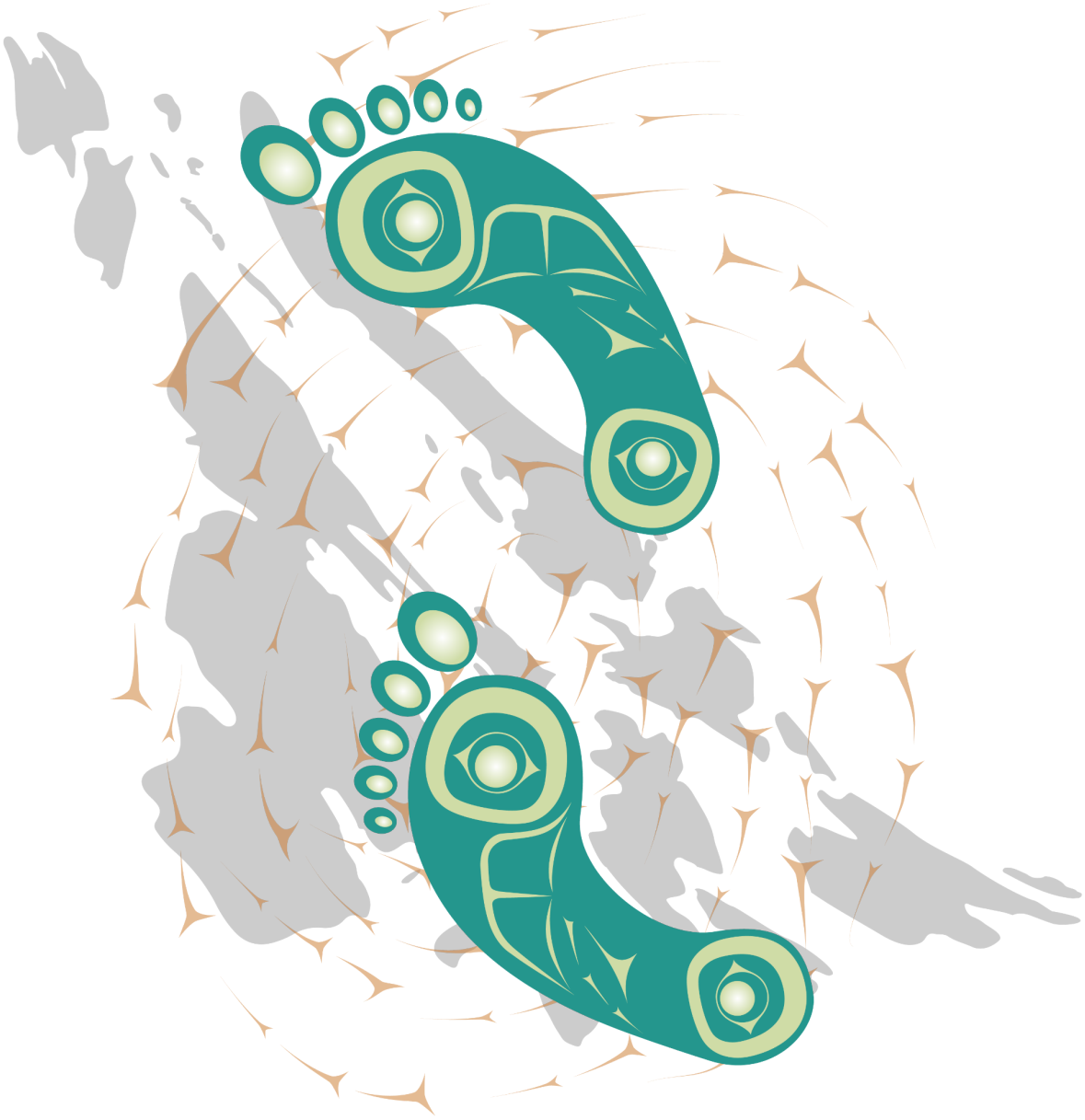

One Island, One Earth

An Ecological Footprint and Fingerprint for Galiano Island

June 2022

Galiano Conservancy Association

Project Acknowledgements

We wish to thank everyone that contributed to this project, from all of the Galiano households that completed our surveys, to the many people who provided us with insight and feedback. We wouldn't have been able to do this project without you, and we hope you see yourselves reflected in it.

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Unless otherwise noted, all of **the artwork in this report is by Gitxsan artist Shar Wilson** - to find more of her work, visit https://finawear.ca/.

This project would not have been possible without the support of our Project Partners and Funders.

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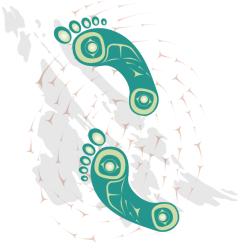
Executive Summary



One Island, One Earth

An Ecological Footprint and Fingerprint for Galiano Island

In this report, we assess the Ecological Footprint of the small Salish Sea community of Galiano Island for the first time. To put the results in context, we situate Galiano Island within the broader territories of Hul'qumi'num, SENĆOŦEN, and Halkomelem-speaking Indigenous Peoples, and we undertake a qualitative study that we refer to as the Ecological *Fingerprint*. We also generate a Biocapacity estimate for the lands and waters that comprise Galiano Island.

One Island?

We attempt to answer the question: **"Is the Galiano Island community living sustainably within and relative to the resources provided by Galiano Island?"**

We assert that the answer to this question is **"No,"** finding that equivalent of **4.3 "Earths" would be required to support the lifestyle of the Galiano Island community** if every human community on the planet shared these standards. We also find that, despite the relatively high productivity of the terrestrial and marine ecosystems of Galiano Island, the combined footprint of full-time residents, part-time residents, and annual visitors **exceeds the annual productivity of island ecosystems by 29%.** After accounting for Galiano's share of the services provided by the national and provincial government, **transportation is the largest component of the footprint**, followed by food, energy and the built environment, and consumables and waste. Water availability is not accounted for in existing footprint methodologies and is discussed separately. The **inclusion of part-time residents and seasonal visitors doubles the overall footprint.** We estimate greenhouse gas emissions to be 9.0 tCO_2e/ca.

One Earth?

We also attempt to answer the question: **"What can the Ecological Footprint of a small island community tell us, and what are its limitations?"**

We assert that the Ecological Footprint effectively frames local accountability, demonstrating that the Galiano Island community's **footprint is less than the Canadian average** but more than **double the global average** and more than **four times higher than sustainable, equitable "One Planet Living."**

Footprints & Fingerprints

The **Ecological Footprint** is an estimate of how much biologically productive land and water area an individual or population needs to produce all the resources it consumes and to absorb the waste it generates; in other words, the area that would be required to support a defined human population and material standard indefinitely. It is measured in global hectares (gha), where a global hectare is a biologically productive hectare with globally averaged productivity for that year.

The **Ecological Fingerprint** is an evaluation of the particular attitude, self-image and intrinsic values a community adopts with respect to global resource use.

Promisingly, we find that the Galiano Island **community has the ability to make reductions across 60%, or 2.6 "Earths" of the footprint**, and that a two-thirds reduction in this portion of the footprint would be required to achieve "One Planet Living" on Galiano Island. We discuss the feedback we received in our interview-based Ecological Fingerprint study, and apply it to the results of the Ecological Footprint to generate **ten recommendations for priority actions** to reduce the community's footprint.

Finally, we underline that **island communities are not "islands unto themselves."** They must seek connections through and across the Salish Sea waters - and beyond - to effect meaningful change.

Summary At a Glance

The Ecological Footprint of the Galiano Island community in 2021:

- Required the equivalent of **4.3 "Earths"** if scaled to the planet's human population
  - Canadians on average use 5.1 "Earths"
  - The world population uses 1.7 "Earths"
- Used **significantly more** of the Earth's resources than its "fair share"
  - The Galiano Island community used about 6.8 global hectares per capita (gha/ca)
  - There are an estimated 1.6 gha/ca available for every person on the planet
- Used **29% more** of the Earth's resources than Galiano Island provides back to the biosphere
  - Galiano Island's ecosystems contribute about 14,373 gha to the biosphere
  - The Galiano Island community used about 18,600 gha in 2021

The Galiano Island community **has the ability to make reductions across 60%** of its footprint, or about **2.6 "Earths"**

- A **62% footprint reduction** would achieve "One Planet Living" at the community level
- Our **One Planet Scenario** calls for a **66% reduction in the community footprint**
- Take our Survey to share your thoughts

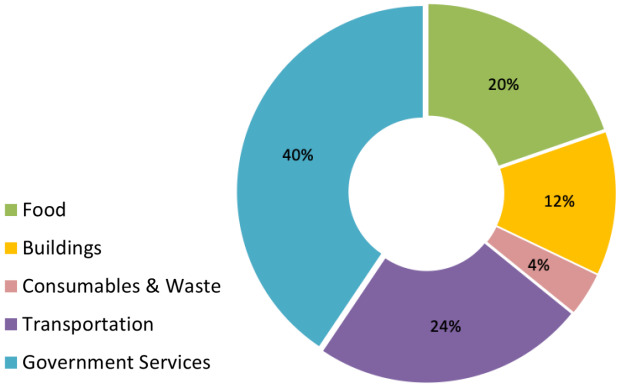


Figure 1. Galiano's Ecological Footprint, 2021
Figure 2. Galiano's Ecological Footprint in Earths

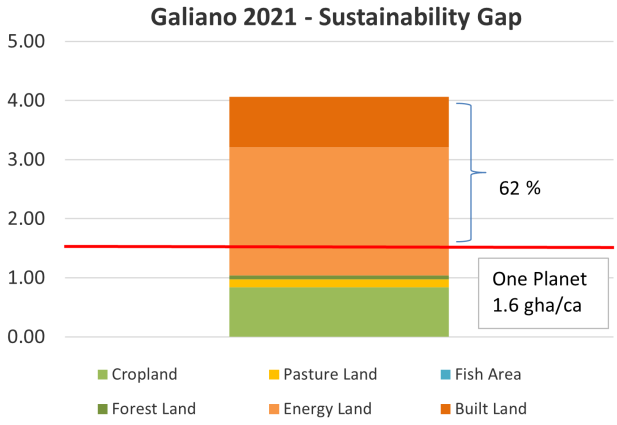


Figure 3. Comparison of community level footprint with threshold for "One Planet Living" (red line)

About this Report

Who We Are - the Authors

Hello! We - *the authors of this report* - are Michelle Thompson (She/Her) and Adam Huggins (He/Him). We are relative newcomers to Galiano Island, and we created this report in the course of our work for the Galiano Conservancy Association on the ***One Island, One Earth*** project.

> **Michelle** is of German, English and Scottish ancestry, and was born and grew up on the traditional land of the Huron-Wendat, the Seneca and Haudenosaunee territories (Toronto, Ontario). She moved to Galiano Island in May 2021 specifically to pursue this project.
>
> **Adam** is of Croatian, Scandinavian, and British ancestry, and was born on Ohlone territory in the Bay Area of California. He grew up in California and Florida, and immigrated to Canada in 2015. He has lived and worked on Galiano Island since 2018. He proposed, secured funding for, and assisted Michelle in the implementation of this project and the drafting of this report.

We are going to use the word “we” a lot in this report. “We” means just that - Michelle and Adam. While we consider ourselves to be members of this community, in this report we endeavour to speak only for ourselves, and to report as accurately as possible what we did, saw, heard, and learned as part of this project.

We spoke with people both on and off of Galiano Island to inform this report, and you will see their voices represented throughout, in their own words. We benefited greatly from the many perspectives that were shared with us, and we hope that you, too, will come away from this document with a new perspective on this place we call Galiano Island, whether it is your home, or just a place you are learning about for the very first time.

Where We Work - Galiano Conservancy Association

The Galiano Conservancy Association (GCA) is a community based non-profit society and registered charity founded in 1989, with a mission to "protect, steward and restore Galiano Island ecosystems by creating a network of natural areas where a healthy environment, learning and a love of nature flourish." The GCA has active programs in conservation, environmental education, ecological restoration, sustainable food systems, and climate adaptation.

The GCA also has a history of community-based mapping projects. This report takes inspiration from and builds upon the results of the 2004 Galiano Island UP-CLOSE Habitat Conservation Project,[1] providing an updated landscape classification for 2021, and revisiting the subject of community values almost two decades after the publication of UP-CLOSE. It also directly responds to a key recommendation of the 2004 report, which was to provide education "for the community about ways of living sustainably and minimizing our Ecological Footprint."

The "One Island, One Earth" project

The **One Island, One Earth** project was inspired by two publications: the 2018 Special Report of the Intergovernmental Panel on Climate Change (IPCC) on "Global Warming of 1.5° C[2], and a 2012 paper entitled "From Ecological Footprint to Ecological Fingerprint - Sustainable Development on Helgoland."[3]

The former publication was a landmark report which received significant attention[4] and catalyzed the Islands Trust to declare a "Climate Change Emergency" on March 13, 2019.[5] At the time, it prompted us to consider what additional contributions the GCA could make to climate mitigation.

The latter publication certainly received less attention at the time of publication, but was equally influential on our process. In it, Dr. Beate Ratter and her student at the time, Jan Petzold, presented - for

[1] Emmings, K., & Erickson, K. (2004). *Galiano Island Landscape Classification and UP-CLOSE Workshop Series Final Report.* Galiano Conservancy Association, Galiano Island, BC. https://galianoconservancy.ca/wp-content/uploads/2016/11/final_report_complete.pdf

[2] IPCC. (2018). *Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Retrieved on May 9, 2022 from https://www.ipcc.ch/sr15/

[3] Ratter, B., & Petzold, J. (2012). From Ecological Footprint to Ecological Fingerprint - sustainable development on Helgoland. In Larsen, K. T. (Ed.), *From One Island To Another - A Celebration of Island Connections* (pp. 191-204). Centre for Regional and Tourism Research.

[4] Davenport, C. (2018, October 8). *Major climate report describes a strong risk of crisis as early as 2040*. The New York Times. Retrieved May 9, 2022, from https://www.nytimes.com/2018/10/07/climate/ipcc-climate-report-2040.html?searchResultPosition=5

[5] See https://islandstrust.bc.ca/document/letter-climate-change-emergency-declaration/

the first time, to the best of our knowledge - an Ecological Footprint analysis for a small island community. After presenting their results for Helgoland, a small island off the northwest coast of Germany, they argue that small island communities are unique enough to necessitate the creation of an Ecological Fingerprint, which we take to be a qualitative study of a community that complements the more quantitative Ecological Footprint.

We decided that we would attempt a similar analysis for the Galiano Island community, and in addition we would also calculate the Biocapacity of Galiano Island as a point of comparison. We hoped that this study would be useful for Galiano Island residents, as well as for policy makers and residents of other small island communities looking for innovative ways to address the Climate Crisis at a local level.

Who And What This Report Is For

We wrote this report for people who would like to read in detail about the results of the **One Island, One Earth** project. Maybe this is you? Then again, maybe you'd appreciate a more dynamic format - for that, you can find our interactive map online at https://galianoconservancy.ca/oneisland/.

This report summarizes the first Biocapacity, Ecological Footprint, and Ecological Fingerprint analysis that has been performed on Galiano Island, and, to our knowledge, on any small island community in the world. It is for island residents, academics, policy makers, students, and anyone else who is interested in helping to make their community more sustainable, resilient, and equitable.

The original purpose of the project was to ask the question: **"Is the Galiano Island community living sustainably within and relative to the resources provided by Galiano Island?"**

As the project developed, we added a second question: **"What can the ecological footprint of a small island community tell us, and what are its limitations?"**

This report represents our attempt to capture a "snapshot" of Galiano Island at a particular point in time, using a particular lens. It is not perfect, or comprehensive. To create this snapshot, we did our best to analyze the data that was available to us, and to collect data directly from the community when it wasn't. The report is built on the work of many other people and organizations, and wherever possible we acknowledge and link to that work. It features interviews and quotations from many island residents, who we thank for allowing us to include their voices. The intent of this report is not to pressure or guilt individual island residents, but instead to help inform conversations about community-scale responses to the climate, biodiversity, and social crises that characterize this moment in time. We are grateful to you for taking the time to read it - huy ch q'u!

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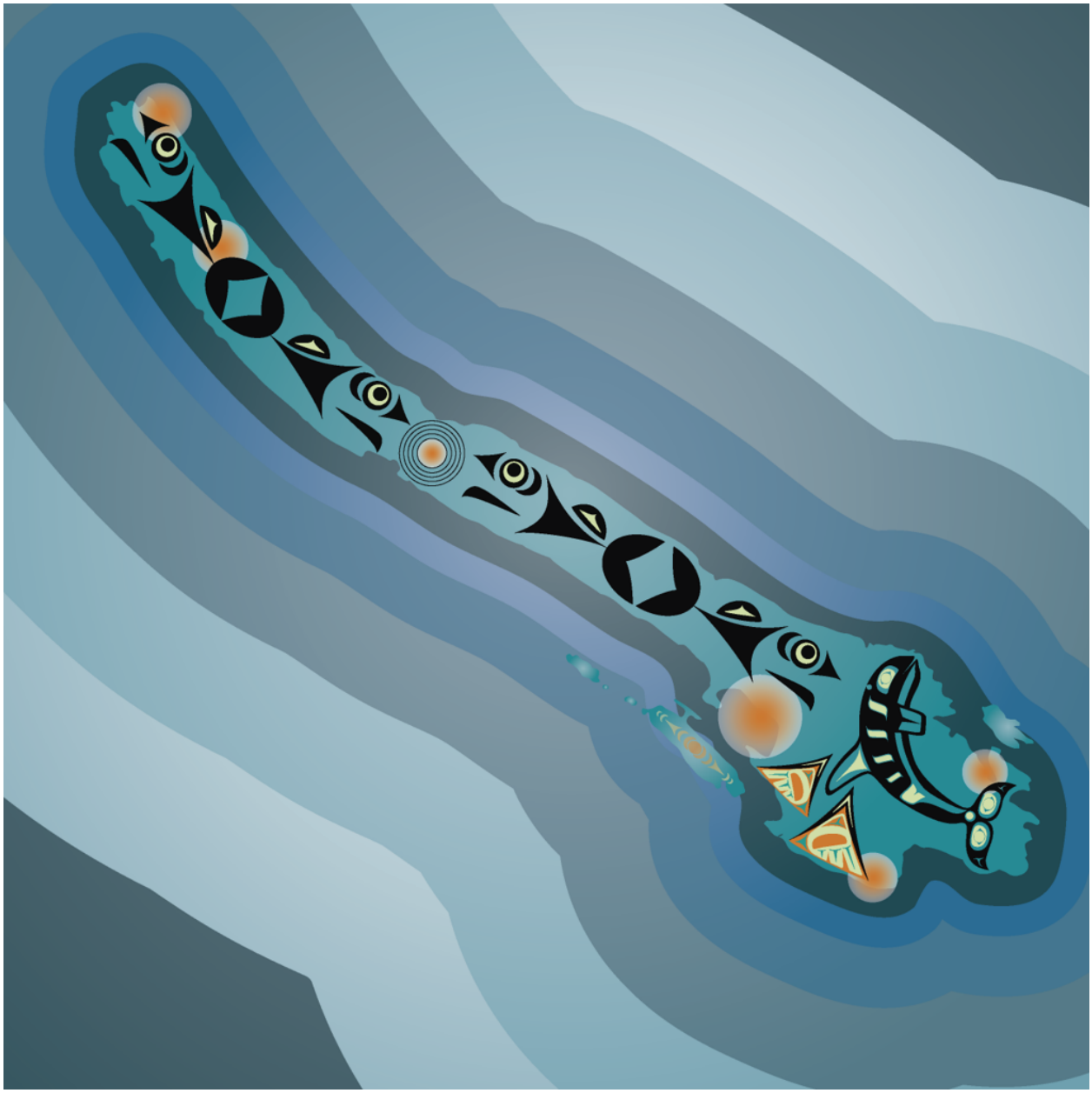

June 2022
Galiano Conservancy Association

"What I've been told is that the main source, the main lifeblood for connection, the main thing for connecting us was the waterways, was the ocean, was the different straits.

And so each bay, each inlet, each point of the island had its own name, and each name was tied to a different family, a different house, a different community... and how the names are attached... was how you understood the place.

And so the whole island was accessed through our canoes, and you don't park your canoe here, travel up the island to the other end, get on another canoe and come back to your canoe. Your canoe is your connection... And so this idea of one continuous part of the island, and having one name for that whole strip, just... it didn't make sense."

"Places like Galiano didn't traditionally have one name for the whole island, it was the waterways that had whole names."

"When we say we claim it, we don't have full claim to every square inch of the island. That is a colonial way of thinking, that is not the traditional way of thinking. You don't throw a blanket over everything and say that that's yours. You have different rights and responsibilities in different places, it's part of the seasonal round. And that seasonal round overlaps, where even at different times of the year different peoples will have connection.

It's why a place like Galiano can have 37 different First Nations that have some form of claim on the island. And it gets really complicated if you only view the island as one whole thing separate from the other islands around it."

"But growing up, the water was a barrier, right? And traditionally, that wasn't the way it should be, the water should be the connection."

- Levi Wilson
  Interview ~ July 21, 2021

Introduction

What Is An Island?

We begin this report with a fundamental paradox which we have wrestled with:

Islands are, by definition, discrete entities. And yet, it is impossible to separate an island from the surrounding waters, from its archipelago, or from the rest of the world.

Nevertheless, for the purposes of this project, that is exactly what we have done. This simultaneously simplifies a complex reality and creates complications, as Levi Wilson[6] shared with us on the previous page. It is, however, necessary to perform the analysis we set out to do, and we believe it also reflects the distinctive community that has developed on and around Galiano Island in the time since European colonization of the region.

Keeping this in mind, we ask the reader to consider what Dr. Beate Ratter shared with us:

> "When I speak about islands, I think you can have two pictures in your mind: a specific Island, which is this definition, a piece of land surrounded by water, and you think that it's definite and it's exact and there is a boundary. But if you look closer, there is no real boundary. And there is no real limitation, because each island population is specifically identified through the connection to other islands or to the mainland."[7]

And - we would add, based on our conversations with island residents - to the water itself.

Therefore, we try to hold these seemingly contradictory understandings of the concept of an "island" together at the same time. We do so while contemplating **two-eyed seeing**,[8] which has been described by Mi'kmaw Elder Albert Marshall as " to see from one eye with the strengths of Indigenous ways of knowing, and to see from the other eye with the strengths of Western ways of knowing, and to use both of these eyes together."[9] This concept informs our presentation of the **Ecological Footprint** and **Biocapacity**, which are grounded in "Western" ways of knowing, alongside the **Ecological Fingerprint**, which has largely been informed by interviews with individual Indigenous people. We have taken

[6] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[7] Ratter, B., Henry, W., & Huggins, A. (2022, April 13). Beate Ratter interview - One Island One Earth Project.
[8] Terms that are defined in the glossary are written in **bold** the first time they appear in this report. Bold text is also used to emphasize key points throughout the text.
[9] Bartlett, C., Marshall, M., Marshall, A. (2012). Two-eyed seeing and other lessons learned within a co-learning journey of bringing together indigenous and mainstream knowledges and ways of knowing. Journal of Environmental Studies and Sciences, 2, 331–340.

different approaches to writing and presentation for these three analyses (see Parts II, III, and IV of this report). In the spirit of two-eyed seeing, then, we present two distinct but complementary descriptions of the island that we have come to know as Galiano.

1) Galiano Island, "Gem of the Salish Sea"

Galiano Island is a Southern Gulf Island located in the Strait of Georgia between Vancouver Island and the lower mainland of British Columbia, Canada. It is located in the Coastal Douglas-fir biogeoclimatic zone, or CDFmm. The CDFmm hosts the highest density of rare species of Provincial and global concern in BC, and is considered to be imperilled.[10] Galiano Island has a mediterranean type climate with rainy winters and very dry summers.

Situated between the two growing urban centres of Vancouver and Victoria, Galiano is a rural community with a year-round population of 1,396[11] and, by our estimates, a comparable number of part-time residents. Although it is small, pressures to develop and change the natural landscape are tremendous.[12] Seasonal tourism is one of the main industries, with an estimated 80,200 visitors in 2007.[13] The Galiano Island Chamber of Commerce advertises the island as the "Gem of the Salish Sea."[14]

[10] Austin, M.A., Buffett, D.A., Nicolson, D.J., Scudder, G.G.E., & Stevens,V. (eds.). (2008). Taking nature's pulse: The status of biodiversity in British Columbia. Biodiversity BC. http://www.biodiversitybc.org/assets/pressReleases/BBC_StatusReport_Web_final.pdf

[11] Statistics Canada. (2021). *Census Profile - Galiano Islands Trust Area.* https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=V0N%201P0&DGUIDlist=2021A0006590004&GENDERlist=1&STATISTIClist=1&HEADERlist=0&fbclid=IwAR2FY6x-CnYKMQFb7xmnnUkMo43VCVQPqkUe14NljQ8xPvegNNlYQrD9Pxc

[12] Islands Trust Conservancy. (2019). *Conservation Status of Galiano Island Trust Area.* https://islandstrust.bc.ca/wp-content/uploads/2019/12/Galiano-Island-LTA-Profile-1.pdf

[13] Ecoplan international. (2008). *Southern Gulf Islands Community Tourism Part 1: Tourism Profile.* https://www.crd.bc.ca/docs/default-source/salt-spring-island-ea-pdf/cedc/part_one-tourism_profile.pdf?sfvrsn=2

[14] https://galianoisland.com/visitor-information/about-galiano

Galiano relies heavily on imported goods for energy, food, housing and other essentials, as this report makes clear. Most year-round residents are low to middle income,[15] work multiple jobs, and depend to some extent on tourism. Basic services are often supplied by volunteer organizations. Land-use is governed by a unique, inter-island, special-purpose government called the **Islands Trust**.

Galiano Island is named after Dionisio Alcalá Galiano (8 October 1760 – 21 October 1805), a Spanish naval officer, cartographer, and explorer who mapped the Strait of Georgia in 1792.[16]

2) Galiano Island, Territorial Acknowledgements

> "You know the hwunitum[17] people think that they own the land and the water - they're only here for a little while. We've been here for a long time. We're rooted. We're rooted! We'll always be here. As First Nations people, we're rooted here. We know the land, we know the water."[18]

- Karen Charlie
  Interview ~ November 5, 2021

> "People have been everywhere on this coast, since forever, since time immemorial is the phrase: time immemorial, meaning time out of mind, time beyond what we can conceive. People have been here and have shaped so many different parts of our environment around us."[19]

- Levi Wilson
  Interview ~ July 21, 2021

During our interviews for this project, we spoke with a small number of hwulmuhw mustimuhw[20] living on and around Galiano Island. They shared knowledge, information about their families, and insights on the changes they have observed in their time on and around the island. Many of these observations and insights are presented in the Ecological Fingerprint section.

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[15] Statistics Canada. (2016). *Census Profile 2016 - Galiano Island Trust Area.* https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=DPL&Code1=590004&Geo2=PR&Code2=59&SearchText=Galiano%20Island%20Trust%20Area&SearchType=Begins&SearchPR=01&B1=All&GeoLevel=PR&GeoCode=590004&TABID=1&type=0

[16] See https://en.wikipedia.org/wiki/Dionisio_Alcal%C3%A1_Galiano

[17] White people. See "xwunítum" in https://www.sfu.ca/~gerdts/papers/HulquminumWords.pdf

[18] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

[19] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

[20] Indigenous People. See "xwulmuxw mulstímuxw" in https://www.sfu.ca/~gerdts/papers/HulquminumWords.pdf

As a form of territorial acknowledgement,[21] and in the interest of providing a brief orientation to the deep and complex relationships between hwulmuhw mustimuhw and the place commonly referred to as Galiano Island, we share here some of what we have learned from speaking with individual hwulmuhw mustimuhw, as well as resources for further reading. We do this with the understanding that "'Histories are not just 'out there'... Indigenous peoples' own narratives of place, language, culture and history undergo transformation through processes of selection, interpretation, revision, as well as integration and assemblage with other narratives."[22] Our intent here is to acknowledge what we can, recognizing that our own knowledge is limited and subjective.

