern society's collective "nature deficit disorder". In their recent review of SBS issues, Soga and Gaston identify, along with lack of historical data, the loss of familiarity with natural environments as a key driver of people's willingness to tolerate progressive degradation of environmental conditions.

In this regard, we are better off on Lasqueti than most other places: our lives here are strongly connected

Above: herring and salmon bones, arch site called "Kleh kwa num" near Powell River in Tla'amin Territory dating to around 2000 years ago Photo D. Lepofsky

to the forest and sea around us. Here, we have the opportunity both to know and experience our environment and to use that familiarity to improve our stewardship of it. Furthermore, we have a rich legacy of cultural knowledge about local ecosystems held by our Indigenous neighbours and reflected in the archaeological sites on Lasqueti and nearby islands. We also have elders within our own community whose experience of environmental changes on Lasqueti over their lifetime can inform our perceptions today. Though Leopold was correct in saying we live in a world of wounds, we are, in fact, not alone.

Further Reading:

Jackson JB and colleagues. 2001. "Historical overfishing and the recent collapse of coastal ecosystems." *Science* 293:629-37.

Leopold A. 1989. *A Sand County Almanac, and sketches here and there.* Oxford University Press, USA.

McKechnie, ID and colleagues. 2014. "Archaeological data provide alternative hypotheses on Pacific Herring *Clupea pallasii* distribution, abundance, and variability. " PNAS 111:E807-E816.

Pauly D. 1995. "Anecdotes and the shifting baseline syndrome of fisheries. Trends in ecology & evolution" 10:430.

Price, MHH, and colleagues. 2019. "Genetics of century-old fish scales reveal population patterns of decline." *Conservation Letters* 12:e12669. https://doi.org/10.1111/conl.12669

Soga M, Gaston KJ. 2018 "Shifting baseline syndrome: causes, consequences, and implications." *Frontiers in Ecology and the Environment* 16:222-30.

Videos:

Shifting Baselines:
https://www.youtube.com/watch?v=Hui5YH-D6Go
https://www.youtube.com/watch?v=oCnbS58nXAo

Herring:
https://www.hakai.org/where-the-herring-spawn/
https://vimeo.com/98622629

Seen In Passing








Top left: Rough-skinned Newt, Anna Smith Next: Slug sex, G Scott Next: Autumn Meadowhawks mating, S Harrington
Top Right: Painted Lady, James Schwartz Below: Mourning Cloak, G Scott Below: Chanterelles, J Schwartz,
Bottom right: parasite infected Russula brevipes mushroom, the lobster with and without the infection J Schwartz
Bottom right: LINC walkers & mushroom hunters with Mikyla, W Bartholomew

We welcome photos for Seen in Passing

LINC
Lasqueti Island Nature Conservancy

Board of Directors: Gordon Scott, Wendy Schneible, Sheila Harrington, Hilary Duinker, Jordan Barton, Aigul Kukolj, Ken Lertzman, James Swartz

Christmas Bird Count is ON: December 30th, Contact Marti for details 333-8879

Please complete our 2020 Survey, found on-line at www.lasqueti.ca/linc or www.facebook.com/LINCBC

Contact us: linc@lasqueti.ca 250-333-8754 www.facebook.com/LINCBC

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