Photo by: Jim Labounty

We have come to understand that many, diverse hwulmuhw mustimuhw have lived on and around Galiano Island and the Salish Sea since time immemorial. Karen Charlie, a Penelakut Elder living in the village of Yuxwula'us on Penelakut Island, told us:

> "The Salish Sea is our home. It's not just one area. It's everywhere. As far as we can travel, we can harvest."[23]

We have learned that Hul'qumi'num speaking peoples,[24] SENĆOŦEN-speaking W̱SÁNEĆ peoples,[25] Halkomelem-speaking peoples (including *sc̓əwaθən məsteyəxʷ* - Tsawwassen), and other hwulmuhw mustimuhw of the Salish Sea all have long-standing relationships with the Southern Gulf Islands, of which Galiano is a part. Karen explained to us:

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[21] See Sandilands, C., Menzies, E., & Wilson, L. (2020). Territorial Acknowledgement. In *Rising tides: Reflections for climate changing times*. essay, Harbour Publishing.

[22] Abramczyk, U. (2017). *Hul'qumi'num peoples in the Gulf Islands: Re-storying the Coast Salish Landscape* (thesis). Retrieved on May 9, 2022 from https://dspace.library.uvic.ca/bitstream/handle/1828/8507/Abramczyk_Ursula_MA_2017.pdf?sequence=1&isAllowed=y

[23] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

[24] Evans, B., Gardner, J., & Brian Thom. (2005). (rep.). *Shxunutun's Tu Suleluxwtst In the footsteps of our Ancenstors: Interim Strategic Land Plan for the Hul'qumi'num Core Traditional Territory*. Ladysmith, BC: Hul'qumi'num Treaty Group.

[25] Elliott, D., & Poth, J. (1990). *Saltwater people: A resource book for the Saanich Native Studies Program*. School District 63 (Saanich).

> "It's shared amongst the Coast Salish people. That's how our connections were made, by... having family throughout the tribes. But Penelakut used to be, they used to live here.[26]

Members of the Spune'luxutth' (Penelakut) First Nation, whose reserves include the northwest tip of Galiano Island and nearby Penelakut (formerly Kuper) Island, include descendants of families who lived in the villages of Yuxwula'us, Puneluxutth', Hwlumelhtsu (Lamalcha), and Xixnupsum (Baines Bay).[27] Penelakut Elder Florence James told us that these families made extensive use of the lands and waters of Galiano Island:

> "That's where they lived. People like saying camp, but camp isn't the word... they lived there. Because they practiced, in your words, "conservation." They lived in one place, then they moved to the next. They protect that place and leave it, because the clams down here, you go about a year and a half before they start doing better again, and then you go back and it's replenished. So our people would move, keep moving. And that's how they conserve their food, that's how they sustain the foods."[28]

Penelakut mustimuhw, including Karen and Florence, maintain close relationships with Galiano Island and continue to harvest foods from the land and water. Karen told us:

> "My soul needs to be fed salmon. My soul needs to be fed deer meat. If I don't have that sea urchin - wow, I just don't feel right. It's all a part of me, you know, even the taste of the ocean, that's a part of me."[29]

We have met and learned from hwumluhw mustimuhw living on Galiano Island as well. The Coast Salish Peoples of Galiano Society (CSPGS), formed in 2021, worked with us on this project and conducted interviews with members that informed this report. Shar Wilson, the manager of CSPGS, told us:

> "The Coast Salish peoples of Galiano Island are made up of descendants of Indigenous women who were here prior to Canada being a country, prior to BC being a province. And they married and they settled on these islands, and they

[26] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[27] McLay, E., Bannister, K., Joe, L., Thom, B., & Nicholas, G. (2004). (rep.). *'A'lhut tu tet Sulhween - Respecting the Ancestors: Report of the Hul'qumi'num Heritage Law Case Study*. Hul'qum'Num Treaty Group.
[28] James, F., Fournier, S., & Thompson, M. (2021, November 16). Florence James Interview - One Island, One Earth Project.
[29] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

had children and grandchildren and great grandchildren. And in spite of everything that's happened, they are an Indigenous group that are themselves Coast Salish."[30]

Shar also told us that hwulmuhw mustimuhw living on Galiano Island include descendants of Henry Georgeson, a Scottish settler and keeper of the Active Pass lighthouse, and Sophie Georgeson, a hwulmuhw woman of xʷməθkwəy̓əm (Musqueam) and Quw'utsun (Cowichan) descent,[31] documented in a death certificate as "Sar Augh Ta Naogh."[32] We have learned that members of these families have made significant efforts to bring this history to light.[33] [34] Bob Wilson spoke about this process:

"And I learned a lot about family and family members that I never really knew a whole lot about. It was, it was good. And I learned our connection to the island was... stronger than I'd, than I thought. We can date back to the 1850s, I believe, or possibly even a little further... and you look around the island and our family is really strong. And I'm really proud of that. We've all provided for ourselves, always."[35]

This provisioning includes forestry, fishing, and hunting, which members of the Coast Salish Peoples of Galiano Society told us they continue to practice on and around Galiano Island. We've included some of their observations from these activities in the Ecological Fingerprint section of this report (Part IV).

We have also learned that many locations on Galiano Island show clear signs of thousands of years of occupation, and that these places continue to be culturally important. Levi Wilson, an educator and member of the Gitga'at First Nation with strong family connections to the Hwlumelhtsu (Lamalcha) peoples, met with us at a site where this is self-evident:

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[30] Wilson, S., Smith, J. L., Huggins, A., & Thompson, M. (2021, August 21). Shar Wilson and James Smith interview - One Island One Earth Project.
[31] Steph document. Family archive.
[32] Death Certificate. Family archive.
[33] See Wilson, S. (2020). *Lelum Sar Augh Ta Naogh "Stepping Into the Light".* Coast Salish Peoples of Galiano Society. https://www.sustainableislands.ca/_files/ugd/df129c_5fd08e5f160d40f5b40c1242a2a81fc5.pdf
[34] See Georgeson, R., & Hallenbeck, J. (2018). We Have Stories: Five Generations of Indigenous Women in Water. *Decolonization: Indigeneity, Education & Society*. 7(1), 20-38. https://jps.library.utoronto.ca/index.php/des/article/view/30390/23052
[35] Wilson, B., Wilson, S., & Wilson, R. (2021). Bob Wilson interview - Coast Salish Peoples of Galiano Society.

> "We're meeting today at a place in English known as Montague Harbour... that I have since come to know as Sum'nuw', which means "the encircling place or "the enclosed place", or something related to that. It is what some people would call a midden - I call [it a] manufactured landscape. It is a site where, I assume, many, many generations of my ancestors have helped cultivate the landscape to promote growth of life [and] promote safety in the inner harbour to make this place better over thousands and thousands of years."[36]

In recognition of Levi's earlier point that every individual bay and important place on the island holds significance, we will highlight several well-known locations identified by name on maps published by the Hul'qumi'num Treaty Group (HTG), of which Penelakut First Nation is a member at the time of writing. The information below is derived from HTG materials, interviews, and several secondary sources; it is meant to be illustrative, not comprehensive.

- Sqthaqa'lh - Active Pass

  Spthaqa'lh is a critical travel corridor between the protected waters of the Southern Gulf Islands and Sutl'quluts (the Strait of Georgia). It is a traditional harvesting area for skw'itth'i' and xihwu (sea urchins), thikwt (sea cucumber), sqi'mukw (octopus), 'e s-hw (harbour seal), shes and ts'axulus (Stellar's and California sea lions), sce:lhtun (salmon), eeyt (lingcod), and stsa'tx (halibut).[37] It once supported large populations of q'am' (bull kelp), which have since diminished.[38] It is also the site of Shxixnetun, where Xeels, the transformer, left his footprint behind as he stepped from the mainland to Vancouver Island.
- Sqtheq - Porlier Pass

  Sqtheq is a travel corridor between the protected waters of the Southern Gulf Islands and the Sutl'quluts. It is a traditional fishing area for slhewut' (herring) and sce:lhtun,[39] and an important harvest area for pinnipeds, including 'e s-hw, shes, and ts'axulus.[40] The historical village of Xixnupsum and the prehistoric villages in Dionisio Point Park open onto the pass, which is shared with Leeyqsun and other Hul'qumi'num mustimuhw.
- Sum'nuw' - Montague Harbour

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[36] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[37] Evans, B., Gardner, J., & Brian Thom. (2005). (rep.). *Shxunutun's Tu Suleluxwtst In the footsteps of our Ancenstors: Interim Strategic Land Plan for the Hul'qumi'num Core Traditional Territory*. Ladysmith, BC: Hul'qumi'num Treaty Group.
[38] Sandilands, C., & Georgeson, R. (2020). A Lifetime with Bull Kelp. In *Rising tides: Reflections for climate changing times*. essay, Harbour Publishing.
[39] Evans, B., Gardner, J., & Brian Thom. (2005). (rep.). *Shxunutun's Tu Suleluxwtst In the footsteps of our Ancenstors: Interim Strategic Land Plan for the Hul'qumi'num Core Traditional Territory*. Ladysmith, BC: Hul'qumi'num Treaty Group.
[40] Rozen, D. L. (1985). *Place-names of the island Halkomelem Indian people* (thesis). University of British Columbia, Vancouver, B.C.

Sum'nuw' is the location of extensive middens and sites of occupancy dating back over three thousand years.[41] The peninsula has been extensively modified by hwulmuhw mustimuhw to enhance local resource harvest opportunities,[42] including for fish, clams, skw'itth'i' and xihw, and seaweed.[43] We have observed that culturally important plants that are rare or absent elsewhere on Galiano are present on and around the midden areas, including sxwesum (soapberry).

- Qwulwi'us (Qw'xwulwis)

  Sheltered coves along the east coast of Galiano Island were commonly used as camping and harvest areas by hwulmuhw mustimuhw prior to departing and after returning from traditional fishing grounds and villages on Shnuwiilh (the Fraser River).[44]

- Xetthequm - Retreat Cove

  The Institute for Multidisciplinary Ecological Research in the Salish Sea is currently piloting a project to "weave together Indigenous ways of knowing and Western ecological science into an ecocultural map of Retreat Cove."[45]

In naming these places, we wish to acknowledge the many generations of hwulmuhw mustimuhw that have lived and continue to live on and around Galiano Island, and to thank the people who shared their knowledge with us for this report. We wish also to acknowledge the cumulative and ongoing impacts of genocide, colonialism, and residential schools on hwumluhw mustimuhw of the Salish Sea,[46] brought into sharp relief during the course of this project by the discovery of over 160 unmarked graves at the site of the former Kuper Island residential school on Penelakut Island in July of 2021.[47]

Below, we have provided direct links and citations to published resources for those who wish to learn more about this shared and unceded territory.

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[41] Easton, N. A., & Moore, C. D. (1991). Test excavations of subtidal deposits at Montague Harbour, British Columbia, Canada-1989. *International Journal of Nautical Archaeology*, *20*(4), 269–280. https://doi.org/10.1111/j.1095-9270.1991.tb00323.x

[42] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

[43] Evans, B., Gardner, J., & Brian Thom. (2005). (rep.). *Shxunutun's Tu Suleluxwtst In the footsteps of our Ancestors: Interim Strategic Land Plan for the Hul'qumi'num Core Traditional Territory*. Ladysmith, BC: Hul'qumi'num Treaty Group.

[44] James, F., Fournier, S., & Thompson, M. (2021, November 16). Florence James Interview - One Island, One Earth Project.

[45] See https://imerss.org/2019/01/01/ecocultural-mapping-pilot/

[46] See CBC Podcasts. (2022, May 17). *Unraveling the legacy of Kuper Island, one of Canada's most notorious residential schools | CBC Radio*. CBCnews. Retrieved May 20, 2022, from https://www.cbc.ca/radio/podcastnews/kuper-island-podcast-1.6418675

[47] Wilson, C. (12 July, 2021). *About 160 unmarked graves found at Penelakut Island Residential School site, Tribe says*. Victoria Times Colonist. Retrieved May 20, 2022, from https://www.timescolonist.com/local-news/about-160-unmarked-graves-found-at-penelakut-island-residential-school-site-tribe-says-4690640

Select Resources

Abramczyk, U. (2017). *Hul'qumi'num peoples in the Gulf Islands: Re-storying the Coast Salish Landscape* (thesis). Retrieved on May 9, 2022 from https://dspace.library.uvic.ca/bitstream/handle/1828/8507/Abramczyk_Ursula_MA_2017.pdf?sequence=1&isAllowed=y

Arnett, C. (1999). *Terror of the Coast - Land Alienation and on Vancouver Island and the Gulf Islands 1849 -1863*. Talon Books, Burnaby, BC.

Barman, J. (2004). *The remarkable adventures of "Portuguese Joe" silvey*. Harbour Publishing, Madeira Park, BC.

CBC Podcasts. (2022, May 17). Unravelling the legacy of Kuper Island, one of Canada's most notorious residential schools | CBC Radio. CBCnews. Retrieved May 20, 2022, from https://www.cbc.ca/radio/podcastnews/kuper-island-podcast-1.6418675

Cryer, B. M., & Arnett, C. (2007). *Two houses half-buried in sand: Oral traditions of the hul'q'umi'num' Coast Salish of Kuper Island and Vancouver Island*. Talonbooks, Vancouver, BC.

Evans, B., Gardner, J., & Brian Thom. (2005). (rep.). *Shxunutun's Tu Suleluxwtst In the footsteps of our Ancenstors: Interim Strategic Land Plan for the Hul'qumi'num Core Traditional Territory*. Ladysmith, BC: Hul'qumi'num Treaty Group.

Georgeson, R., & Hallenbeck, J. (2018). We Have Stories: Five Generations of Indigenous Women in Water. *Decolonization: Indigeneity, Education & Society*. 7(1), 20-38. https://jps.library.utoronto.ca/index.php/des/article/view/30390

Georgeson, R., Charlie, K., Blaney, F., Wilson, E., Charles, C. L., & Hallenbeck, J. (n.d.). *The water we call home*. The Water We Call Home. Retrieved April 26, 2022, from https://www.thewaterwecallhome.com/

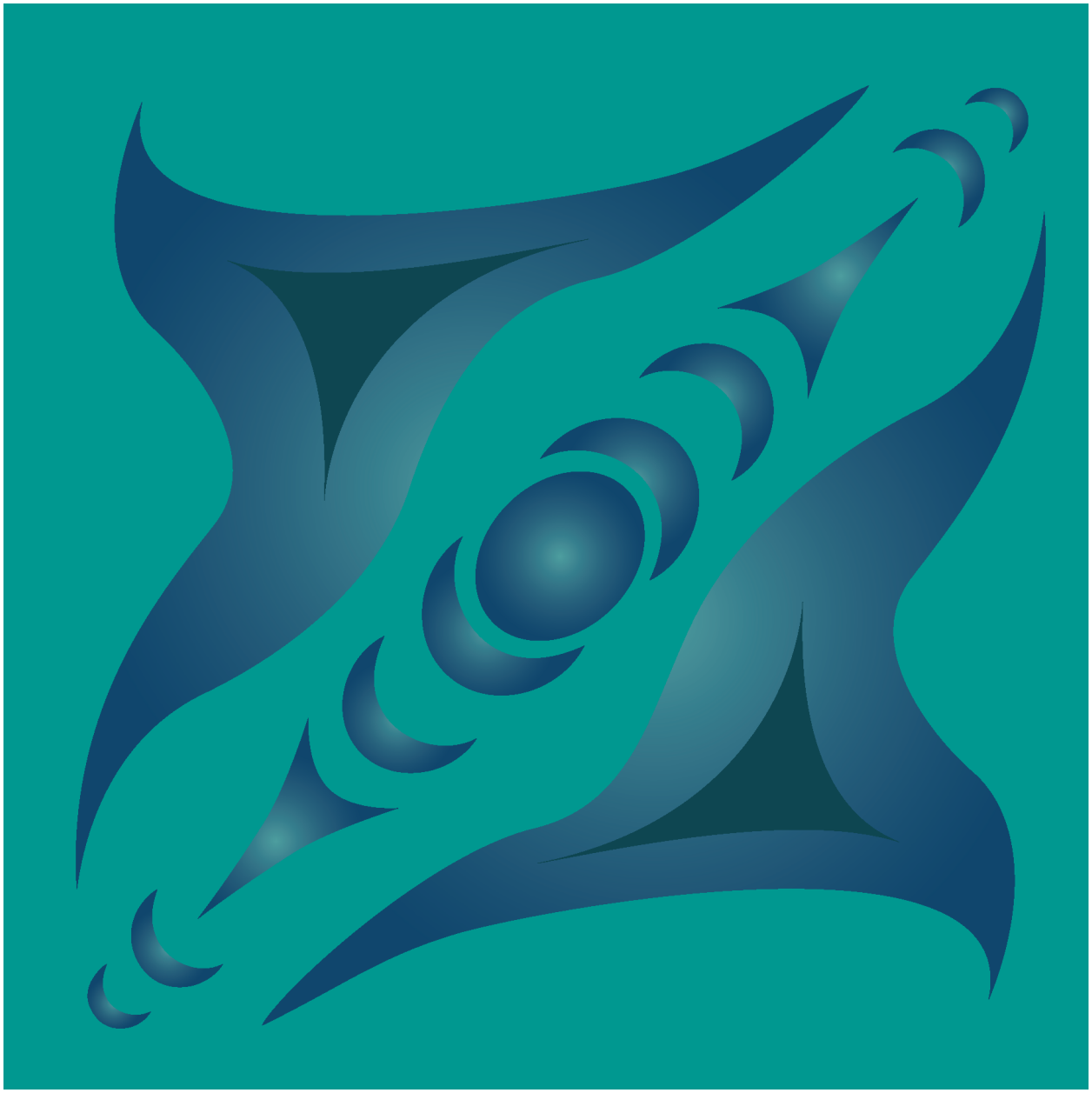
Hallenbeck, J. W. (2019). *The water we call home : five generations of Indigenous women's resistance along the Salish Sea* (thesis). University of British Columbia, Vancouver, BC.

McLay, E., Bannister, K., Joe, L., Thom, B., & Nicholas, G. (2004). (rep.). *'A'lhut tu tet Sulhween - Respecting the Ancestors: Report of the Hul'qumi'num Heritage Law Case Study*. Hul'qum'Num Treaty Group.

Wilson, R., Access to Media Education Society, & Galiano Conservancy Association. (2018). *Acknowledging Our Shared Territory*. *Vimeo*. Retrieved April 26, 2022, from https://vimeo.com/275778636.

Wilson, S. (2020). *Lelum Sar Augh Ta Naogh "Stepping Into the Light".* Coast Salish Peoples of Galiano Society. https://www.sustainableislands.ca/_files/ugd/df129c_5fd08e5f160d40f5b40c1242a2a81fc5.pdf

Part II: Biocapacity



June 2022
Galiano Conservancy Association

Background

The **One Island, One Earth** project includes three separate but complementary analyses, each aimed at determining the Biocapacity, the Ecological Footprint, and the Ecological Fingerprint of the Galiano Island community. Part II of this report summarizes the results of our Biocapacity analysis; for the Ecological Footprint, see Part III, and for the Ecological Fingerprint, see Part IV.

Biocapacity represents the potential productivity of an area's biologically productive land and water surface.[48] Biocapacity is assessed in **global hectares (gha)**, a unit of measurement representing the productivity of an average bioproductive hectare on earth.[49]

What this means in practice is that areas of land (or water) that are above global average productivity will contribute more than one global hectare per hectare to the biosphere, whereas areas that are below global average productivity will contribute less than one global hectare per hectare. For example, a single hectare of a sagebrush desert ecosystem will almost certainly contribute fewer global hectares to the biosphere than a single hectare of tropical rainforest ecosystem. This system recognizes that, fundamentally, some surface areas of the planet have greater potential to support life than others.

Biocapacity is an annual measure of primary productivity, and therefore accounts only for those resources which are regenerated renewably on an annual basis. This is very important: it means that non-renewable resources which are used widely by humans, such as oil or copper, are not captured in a Biocapacity analysis. It also means that standing biomass, or the accumulated 'natural capital' of ecosystems, only *indirectly* informs biocapacity (by underwriting primary productivity), but does not in and of itself contribute to biocapacity totals.

In the simplest terms, if all of the Earth's ecosystems represented the capital invested in a bank account, then the Earth's Biocapacity is the annual interest that accrues on that account. Earth's residents may then choose how to spend that interest, and these expenditures are captured by the Ecological Footprint. If Earth's residents choose to spend more than the amount of the interest / Biocapacity, they begin to draw into the capital of the account, lowering the interest-generating amount for future generations. This is called **Overshoot**.

We decided to undertake a Biocapacity analysis for Galiano Island in order to help contextualize the Ecological Footprint results (see Part III), as well as to quantify some of the benefits provided by island ecosystems to the Galiano Island community and, by extension, to the biosphere.

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[48] The Global Footprint Network defines "productivity" as the amount of biological materials useful to humans that is generated in a given area. Productivity that isn't useful to humans is not taken into account. See Global Footprint Network. (2022). Glossary. https://www.footprintnetwork.org/resources/glossary/#:~:text=It%20is%20the%20ratio%20of,primary%20product

[49] Ibid.

Methods

The following datasets were provided to the **Global Footprint Network**[50] and used to estimate the Biocapacity for Galiano Island.

- Aerial Imagery - 2017 Aerial Imagery (Open access through the Islands Trust)
- Carbon sequestration values
    - Evaluation of Carbon Storage within Forests in the Coastal Douglas Fir Zone[51]
    - Carbon and Biodiversity Mapping and Assessment for the Islands Trust Area[52]
    - Datasets are available upon request from the Islands Trust Conservancy
- Land Use Map - Using 2017 and 2021 aerial imagery, we updated the land use map of Galiano Island for the first time since 2004. Both land use maps can be found in Appendix A.
- Marine **Net Primary Productivity** - 2018 catch numbers for the Pacific West Coast of Canada. Requested from Sea Around Us.
- Marine Buffer - Unlike nation states, small islands in the Salish Sea do not assert an **Exclusive Economic Zone**, or EEZ. After much discussion, we decided to create a 2 km buffer around Galiano Island and the surrounding "satellite" islands (Parker, Gossip, Wise, Charles, Sphinx and Julia) to use for generating an estimate of marine Biocapacity. We created similar buffers around Valdes, Penelakut, Salt Spring, Mayne, Prevost, Wallace, and Secretary Islands, and wherever overlap occurred with the Galiano Island buffer, we reduced the buffer to the midpoint between shorelines. We made this delineation as an attempt to represent a reasonable, non-overlapping zone of marine Biocapacity to inform this analysis. It is not meant to imply or claim any form of exclusivity of use.

Figure 4. The buffer area used to calculate the marine Biocapacity for the One Island, One Earth project.

[50] See https://www.footprintnetwork.org/
[51] Seely, B. (2012). *Evaluation of Carbon Storage within Forests in the Coastal Douglas Fir Zone.*
[52] Schuster, R. (2014). *Carbon and Biodiversity Mapping and Assessment for the Islands Trust Areas.* https://islandstrust.bc.ca/wp-content/uploads/2020/11/carbonassessment.pdf

Results

The following is our summary of the results provided to us by the Global Footprint Network; for their technical report, please visit www.galianoconservancy.ca/oneisland.

Terrestrial Biocapacity

The natural, undeveloped landscape of Galiano Island has an area of **5,681 hectares (ha)** and a Biocapacity of **7,750 global hectares (gha)**. This means that a hectare of natural land on Galiano Island is approximately **36% more productive than an average bioproductive hectare on planet earth.**

*Table 1. Biocapacity results by land class. For descriptions of land classes, see Appendix A. **The biocapacity of developed land (roads, utility corridors, etc.) represents the biocapacity potential of the space, 100% of which is currently being 'used' by the infrastructure on top of it, and is not otherwise accessible.*

Summary By Land Class:	Area Hectares	Biocapacity Global Hectares	% of Total Biocapacity
Rural Settlement	699	**965**	7%
Herbaceous	11	**9**	0%
Woodland	137	**111**	1%
Agriculture	77	**44**	0%
Young Forest	1,597	**2,149**	14%
Mature Forest	1,522	**2,318**	16%
Wetland	79	**63**	0%
Pole Sapling	921	**1,239**	8%
New Young Forest	456	**614**	4%
Cliffs	38	**50**	0%
Littoral	5	**6**	0%
Lacustrine	20	**11**	0%
Old Growth Forest	4	**5**	0%
Recent Harvest	47	**63**	0%
Riparian	68	**105**	1%
Natural Land	5,681	**7,750**	52%
(Subset: Protected Areas)	*1,702*	*2,361*	*16%*

Marine	10,112	**6,596**	44%
(Subset: Rockfish Conservation Area)	*3,847*	*2,510*	*17%*
Total functional Biocapacity	15,793	**14,373**	97%
Developed Land**	312	**492**	3%
Total Biocapacity	16,105	**14,839**	100%

The above-average bioproductivity of Galiano Island is largely due to forested lands. A hectare of forest on Galiano Island is approximately **4% more productive** than an average hectare of forest globally, but is **48% more productive** than an average hectare of Canadian forest. This is because Canadian forests are less productive than average: a hectare of Canadian forest is 29% less productive than an average hectare of forest on earth, and is 11% less productive than a global hectare, considering all land-use types.

Other ecosystem types on Galiano Island also contribute to the terrestrial Biocapacity of Galiano Island, albeit less so. Some ecosystems on Galiano Island are more productive per hectare than a global hectare (e.g. Riparian), and some are less (e.g. Agriculture). These values are derived in part from regional reports (see Methods section), and in part from the National Footprint and Biocapacity Accounts.[53]

Marine Biocapacity

The 2km marine buffer for Galiano Island has an area of **10,112 hectares (ha)** and a Biocapacity of **6,596 global hectares (gha)**. The Biocapacity of marine ecosystems is generally less per hectare than terrestrial ecosystems; nevertheless, marine biocapacity makes up at least **44% of Galiano Island's Biocapacity.**

Biocapacity Per Capita

Put together, the terrestrial and marine Biocapacity of Galiano Island yield a total functional Biocapacity of **14,373 global hectares (gha).** This value is derived largely from the highly productive forest and marine ecosystems that characterize the island. As of January 2022, **33% of this Biocapacity is in protected areas**. Approximately 3% of Galiano

A Note on How We Value Ecosystems

Through the lens of **Ecosystem Services,** ecosystems provide human beings with:

- Provisioning Services (ex. food production)
- Regulating Services (ex. carbon storage)
- Cultural Services (ex. recreation)
- Supporting Services (ex. nutrient cycling)

The metric of Biocapacity focuses narrowly on quantifying biological productivity in order to assess the human demand on ecosystems. It tells us nothing about biodiversity or other critical Ecosystem Services, such as air purification, water retention, or spiritual connection.

For example, while the 'Wetland' land class appears to make a low contribution to terrestrial Biocapacity in numerical terms, wetlands are incredibly valuable ecosystems in terms of biodiversity, water purification and storage, and flood mitigation.

It is also likely that current Biocapacity assessments underestimate the productivity of certain ecosystems, including wetlands and seagrass meadows, for which data are limited.

[53] The specific calculation factors (including Yield Factors) can be downloaded at www.footprintnetwork.org/licenses/calculation-factors-free/

Island's *potential* Biocapacity is currently tied up in human infrastructure, and therefore not included in the total.

Considering the effective population of Galiano Island (1,396 people full-time residents, plus 1327 full-time equivalent seasonal residents),[54] the Galiano Island community enjoys about **5.4 global hectares per capita.** This is a third of the Canadian average, but significantly higher than world average.

*Table 2. Galiano results in context. Source: Global Footprint Network National Footprint Accounts. 2018 values. *Land Area excludes the Biocapacity of marine areas. **See Part III of this report for a discussion of the Ecological Footprint of the Galiano Island community. This value accounts for 1396 full-time residents and 1327 full-time equivalent residents (based on estimates of part-time residents and tourists).*

Population	**Total Biocapacity** (gha/cap)	**Land Area* Biocapacity** (gha/cap)	**Total Ecological Footprint** (gha/cap)
Galiano Island (2723 full-time equivalent residents)	5.4	3.0	6.8**
Canadian Average	14.8	11.5	8.2
World Average	1.6	1.4	2.8

Land Use Change Over Time

To estimate the Biocapacity of Galiano Island, we updated the land use map for the island for the first time since 2004. We used the same categories employed in the Galiano Island UP-CLOSE report,[55] with some minor updates.

Notable changes over the past two decades include:

- **Forest succession of the majority of recently harvested areas** to pole sapling and pole sapling to young forest, with some conversion of recently harvested areas to rural settlement
- **8% Increase in wetland area** and increased flooding within wetland areas due to beaver activity
- **34% reduction in agricultural land use**, with conversion to rural settlement or wetland
- **37% Increase in rural settlement area** through conversion of other land uses

Small changes in the area of "Littoral" and other minor ecosystems are due to improvements in detection with access to higher quality 2021 aerial imagery, as well as the addition of Wise, Charles, Sphinx, and Julia islands, which were not included in the 2004 Land Use map. See Appendix A for a detailed description of the land use classes.

[54] See discussion of the Galiano Island population in Part III of this report.
[55] Emmings, K., & Erickson, K. (2004). *Galiano Island Landscape Classification and UP-CLOSE Workshop Series Final Report.* Galiano Conservancy Association, Galiano Island, BC.

*Table 3. Comparison of land use on Galiano Island from 2004 to 2021. * These % change values are attributable to improvements in mapping and the inclusion of Wise, Charles, Sphinx, and Julia Islands in 2021. ** 'Developed' includes roads, parking lots, gravel pits, utility corridors, exposed soil, and (sub)urban-style developments. 'Rural Settlement' includes the majority of island houses and associated developed areas.*

Land Use Class	2004 (%)	2021 (%)	Relative Change (%)	Overall Change (%)
Agriculture	1.94%	1.28%	-34%	-0.66%
Cliffs	0.64%	0.64%	-0.6%*	0.00%
Developed**	5.27%	5.33%	+1%	+0.06%
Herbaceous	0.20%	0.21%	+4%*	+0.01%
Lacustrine	0.21%	0.25%	+15%	+0.03%
Littoral	0.25%	0.27%	+7%*	+0.02%
Mature Forest	25.87%	25.31%	-2%	-0.57%
Old Growth Forest	0.07%	0.07%	-0.4%	0.00%
Pole Sapling	7.91%	15.30%	+93%	+7.38%
Recent Harvest	16.71%	1.45%	-91%	-15.26%
Riparian	1.17%	1.13%	-3%*	-0.04%
Rural Settlement	8.49%	11.64%	+37%	+3.15%
Woodland	2.32%	2.28%	-2%*	-0.04%
Wetland	1.30%	1.41%	+8%	+0.11%
Young Forest	27.63%	33.43%	+21%	+5.81%

Discussion

Terrestrial Biocapacity

The terrestrial ecosystems that comprise Galiano Island are **36% more productive than the global average**, despite their location at the 49th parallel. This value reflects the incredible productivity and carbon sequestration potential of forested ecosystems within the Coastal Douglas-fir biogeoclimatic zone (CDFmm).[56] These results demonstrate that the Galiano Island community's efforts to prevent the continued clear-cutting and development of forested lands on the island (see section on 'Forests' in Part IV of this report) yielded significant benefits in terms of Biocapacity, as these forested ecosystems make an outsized contribution to the total. Although not considered in this analysis, it is well known that terrestrial ecosystems in the CDFmm, including Galiano Island, harbour a **disproportionately high species biodiversity value** as well.[57] Ecosystems that appear to have a low overall contribution to Biocapacity - including wetland, woodland, and littoral (shoreline) areas - make a high contribution to supporting island biodiversity and other important values.

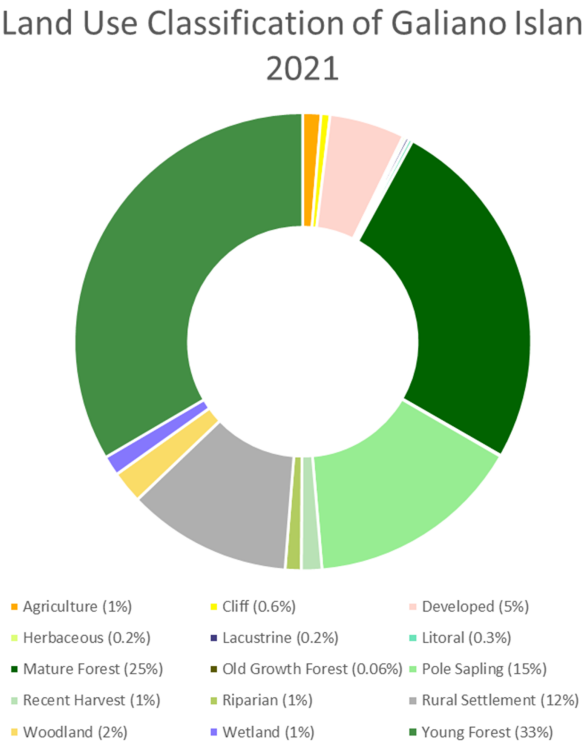

Figure 5. Galiano Islands Land Use, 2021

While an expert has informed us that the regional analysis of carbon sequestration values of CDFmm forests that we use in this report underestimated carbon storage values,[58] it is likely that the terrestrial Biocapacity of Galiano Island presented here is an overestimate, as the methodology cannot and **does not take into account environmental degradation at the local scale**. This means that factors such as topsoil loss (erosion) and compaction, hydrological modification, biodiversity loss, pollution, and other impacts to ecosystem health are not captured. Ecosystem degradation may also be masked behind fertilisers or other energy intensive practices (for example, in agricultural land) that "prop up" regional productivity values for these land use types. Galiano Island's terrestrial ecosystems have a long history of clear-cut logging, agricultural drainage, gravel extraction, soil compaction, development and other practices.[59] This history of degradation may have lessened the overall functional Biocapacity relative to

[56] Seely, B. (2012). *Evaluation of Carbon Storage within Forests in the Coastal Douglas Fir Zone.*
[57] See Austin, M.A., Buffett, D.A., Nicolson, D.J., Scudder, G.G.E., & Stevens,V. (eds.). (2008). *Taking nature's pulse: The status of biodiversity in British Columbia*. Biodiversity BC.
[58] R. S. Brinkman (personal communication, January 14, 2022)
[59] See Emmings, K., & Erickson, K. (2004). *Galiano Island Landscape Classification and UP-CLOSE Workshop Series Final Report.* Galiano Conservancy Association, Galiano Island, BC. https://galianoconservancy.ca/wp-content/uploads/2016/11/final_report_complete.pdf

assumptions used for this analysis. Nevertheless, it is clear that the terrestrial ecosystems of Galiano Island continue to yield substantial benefits in terms of Biocapacity, well beyond the Canadian average and the global average.

Marine Biocapacity

The area we chose to consider in order to calculate Galiano Island's marine Biocapacity (10,112 ha) is almost twice as large as the terrestrial area (5,681 ha), and provides just under half of Galiano's Biocapacity (44%). This reflects the relatively low productivity of marine ecosystems per hectare when compared to terrestrial ecosystems, but also the outsized contribution marine productivity provides to coastal communities.

It is important to note that the Galiano Island community has no legal jurisdiction over the waters surrounding the island; indeed, the marine ecosystems of the Salish Sea have been shared since time immemorial[60] and cannot be claimed by any single community (see the 'Water' theme in Part IV of this report). With this understanding, and **solely for the purpose of this analysis**, we settled upon the 2km marine buffer that was used to generate these figures by employing a set of assumptions designed to (somewhat) equitably distribute the marine Biocapacity of the Salish Sea between the islands and coastal communities on the mainland. We wanted other neighbouring islands to be able to replicate this analysis without "double-counting" marine Biocapacity.

The virtue of our approach is that every other small island community within the Salish Sea could employ it to generate a non-overlapping marine buffer in order to calculate local Biocapacity, while leaving a substantial portion of the surrounding waters to "serve" the larger urban communities of Vancouver Island and the Lower Mainland. Admittedly, however, there are many other approaches to this analysis that could have been taken (for example, by allocating marine biocapacity by community population as opposed to by coastline) that would certainly change the results.

Additional Marine Productivity

The Biocapacity methodology does not account for the productivity of kelp, eelgrass, and other non-fish productivity. If the methodology included bivalves, fish, algae, plankton, and eelgrass, it is likely that in our region marine Biocapacity would be higher than our current estimate.

Kelp and eelgrass ecosystems are extremely productive, and we are still learning a lot about them. Future assessments could incorporate new findings in this area to improve Biocapacity methods.

The average marine Biocapacity per hectare of western Canada's exclusive economic zone (EEZ) was used for this analysis. This may result in an underestimate, as marine primary productivity tends to be higher closer to the coast, and the EEZ includes both coastal and offshore areas. The 2km marine buffer around Galiano Island, which consists of productive near-coastal marine ecosystems of the Salish Sea, would be

[60] See Abramczyk, U. (2017). *Hul'qumi'num peoples in the Gulf Islands: Re-storying the Coast Salish Landscape* (thesis). Retrieved on May 9, 2022 from https://dspace.library.uvic.ca/bitstream/handle/1828/8507/Abramczyk_Ursula_MA_2017.pdf?sequence=1&isAllowed=y

expected to have higher Biocapacity than the average across the entire EEZ for western Canada. At the same time, our **Ecological Fingerprint** analysis (see Part IV of this report) suggests that many important fish, shellfish, and macroalgae species are less abundant today than they were in the past. This implies that, although the *potential* productivity of these ecosystems is quite high, these values are compromised by industrial overfishing, pollution, habitat loss (i.e., docks and coastal development), the effects of a warming ocean, and other impacts to the health of marine ecosystems.

We emphasize, then, that **the marine Biocapacity is meant to be illustrative**. We currently lack the locally relevant data to properly quantify marine productivity for the waters around Galiano Island, and we recognize that this productivity is shared among the many human and non-human members of the Salish Sea community. Ultimately, we made the decision to include marine Biocapacity in this analysis because we recognize that marine ecosystems have always been foundational to human communities, cultures, and economies in the Salish Sea, and continue to play an important (if diminished) supportive role.

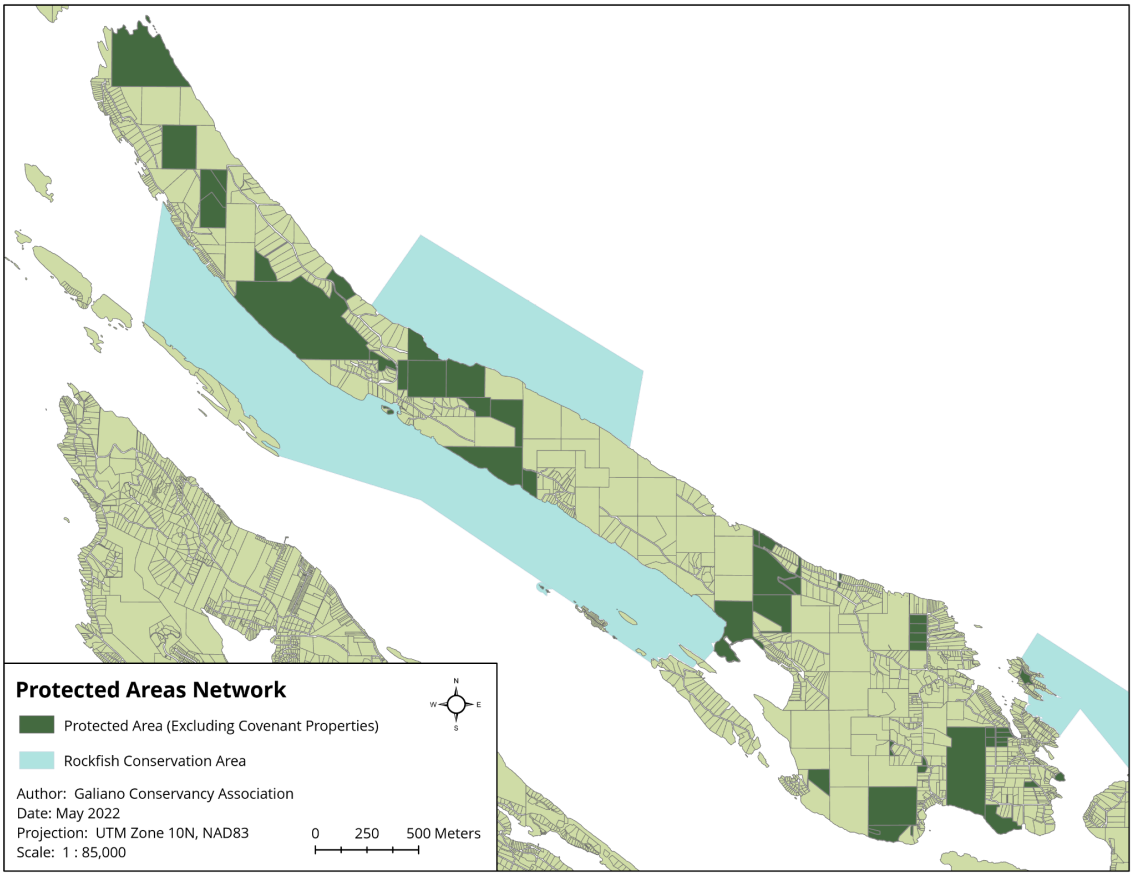

Figure 6. Protected Areas on Galiano Island Excluding Covenant Properties, 2022

Biocapacity Through Time

This report is a snapshot of Galiano Island's current Biocapacity, circa 2017-2021. The Biocapacity that we have estimated is not forever. Many factors can increase or decrease this value over time, including: development, land-use changes, ecological restoration, enhanced ecosystem management, climate change, natural disasters, pollution, and the unpredictable fluctuations of marine ecosystems.

As of January 2022, 16% of Galiano Island's Biocapacity existed within terrestrial protected areas, which comprised 28% of the island's land area.[61] **Rockfish Conservation Areas** in the surrounding waters accounted for an additional 17% of the Biocapacity. Therefore, **one third (33%) of Galiano Island's existing Biocapacity has some level of protection** in 2022.

A potential threat to Galiano's biocapacity is land-use change. In 2021, the land area of "Rural Settlement" on Galiano had increased by 37% relative to the 2004 area, or 3% overall. Newly "settled" areas were previously a combination of mature forest, young forest, pole sapling, developed land, agricultural land, and recently harvested forest land. This means that, while forest clearance and development are constrained on Galiano Island, some development continues to take place, with negative impacts on island Biocapacity. See Appendix A for land use maps from 2004 and 2021.

Comparisons

The relatively high Biocapacity of the lands and waters that comprise Galiano Island demonstrates that, if we were to treat the island as a microcosm of the world, 5.4 global hectares would be available to support each human community member (i.e., there are 5.4 gha/ca). In practice, of course, Biocapacity is fluid between contiguous areas such as the Salish Sea, and in a globalized economy **no community is "an island unto itself" in economic, ecological, and social terms.** Nearby cities such as Vancouver operate at a significant Biocapacity deficit[62] and require large areas of forest, farmland, ocean, and other natural and rural ecosystems to support them. In the past, many Galiano Island residents derived a significant amount of their basic livelihoods from the island itself (i.e., they relied *directly* on local Biocapacity), but in the present this is no longer the case, as the vast majority of resources are now imported to the island community from elsewhere. This regional and global interdependence means that looking at any community in isolation - as we do here - can only be done for educational and illustrative purposes, to understand the *relative* contributions made by local ecosystems.

Zooming out, Canadians on average have a Biocapacity of 14.8 gha/ca as a result of representing a relatively small population on a very large area of land and water. In contrast, Galiano Residents have only about one third of this Biocapacity available locally per capita. Globally, **the world's population has**

[61] This includes park lands, protected Crown lands, privately-held conservation lands, and conservation covenants.
[62] Rees, W., & Wackernagel, M. (1996). *Our ecological footprint: Reducing human impact on Earth*. New Society Publishers.

only about 1.6 gha/ca,[63] or much less than either Galiano Island or Canada enjoy. In the end, neither Galiano Island nor Canada are closed systems. While Canadians lay claim to a geographic area[64] that provides them with a disproportionate share of the Earth's Biocapacity, we argue that this does not necessarily entitle people who live in Canada to a disproportionate share of the Earth's productivity. Nevertheless, as we show in Part III of this report, that is exactly what Canadians - including the residents of Galiano Island - are using.

Conclusion

To our knowledge, this analysis represents the first time that a Biocapacity calculation has been attempted for a small island community. The results demonstrate that **Galiano Island contributes a disproportionately large amount of Biocapacity to the biosphere** relative to its size and geographic location**.** Most of this productivity is generated by intact forest and near-shore marine ecosystems, a significant percentage of which have some level of protection. This means that Galiano Island residents are acting as "stewards" of Biocapacity, and can take some pride in the accomplishments they have made in preserving productive natural areas. Efforts to maintain, restore, and enhance the productivity of island ecosystems will yield benefits for both Biocapacity *and* biodiversity.

At the same time, there are many threats to local, regional, and global Biocapacity that must be mitigated and addressed in order to maintain the productivity that the island community currently enjoys. Future work on this topic could examine how changes in marine ecosystems, and marine productivity in particular, impact Biocapacity calculations.

Finally, the concept of "Biocapacity" exists to provide a metric by which to judge the relative magnitude of the human Ecological Footprint - it is, simply put, the "numerator" in the equation of sustainability. At a global level, Biocapacity provides an annual "budget" for life on planet Earth; at a local level, Biocapacity represents Galiano Island's contribution to that budget. How island residents are currently spending (and exceeding) that budget is the subject of Part III of this report.

[63] See https://data.footprintnetwork.org/#/countryTrends?cn=5001&type=BCpc,EFCpc

[64] We note here that Canada is a settler colonial state, and its jurisdiction is contested by the many First Nations that fall within its self-defined "boundaries."

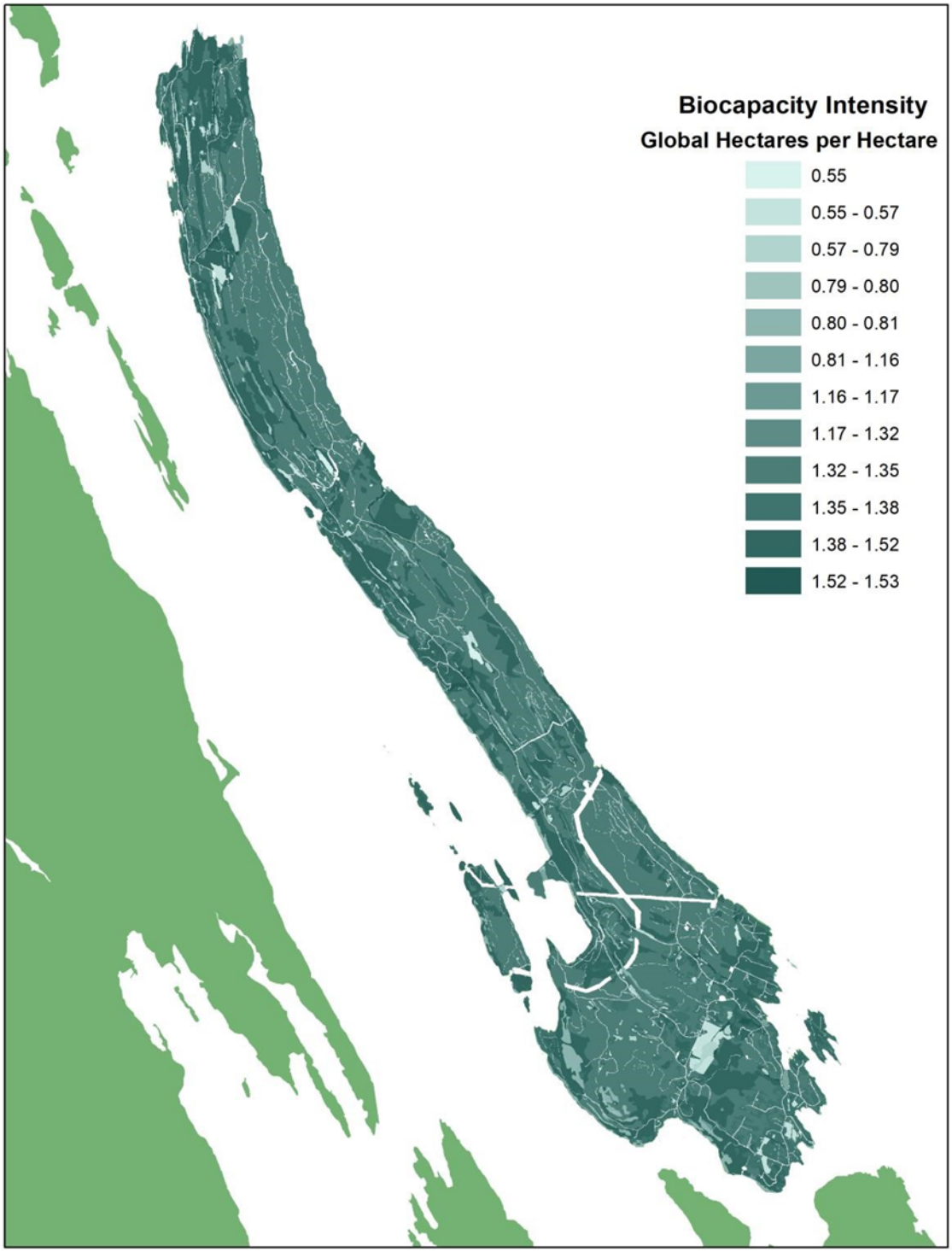

Figure 7. Terrestrial Biocapacity concentration across Galiano island ecosystems. Developed land areas and surrounding water areas are shown in white.

Part III: Ecological Footprint

June 2022
Galiano Conservancy Association

Background

Those who have frequented it know that the library at the Galiano Conservancy Association (GCA) office is a treasure trove of diverse titles relating to ecology and sustainability. Browsing the shelves, an attentive reader might come across a worn copy of a book entitled "Our Ecological Footprint: Reducing Human Impact on the Earth." This book, which introduced the concept of the Ecological Footprint to popular audiences for the first time, was published in 1996 on Gabriola Island, just a handful of kilometres to the north of Galiano Island. The concept has since been applied to municipalities, cities, states, countries, and the planet as a whole, but never - we note with some irony - to one of the islands from which it took flight.

It has, however, been applied to a small island at least once before.[65] Taking inspiration from the small island of Helgoland off the northwest coast of Germany, we attempt here to present an Ecological Footprint analysis for Galiano Island.

In their 1996 book, Dr. William Rees and his student Mathis Wackernagel defined the Ecological Footprint as "the land (and water) area that would be required to support a defined human population and material standard indefinitely."[66] In other words, it is an estimate of **how much biologically productive land and water area a population is depending upon to produce all the resources it consumes and to absorb the wastes it generates**. Like Biocapacity, the Ecological Footprint is assessed in global hectares (gha), a unit of measurement representing the productivity of an average bioproductive hectare on earth[67] (for a further discussion of this topic, see Part II of this report). Based on current global population figures and Biocapacity estimates, an average of 1.6 gha is available for each person on the planet if resources were distributed equitably *and* if human beings appropriated the totality of the annual bioproductivity of the planet.[68]

The Ecological Footprint has emerged as an important tool for communities to organize around to address climate change, and has been employed by many communities throughout British Columbia,

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[65] See Ratter, B., & Petzold, J. (2012). From Ecological Footprint to Ecological Fingerprint - sustainable development on Helgoland. In Larsen, K. T. (Ed.), *From One Island To Another - A Celebration of Island Connections* (pp. 191-204). Centre for Regional and Tourism Research.

[66] Rees, W., & Wackernagel, M. (1996). *Our ecological footprint: Reducing human impact on Earth*. New Society Publishers.

[67] The Global Footprint Network defines "productivity" as the amount of biological materials useful to humans that is generated in a given area. Productivity that isn't useful to humans is not taken into account. See Global Footprint Network. (2022). Glossary. https://www.footprintnetwork.org/resources/glossary/#:~:text=It%20is%20the%20ratio%20of,primary%20product

[68] In other words, this figure of 1.6 gha leaves no Biocapacity for non-human species, and is therefore a minimum threshold for sustainability.

including Vancouver,[69] Saanich,[70] and Powell River.[71] It is used to collect and frame useful baseline data at a community scale, allowing community members, organizations, and governments to work together to develop and measure progress towards priority climate actions. **Consumption data is grouped into five main categories**: food systems, buildings & stationary energy, consumables & waste, transportation, and water.

An important note regarding Ecological Footprint analysis: water infrastructure is assessed, but **water *availability* is not accounted for in this methodology**. We understand availability of freshwater to be of critical interest to small island communities in the Salish Sea, and were surprised to learn that it would not be considered within the analysis. As such, we have included a section on water that provides a summary of key points from recent reports on the topic produced by the Islands Trust, including the Aquifer Conceptualization Report,[72] Recharge Potential Mapping Report,[73] and Southern Gulf Islands Groundwater Availability Assessment Report.[74]

Methods

Community Gathered Data - "Bottom-up"

No municipal government exists on Galiano Island, making it difficult to obtain data about the community. Early on in the process, we identified lack of locally-relevant data as the most significant barrier to small island communities participating in Ecological Footprinting. To overcome this barrier, we created community surveys to fill data gaps that we identified with CHRM Consulting and the **BCIT Centre for Ecocities**, our project partners for the Ecological Footprint analysis. This "bottom-up" approach generates crucial data that would not otherwise be available, but is time-consuming and is generally considered to result in underestimates.

Surveys were made available digitally and in physical survey packages. Three local businesses, the Galiano Conservancy Association's office at the Millard Learning Centre, and the Galiano Saturday Market

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[69] BCIT, Cora Hallsworth Consulting. (2018). *ecoCity Footprint Tool Pilot - City of Vancouver.* https://commons.bcit.ca/ecocitycentre/files/2020/04/EcoCity-Footprint-Tool-Vancouver-Summary-Report-REV-MAR-18.pdf

[70] BCIT, Cora Hallsworth Consulting. (2018). *ecoCity Footprint Tool Pilot - City of Saanich.* https://www.saanich.ca/assets/Community/Documents/Saanich%20ecoCity%20Pilot%20Summary%20Report%20final.pdf

[71] BCIT, Cora Hallsworth Consulting. (2018). *ecoCity Footprint - City of Powell River*. https://powellriver.civicweb.net/document/75517/

[72] GW Solutions. (2021). *Islands Trust Area Aquifer Conceptualization Model.* *https://islandstrust.bc.ca/document/islands-trust-area-aquifer-conceptualization-report-ver-2021/*

[73] GW Solutions. (2021). *Islands Trust Area Groundwater Recharge Potential Mapping.* *https://islandstrust.bc.ca/document/islands-trust-groundwater-recharge-mapping-potential-project-report-ver-2021/*

[74] GW Solutions. (2021). *Islands Trust Area Groundwater Availability Assessment.* https://islandstrust.bc.ca/document/southern-gulf-islands-groundwater-availability-assessment-report-ver-2021/

served as pick-up and drop-off locations for survey packages. QR codes linking to the digital version of the Community Mail-Out survey were posted on poster boards across the island.

The following four surveys were created specifically for this project:

Odometer Survey

This two-part survey was designed to gain an understanding of how many kilometres Galiano Island residents drive both on-island and off-island on an annual basis. The survey launched on January 8th, 2021 and closed on August 3rd, 2021. In the first part of the survey, we asked island residents to provide a dated odometer reading on each vehicle they owned, vehicle make and model, and how many days a week they typically spend on Galiano Island. The second part of the survey was open from Sept ,1 2021 to Oct 9, 2021, and followed up with participants from the first survey to obtain updated odometer readings for each of their vehicles. Results were averaged over the length of the survey (based on dates and odometer values provided by each participant), extrapolated to obtain annual values, sorted by vehicle type, and then applied proportionately to vehicle ownership data for Galiano Island that we obtained from ICBC. Copies of both odometer surveys can be found in Appendix E.

Food Diary Survey

This detailed survey was designed to gain an understanding of the diets and food sourcing patterns of Galiano Island residents. In it, we asked participating households to track everything they ate over the course of one week. Food categories were listed with specific serving sizes, and participants had to identify whether the portions originated from off-island, or were grown, hunted, fished or foraged on-island. This survey ran twice, once in the spring and once in the summer of 2021, in order to account for seasonal shifts in local food consumption patterns. Surveys were accepted from April 4th, 2021 to Oct 15, 2021. Once we obtained the data, we adjusted for occasional inconsistencies due to labeling confusion (e.g. locally produced chocolate and bread were sometimes incorrectly assumed to be of "on-island" origin). Copies of the spring and summer surveys can be found in Appendix E.

Waste Tracker Survey

This survey was designed to gain an understanding of the material consumption and waste patterns of Galiano Island residents. In it, we asked participating households to separate and weigh any and all waste that they produced over the course of two weeks. Waste was divided into three major categories: "garbage," "recycling & compost," and "waste that you plan to burn". These categories were broken down into more specific subcategories. This survey ran twice, once in the spring and once in the summer of 2021, in order to account for seasonal shifts in local consumption patterns. Surveys were accepted from April 4th, 2021 to Oct 15, 2021. Copies of the spring and summer surveys can be found in Appendix E.

Community Mail-Out Survey

This brief survey was designed to solicit basic information from as large a number of Galiano Island residents as possible. The survey included questions about transportation, energy, water, waste, food, boat ownership and use, and attitudes about sustainability. Some questions covered topics related to

the other data collection initiatives. This survey was mailed out to the entire community on June 8th, 2021 and remained open until October 15, 2021. A copy of this survey can be found in Appendix E.

Public and Private Data Sources - "Top-down"

We also compiled data that is collected by Federal and Provincial governments, local NGOs and businesses, and regional governments. Some of this data was publicly available, and some was provided on request. Sources included:

- Statistics Canada - Population and private dwelling occupancy statistics for 2016 and 2021.
- ICBC - Make and model of all vehicles registered on Galiano Island in 2020.
- Galiano Island Recycling and Resources (GIRR) - Monthly weights for each recycling material category for the year 2019.
- Garbage Gals (private on-island garbage collection business) - Weight of garbage removed from the island to landfill in 2021.
- BC Hydro - Annual averages of electricity use on Galiano Island (2014-2020).
- Superior Propane - The weight of propane delivered to Galiano Island (V0N 1P0) in 2020.
- Salish Sea Renewable Energy Co-op (SSREC) - Estimates of how much electricity is generated locally by Galiano Island residents on an annual basis.
- Islands Trust - Publicly available GIS data layers for Built Area and Zoning.
- Seair Seaplanes- Annual averaged fuel used for seaplane landing in Montague Harbour.

ecoCity Footprint Tool

We provided both the "bottom-up" and "top-down" data we collected to our Ecological Footprint project partners, CHRM Consulting and the BCIT Centre for Ecocities. All additional data required for this analysis was supplied by these partners, and may not be publicly available.

The **ecoCity Footprint Tool**[75] approach to the Ecological Footprint also includes and incorporates both territorial and consumption-based greenhouse gas (ghg) emissions inventories. The **Territorial Emissions Inventory** captures emissions sources from within a given geographic area; the **Consumption-based Emissions Inventory** (CEBI) quantifies all ghg emissions attributable to a given population, regardless of where those emissions occur geographically. Greenhouse gas emissions are measured in **Tonnes of Carbon Dioxide Equivalent (tCO_2e)**, which expresses the impact of different ghgs in terms of the amount of CO_2 (carbon dioxide) that would create the same amount of warming if released into the atmosphere. This enables reporting of total greenhouse gas emissions in one measurement.[76] To view BCIT's methodology, see their report at www.galianoconservancy.ca/oneisland.

[75] See https://www.bcit.ca/centre-for-ecocities/tools/ and https://www.ecocityfootprint.org/#home
[76] Methane, for example, is a potent ghg that is at the time of this report *not* included in Ecological Footprint accounting, but is captured by emissions inventories.

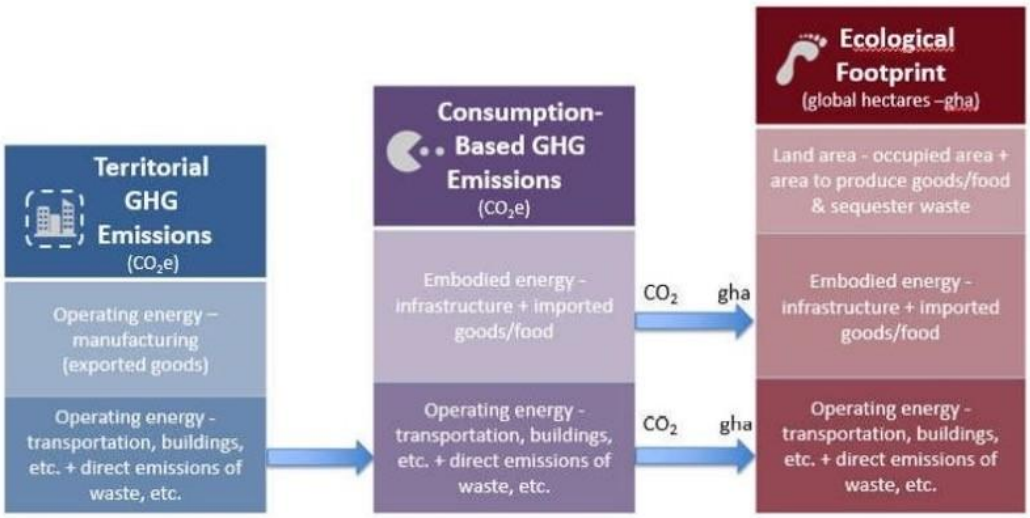

Figure 8. Comparison of the GHG Emission Inventories and Ecological Footprint Approach

Ecological Footprint of Galiano Island

The following is our summary of Ecological Footprint results provided to us by the BCIT Centre for Ecocities; for their technical report, which includes additional scenarios and a discussion of the CEBI, please visit www.galianoconservancy.ca/oneisland.

Overview

We present the results of our Ecological Footprint analysis for the Galiano Island community in two distinct scenarios:

The **Baseline Scenario** is a snapshot of the Galiano Island community's Ecological Footprint circa 2017-2021. It includes the combined footprint of all full-time residents, the 'on-island' footprint of part-time residents and tourists (including ferry and seaplane transportation to Galiano Island), and a portion of part-time resident flights taken globally. **Senior government services** are included.[77]

The **One Planet Scenario**, on the other hand, is an illustrative example of measures that could be taken collectively to reduce the Ecological Footprint of the Galiano Island community to a size that is sustainable and equitable from a planetary perspective. The actual reductions would need to be greater to account for senior government services and to include setting aside land for nature.[78]

[77] Services provided by Federal and Provincial governments to the citizenry; in Canada, this includes military, health care, administrative, and other high-level services that aren't accounted for at the local level.
[78] We note that this scenario was provided to us by CHRM Consulting and the BCIT Centre for Ecocities as one possible route to achieve **"One Planet Living"** on Galiano Island, and should not be viewed as prescriptive. For our summary and recommendations from this project, see Part V of this report.

Baseline Scenario

Results

We found that **the Ecological Footprint of the Galiano Island community is 18,600 global hectares, or 6.8 gha/ca**. This means that, if everyone on the planet lived according to average Galiano Island standards, the equivalent of **4.3 earths would be required** to support this lifestyle at a global scale. Included in this analysis are 1,396 full-time residents[79] and 1,327 full-time equivalent seasonal residents, a composite population based on our estimate of the number of part-time residents on the island[80] and the total estimated person-days of the approximately 80,000 tourists[81] that visit the island annually. **Roughly half of the footprint is attributable to full-time residents** (9,700 gha) and the other half is attributable to part-time residents and tourists (8,900 gha). This result reflects the true cost of a local economy that specializes in goods and services provided to the seasonal population.

Discussion

Like most - if not all - communities in Canada, **the Galiano Island community uses a disproportionate amount of the Earth's surface area** to support its current standard of living, relative to both its population *and* the Biocapacity of the island itself. We estimate that **the community uses 29% more Biocapacity than the lands and waters that comprise Galiano Island offer** back to the biosphere (14,373 gha). It is important to remember that this is an *indirect* comparison, as the community no longer relies on local ecosystems to produce the vast majority of the resources it requires to live.[82]

It is also important to note that **this footprint includes senior government services** that are provided to all Canadians by the Provinces and the Federal government, including health care, military, and administrative services. These services are a critical piece of the Galiano Island community's footprint, but are beyond the control of the local community. When these services are excluded from the analysis, we are left with a total of 11,100 gha, or **4.1 gha/ca that are responsive to community action** (i.e., over which the community can exert some level of influence). It would take **2.6 earths to support the global population at this local standard**, excluding senior government services.

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[79] Statistics Canada. (2021). *Census Profile - Galiano Islands Trust Area.* https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=V0N%201P0&DGUIDlist=2021A0006590004&GENDERlist=1&STATISTIClist=1&HEADERlist=0&fbclid=IwAR2FY6x-CnYKMQFb7xmnnUkMo43VCVQPqkUe14NljQ8xPvegNNlYQrD9Pxc

[80] This estimate is based on our comparison of different values for "Private Dwellings Occupied by Usual Residents," and "Total Private Dwellings" on Galiano Island from 2021 census data. We assumed that dwellings that are not occupied by "usual residents" belong to part-time residents, and based our estimates for average part-time resident household size and occupancy rates (i.e., annual days on the island) on data from our Community Mail-Out Survey.

[81] This value for annual visitation is from 2007. We assume an average of four days on the island per tourist. See Ecoplan international. (2008). *Southern Gulf Islands Community Tourism Part 1: Tourism Profile.* https://www.crd.bc.ca/docs/default-source/salt-spring-island-ea-pdf/cedc/part_one-tourism_profile.pdf?sfvrsn=2

[82] See Part IV of this report for a detailed discussion of the trend away from reliance on local resources.

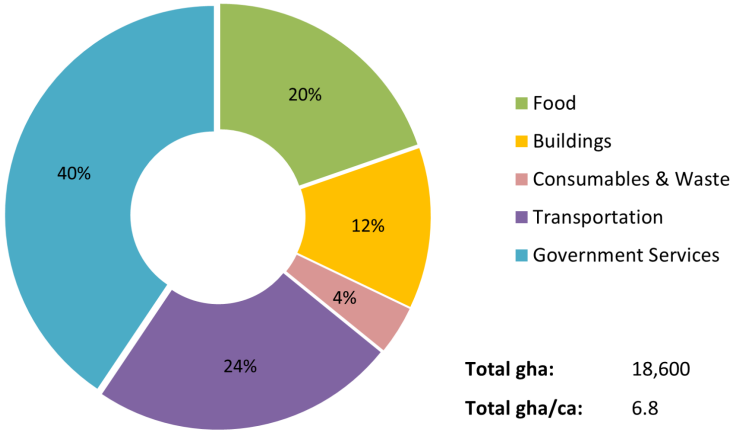

Figure 9. Galiano's Baseline Ecological Footprint, 2021

Data Visualizations

The ecoCity Footprint Tool presents results for the Ecological Footprint alongside a Consumption-based Emission Inventory (CBEI). The emissions inventory is included in (i.e., directly informs) the footprint results, but also captures some emissions not accounted for by Ecological Footprint analysis, including methane emissions. Some impacts have larger relative contributions to the footprint, and some have larger relative contributions to the emissions inventory, allowing for a comparison of relative impact. For each category, we will present the **footprint on the left**, and the **emissions inventory on the right.**

Ecological Footprint | BASELINE SCENARIO | GHG Emissions Inventory

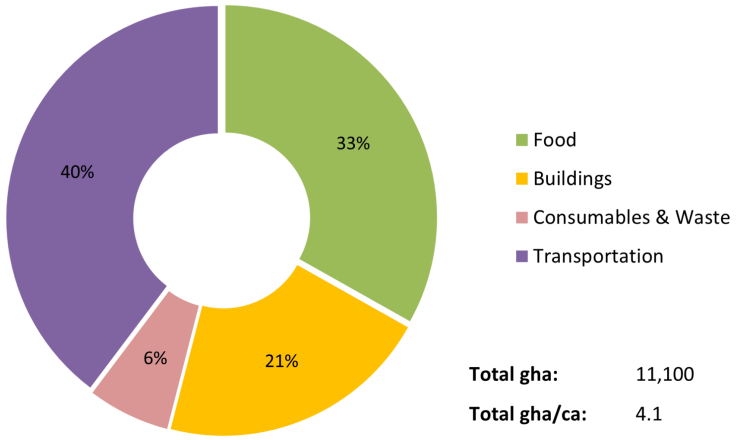

Figure 10. Galiano's Baseline Ecological Footprint, minus national and provincial government services, 2021

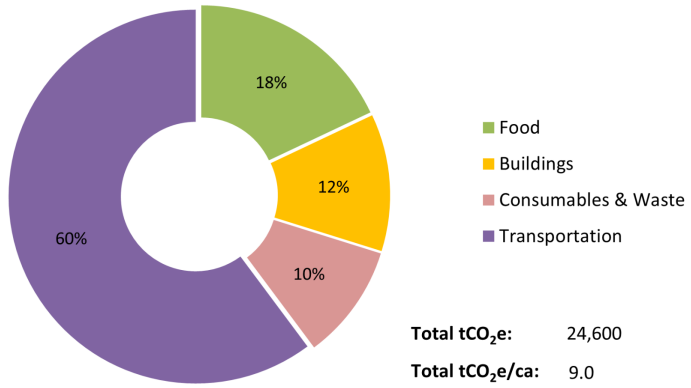

Figure 11. Baseline GHG Emissions Inventory, minus national and provincial government services, 2021

Figure 12. Galiano's Ecological Footprint, including national and provincial government services, 2021

Figure 13. Galiano's Ecological Footprint, excluding government services, 2021

How Many Earths?

Ecological Footprint results are often expressed in terms of the number of "Earths" that would be required to support the global human population at the material standard of a specific community at a specific point in time. This illustrative metric is derived from dividing the gha/ca for a community by the estimated gha/ca available to everyone at a planetary scale. At the time of writing, there is an estimated **1.6 gha/ca available to support human life on Earth.** At 6.8 gha/ca, the Galiano Island community is living at a standard that would require **4.3 "Earths" to support at a global scale**; of this, the community is **directly responsible for 2.6 Earths**, or about 4.1 gha/ca.

It is important to emphasize that the target of 1.6 gha/ca (a) does not leave any Biocapacity for wildlife, and (b) is a moving target that shrinks with increasing global population and Biocapacity losses.

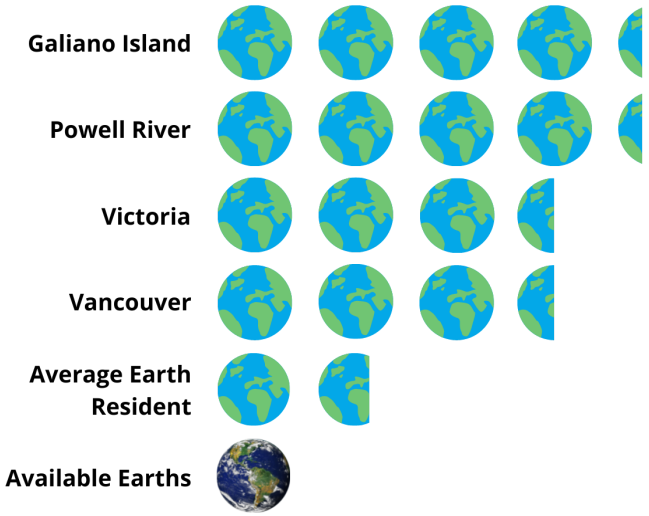

Figure 14. BCIT completed Ecological Footprints of nearby municipalities using the same methodology in 2018. This figure includes national and provincial government services.

How Do We Compare?

Ecological Footprints have been calculated in many other jurisdictions, including the City of Calgary, Alberta.[83] Footprint results should be compared with caution, as different methodologies may include or exclude specific components. Senior government services are often excluded at the municipal level but are included at the Provincial and national level. The Ecological Footprint is still evolving, and new components are constantly being added. It is a snapshot in time, which is why the City of Vancouver has performed three successive Ecological Footprint assessments. According to the Global Footprint Network, **the Earth's human population uses the equivalent of 1.75 Earths** at the time of writing.

[83] See https://www.footprintnetwork.org/2015/04/10/calgary/

Food

Results

Food contributes an estimated **3,700 gha (33%)** to the Ecological Footprint - **lower than the Canadian average**. The food survey results demonstrate that Galiano Island residents consume, on average, less meat and more legumes than the Canadian population as a whole. The addition of the tourist population to the analysis increased the contribution of meat and meat products to the footprint, as we assumed an average Canadian diet for visitors.[84] Animal products are very resource intensive to produce relative to comparable foods, and **meat and dairy products are by far the biggest contributors** to the footprint - despite the Galiano Island community's apparent reduced reliance on these foods relative to the average. An exception to this rule is locally-harvested seafood and venison,[85] which have negligible impact on the food footprint.[86]

Food transportation has a very low impact relative to the energetic and spatial demands of industrial-scale food production. **Food waste plays a major role** - it is estimated that over half of the food that is grown is wasted at some point along the supply chain and in households.[87] We found that on-island production of fruits, vegetables, and eggs plays a significant role in reducing the food footprint by eliminating food miles and waste that would otherwise occur in the supply chain.

Discussion

The Galiano Island community's diet and **efforts to produce local food are reflected in the below-average footprint of food**, and likely have an even greater impact than what we've captured here.[88] Our Food Diary results suggest that, by weight, **13.5% of the food consumed on Galiano Island was produced locally** in 2021, including 32% of the fruits and vegetables and 50% of the eggs. Our Community Mail-Out Survey results suggest that the average food-producing garden size is 5707 ft^2 for full-time residents and 1918 ft^2 for part-time residents, while 23% of survey participants stated that they are currently facing barriers to starting a garden or expanding their existing garden. Lack of time and capacity, lack of knowledge, cost, and access to contractors and trades workers were the most common barriers. A remarkable 71% of participants stated that they preserve their own food, and 21% stated that they hunt and fish locally. Efforts to reduce the footprint of food on Galiano Island should focus on reducing food waste, which can include expanding local food production and harvesting. Reducing consumption of imported meat and dairy products is also beneficial.

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[84] Agriculture and Agri-Food Canada. (2015). *An Overview of Canadian Food Loss and Waste Estimates.*
[85] From a greenhouse gas perspective, it is arguably beneficial to harvest local deer from the landscape, as deer emit methane as a byproduct of their digestion - a trait they share in common with other ungulates such as cattle.
[86] However, fossil fuels may be used to power the boats or vehicles used to access these animals.
[87] National Zero Waste Council. (2022). *Food Waste.* https://lovefoodhatewaste.ca/
[88] This is because locally-grown fruit, vegetables, and eggs were still assumed to have a material and production footprint equivalent to that of industrial agriculture, due to lack of relevant data on small-scale production.

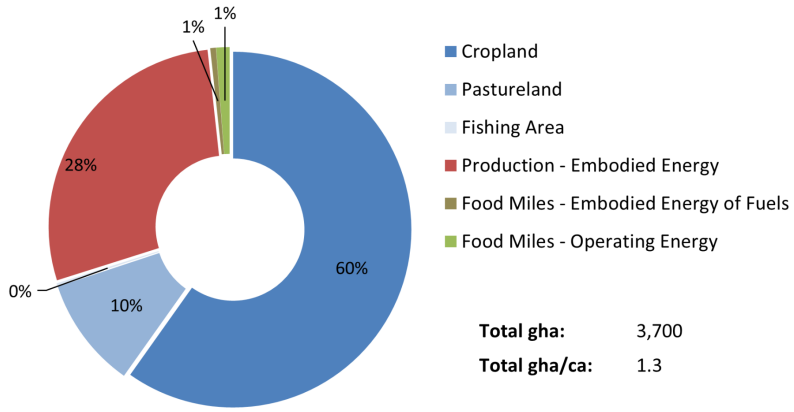

Figure 15. Galiano's Food Footprint, 2021

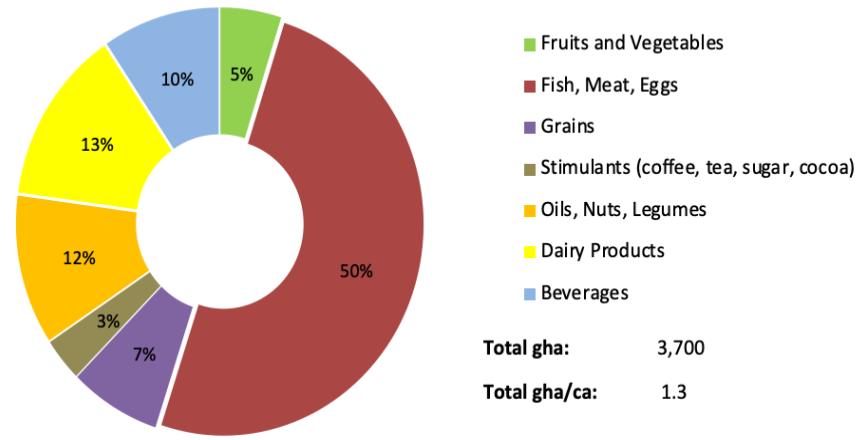

Figure 16. Galiano's Food Footprint by Food Type, 2021

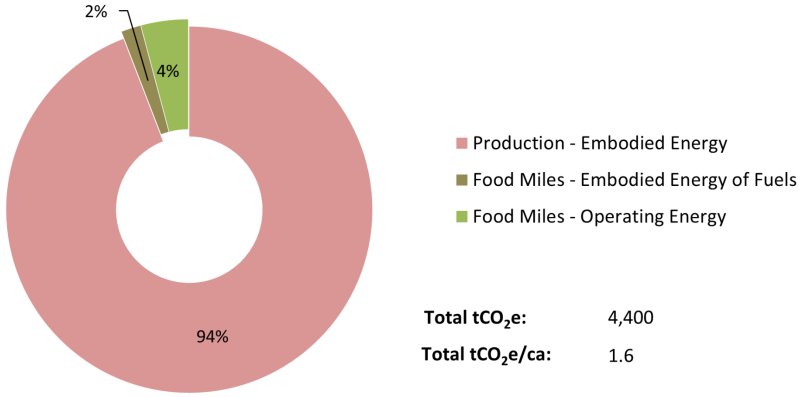

Figure 17. GHG Emissions Inventory of Food, 2021

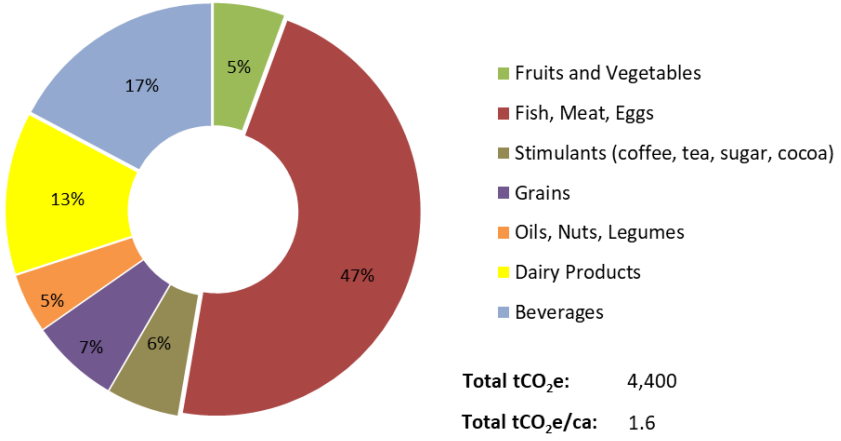

Figure 18. GHG Emissions Inventory by Food Type, 2021

Buildings & Stationary Energy

Results

Buildings and stationary energy contribute an estimated **2,300 gha (21%)** to the Ecological Footprint. The **impact of the built area is higher than BC average.** Low-density single-family homes scattered across the island are the driving cause behind the relatively high impact of the built area. **Operating emissions are below average for British Columbia**, due to relatively high electricity use and low fossil fuel use for home heating. Wood stoves, a common heat source on the island, are considered to be ghg neutral from a footprint perspective if the wood is derived from local ecosystems, but do contribute to local particulate pollution.

Discussion

The residential built area[89] is by far the biggest contributor to the footprint of buildings and stationary energy on Galiano Island, due to the **low density of the island population relative to the amount of space occupied by structures and clearings.** This is unusual, as elsewhere in British Columbia operating energy (energy used to power and heat buildings) is a more significant impact in relative terms. Even for smaller towns like Powell River, the built area only takes up about ¼ of the footprint of buildings and stationary energy.[90] Historically, low-density development on Galiano Island has resulted in part from concerns about limited groundwater supplies, zoning bylaws, and cultural preferences - this is discussed further in Parts IV and V of this report.

Galiano Island households typically employ a combination of wood stoves, baseboard heating, and heat pumps, although some homes are still reliant on fossil fuel for heating. **Electricity use on Galiano Island is high relative to other BC jurisdictions**, due in part to easy access to electricity relative to fossil fuels. Inefficient baseboard heaters and poorly-insulated homes are issues across BC. High electricity use has a low impact on the overall footprint because 90% of B.C. Hydro's energy production is hydroelectric.[91] From an Ecological Footprint perspective, hydroelectric dams have a much lower impact than burning fossil fuels. Nevertheless, hydroelectric dams do have negative effects on ecosystems and communities, including: flooding, negative effects on fish migration, methane production, and embodied emissions from concrete production.[92] At the time of writing, we estimate that **local solar installations produce more than 1.5% of the electricity used on the island.**

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[89] Built area includes areas categorized as 'Developed' and as 'Rural Settlement' in the 2021 Land-Use Map. This means that the cleared areas around homes on the island - including septic fields, gardens, and lawns - are included.
[90] BCIT, Cora Hallsworth Consulting. (2018). *ecoCity Footprint Tool Pilot - City of Powell River* https://powellriver.civicweb.net/document/75517/
[91] BC Hydro. (2022). *Generation Station* https://www.bchydro.com/energy-in-bc/operations/generation.html
[92] Cox, S. (2022, May 13). *BC Hydro lacks an appetite for green electricity. That's hurting this historic family-run plant*. The Narwhal. Retrieved May 13, 2022, from https://thenarwhal.ca/bc-hydro-lacks-an-appetite-for-green-electricity-thats-hurting-this-historic-family-run-plant/

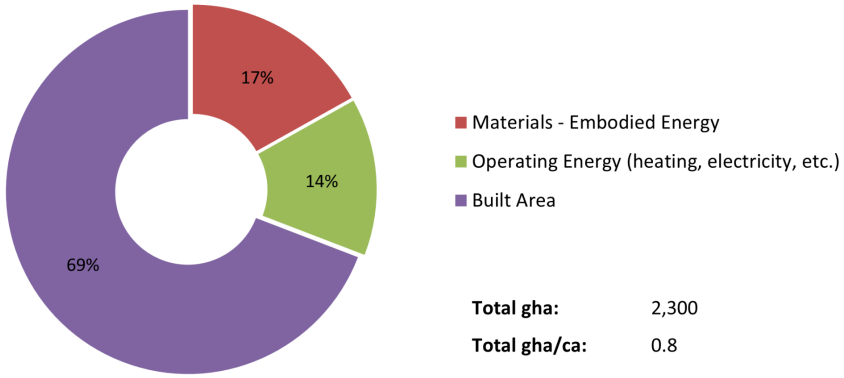


Figure 19. Galiano's Buildings Footprint Summary, 2021

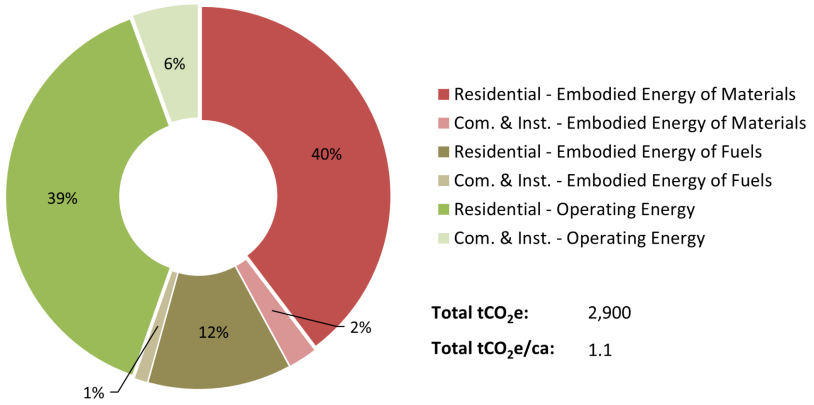


Figure 21. GHG Emissions Inventory of Buildings, 2021

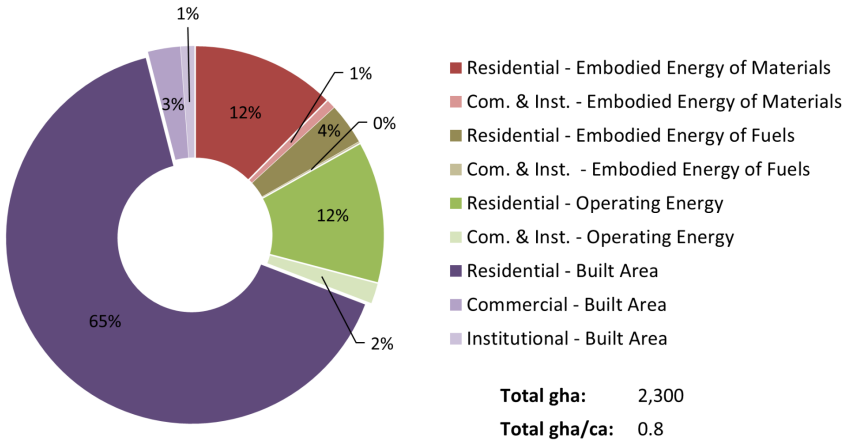


Figure 20. Galiano's Buildings Footprint Detail, 2021

Consumables & Waste

Results

Consumer products and waste contribute an estimated **690 gha (6%)** to the Ecological Footprint - **lower than other BC juridictions**. Results from the Waste Tracker survey for the Galiano Island community were about ½ of the Capital Regional District average. These results were used for both full-time and part-time residents, while Metro Vancouver and Capital Regional District averages were used for tourists.

Recycled and disposed supply chain emissions (embodied energy of materials) are the largest contributors. **Direct landfill emissions and septic tank emissions (primarily methane) are not captured in the footprint**, but are accounted for in the ghg emissions inventory, where they make a significant contribution.

Discussion

The Ecological Footprint methodology accounts for the land and energy required to produce, transport, and dispose of consumer goods by examining the waste stream, with the assumption that all products eventually make their way into landfill or recycling facilities. This means that reusing, repurposing, and/or locally composting products effectively removes them from the embodied energy footprint of consumables and waste. Embodied energy accounts for the majority of the waste footprint, and originates from supply chain emissions, including extraction, processing and transport.

Of all the categories, **consumables and waste is most likely an underestimate** for several reasons. First, the Waste Tracker survey provided "bottom-up" data that is probably lower than the reality. Secondly, an unknown percentage of products purchased and disposed of by members of the Galiano Island community apparently do not find their way to landfill or recycling facilities, and are instead burned, dumped in local ecosystems, or left sitting in yards or basements due to the relatively high cost of disposal off-island.[93]

While this category is likely underestimated, there is good reason to believe that the Galiano Island community is still below Canadian average in terms of waste, due in large part to a healthy local culture of recycling and reuse, the financial disincentive of producing garbage in the first place (i.e., cost and hassle of off-island disposal), and a very high level of composting of organic wastes.[94]

Emissions from septic fields are a significant local component of the emissions inventory.

[93] See Part IV of this report for a discussion of the history of waste disposal and recycling on Galiano Island.
[94] 91.3% of respondents to a 2021 survey report that they compost organic wastes at home. See Nuckhady, B. (2021). *Key Findings: Understanding Household Food Consumption and Food Waste Management in Galiano Island*. https://galianoconservancy.ca/wp-content/uploads/2022/05/Galiano-Household-Consumption-Survey-results.pdf

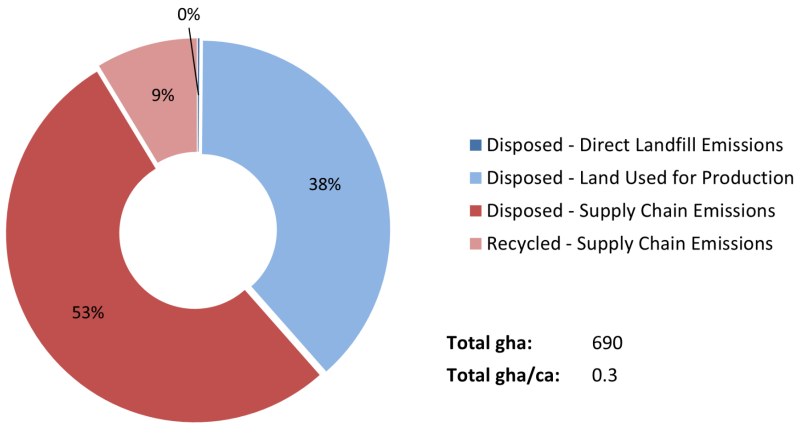


Figure 22. Galiano's Consumables & Waste Footprint, 2021

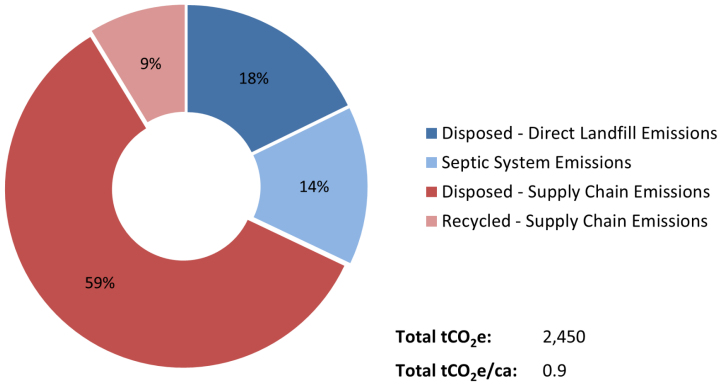


Figure 24. GHG Emissions Inventory of Consumables & Waste, 2021

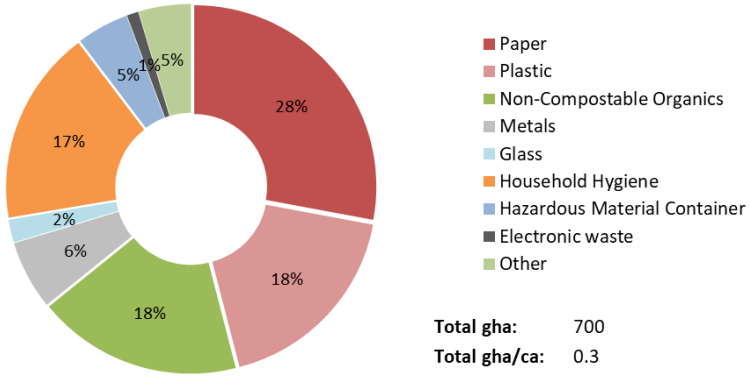


Figure 23. Galiano's Consumables & Waste Footprint Detail, 2021

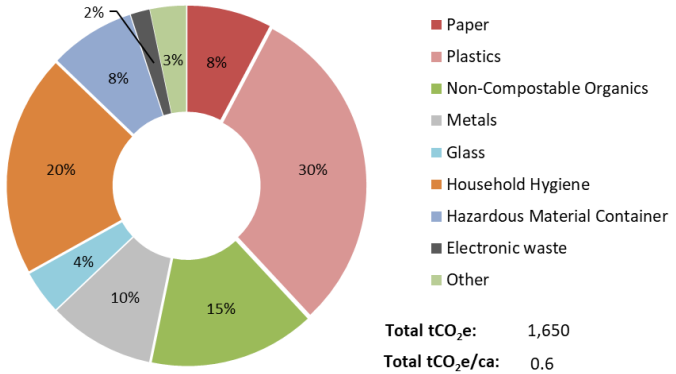


Figure 25. GHG Emissions Inventory of Consumables & Waste Detail, 2021

Transportation

Results

Transportation contributes an estimated **4,400 gha (40%)** to the Ecological Footprint - **higher than other BC jurisdictions**. Transportation is the single largest contributor to the Galiano Island community's Ecological Footprint. For full-time and part-time residents, the **transportation footprint is roughly ⅓ each of vehicle use, ferry trips and air travel.** Full-time residents **drive less and fly more than the average BC jurisdiction**. Tourists contribute significantly to seasonal increases in vehicle, ferry, and seaplane trips.[95]

While the embodied energy of paved and unpaved roads is minor, **the built area occupied by the extensive road network on Galiano Island is very high relative to other BC jurisdictions.** Galiano Island has 0.25 km^2 of paved roads *and* 2.78 km^2 of non-paved roads, many of which are legacies of the forest industry on the island but that remain clear of vegetation due to continued use or compaction.

Discussion

Compared to other BC jurisdictions, the full-time and part-time residents of Galiano Island travel **twice as much by plane, and travel ⅔ less by vehicle.** Ferry travel is a significant portion of the footprint. Daily tourist vehicle use on-island is estimated to be 3 times higher than resident use. The addition of tourists increases the impacts of both vehicle and ferry use, while somewhat masking the outsized contributions of air travel and built area to the footprint.

Despite low vehicle use relative to Provincial averages, **personal vehicles remain the primary local form of transportation.** Serious barriers to adoption of active transport were apparent from our Community Mail-Out Survey, where 57% of participants stated that they do not feel safe biking, and 28% stated that they do not feel safe walking on public roads. Nevertheless, **45% of participants who completed our Community Mail-Out survey claimed to use active transport at least occasionally** (1% - 10% of their trips). Those that felt safe biking on public roads followed up with comments such as: "Safer during the non-tourist season"; "Yes, but avoid weekends and other busy times if possible"; and "generally on the north part of the island and on weekdays."

Galiano has three public electric vehicle (EV) charging stations. Electric vehicle ownership on the island has been increasing since 2015 (from 3x in 2015 to 26x in 2020). **48% of our survey respondents stated that purchasing an EV was a lifestyle change that they would like to make**, but that it is currently out of reach. All but one participant identified cost as being the most significant barrier.

[95] For the purposes of this analysis, we assumed an average of 4 days per trip for each visitor to the island, and then created a daily vehicle use profile (based on a typical itinerary) for these trips. All seaplane use was attributed to visitors.

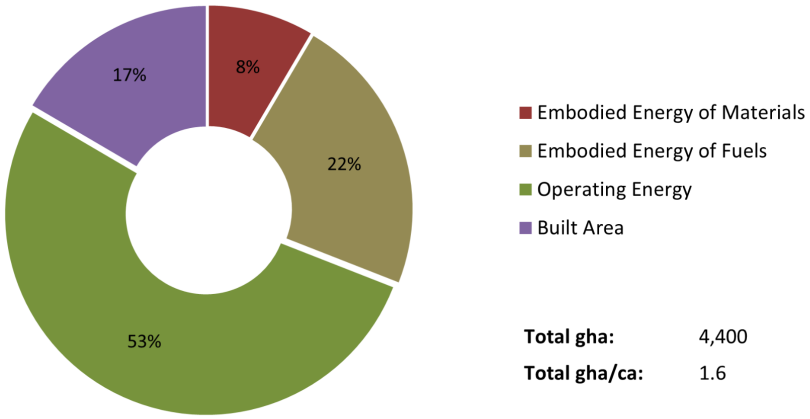


Figure 26. Galiano's Transportation Footprint Summary, 2021

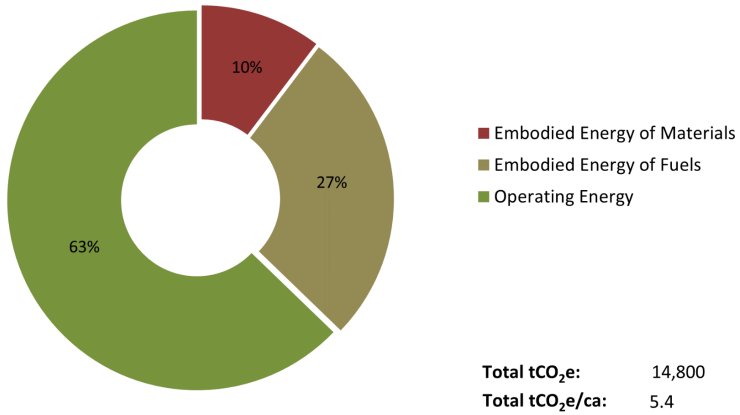


Figure 28. GHG Emissions Inventory of Transportation, 2021

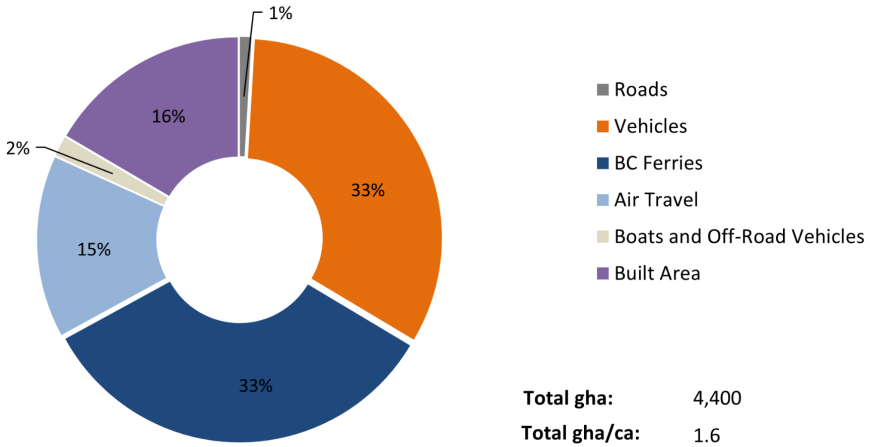


Figure 27. Galiano's Transportation Footprint by Type, 2021

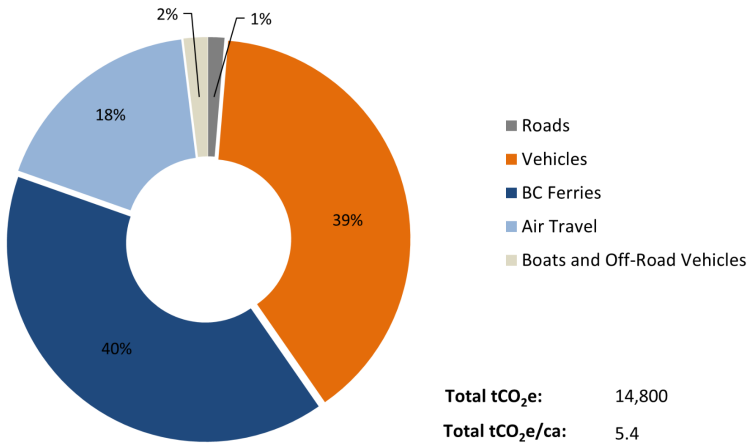


Figure 29. GHG Emissions Inventory of Consumables by Type, 2021

Water

Discussion

Water is typically included as a category in Ecological Footprint analysis, but only in terms of the land and infrastructure required to supply it to a given population. Since the Galiano Island community relies almost exclusively on private wells and rainwater harvesting infrastructure to meet its water needs, the lack of centralized water distribution systems prevented us from including water infrastructure in the Ecological Footprint results.[96]

Nevertheless, freshwater availability and accessibility is a critical component of local sustainability that deserves consideration. Accordingly, we provide a summary of ongoing, publicly available research being conducted by the Islands Trust on this topic. This brief discussion is informed by the following reports:

- Islands Trust Area Aquifer Conceptualization Report, 2021[97]
- Islands Trust Area Groundwater Recharge Potential Mapping Report, 2021[98]
- Islands Trust Groundwater Recharge Potential Mapping Appendices, 2021[99]

Arguably, water is the one remaining footprint category which the Galiano Island community remains overwhelmingly reliant on the island itself to provide. The irony is that this local reliance effectively removes water from the scope of Ecological Footprint analysis and places it squarely in the purview of island residents themselves. After reviewing the existing literature, we feel that more work needs to be done to understand water availability, water consumption and thresholds across the island, and to address local deficits. We observe that annual rainfall (between 60 and 75 centimetres on average) provides ample opportunity for reducing reliance on limited groundwater supplies.

Summary

According to Islands Trust data, groundwater wells serve as the primary water source for about 77% of island households, with surface water wells making up the remainder (~23%). Galiano's groundwater is at its lowest availability in August and September. Aquifer recharge starts in October, and Galiano's groundwater's maximum is in the winter months. The influx of seasonal residents and demand for

[96] The embodied energy of private water infrastructure could be investigated further, but was not evaluated due to its long lifespan and very low overall contribution to the footprint. The grid energy required to pump water is incorporated in the buildings and infrastructure section.

[97] GW Solutions. (2021). Islands Trust Area Aquifer Conceptualization Model. *https://islandstrust.bc.ca/document/islands-trust-area-aquifer-conceptualization-report-ver-2021/*

[98] GW Solutions. (2021). Islands Trust Area Groundwater Recharge Potential Mapping. *https://islandstrust.bc.ca/document/islands-trust-groundwater-recharge-mapping-potential-project-report-ver-2021/*

[99] GW Solutions. (2021). Islands Trust Area Groundwater Availability Assessment. https://islandstrust.bc.ca/document/southern-gulf-islands-groundwater-availability-assessment-report-ver-2021/

irrigation cause the Galiano Island community's water consumption to increase from May to September, with July and August being the most intensive. Therefore, the time of greatest groundwater need coincides with the time of lowest availability.

From 1980 to present, groundwater elevation has decreased in OW258, the Provincial observation well at the Galiano Community School. This seasonal fluctuation of 9 to 11 metres is the largest noted across all of the Southern Gulf Islands included in the study. Decreasing trends in groundwater elevation indicate aquifer discharge is greater than recharge, and may be attributed to the cumulative impacts of climate change, well density, land-use change, and development. In coastal areas, local groundwater deficits can result in salt-water intrusion into aquifers, which is a potentially non-reversible process.

For the Islands Trust Area Groundwater Availability Assessment, groundwater regions were used to compare the percentage of groundwater used to the amount of groundwater recharge across the island. The Islands Trust employs a threshold of 10%, meaning that 10% more groundwater is being used then recharged. In the "Normal" scenario (Left), the Cain Peninsula groundwater region (Red) is currently exceeding the 10% threshold. Other notable areas with 5-9% stress (Yellow) are the Montague Harbour groundwater region and the South Galiano groundwater region. When the driest scenario is projected (Right), more groundwater regions show an increase in groundwater stress. If the Southern Gulf Islands were to experience drought conditions comparable to those of 1985, groundwater recharge could be reduced by up to 50%, further exacerbating groundwater deficits.

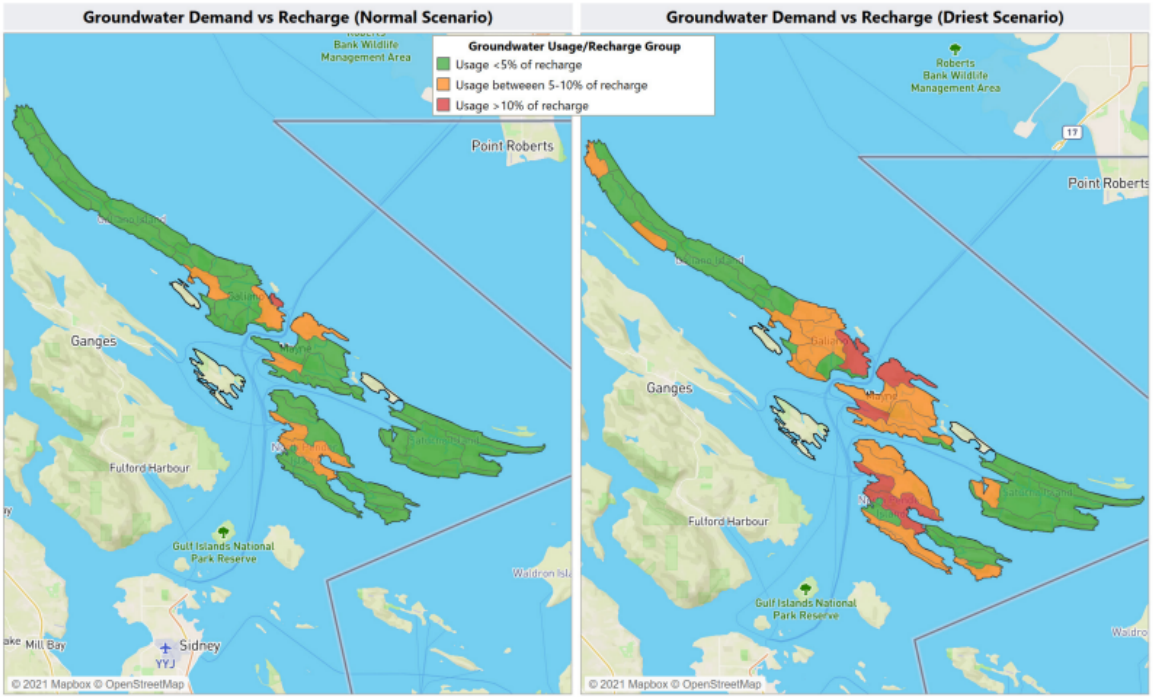


Figure 30. Groundwater recharge and groundwater use per groundwater region (normal and driest scenario) [100]

[100] GW Solutions. (2021). Islands Trust Area Groundwater Availability Assessment. https://islandstrust.bc.ca/document/southern-gulf-islands-groundwater-availability-assessment-report-ver-2021/

Reducing Reliance on Groundwater

In our Community Mail-Out Survey, 93% of households stated that a groundwater or surface water well was their primary water source, while the remaining 7% reported getting their water from rainwater harvesting or by purchasing bottled water. 20 households out of 126 indicated that their well has at one point either run out of water or gotten "extremely low."

The Galiano Island community has already started taking steps to reduce its reliance on groundwater by harvesting rainwater and/or installing water-reducing appliances. Many gardeners on Galiano Island are keenly aware of the high water demands of non-native garden plants, and many practice rainwater collection to supply at least part of their irrigation needs. Neighbouring islands such as Salt Spring have also identified water availability to be a serious issue[101] and are currently offering rebates for rainwater harvesting infrastructure.[102]

Table 4. Use of additional water conservation practices reported by participating households.

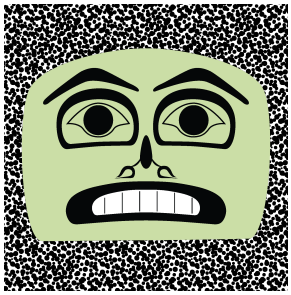
Water Reducing Practices	Survey Responses
Cistern or Water Storage Tanks	39%
Greywater system	18%
Rain Barrels	52%
Dual system toilets	17%
Composting toilets	14%

The Galiano Conservancy Association provides resources to help island residents reduce their reliance on groundwater: for more information, visit www.galianoconservancy.ca/water.

[101] Transition Salt Spring. (2021). *Climate action Plan 2020 to 2030.* https://transitionsaltspring.com/wp-content/uploads/2021/01/1.-CAP-2.0-COMPLETE-WEB.pdf

[102] See https://transitionsaltspring.com/cac-rainwater-harvesting/#:~:text=Applicants%20can%20receive%20%24250%20for,volume%20held%20meets%20the%20requirements.

One Planet Scenario



Overview

CHRM Consulting and the BCIT Centre of EcoCities provided us with a reduction scenario that examines one potential pathway to reducing the Galiano Island community's footprint to a level that is sustainable and equitable from a global perspective. It is an example of what it might take to **collectively reduce the impacts of the entire Galiano Island community to less than 1.4 gha/ca** (i.e., if everyone on the planet had an equal impact and equal share of the remaining Biocapacity, and a tiny amount was left over for wild nature). A **Sustainability Gap** of 63% of the current footprint must be addressed to achieve "One Planet Living." As extreme as this scenario might appear to many community members, further emissions reduction activities would likely be needed to meet climate stabilization goals. This scenario focuses on **reducing components of the Galiano Island community's Ecological Footprint that are responsive to community-led actions**. The actual reductions would need to be greater to account for senior government services. See Part V of this report for our recommendations.

Table 5. Reductions need to reach a One Planet Scenario.

Reduction Measures	**EF Reduction (gha)**	**GHG Reduction (tCO_2e)**
Food • 80% reduction of food waste	1,520	1,830
Buildings & Stationary Energy • 85% reduction in residential developed area, 50% in commercial/institutional • 100% conversion to renewable energy	1,640	1,320
Consumables & waste • 50% reduction of municipal solid waste (MSW) through reduced consumption and improved circularity (sharing, repair, reuse) • 50% reduction in septic system emissions	340	1,180
Transportation • 80% reduction in non-paved roads • 50% decrease in vehicle fleet • 100% conversion to electric vehicles, ferries, and personal watercraft • 80% reduction in air travel	3,840	13,330
Total Reduction	**7,340**	**17,660**

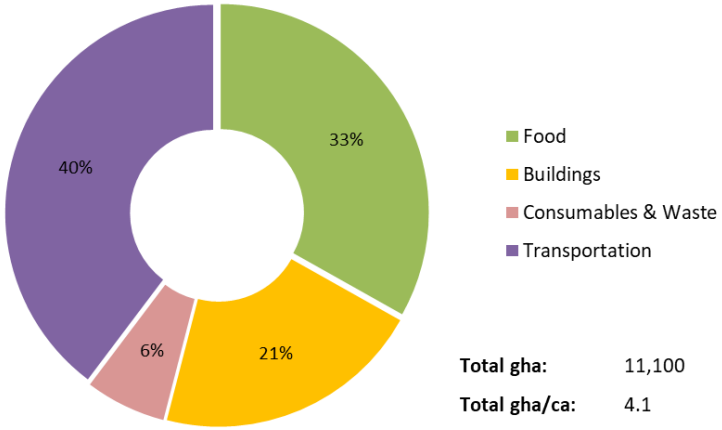


Figure 31. Galiano's Baseline Footprint Summary, 2021

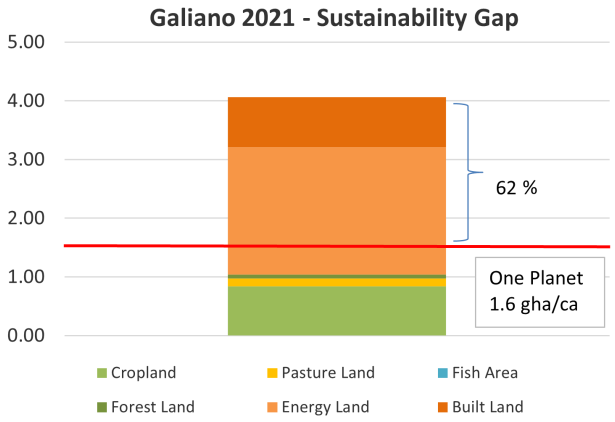


Figure 32. Galiano's Baseline Footprint Sustainability Gap, 2021

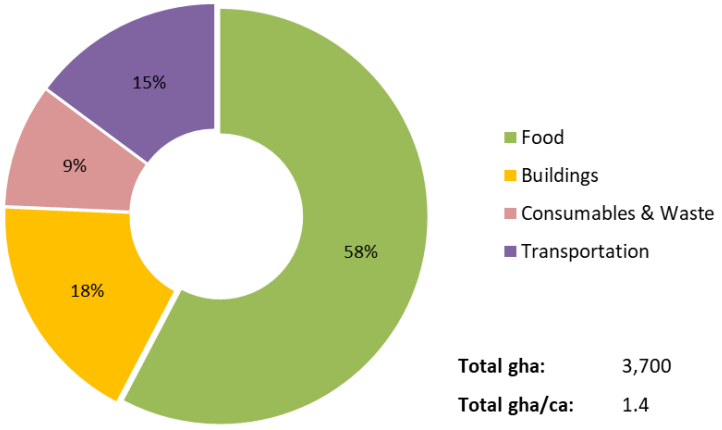


Figure 33. Galiano's One Planet Scenario Summary, 2021

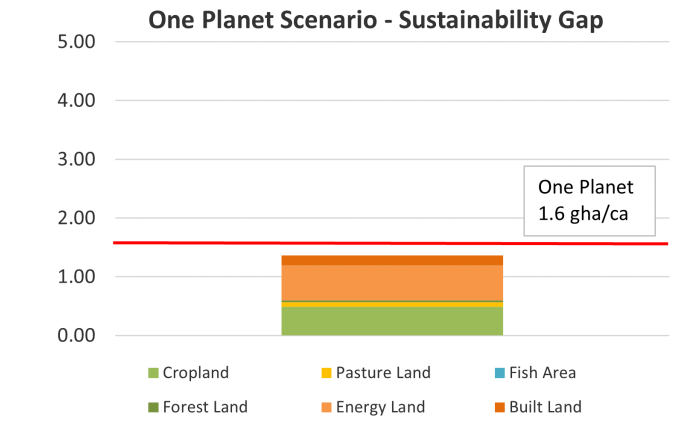


Figure 34. Galiano's One Planet Scenario Sustainability Gap, 2021

Emissions Reductions

A Matter of Degrees

The **One Planet Scenario** calls for a **66% reduction in the Ecological Footprint** and a **72% reduction in greenhouse gas emissions** attributable to the Galiano Island community. If projected to the year 2030, this target exceeds the current 2030 targets set by Canada (40% reduction from 2005 levels), the Capital Regional District (50% reduction from 2007 levels), and Transition Salt Spring (50% reduction by 2030).[103] In reality, however, **any emissions reductions that can feasibly be achieved must be attempted** across every human community if the goal is to minimize the probability of exceeding 1.5 ℃ at a planetary scale. This is because, even if achieved, the international commitments made during and since the **2015 Paris Climate Accords do not themselves provide reasonable assurance of meeting the 1.5 ℃ threshold**,[104] and - like many countries - Canada appears at the time of writing not to be on track to meet its commitments.[105]

Putting targets and probabilities aside, every ton of greenhouse gas that is prevented from entering the atmosphere mitigates against the existential threat posed by the **Climate Crisis**. While it is undesirable (and impossible) to reduce the human Ecological Footprint to zero, it *is* desirable and **essential to achieve net-zero emissions as soon as possible**. On Galiano Island, this means virtually eliminating emissions from the transportation sector, reducing food and consumer waste, electrifying home heating, and reducing septic field emissions.

Oil and Gas

According to the national inventory for 2020, the **oil and gas sector is responsible for a stunning 27% of all territorial emissions in Canada**.[106] While the majority of this report considers opportunities for the Galiano Island community to directly reduce its own footprint and emissions, we must observe that ongoing oil and gas development elsewhere in Canada cannot credibly be shown to be compatible with a livable future below the 1.5 ℃ threshold. We pause here to express gratitude to members of the Galiano Island community who are involved in efforts - whether grassroots, Indigenous-led, or institutional - to prevent further exploitation of fossil fuel resources in this country, and to emphasize that these efforts must be successful in order to meet international (and local) targets.

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[103] Transition Salt Spring. (2021). *Climate Action Plan 2020-2030*. Retrieved March 25, 2022 from https://transitionsaltspring.com/wp-content/uploads/2021/01/1.-CAP-2.0-COMPLETE-WEB.pdf

[104] R. Mackie (Personal communication. May 25, 2022).

[105] Labbe, S. (2022, May 24). *Canada's emissions plan 128 megatonnes short of 1.5 C target, says report*. Victoria Times Colonist. Retrieved May 25, 2022, from https://www.timescolonist.com/highlights/canadas-emissions-plan-128-megatonnes-short-of-15-c-target-says-report-5401327

[106] Environment and Climate Change Canada. (2022). *Canadian Environmental Sustainability Indicators: Greenhouse gas emissions*. Retrieved May 25, 2022, from www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gasemissions.html

Limitations

Survey Results

Survey results are generally considered statistically significant when 10% or more of the population has been represented.[107] We discussed using proxies from other sources in specific circumstances where survey representation was less than 10% of the island population, but concluded that using local data with lower representation was still the best method to get a snapshot of local consumption patterns.

Table 6. Survey representation

Survey Type	Participation	Galiano Representation
Community Mail-Out Survey	135 Households (282 People)	20%
Food Diary	43 Households (88 People)	6%
Waste Tracker	41 Households (91 People)	7%
Odometer Survey	62 Vehicles	7%

It is possible that participants in our surveys were more "environmentally conscious" than the general Galiano population, as all surveys were opt-in. This may have affected our data.

Data was collected during the COVID-19 pandemic in 2021, with pandemic-related restrictions in effect throughout much of the year. This may also have affected the data (e.g. part-time resident reported length of stay). When appropriate, survey questions were framed "In a non-covid year" (e.g. flights).

Ecological Footprint

Data for the Ecological footprint came from various sources. Some data was collected at the community level ("bottom-up") and other data sets were provided from private entities and governments ("top-down"). This can make comparability between datasets difficult. We did our best to seek out other sources to double check the accuracy and scalability of our data. Most dataset were from between 2019 - 2021, although in some cases data from 2018, and 2017 were used.

The ecoCity Footprint Tool's methodology is geared towards urban centres. We worked with BCIT to adapt the methodology to accommodate data from a small, rural island community (e.g. including small-scale food production, hunting, wood stoves, ferry dependency, etc.), but in some of these areas solid data to evaluate the impacts of rural activities is not currently available.

[107] Dattalo, A. (2008). *Determining Sample Size: Balancing Power, Precision, and Practicality*. Oxford Scholarship Online

Methane, a potent greenhouse gas, is not considered in the Ecological Footprint but is considered in the GHG Emissions Inventory.

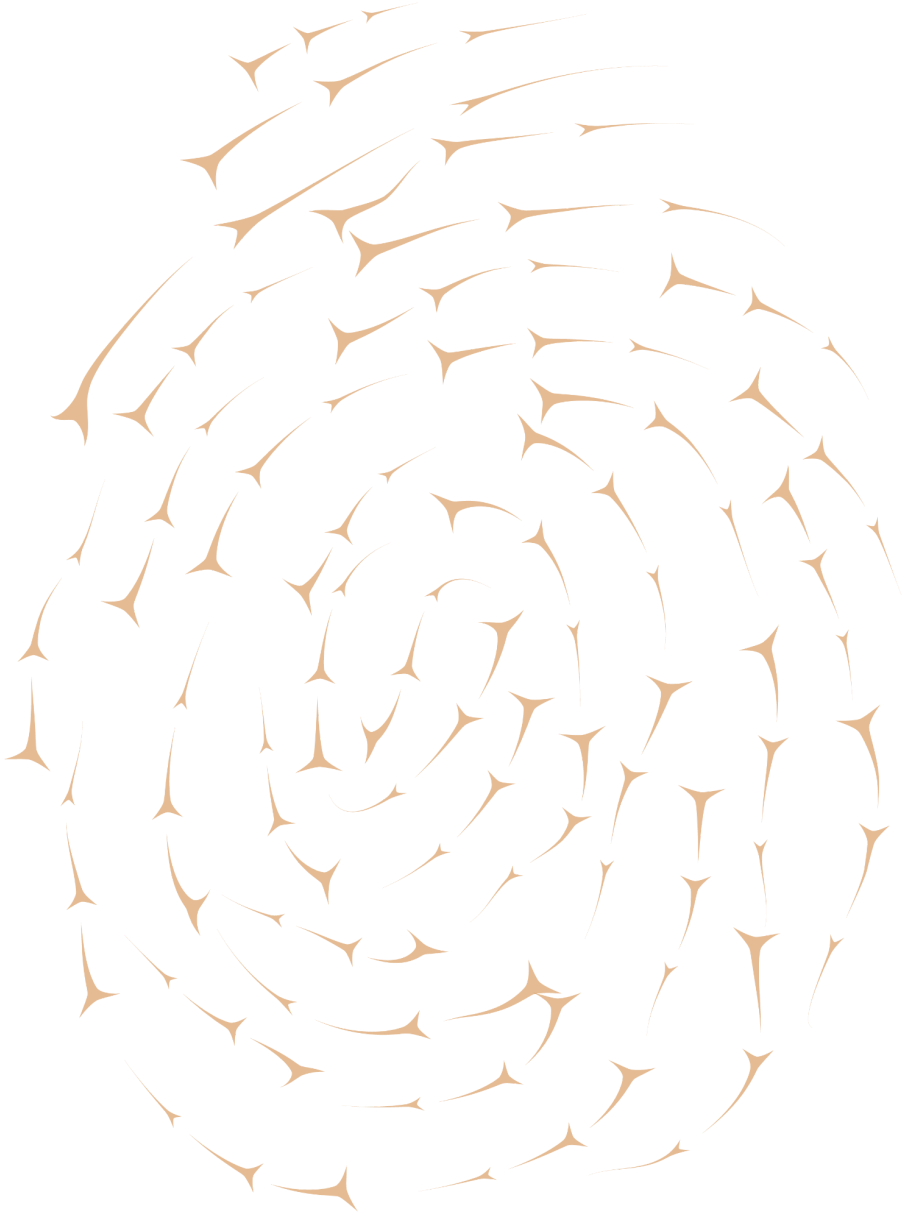
We also asked CHRM Consulting and the BCIT Centre for Ecocities to present an Ecological Footprint analysis that only considers the footprint of full-time island residents, and this assessment is included in their report. We chose not to reproduce it here because we feel that it is essential to include for the on-island footprint of visitors and seasonal residents, who we estimate account for roughly half of the person-days spent on Galiano Island, and who play a significant role underwriting the local economy.[108] This choice nearly doubles the total footprint, and affects all of the values expressed on a per-capita basis in this report. It is also likely that, since our estimate of 80,000 tourists comes from a 2007 report, we have underestimated the true contribution of the full-time equivalent seasonal resident population to the footprint.

Comparing Biocapacity to Ecological Footprint at a *local scale* should be done with caution. The Ecological Footprint methodology considers planet Earth to be a closed system for all intents and purposes, but nearly every geographically distinct community in the world is now enmeshed in a global economy that has, to greater or lesser degrees, distanced it from direct reliance on the bioproductivity of its immediate environment. The Galiano Island community simply would not exist as it currently does in the absence of regional and global supply chains providing for most of its fundamental needs.

This project is a first attempt at generating an Ecological Footprint for a small island community in North America. It was an experiment, and like all experiments it revealed lessons both through the results and through the process of generating them. Future assessments along these lines should consider how to better account for and incorporate small-scale, non-industrial production practices, infrastructure, and lifeways into footprint frameworks. Freshwater availability is also an important element of sustainability that appears to fall outside of the scope of existing Ecological Footprint methodologies.

[108] In the same way, we would not consider an Ecological Footprint analysis for the city of Fort McMurray in Alberta to be credible if it failed to account for at least a portion of the footprint of the dominant industry in the community.

Part IV: Ecological Fingerprint



June 2022
Galiano Conservancy Association

"The People of Galiano Island, being mindful of the pressures from a growing West Coast population and a demonstrated desire of many to find relief from urban congestion and associated tension through a rural atmosphere, and being aware of the physical limitations of Galiano Island to accept uncontrolled population increase without degradation of the rural way of life and damage to the ecological systems, deem it desirable to create a Community Plan to deal with these issues.

The rural character of the Galiano Island Trust Area must be preserved. The waterfronts, beaches and waters surrounding them must be preserved and kept free of pollution for the enjoyment of users and the preservation of marine life. Groundwater supplies must be protected from contamination by effluent of all types. Ground cover and trees must be preserved to the extent necessary to maintain the natural beauty of the island, the ability of the soil to retain moisture and to prevent erosion of soil and soft rocks. Particular care must be taken to preserve sufficient land and water in their natural state to enable wildlife, plant life and marine life of the island to continue to exist and flourish.

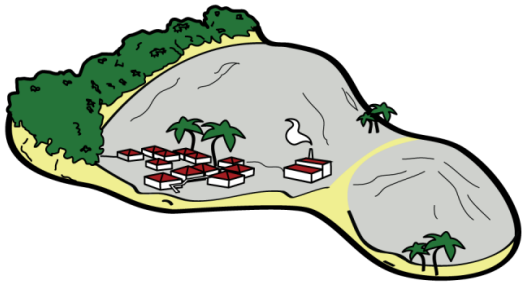
As the present generation inherited these islands in a relatively preserved state, this Plan attempts to perpetuate this state and preserve the unique environment for future generations.

Even seemingly small changes can damage or deplete resources, compromise self-sufficiency and distort long term planning. It is a tribute to the continuing vigour, passion and foresight of our community that much of the natural character and resources of Galiano has been maintained.

- Preamble,
  Galiano Island Official Community Plan[109]
  1974 - 2021

[109] Islands Trust. (1995). *Galiano Island Local Trust Committee - Official Community Plan ByLaw # 108.* https://islandstrust.bc.ca/document/galiano-ltc-ocp-bylaw-no-108/

Background



Island Ecological Fingerprints

We were originally inspired to generate an Ecological Footprint for Galiano Island after reading a 2012 paper by Dr. Beate Ratter and Jan Petzold entitled "From Ecological Footprint to Ecological Fingerprint - sustainable development on Helgoland." In this study, the authors present their analysis of the Ecological Footprint of the German island of Helgoland in 2009, and pose a challenging question:

> "Sustainability is difficult in insularity and isolation. Is it fair to calculate the Ecological Footprint of a small island?"[110]

In response to this question, they proposed the idea of the Ecological Fingerprint. They wrote:

> "The ecological fingerprint is a measure of the particular attitude, self-image and intrinsic values an island chooses for itself with respect to global resource use. Rather than the footprint, it is thus the fingerprint of an island which should be measured to indicate the prevalent island attitude and its active contribution to sustainability."[111]

The Ecological Fingerprint can take the form of a qualitative study that provides context to the quantitative information provided by the Ecological Footprint. We corresponded with Dr. Ratter regularly during the development of this project, and decided that, in order to capture the Ecological Fingerprint of the Galiano Island community, we would interview island residents who have lived in the community for a long time about their experiences of environmental change and their attitudes towards sustainability, community, and island ecosystems.

Oral Histories

Between July 2021 and April 2022, we interviewed 17 community members; during the same period, the Coast Salish Peoples of Galiano Society interviewed 6 of its members. We selected Interviewees by soliciting community suggestions through our "Community Mail-Out Survey," and then reaching out to community members who were mentioned multiple times or with whom we had pre-existing personal or professional relationships. We were unable to interview every community member who was

[110] Ratter, B., & Petzold, J. (2012). From Ecological Footprint to Ecological Fingerprint - sustainable development on Helgoland. In Larsen, K. T. (Ed.), *From One Island To Another - A Celebration of Island Connections* (pp. 191-204). Centre for Regional and Tourism Research.
[111] Ibid.

recommended to us, and we were unable to arrange interviews with several community members who we contacted within the timeframe of this project. In general, our Interviewees tended to be middle-aged or older as a result of our selection criteria, so future work could be done to highlight youth voices as well. What we present in the following pages, then, is a "snapshot" of the Ecological Fingerprint of Galiano Island, based on the remarks of the people we were able to speak with.

We recorded interviews on audio and sometimes video, depending on the Interviewee's preference. We conducted most of the interviews personally; several additional interviews were conducted by Kris Krug and Ana Bazdresch. We created a list of questions to guide the interviews (which can be found in the Appendix C), but were flexible in our questioning to allow for a natural conversation.

For the Coast Salish Peoples of Galiano Society, interviews were conducted by Shar Wilson and Richard Wilson, from a set of questions they prepared.

After the interviews were completed, we transcribed all the interviews using Otter.ai and performed an informal thematic analysis, selecting and categorizing quotes that stood out to us as relevant to the Ecological Fingerprint.[112] We include a number of representative quotes in the following pages.

Edited transcripts of the original interviews may be obtained by reaching out to us at oneisland@galianoconservancy.ca. A list of Interviewees and interview dates can be found in Appendix C.

Additional Activities

We also wanted to involve youth community members in helping to document the community's Ecological Fingerprint. We reached out to Deblekha Guin and Roksan Parfitt of the Access to Media Education Society and the Yellowhouse Art Centre Society, respectively, to help us engage island youth in the project. They created and facilitated two workshops at the Galiano Community School.

Roksan Parfitt and Ria Okuda (GCA Educator) engaged students in a guided colouring session. Tree ring colouring sheets with three distinctive sections were given to students. Below are the discussion topics that were discussed during the guiding colouring sessions.

- Inner Circle - How did your ancestors connect to this land (or another)?
- Middle Circle - How are you connected to this place?
- Outer Circle - How do you imagine future generations will inhabit this place?

[112] Our discussions focused primarily on the practical and material relationships between the residents of Galiano Island and the environment, in order to give context to the Ecological Footprint. For a deeper discussion of aesthetic, recreational, and cultural values associated with Galiano's ecosystems, see Emmings, K., & Erickson, K. (2004). *Galiano Island Landscape Classification and UP-CLOSE Workshop Series Final Report.* Galiano Conservancy Association, Galiano Island, BC. https://galianoconservancy.ca/wp-content/uploads/2016/11/final_report_complete.pdf

Deblekha Guin and Richard Wilson facilitated an "Interviewing with Elders" workshop, in which the Upper Intermediate class at The Galiano Community School (12 students between Grades 4-7) learned the basics about interviewing and recording audio on Zoom recorders. In the spirit of 'hands on learning,' it began with them practicing their interviewing skills by interviewing each other (with a slightly modified version of the questions used in the Oral History component of this project). The next day they worked in groups to interview five local elders. Richard Wilson edited excerpts from these interviews into a sound collage.

We also asked three qualitative questions in our "Community Mail-Out Survey" about community improvement, if residents are living sustainably, and how residents think they will be impacted by climate change. We intended these questions to solicit a broader, island-wide perspective on the themes discussed in this report. We summarize the feedback we received in Part V of this report. The responses to these questions were sorted by theme and can be found in the Appendix D.

Organization

We present our "snapshot" of the Ecological Fingerprint of Galiano Island based on our oral history interviews. We intend this not as a comprehensive account of the island's history and ecology, but rather as a lightly-curated collection of memories, observations, insights, and attitudes expressed by Interviewees. Some topics were discussed in great detail by most Interviewees (see 'Forests' and 'Fish'), while other topics that we understand to be important to island residents were mentioned less frequently or not at all. To our knowledge, ours is the first attempt to create and present an Ecological Fingerprint alongside an Ecological Footprint analysis.

We present this collection under the umbrella of three broad themes: "Land", "Water", and "Community". Each theme has multiple sections based on the categories of our thematic analysis. Some Interviewees' voices feature more prominently in some sections, and less so in others. In all cases we have done our best to preserve the intent of the Interviewee in what they meant to communicate to us.

At the end of some sections, we provide **Our Takeaway**, which is just that - our perspective on how the information we collected relates to the Ecological Footprint and the Ecological Fingerprint of the Galiano Island community. The reader may take it or leave it as they see fit.

Land

Terrestrial ecosystems on Galiano Island provide many resources and services to the island community. The sections below cover several topics that were raised repeatedly throughout our interviews.

Forests 🌲

Galiano Island's forests are representative of the Coastal Douglas-fir biogeoclimatic zone, making them globally unique and uniquely imperiled.[113] Forested landscapes account for about 78% of Galiano's land cover, a number which has stayed fairly consistent between 2002[114] and 2022 (see Part II of this report). Despite this apparent stability in more recent years, many Interviewees told us that they had witnessed significant changes in Galiano's forests over the course of their lives. Florence James recalled:

> "The huge change is on the east side of Galiano Island, there's no more trees. There was old growth there - huge, huge trees. And I missed them and my husband did too, because when he fished he used those trees for a mark... like way up in the forest that rise high - the old growth. They're all gone."[115]

It is well-documented that hwulmuhw mustimuhw of the Salish Sea have practiced unique forms of sustainable forestry for thousands of years, and that old-growth western redcedar trees (Hul'qumi'num - X'pey; Latin - *Thuja Plicata*) in particular were stewarded for generations to provide wood for hats, baskets, longhouses, and, eventually, canoes.[116] Karen Charlie shared with us:

> "I work with cedar all the time. I learned from my mum. I have a basket that's over 200 years old now that's a cedar basket. That was just something that they carried their stuff in... The cedar tree is a very important thing to me. It's part of me - there's a lot of different things that are, that makes me who I am today. What I eat, what I work with, what I treasure - the cedar tree is one of them."[117]

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[113] Austin, M.A., Buffett, D.A., Nicolson, D.J., Scudder, G.G.E., & Stevens,V. (eds.). (2008). *Taking nature's pulse: The status of biodiversity in British Columbia*. Biodiversity BC.

[114] Emmings, K., & Erickson, K. (2004). *Galiano Island Landscape Classification and UP-CLOSE Workshop Series Final Report.* Galiano Conservancy Association, Galiano Island, BC. https://galianoconservancy.ca/wp-content/uploads/2016/11/final_report_complete.pdf

[115] James, F., Fournier, S., & Thompson, M. (2021, November 16). Florence James Interview - One Island, One Earth Project.

[116] See Deur, D., & Turner, N. J. (2011). *Keeping it living traditions of plant use and cultivation on the northwest coast of North America*. University of Washington Press.

[117] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

Today, western redcedar trees are still common in forests on the island, but we estimate that less 0.1% of Galiano's remaining forests are old-growth. Bowie Keefer, who lives along the coastline that Florence described above, told us:

> "And if you look at the forest... There's very little old growth timber left, a few sample trees here and there that the loggers spared, perhaps because they were not that valuable as timber... The island is all second growth or third growth forest."[118]

The economic value of Galiano's forests has long been recognized. Interviewees who lived on the island prior to the 1980s recalled a small, thriving (and colourful) community based in part on forestry. Don and Carol Robson told us:

> "Well, when we came here, it was a logging community...the whole island was logging, logging camps all over, logging tracks going up and down the road. Whaler's Bay, full of logs all the way out to Lions Island. And it was a booming little place - a dance at the community hall every Saturday night with all these wild loggers. And usually, some kind of fistfight and somebody's car upside down in the ditch on Sunday morning!"[119]

MacMillan Bloedel 1976

Don also recalled how the "gunny sack" logging that was practiced during his childhood eventually led to land consolidation. After clearing the valuable timber from a piece of land, he said, they were left with a dilemma, and some reached out to his father:

> "And I remember loggers, phoning [him] up and, "we got this chunk of property and how are we going to ever sell it?" My dad says, "you call up that Powell River Pulp and Paper Company and they'll buy it right over the phone. They don't even know it's got no timber on it!" And, and he says, "not only that, they'll send you a check and the check doesn't bounce!"[120]

[118] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[119] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[120] Ibid.

Land that was acquired by the Powell River Pulp and Paper Company, including an enormous acreage acquired from Canadian Collieries, would become the property of MacMillan Bloedel, which eventually came to own roughly half of the land on Galiano Island by 1960.[121] A number of Interviewees told us that, prior to the 1970s and 80s, MacMillan Bloedel's logging activities were relatively limited in scale. During this time, community members could freely access these lands. Gary Moore told us:

> "At that time, there was a vast hinterland of forested land that people could access. They were welcome to go there at any time, they could go to beaches and coves and get firewood for $10 - you had to pay a $10 fee at the gas station and get the permit to go and cut firewood on the company land... The local people, the old timers used to feel it was almost like the commons... If they needed gravel, they would go in there, there were gravel pits, and you could take gravel, and people did."[122]

Many Interviewees told us they valued this forest land very highly. Jane Wolverton shared that:

> "One of the things that appealed to me about Galiano was that 56% of it was owned by MacMillan Bloedel as a tree farm, and I thought, "well, that's great, because it won't get developed." That was my thing. And, and then, of course, all of that changed."[123]

In the 1970s and 80s, when MacMillan Bloedel clear-cut most of the forest lots they owned on Galiano Island, and subsequently put these lots on the market. All of the Interviewees who spoke to us about the clear-cutting were disturbed by it. Geoff Gaylor told us:

> "It was very unpleasant to have that kind of environment destroyed. It was beautiful here... the local community had full access to this whole forest, [and] all of a sudden, the forest disappears. And then you don't have access because they sell it to private individuals who put up gates, you know, so it was really disturbing."[124]

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[121] Horter, W. (2017, March 10). *The Great Land Grab*. Dogwood. Retrieved May 3, 2022, from https://dogwoodbc.ca/news/the-great-land-grab/

[122] Moore, G., Moore. B., & Thompson, M. (2022, February 7). Barbara and Gary Moore Interview - One Island, One Earth project.

[123] Wolverton, J., Krug, K., & Thompson, M. (2021, October 1). Jane Wolverton Interview - One Island, One Earth project.

[124] Gaylor, G., & Bazdresch, A. (2022, January 31). Geoff Gaylor Interview - One Island, One Earth project.

In addition to the clear-cutting carried out by MacMillan Bloedel, developers who bought the forest lots also engaged in logging. Bowie Keefer, who purchased a forest lot from MacMillan Bloedel in the early 1990's, explained that:

> "The forest lands were auctioned off. And some of it was bought by entrepreneurs, the kind of rural entrepreneur that does logging, and sometimes in a very rough way, and then flogs real estate. So the community saw some of this happening, there was a burst of logging, and there was a bunch of real estate proposals."[125]

Gary Moore remembered that:

> "When [MacMillan Bloedel] sold their lands to developers, the developers continued selling timber to pay for the land they just bought. So there was a tremendous removal of biomass in the form of trees, and the trunks of trees going off on logging trucks. And at the same time... they burned and they burned... they burned the whole cut."[126]

MacMillan Bloedel 1947

The result of all of this logging was turmoil in the community. George Harris recalled:

> "So for a period of five years there, it was like a war zone here. It was quite disturbing. There was nothing... I mean, okay, there was nothing legally we could do. But the community rose up."[127]

MacMillian Bloedel 1947

This period of time figures prominently in the memories of many island residents, and almost all of the Interviewees provided their perspectives on what occurred. We have learned that this turbulent period resulted in broad-based community organizing, the formation of organizations (including the Galiano Conservancy Association),[128] a lawsuit that advanced to the Supreme

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[125] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[126] Moore, G., Moore. B., & Thompson, M. (2022, February 7). Barbara and Gary Moore Interview - One Island, One Earth project.
[127] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[128] An organization called Clear-Cut Alternatives was formed in 1987 in response to these events, and this organization evolved into the Galiano Conservancy Association in 1989. See https://galianoconservancy.ca/wp-content/uploads/2020/05/Galiano-Stewardship-News-Fall-2019-1.pdf

Court of British Columbia, the creation of Dionisio Provincial Park, the acquisition of Mount Galiano by the Galiano Club, and many other notable developments. We won't recount the details of these events here, as accounts of this history are already available,[129] but we think there are at least four significant outcomes of this period of time.

The first outcome we identified is the preservation of a forest land-base on Galiano in the face of intense development pressures. According to George Harris:

> "We focused on the most important assets, and protected them. And it was spectacular, what the community was able to do over a period of many years."[130]

Bowie Keefer told us that:

> "Since then, there has been essentially very little harvesting and no clear-cut logging on Galiano. And the result is the entire island is now green, if seen from outer space, and this means that we can look forward optimistically toward, eventually, the island being covered with a forest that is mature... tending towards old growth. So I'm an optimist about that."[131]

Interviewees attributed this first outcome to the effects of community bylaws, protected areas, Province-wide changes in the economics of the forest industry, and shifts in community attitudes. John Georgeson reflected that:

> "When you drive around on the island there now compared to what it was like in the 60s and 70s, I can remember, maybe in the 80s, used to be able to see the water. Now it's all grown in because everybody's afraid to cut trees... Used to drive up, if you went up to the north end in the afternoon, it was so bright in your eyes, but... most of it's shaded now, because the trees are all over the road now."[132]

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[129] See Griffiths, M. (2004). *The Story of Galiano Island ~ across thirty important years*. Galiano Island, BC. Retrieved from http://galianostory.com/OVERVIEW.HTM; and Moore, G. (2017). *What Happened at Coon Bay: Roots and Branches of the Galiano Conservancy Association* (1st ed.). Alea Design and Print.
[130] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[131] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[132] Head, C., Baines, L., Georgeson, J., Wilson, R., & Wilson, S. (2021). Charlie Head, Loyd Baines, and John Georgeson Interview - Coast Salish Peoples of Galiano Society.

The second outcome we identified was the loss of a forest-based economy on Galiano Island. Gary Moore told us that many islanders who opposed MacMillan Bloedel's clear-cuts were still in favour of sustainable forestry:

> "Unfortunately, we lost that fight. We tried to keep it in the community's hands so that the community could manage it sustainably according to the community's needs and wants and firewood needs and that sort of thing, as well as employment, of course."[133]

Photo by: Jim Labounty

Instead of a sustainable forestry economy, Galiano Island today has little to no forestry economy. George Harris told us:

> "[In the] early 90s, the clearcutting stopped. And now the log dump is gone. And so the economics of forestry - because they also took the best trees, but also getting the trees off the island now is almost impossible. So, that's probably been the biggest change is the end of logging."[134]

Looking over Whaler Bay, Charlie Head recounted:

> "Used to see logging, there used to be logs or something happening in this bay all the time, now there's nothing."[135]

The third outcome we identified is the polarization of the Galiano Island community along several fault lines associated with these events. According to John Georgeson:

> "Yeah, I think it was the protesters, or the logging fighters there in the late 80s segregated the community, and it's maintained that since then."[136]

George Harris told us:

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[133] Moore, G., Moore. B., & Thompson, M. (2022, February 7). Barbara and Gary Moore Interview - One Island, One Earth project.
[134] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[135] Head, C., Baines, L., Georgeson, J., Wilson, R., & Wilson, S. (2021). Charlie Head, Loyd Baines, and John Georgeson Interview - Coast Salish Peoples of Galiano Society.
[136] Ibid.

> "And so we fought [the development], and we changed the rules, but it created a divide in the community that's never healed, because it was a multi-million dollar - I mean, this was 7000 acres was being developed."[137]

Don Robson's perspective summed up a sentiment we heard from many Interviewees:

> "So really the way MacBlo [MacMillan Bloedel] left it, I think they knew we would be fighting about it forever. "Take that Galiano, you suckers."[138]

The fourth outcome we identified was the simplification of Galiano Island's forest ecosystems. According to Bowie Keefer:

> "Right now our forests are quite impoverished because of the history of clear-cut logging. You don't see many dogwood trees for example. And because of climate change, we're seeing a lot of cedar trees dying. And what we need is a forest that is more diverse."[139]

Bowie was, however, hopeful that this could be addressed:

> "Much of the forest land on this island has been in a state of neglect, almost complete neglect. And that's kind of benign neglect, in the sense that you're letting nature take its course. But you're not helping nature. Your land has been seriously impacted and impoverished ecologically. And if you restore it with some sensitivity and intelligence, and major investment of effort, you can help nature."[140]

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[137] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[138] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[139] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[140] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.

The Galiano Conservancy Association has been engaged in forest restoration projects for over two decades, developing innovative approaches[141] which are now being adopted in the UK.[142] Many of our Interviewees indicated renewed interest in more hands-on management of Galiano's forests. Geoff Gaylor told us:

> "Selective logging is pretty easy... [laughs], you leave some trees, you know, and you don't only take the best ones and leave the bad ones; you take the bad ones with some of the best ones, but you leave a good seed. Whatever you want to call it, like gardening right, you get a good seed thing going on. So that's how I kind of see the environment here."[143]

Bowie Keefer spoke at length about the vision that he and GEFA, the newly-formed Galiano EcoForestry Association,[144] have for Galiano Island:

> "And we see this, the island, all of Galiano eventually being a kind of a demonstration forest, where you've got public trail networks, you've got a forest being cared for, you've got a community that's getting along, you've got jobs for young people working on the trails and maintaining the forest."[145]

Our Takeaway is that the Galiano community has succeeded - despite significant development pressure - in preserving a forest land base and associated community values, but has been unable to maintain either the full ecological integrity or the economic viability of this land base. Forest lands on Galiano Island continue to provide for the vast majority of our terrestrial Biocapacity (see Part II of this report), but are also in need of restorative interventions to maintain and improve their health. Forests, then, continue to be a source of identity, pride, enjoyment, solace, and opportunity, but also some amount of lingering tension. And, as we show in the next section, a degree of risk.

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[141] Scholz, O., Erikson, K., Azevedo, J. (2004). Restoring the Forest in a Young Coastal Douglas-fir Plantation. *Society for Ecological Restoration*. https://galianoconservancy.ca/wp-content/uploads/2016/11/restoration_paper_1.pdf

[142] Weston, P. (2022, January 29). *Chopping, twisting, felling: The unruly way to Rewild Scotland's forests*. The Guardian. Retrieved April 29, 2022, from https://www.theguardian.com/environment/2022/jan/29/chopping-twisting-felling-the-unruly-way-to-rewild-scotlands-forests-aoe

[143] Gaylor, G., & Bazdresch, A. (2022, January 31). Geoff Gaylor Interview - One Island, One Earth project.

[144] See https://www.youtube.com/watch?v=1kTm1hPSbqA

[145] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.

Fire 🔥

Forests in the Coastal Douglas-fir biogeoclimatic zone have evolved alongside both natural and anthropogenic fire, with an estimated mean fire return interval of approximately 100-250 years for stand-replacing natural ignitions and much shorter rotations for low-intensity human-ignited fires.[146] We have observed that many of the surviving old-growth Douglas-fir (Hul'qumi'num - Ts'sey; Latin - *Pseudotsuga menziesii*) trees on Galiano Island are marked by fire scars.

Due to widely shared concerns around the potential impacts of wildfire on this small and very flammable island, the Galiano Island community organized to create not one but two volunteer fire departments, in the north and south of the island. Don Robson told us that at first, not every community member was on board:

> "We formed the fire department here about 1962. And in 1966, we decided we were going to form a fire district. And we actually had quite an opposition to it. I was the fire chief, and one of my best friends says 'we don't want to be paying taxes for a fire department.' He says, 'if my house catches [fire], don't even spray any water on it.' I said, 'Well, we'll show up with a fire truck and beer and hot dogs, and we'll just watch it burn.' [laughter]" [147]

Despite this initial reluctance, it is clear to us that the vast majority of island residents now see value in these community institutions, supporting them financially and as volunteers. These fire departments have been highly successful in responding to emergencies and preventing wildfires on Galiano since their inception, which is in keeping with over a century of reasonably successful fire suppression throughout the Province[148] and, indeed, throughout North America.[149] As a result, a number of Interviewees noted the risks posed by the build-up of fuels in forests on Galiano Island. Bowie Keefer pointed out that:

> "We're intimately living in the forest or close to it. And so we are at risk from forest fires. The risk of wildfires here is much much less than in the interior, because we're close to the cooling influence of the ocean, and in the winter, we do get lots of rain - as we are this year. And it appears that climate change is making our winters wetter and our summers drier, and these very long

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[146] Derr, K. (2014). Anthropogenic Fire and Landscape Management on Valdes Island, Southwestern BC. *Canadian Journal of Archaeology, 38*, 250-279.

[147] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.

[148] Hanes, C. C., et al. (2018). Fire-regime changes in Canada over the last half century. *Canadian Journal of Forest Research, 49.*

[149] Parisien, M., et al. (2016). The spatially varying influence of humans on fire probability in North America. *Environmental Research Letters,* 11.

droughts are greatly raising the risk of forest fire. Forest fires have a natural role in rejuvenating forests, but we don't need large and destructive forest fires."[150]

Some Interviewees related the risk of forest fires to the effects of climate change, reduced logging, or both. Janice Wilson observed:

"You know, the warmer weather, the lack of logging - which used to happen in a good way on Galiano, no longer happens anymore. So there's a lot of dry debris in the forest that never used to be there before."[151]

The danger of this situation was made evident on July 23, 2006, when an anthropogenic wildfire forced evacuations of over 100 island residents and consumed over 60 hectares of land on the southeast side of Galiano.[152] The fire and its aftermath have had a lasting impact on some island residents.[153] Bowie Keefer told us that it's time for the Galiano community to address the issue of fuel build-up:

"The forest needs to be cared for to reduce the fire risk and to do some management so that the young forest will be diverse and beautiful."[154]

The Galiano Conservancy can provide guidance on balancing FireSmart principles with ecological landscaping, including maintaining sufficient coarse woody debris (CWD) in forested ecosystems while minimizing fire risk.[155] During the same time period as this project unfolded, the community secured

[150] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[151] Wilson, J., Wilson, R., & Wilson, S. (2021). Janice Wilson Interview - Coast Salish Peoples of Galiano Society.
[152] Salinas, E. (2006, July 25). *Fire, evacuation shatter B.C. Island's calm*. The Globe and Mail. Retrieved April 29, 2022, from https://www.theglobeandmail.com/news/national/fire-evacuation-shatter-bc-islands-calm/article1106656/
[153] See Sandilands, C., & Colwell, A. (2020). Wildfire. In *Rising tides: Reflections for climate changing times*. essay, Harbour Publishing.
[154] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[155] See https://galianoconservancy.ca/wp-content/uploads/2020/08/Stewardship-News.pdf

funding to hire three part-time positions to help residents apply FireSmart principles to their properties. Several demonstration FireSmart forest areas have been established on the island.

While some Interviewees echoed this desire for improved forest management, no Interviewee brought up the topic of prescribed fire, a practice which is being experimented with elsewhere in the Southern Gulf Islands[156] and which has long been employed by hwulmuhw mustimuhw of the Salish Sea.

🔥

Our Takeaway is that the Galiano community has begun to recognize an increased risk of wildfires on the island, and is beginning to take some measures to proactively address this risk. Community members are worried, but not worried enough yet to pursue altering settlement patterns, creating firebreaks, selective logging, or returning prescribed fire to the land.

Deer 🦌

Black-tailed deer (Hul'qumi'num - Ha'put; Latin - *Odocoileus hemionus columbianus*) are native to Galiano Island, and we have observed that they are very abundant on Galiano and on neighbouring Parker Island as well. Levi Wilson told us:

> "One of the stories I've heard about Parker Island and its name Qwi'qwuns... relates to the fact that that's where all the deer on Galiano - anybody who comes to hunt deer from Galiano - the deer come from Parker Island. It's like the deer breeding ground, and then they swim over and populate."[157]

Emily Menzies added:

> "I can attest to that... because I lived there for about a year, and there's herds of deer - like forget mom and two babies - there's freaking herds [laughs]."[158]

Hwulmuhw mustimuhw told us they have always come to Galiano Island to hunt deer, and that deer are a critical food source. Hunting is an important life skill that is taught from a young age, Karen Charlie told us:

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[156] Cunningham, S. (2016, October 1). *Small Gulf Island set ablaze in hopes of spurring new growth*. Vancouver Island. Retrieved April 29, 2022, from https://vancouverisland.ctvnews.ca/small-gulf-island-set-ablaze-in-hopes-of-spurring-new-growth-1.3097232

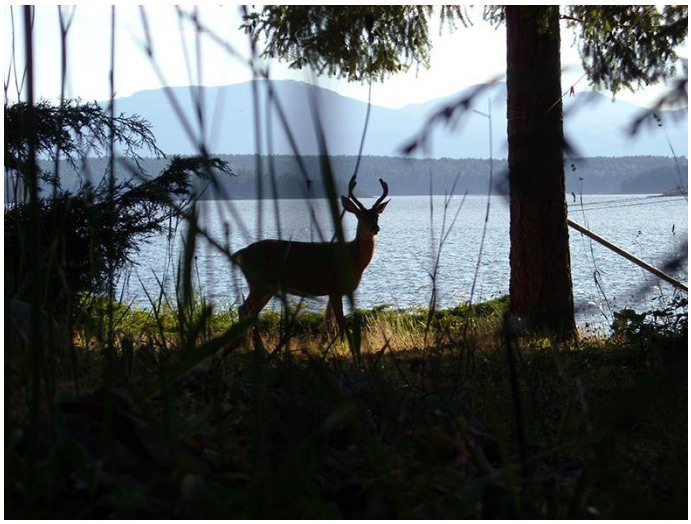
[157] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

[158] Ibid.

"We start teaching our kids how to hunt when their voices start to change."[159]

We've learned that deer have been an important source of sustenance for hwunitum and hwulmuhw mustimuhw alike. According to Don Robson, who grew up on Galiano in the 40s and 50s:

"In those days, you had to go out and get your limit of deer just to survive. We didn't hunt for sport... that was your meat in the wintertime. I can remember when I finally got old enough to get my hunting license, so now we could have three deer. So that was a big event."[160]



Bob Wilson told us it was previously easier to access good hunting areas on Galiano Island:

"There used to be so much room to hunt. And we never ever thought about private property or anything. We knew where the houses were back then, and of course you wouldn't go and endanger somebody. You knew a safe place to hunt. And there was always lots of land and different roads you could hunt that you knew you were away from the people."[161]

In more recent years, though, he says it has become much more difficult:

"I don't even know where to hunt on this island anymore, really, to be honest. I mean, where we get our deer meat now is on a person's private property that he allows us to hunt. And there's no really public areas to hunt that I can think of, safely anyways."[162]

In addition to the impacts of development and housing in reducing access to former hunting areas, some Interviewees noted that hunting is not allowed in most protected areas on the island. Florence James,

[159] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[160] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[161] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.
[162] Ibid.

recalling her conversations regarding land acquisition efforts with the late Ken Millard (the first Executive Director of the Galiano Conservancy Association), told us:

> "I said 'don't protect it so hard that we can't hunt there.' Because that was my deal. I said, 'I'm gonna help you and I'll tell you, but you gotta let us hunt.' That's our food. And because you're keeping it more clean, I really now want to be there. Yes! [laughs] So you got to work with us. You can't work against us."[163]

Emily Menzies observed to us that:

> "The few places that have been preserved are often in parks where harvesting isn't allowed, and so much of the conservation and preservation movements, unfortunately, have for a long time seen Indigenous people as inimical to conservation goals."[164]

Over the years, Interviewees told us, access to hunting areas has declined and the population of deer has grown. Several Interviewees also said they'd observed a decrease in the size of the deer on the island. Bob Wilson told us:

> "I think it has a lot to do with the overpopulation of deer. I think there's more deer on the island now than there used to be. But they are a lot, they're smaller."[165]

Deer populations across the Southern Gulf Islands, including Galiano Island, have been labeled "hyper-abundant" by local scientists, and studies have demonstrated negative impacts on native wildflowers,[166] culturally-important plant foods,[167] and songbirds.[168] We have heard islanders attribute the abundant deer population to extirpation of native predators from Galiano, reduced hunting pressure, and the aftermath of the clear-cuts in the 1970s and 80s. Sheila Anderson told us:

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[163] James, F., Fournier, S., & Thompson, M. (2021, November 16). Florence James Interview - One Island, One Earth Project.

[164] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

[165] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.

[166] Gonzales, E., & Arcese, P. (2008). Herbivory More Limiting Than Competition On Early And Established Native Plants In An Invaded Meadow. *Ecology, 89(12)*, pp. 3282–3289.

[167] Arcese, P., et al. (2014). Deer Density and Plant Palatability Predict Shrub Cover, Richness, Diversity and Aboriginal Food Value in a North American Archipelago. *Diversity and Distributions, 20(12)*, pp. 1368–1378.

[168] Martin, T., et al. (2011). Browsing down Our Natural Heritage: Deer Impacts on Vegetation Structure and Songbird Populations across an Island Archipelago. *Biological Conservation*, *144(1)*, pp. 459–469.

> “I think that changed when they did the clear cutting, it really changed the deer population. And there seemed to be - as is typical, I believe - when clear cuts start to come back in young saplings, that population goes up. And we definitely noticed more deer after that."[169]

She continued:

> "And then the trees grow back and get to the point where there's not enough food to browse for them. And then they start shifting into the other lands, like where people are living.” [170]

Many Interviewees acknowledged that living alongside a large population of deer has some downsides, including frequent vehicle collisions and difficulties growing food. George Harris told us:

> “We're putting in big gardens, but they're a disaster. The deer come in, and they just decimated our cherry orchard.”[171]

Emily Menzies remarked:

> “What vegetarian who grows a garden on Galiano doesn't, like, curse the deer at some point? Because they got into your garden and ate everything, you know? Like, there's too many... and Levi's told me about these cyclical diseases that have run through the deer population, right?”[172]

During the course of this project, the deer population on the island was going through one such outbreak (in this case of a disease that had not been previously recorded in BC).[173] Many Interviewees expressed some desire for reducing

[169] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[170] Ibid.
[171] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[172] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[173] British Columbia Government. (2021). *Adenovirus Hemorrhagic Disease In Deer British Columbia Wildlife Health Fact Sheet.* BC Environment. https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/wildlife-wildlife-habitat/wildlife-health/wildlife-health-documents/adenovirus_hemorrhagic_disease_in_deer.pdf

the deer population. Emily said that she thinks that, with the proper organization, a community-led hunting effort could be a win-win-win for island residents, conservation, and food security:

> "But if there was an actual planned thing, where we took care of the safety concerns, where it was mapped out whose properties are open to hunting to come through... and there was actually like, some record, you know, some observation done of how many deer do need to be culled, and then have it all set up, ready for processing. And then you have local, organic, wild meats. You're not shipping in beef from who knows where that's so expensive, right, for people to meet their protein needs?"[174]

The Galiano Conservancy Association hosted the 3rd edition of their "Feed the People" workshop during the course of this project. The workshop is led by Penelakut Elders, including Karen and Richard Charlie, and teaches participants how to respectfully process deer that have been hunted by Penelakut hunters on Galiano Island and Conservancy lands.[175] A central goal of the workshop is to communicate to participants the importance to hwulmuhw mustimuhw of being able to access deer on their territories, especially as fish stocks have declined (see 'Water' theme). Karen Charlie reminded us:

> "The salmon's almost all gone, which needs to be revived. That's where we talk about being able to adapt. And that's why we're depending mostly on the deer meat now. Deer meat is the most pure meat that we have now."[176]

Our Takeaway is that Galiano Island is capable of supporting robust native deer populations, but that absent sufficient top-down pressure (i.e., predation or hunting), deer populations will continue to be held in check by food scarcity, disease, and vehicle collisions, with negative implications for island residents, island ecologies, and the deer themselves. Finding creative ways to facilitate hunting by hwulmuhw mustimuhw and to improve overall access to safe areas to hunt could have significant benefits to the community as a whole.

Birds 🐦

Interviewees made several notable observations about changes in the populations of birds on the island.

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[174] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[175] Galiano Conservancy Association. (2019). *Conservation and Deer On Galiano Island.* Galiano Conservancy Association. https://galianoconservancy.ca/deer/
[176] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

The first observation is that populations of sooty (blue) grouse (Hul'qumi'num - Miit'; Latin - *Dendragapus obscurus*) are lower today than they were in the past. Many Interviewees reported that, when they were young, grouse were plentiful and were commonly hunted and eaten by island residents. Carol Robson told us:

"We had a good life. There was lots of food. We had lots of grouse on Galiano. Dad was a good hunter."[177]

Encounters with grouse were a common occurrence, according to Sheila Anderson:

"You hear them in the spring when they were doing their mating thing and you'd run into them when you're on the trails... Even on Bluffs Park, a mother with babies right on the trail and all flying up and panicking because you came along."[178]

While we have observed grouse on the island, they are almost certainly less common today. Don Robson remarked to us:

> "Everybody hunted grouse. Up on Mount Sutil, used to be grouse everywhere. Now there's no grouse."[179]

Another bird that was identified as an important local food source is the common murre (Hul'qumi'num - Sxeetth; Latin - *Uria aalge*). Karen Charlie told us:

> "That's one of our main foods in the wintertime. Especially for the oils in the murre duck... there's not much oils in the deer meat."[180]

She continued to tell us that the populations of common murre in the Salish Sea crashed following the 1989 Exxon Valdez oil spill in Alaska:

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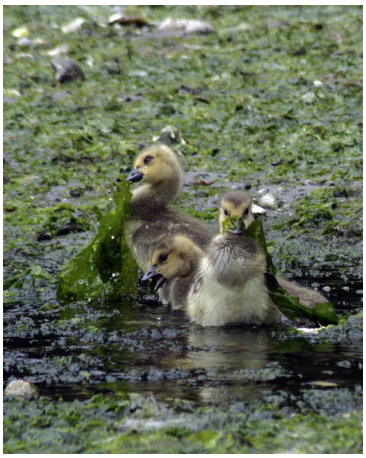
[177] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[178] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[179] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[180] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

> "I just love ducks. I was so devastated when the murre duck was really gone for a while. Just couldn't find one! And then when we did start to get it, they had patches of oil on them, [and] we weren't allowed to clean and cook, and so it was just wasted. So the First Nations men kind of gave up on the murre duck. You know that oil spill that happened in Alaska? They polluted our food, because the murre duck goes away in the summertime. They come back in the winter time."[181]



Karen told us that the population has recovered to a certain extent since 1989:

> "Almost. It's not as good as it used to be. Our hunters used to come in with up to 300; now we're lucky we get 20."[182]

Interviewees mentioned other observed changes in bird populations that have less relevance to this project, including the near replacement of western screech owls (Latin - *Megascops kennicottii*) by barred owls (Latin - *Strix varia*), as well as the arrival of Anna's hummingbird (Latin - *Calypte anna*).

🐦

Our Takeaway is that at least two important and previously common species of bird are no longer abundant enough today to support the kind of hunting that was practiced in the past on and around Galiano Island. Efforts to recover these species might afford future generations the opportunity to once again harvest these species, but may need to address land use change, pollution, and fish populations (see the section on 'Fish').

Introduced Species 🧹

Several Interviewees expressed concern about the introduction and establishment of non-native species to Galiano Island. Karen Charlie told us:

[181] Ibid.
[182] Ibid.

> "There's a lot of different trees that are brought in and planted that are not part of the natural environment. And invasive species like the scotch broom - people don't know that was brought here. My grandchildren don't know that that plant doesn't belong here. It's just like garbage laying all along our road now - invasive."[183]

Shar and Bob Wilson also felt that Scotch broom (Latin - *Cytisus scoparius*) had increased on Galiano Island over the years. Shar observed:

> "Broom brush has kind of overtaken Galiano, pretty much. There's lots. I mean, that probably has to do with, I don't know, I don't think deer eat broom brush."[184]

Scotch broom was not the only introduced species that elicited concern. Shar continued:

> "I wish people would stop bringing species on this island that don't belong here. Like, to eradicate all those invasive species, to try to get the land back to where it used to be like. People are planting flowers... I don't remember daffodils growing all over the island before. Now there's daffodils everywhere."[185]

We note that many of these introduced species have become so established on the island that many residents appear to consider them to be fully naturalized. For example, on a widely published illustrated community map of the island produced for a community atlas of the Salish Sea,[186] nearly every one of the wildflowers depicted on the map is an introduced species - these include rose campion (Latin - *Silene coronaria*), daffodil (Latin - *Narcissus spp.*), foxglove (Latin - *Digitalis purpurea*), and crocus (Latin - *Crocus spp.*); the only native species depicted appears to be chocolate lily (Hul'qumi'num - lhasem; Latin - *Fritillaria affinis*). The Galiano Conservancy Association actively controls

[183] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[184] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.
[185] Ibid.
[186] See Stevenson, J., & Harrington, S. (2007). *Islands in the Salish Sea: A community atlas*. TouchWood Editions.

and removes introduced species in protected areas, and maintains a web page to provide up-to-date information and resources to island residents on the subject.[187]

Some Interviewees were also concerned about marine introduced species. Richard Charlie told us:

> "You can see all the freighters parked close to reserve areas. I seen it on the news that they caught a different species of crab in Ladysmith that could kill all the Dungeness and whatever else that we live off of if they didn't catch it... And I blame those freighters, you know, being stuck on the bottom of the freighters for how many months and then finally just let go."[188]

Our Takeaway is that some within the Galiano Island community remain concerned about new species introductions and well-established introduced species; others may now be inured to them, or less aware of their impacts. We've observed that significant community efforts have been and are being made to address this issue; nevertheless, we note that, at the time of writing, these efforts have been insufficient to prevent the establishment of these species, or control their expansion in many parts of the island (including the Provincial Parks). Our experience has been that it is possible to control or eliminate many of these species from an area given appropriate effort and persistence. Ongoing efforts to educate island residents and secure more resources to address this issue could help prevent introduced species from further impacting island ecosystems.

Freshwater 💧

During our time on Galiano Island, we've observed that the availability (or lack thereof) of freshwater to support households, local food production, and new developments has been a serious concern to most, if not all, island residents. There is significant overlap between this issue and concerns about climate change (see next section) and development (see 'Housing' section).

Galiano Island is defined by a Mediterranean climate, with cool, wet winters and summer drought. Rainfall is ample in the winter season, but absent during key summer months, a pattern that is expected to be exacerbated by climate change.[189] Despite this, the Interviewees who spoke on the topic told us that water wasn't always scarce on Galiano Island. Florence James recalled her experiences of north Galiano when she was young:

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[187] See https://galianoconservancy.ca/our-work/restoration/

[188] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

[189] Capital Regional District. (2017). *Climate Projections for the Capital Region*. Retrieved on May 5, 2022 from https://www.crd.bc.ca/docs/default-source/climate-action-pdf/reports/2017-07-17_climateprojectionsforthecapitalregion_final.pdf?sfvrsn=bb9f39ca_12

> "Lots of space, lots of freedom, lots of good water, no contamination."[190]

We have learned that this is no longer the case in more populated parts of the island (see 'Water' section of Part III of this report). Several Interviewees remarked to us that they now regularly see trucks delivering water to residents and businesses in the summertime. Barbara Moore asked:

> "How much water do we [see being brought in], in tanks? Yeah, there's a lot. That never used to happen!"[191]

Gary Moore responded:

> "Many, many wells have failed here now in the areas that they've always produced water. Lots of saltwater intrusion... It's easy to forget that there was a time when we were shocked that they were selling water at the gas station in large five gallon containers. 'What? We're importing water? Oh, shit!'"[192]

Barbara and Gary told us that they've had to be really careful to conserve water in their own home:

> "So it's a really small amount of water, which is what informed many of our choices about how to live here. So, you know, we don't have a flush toilet."[193]

Emily Menzies told us that the lack of water impacts local agriculture:

> "So agriculture, you know, it's tough. It's tough on an island with very little water."[194]

In our Community Mail-Out Survey,[195] 'Water Accessibility' and 'Agricultural Water' were by far the most frequently mentioned issues for participants when responding to how they think climate change will affect them. Despite the widely-held concerns about water, relatively few Interviewees spoke with us at length about this topic. It is possible that this may be because water has been a controversial issue on the island during the course of this project.

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[190] James, F., Fournier, S., & Thompson, M. (2021, November 16). Florence James Interview - One Island, One Earth Project.
[191] Moore, G., Moore. B., & Thompson, M. (2022, February 7). Barbara and Gary Moore Interview - One Island, One Earth project.
[192] Ibid.
[193] Ibid.
[194] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[195] See Appendix D

The topic of water availability and development will be discussed further in the 'Housing' section.

💧

Our Takeaway is that limited groundwater supplies are a defining issue for the Galiano Island community, with impacts for quality of life, housing, agricultural potential, and ecosystem management. Parts of the island where freshwater was once taken for granted are now experiencing regular water shortages and in some cases saltwater intrusion. There appears to be broad agreement that development must be constrained by water availability, but disagreement over where and how to draw that line depending on the land and development in question. Nevertheless, the plentiful rainfall during the winter months on Galiano Island provides substantial opportunities for rainwater harvesting, water-efficient technologies, greywater systems, and composting toilets to help address this problem. The Galiano Conservancy Association maintains demonstration facilities for each of these approaches at the Millard Learning Centre, as well as a web page of resources.[196]

Climate 🌀

Our central motivation for this project was to better understand what a small island community like Galiano Island can do about the Climate Crisis. Over the course of our interviews, it became clear to us that many Interviewees already attribute some of the changes they've observed on the island to climate change. Since most of these observations are associated with the land, we've included this section here.

The vast majority of Interviewees acknowledged climate change and attributed it to human agency. Bowie Keefer remarked to us:

> "Humanity is stupid enough to burn all the coal as quickly as you can and dig out all the oil sands as quickly as you can, and burn all the fossil fuels as quickly as you can on the principle that we've got to do it right now because it's there. And we have recklessly perturbed the climate, which is impacting on Galiano."[197]

[196] See www.galianoconservancy.ca/water

[197] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.

Interviewees mentioned several impacts they had already observed. Several Interviewees recalled longer, colder winters in the past. Janice Wilson said:

> "I believe the weather has changed throughout the years. I remember when I was growing up, some years we'd have like three feet of snow. I remember, my dad would come out and we'd make tunnels in the snow when I was young. And I don't think that Galiano gets that much snow anymore."[198]

Richard Charlie told us:

> "We used to have a lot of snow... I can remember climbing on the roof and jumping into a great big snow pile as a kid. You know, my mom's asking me, 'what are you doing?' 'Playing in the snow.' 'Well, get off the roof!' 'Okay.' Jump in the snow! But here we hardly have any snow now in the winter time. We're lucky to have three weeks at the most of snow."[199]

Bob Wilson remembered:

> There'd be cold spells where the small little ponds and things would freeze over and we'd all dig out our thrift store skates and go and try to play hockey on it and stuff. And nowadays, if it does freeze it doesn't freeze enough to even try to skate on... The school used to take skating days... I'm sure that never happens anymore because there wouldn't be any ice there. It definitely was colder back then. The climate was, the winter was different for sure."[200]

Some Interviewees also noted changes during the summer season. In addition to increasingly regular smoke from wildfires, higher temperatures were a concern. Karen Charlie told us:

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[198] Wilson, J., Wilson, R., & Wilson, S. (2021). Janice Wilson Interview - Coast Salish Peoples of Galiano Society.
[199] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[200] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.

> "The environment is changing, the world is changing - the heat. Take a look at the heatwave that happened this summer. I've never really seen that. I've never really lived in that kind of heat before."[201]

Karen's reference here to the 'heat dome' event in June of 2021[202] would be immediately clear to any islander (or indeed any resident in the affected areas). Other observations that Interviewees associated with a changing climate included stressed western redcedar trees and intense wind storms.

Levi Wilson told us:

> "The most visually striking one that I've seen is how cedars all have some red on them now. They grow a lot slower. I remember when I was a kid there was no real red in the forest. There's lots of it now."[203]

Bowie Keefer explained to us:

> "Our cedar trees are in bad shape in much of the island because of the severe droughts."[204]

Richard Charlie told us:

> "My wife says it's got to be, maybe climate change. Our cedar trees are starting to die off for no reason at all."[205]

Declines in western redcedar populations like those observed on Galiano Island have been predicted based on regional climate projections.[206] On the subject of storms, Janice Wilson observed:

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[201] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[202] Schmunk, R. (2021, November 1). *595 people were killed by heat in B.C. this summer, new figures from Coroner Show | CBC news*. CBCnews. Retrieved May 2, 2022, from https://www.cbc.ca/news/canada/british-columbia/bc-heat-dome-sudden-deaths-revised-2021-1.6232758
[203] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[204] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[205] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[206] Wilson, S. J., & Hebda, R. J. (2008). Mitigating and Adapting to Climate Change through the

> "The wind seems a lot stronger now than it did before. We have more fierce storms... I mean, you know, trees fall and the wind is strong, the island is without power for days and days. Yeah, I believe that. It's changing a lot."[207]

Gary Moore told us:

> "Power outages and high, high wind events were less normal, less common when we first moved here."[208]

It was clear to us from our interviews that a particularly destructive December 2018 windstorm[209] still figured largely in Interviewee's memories. When asked how they thought climate change would affect them, some of the most frequent responses from participants in our Community Mail-Out Survey[210] (aside from 'Water Accessibility' and 'Agricultural Water' - see 'Freshwater' secretion, above) were "Heat Waves/Temperature", "Fire", "Extreme Weather", "Food Production/Availability", and "Air Quality/Smoke" - in that order.

Our Takeaway is that the Galiano Island community is, for the most part, keenly aware of some of the risks associated with the climate crisis, and already attributes some locally observed changes to its effects. Significant organizing and engagement around this issue has already occurred, including art exhibitions[211] and the recent publication of a compilation book.[212] During the course of this project alone, we experienced an unprecedented heat dome in June of 2021, persistent wildfire smoke in July of 2021, an atmospheric river rain and flood event in November of 2021, and frequent storm-related power outages throughout the winter of 2021 and 2022. This report is an attempt to contribute to the ongoing dialogue around community-led efforts to mitigate and adapt to a changing climate.

Conservation of Nature. The Land Trust Alliance of BC. Available from: https://www.savethecedarleague.org/docs/FixClimatebyConservingNature.pdf

[207] Wilson, J., Wilson, R., & Wilson, S. (2021). Janice Wilson Interview - Coast Salish Peoples of Galiano Society.

[208] Moore, G., Moore. B., & Thompson, M. (2022, February 7). Barbara and Gary Moore Interview - One Island, One Earth project.

[209] Denis, J. S., & Cruickshank, A. (2018, December 29). *These B.C. Islanders just survived the most violent storm to hit the province in 20 years. Here's what they want you to know*. thestar.com. Retrieved May 2, 2022, from https://www.thestar.com/vancouver/2018/12/28/these-bc-islanders-just-survived-the-most-violent-storm-to-hit-the-province-in-20-years-heres-what-they-want-you-to-know.html?rf

[210] See Appendix D

[211] See 'Higher Tide', https://www.yellowhouseartcentre.ca/past-exhibitions

[212] See Sandilands, C. (2020). *Rising tides: Reflections for climate changing times*. Harbour Publishing.

Water

Island communities frequently depend on marine resources, and Galiano Island is no exception. The people who spoke with us repeatedly emphasized the importance of marine resources, and expressed serious concern about declines in these resources that they have witnessed over their lifetimes.

Fish 🐟

The vast majority of our Interviewees spoke about the historical importance of fishing to the Galiano Island community. It is clear to us that fishing has always been a foundation of coastal communities, economies, and cultures in the Salish Sea, and that unique systems of harvest and governance have been practiced here since time immemorial.[213] During our interview, Karen and Richard Charlie described how Karen's father used to fish for Pacific herring (Hul'qumi'num - Slhewut'; Latin - *Clupea pallasi*) when they were young. Richard told us about how he made a herring rake:

> "He spent days and days just making that rake, and I spent days helping him make that rake... He used to just go out on his canoe - it was just outside of the spit in Penelakut - and just rake up buckets and buckets of herring. Soon as you would go like this and paddle with that rake, up comes, maybe there's 20-30 herrings just on the end of the board going like this, then he'd just go like this and start banging it in the canoe, filling up his canoe with herrings... One of the joyful times of living, to spend with elders to watch that magic happen."[214]

Karen told us that it's been many years since it was possible to fish like that:

> "Probably 40 years ago was the last time that we were able to just rake it out of the water. Can't do that anymore. Nobody does that anymore. They're all fishing with the great big boats and nets."[215]

There were active herring salteries (and later canneries) operated by Japanese families since the early 1900s in several bays on the north end of Galiano Island, prior to Japanese internment during the Second World War.[216] The Strait of Georgia in the Salish Sea currently supports one of the last remaining

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[213] See, for example: Claxton, N. NXEMŦOLTW. (2015). *To Fish as Formerly: A Resurgent Journey back to the Saanich Reef Net Fishery* (thesis). University of Victoria, Victoria.
[214] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[215] Ibid.
[216] Steward, E. (1994). Herring Salteries - Canneries. In *Galiano houses and people: Looking back to 1930* (pp. 140–141). essay, E. Steward.

industrial herring fisheries on the Pacific coast,[217] which had its quota cut in half in 2021[218] in response to ongoing declines and public pressure. Herring are a foundational species for the marine food web of the Salish Sea,[219] but Karen told us that they have long since stopped spawning in the waters around Galiano and Penelakut Islands:

> "I used to always wait - every February they'd be spawning down in our bay, they'd be coming around. But now we don't get herring. We have to go and wait with buckets at the fisherman's wharfs. That's where we get our herring now. Because they don't come to where we usually go and fish for them."[220]

Fishing is a cherished way of life for many hwulmuhw mustimuhw in the region. In her 2018 article, "We Have Stories: Five Generations of Indigenous Women in Water," Rosemary Georgeson shares:

> "I grew up on fishing boats. My first memories are of being on the water on my dad's fish packer in the Georgeson Bay. I mostly worked with my dad, trolling from Galiano Island to Prince Rupert and back. Surrounded by the smell of saltwater, coffee, fish, and diesel, I loved to fish in the early morning. The sun was always the brightest then, and there would be a gentle roll in the boat. My brothers and I knew our life was part of the water that was around us, in our bay, around our island. It was our highway. We survived off it. It was our food source, our economy, our social structure. The water was a place where we connected with family and friends. It all came from the water around us. We used to all be fishermen."[221]

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[217] Pollon, C. (2022, May 3). *B.C.'s last great herring fishery*. The Narwhal. Retrieved May 3, 2022, from https://thenarwhal.ca/b-cs-last-great-herring-fishery/

[218] See https://www.canada.ca/en/fisheries-oceans/news/2021/12/fisheries-and-oceans-canada-updates-pacific-herring-coast-wide-harvest-plan-for-2021-22.html

[219] MacDuffee, M. (2021, September 16). *Pacific Herring: Underpinning the coastal foodweb*. Raincoast Conservation Foundation. Retrieved May 3, 2022, from https://www.raincoast.org/2018/06/pacific-herring-underpinning-the-coastal-foodweb/

[220] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

[221] Georgeson, R., & Hallenbeck, J. (2018). We Have Stories: Five Generations of Indigenous Women in Water. *Decolonization: Indigeneity, Education & Society*. 7(1), 20-38. https://jps.library.utoronto.ca/index.php/des/article/view/30390

Hwumlmuhw mustimuhw and hwunitum Interviewees alike told us that, like herring, other fish and seafood used to be much more abundant. Carol Robson told us:

> "Food was actually abundant. Salmon, you could be sure if you went out there you're going to catch a salmon. Our parents ended up running a fishing lodge, which is now the inn, and we would guarantee people 'if they want to go fish, you'll catch a salmon.' There was lots of fish. Then, we used to catch little rock cod right off the dock for supper with a little string and a hook. There was lots of food." [222]

Lloyd Baines spoke about his memories of fishing in his childhood:

> "We did a lot of fishing in those days, even as young kids. We were out in rowboats and that, catching fish, and there was two buyers at the north end then: one in Baines Bay and one in the gas station bay. There was lots of buyers there, there was a lot of people fishing."[223]

Bob Wilson recalled some of his fondest memories:

> "During the winter my dad used to go fishing in Whalers Bay and Montague Harbour, because there's always a lot of spring salmon in the bays at nighttime. And I loved it, like, I fished with him all summer long up north and over in the Fraser, but coming home and going out fishing right here at home, I always felt really good... The fish we caught were for food for our family. And sometimes we took it over to Vancouver, to Ladner and sold them. And I believe my dad thought it was his right to do that."[224]

Levi Wilson told us:

[222] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[223] Head, C., Baines, L., Georgeson, J., Wilson, R., & Wilson, S. (2021). Charlie Head, Loyd Baines, and John Georgeson Interview - Coast Salish Peoples of Galiano Society.
[224] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.

> "Fishing is such a big thing for my family. On my grandpa's wedding ring, he had a carved salmon. So much of his life identity was built around salmon... But it's all gone so far that I never even considered being a fisherman. My dad was a fisherman: he took his first boat out when he was 15, my grandpa when he was 12, my brother started when he was 16. I'm a little bit older than him, but it never really entered my mind as something to do because we all saw the way that it was going... The scarcity has changed, like, our family trajectory, where everybody was a fisherman, now there's just like one or two, if they've been able to hold on that long."[225]

Every Interviewee who told us that they fished expressed that they've observed significant declines in fish populations. Geoff Gaylor told us:

> "I'm a pretty ardent fisherman, and not for the sport of it, just to go out and get some nice fresh food. But it's harder because the salmon are gone, they're way, way less. So it's a lot harder now... The source is diminishing, which has nothing to do with this island."[226]

Richard Charlie told us:

> "We go as far as Tumbo Island to go catch some of our fish because sometimes there's hardly any on the outside of Galiano, we can't even get a nibble there, so we've got to try and find them and find out where they're hiding."[227]

Interviewees who do not fish regularly also recognized the declines in fish stocks and their impacts on the community. Jane Wolverton told us:

> "One of the things that I worry about - and I've seen the change over time - is the loss of a lot of the marine life. There used to be 20 or 30 boats out in Active Pass at Helen Point fishing, you know, and the ferries would come around the corner and they'd be just 'Honk honk, Honk honk.' [Now] there's no fish out there, you know, to attract that kind of fishery."[228]

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[225] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[226] Gaylor, G., & Bazdresch, A. (2022, January 31). Geoff Gaylor Interview - One Island, One Earth project.
[227] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[228] Wolverton, J., Krug, K., & Thompson, M. (2021, October 1). Jane Wolverton Interview - One Island, One Earth project.

George Harris explained to us:

> "Galiano was a major home port for fishermen. And what's happened in the last 25 years, due to destruction of habitat - not on Galiano, but on the mainland, all over the world - the destruction of habitat, and the overfishing has decimated the fishing industry."[229]

Declines in fish stocks in the Salish Sea and the associated impacts of fisheries policy and industrial consolidation on fishing families are well-documented. Rosemary Georgeson writes:

> "We do not live on the water because we cannot go out on it. There is no movement on the water anymore. No women out there. They succeeded in taking that away. Food and life and movement is gone. They were doing that then to my great grandmother, and one hundred and twenty years later, they have succeeded. The separation is what we have inherited. 150 years ago, this was to be a place for tourists. They now come from all over the world to fish in our waters, and our access to it is limited and cut off. And they are still polluting our creeks and our rivers, farmed fish, whatever they can do to disconnect us from the water we used to call home."[230]

Shar Wilson explained that, as a result:

> "There's a gap of exchange of knowledge that has happened. For example, Bob's dad taught him how to fish and his uncles taught him how to fish... and our kids almost still depend on Bob and I to do the fishing. Here we are, you know, grandparents and doing the fishing. I never... I always thought that our kids would be doing the fishing. Honestly. Yeah, I did."[231]

Emily Menzies told us:

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[229] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[230] Georgeson, R., & Hallenbeck, J. (2018). We Have Stories: Five Generations of Indigenous Women in Water. *Decolonization: Indigeneity, Education & Society*. 7(1), 20-38. https://jps.library.utoronto.ca/index.php/des/article/view/30390
[231] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.

> "Levi's comfort food is canned salmon, rice, seaweed, and eulachon grease... I mean, places around here used to be called the grease trail! There was so much spilled on the ground, because of the trade in eulachon grease up and down the coast. And now it's worth its weight in gold type of thing. It's the eulachon, they're so endangered... And just even with canned salmon, you know, we don't get any salmon from any family anymore. Like, you know, it's a special treat to be able to afford Levi's comfort food."[232]

Emily continued to explain that declines in seafood didn't just happen decades ago, but have continued and accelerated up to the present day. She talked about being invited to an annual seafood dinner when she was first getting to know Levi Wilson, a decade previous to our interview:

> "Literally my first year was just like this huge mountain of food, I'd never seen so much food. And it was like a full on buffet, just take as much as you want [of] this amazing, incredible seafood. And each year, you know, it's been tougher and tougher. And a lot of the types of creatures aren't there, you know? My first year was totally like crab, prawns, salmon and cod... And each year we kind of lost a thing, or not as much, you get just a little portion, and you have servers now doling out, you know, 'you get two prawns each,' you know? That kind of thing. So we're not even just talking in one lifetime, we're talking in the life of a relationship. You know, we're talking the last 10 years, that there's been a huge difference."[233]

Every Interviewee who spoke to us about fishing felt that the loss of the local fishing industry was not the fault of the Galiano Island community, but instead was caused by larger social, economic, and political forces. Nevertheless, islanders continue to fish and to buy fish, when they can, from local sources. George Harris told us:

[232] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[233] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

> "I guess I have always tried to find local fishermen who sell me local fish. And in the 80s, we were able to buy cod, commercially caught by the same Japanese fishermen that we kicked off this island in 1942. They came back to the north end, and were living on fish boats. And we would buy our cod from them. But again, overfishing, destruction of habitat. And so the cod fishery died in the early 90s. So we probably have less access, but we have a very good First Nations friend who does fishing and we buy fish from him. You know, if the world worked like that, we'd have lots of fish. It's the seven mile long nets that are the problem, not the guy with a fishing rod."[234]

Our Takeaway is that the Galiano Island community has observed serious declines in populations of most - if not all - species of fish that are valued for food, and that these declines have caused significant harm to local families, economies, and the community as a whole. We observe that this is an issue that affects the whole of the Salish Sea, and needs to be addressed at this scale. Overfishing, unfair regulations, and industrial consolidation were the most frequently cited causes for these declines, but several other potential causes were also discussed (see below).

Marine Mammals

Cetaceans (whales, dolphins, and porpoises) and pinnipeds (seals and sea lions) are commonly observed in the waters around Galiano Island. Southern Resident orca whales (Hul'qumi'num - Q'ul-lhanamutsum; Latin - *Orcinus orca*), humpback whales (Latin - *Megaptera novaeangliae*), Steller sea lions (Hul'qumi'num - Shes; Latin - *Eumetopias jubatus*), California sea lions (Hul'qumi'num - Ts'axulus; Latin - *Zalophus californianus*), and harbour seals (Hul'qumi'num - 'E s-hw; Latin - *Phoca vitulina*) are all characteristic species of the Salish Sea that Interviewees spoke about.

Both cetaceans and pinnipeds were historically harvested by hwulmuhw mustimuhw. We have read accounts of pinniped hunting at Sqtheq (Porlier Pass).[235] Of whales, Florence James told us:

[234] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[235] See Cryer, B. M., & Arnett, C. (2007). *Two houses half-buried in sand: Oral traditions of the hul'q'umi'num' Coast Salish of Kuper Island and Vancouver Island*. Talonbooks.

> “You're not going to see a whale. You have to go out, and you have to time them - that's what my mom said, they timed it. And they could hear it, they could hear the different sounds of the whales when they're blowing their air... And then they'd have to get on a canoe and go out, and my great grandpa could sing a song. He said if it didn't stop, it meant it wasn't gonna give its life. They always played fair. There was no overkill, no hurting them - to make them, you know, die in pain. Yeah, my great grandpa knew how to do that."[236]

Florence also mentioned pinnipeds when discussing the foods of her ancestors:

> "Their food would be halibut, cod, lingcod, rock cod. Seals - I love eating seal meat."[237]

All Interviewees who spoke on this topic agreed that - with the notable exception of Southern Resident orcas - the other species mentioned above are more abundant now than they were in the 1960s, 70s, and 80s. Charlie Head remembered:

> "As a kid, if you saw a seal everybody wanted to look. [laughter] They were so rare! I think that, yeah, the fishermen did their part in that.”[238]

Photo by: Wetland Restoration Consulting

Lloyd Baines explained that, prior to protections for pinnipeds and cetaceans that were enacted in the 1960s by the Department of Fisheries and Oceans, there was a bounty system designed to keep pinniped populations down:

[236] James, F., Fournier, S., & Thompson, M. (2021, November 16). Florence James Interview - One Island, One Earth Project.
[237] Ibid.
[238] Head, C., Baines, L., Georgeson, J., Wilson, R., & Wilson, S. (2021). Charlie Head, Loyd Baines, and John Georgeson Interview - Coast Salish Peoples of Galiano Society.

> "Well, they used to pay us to get rid of them and they'd like you to try to harvest them. You get a sea lion, they're longer than this table. Not very easy to harvest."[239]

Since the introduction of protections for cetaceans and pinnipeds, Interviewees observed that their populations have rebounded in the region. In some cases, Interviewees framed these observations positively. Bowie Keefer told us:

> "We are seeing the whales coming back, the humpbacks."[240]

Barbara Moore told us:

> "One big change is we have a lot more of the sea lions coming every year now than I can remember in the early years. I don't think they came. So I'm not sure what that is. But, you know, they've been here every year for several months at a time in droves, as you probably know, for the last five years... And before that, they would be intermittent."[241]

In other cases, Interviewees had mixed or negative associations with these changes in pinniped populations. Bob Wilson observed:

> "The warm weather brings up an increase of the California sea lions, and that's what's happening with a lot of the fish population, I believe. They're wiping out the species that were around when I was growing up."[242]

We note that the findings of the Salish Sea Marine Survival Project support the observation that pinnipeds, and specifically harbour seals, are an important factor impacting salmonid populations.[243]

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[239] Ibid.
[240] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[241] Moore, G., Moore. B., & Thompson, M. (2022, February 7). Barbara and Gary Moore Interview - One Island, One Earth project.
[242] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.
[243] Pearsall, I., Schmidt, M., Kemp, I., & Riddell, B.. (2021). Synthesis of findings of the Salish Sea Marine Survival Project, Version 1.0. Retrieved on May 4, 2022, from www.marinesurvivalproject.com

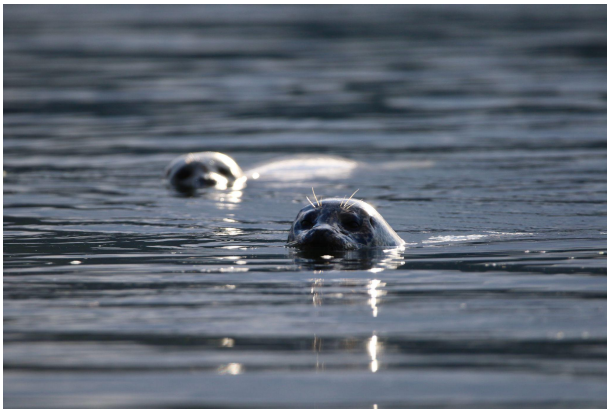
Charlie Head, Lloyd Baines, and John Georgeson also said that they felt that the increase in pinniped populations had negative effects on fish stocks. John Georgeson remarked:

> "I mean, it's long overdue for a culling and a maintenance of the population... Anybody who works on the water knows the decimation they take to the salmon."[244]

Most Interviewees who spoke on the topic recognized some level of competition between marine mammals and human beings for declining fish stocks. Pinnipeds came up frequently, but cetaceans were also mentioned. Carol Robson recalled:

> "The black fish, or the killer whales, as we call them, they were a very large pod. And when they'd go through, dad would say 'no point in going fishing for a couple of days.' Because they'd clean the pass out as they [went]... So it was a healthy environment."[245]

Some Interviewees remembered a time when both fish and orcas were more abundant. Don Anderson recalled:



[244] Head, C., Baines, L., Georgeson, J., Wilson, R., & Wilson, S. (2021). Charlie Head, Loyd Baines, and John Georgeson Interview - Coast Salish Peoples of Galiano Society.
[245] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.

> "Back in the 70s, when I first went to sea I was 15. I did that for a couple of summers. Anyway, it was not uncommon to see a pod of orcas, it was an everyday occurrence. And I don't know what the population was then. Nobody really kept track of it... We just saw them everywhere."[246]

Unlike the other marine mammals mentioned in this section, orcas are widely recognized to have decreased in population over the last half-century in the Salish Sea. In addition to lack of food (declines in salmon populations), habitat conversion, pollution, and other commonly cited causes for this decline, Don observed that vessel traffic and associated noise pollution has a role:

> "I think it's mainly the container ships that have caused the trouble. There's so many of them coming in here now, [and] the noise is just phenomenal. I don't know if you've ever been in an engine room of a boat. You can actually hear a ship two miles away. That's just with your human hearing. So you take the kind of hearing they have and you know, just mind boggling... So it's no wonder that the population shrunk."[247]

Our Takeaway is that the relationship between the Galiano Community and large marine mammals is complex: these animals inspire wonder (and likely benefit the tourism economy), but are also considered to compete for fish and to have played a role in declining fish stocks. Some (i.e., harbour seals) may be increasing at the expense of others (i.e., orcas). Those mentioned - with the notable exception of orcas - were observed to have become much more abundant in recent decades. It is possible that neither the system of bounties and harvest of the first half of the 20th century, nor the system of protections enacted in the second half, adequately reflects the complexity of this relationship.

[246] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[247] Ibid.

Seaweed

We have observed that seaweeds, and especially kelps, are important components of marine ecosystems in the Salish Sea, and many of the Interviewees viewed them as a sign of ecosystem health. Discussion focused largely on bull kelp (Hul'qumi'num - Q'am'; Latin - *Nereocystis luetkeana*). Richard Charlie recalled to us:

"My mom used to just grab a kelp and tie her canoe to it and just sit there and jig right against the bull kelp, and catch lingcod, rock cod, salmon - just at the edge of those bull kelp beds. There was so much of that bull kelp, you could almost get off the canoe and walk across."[248]

Hwumluhw mustimuhw have many uses for this species. For example, Karen Charlie told us:

> "The bull kelp is a really important one. We use that in some of our soups and drying for the winter. They have a lot of vitamins in there. The omegas and medicines, there's a lot of medicine in the bulb of the bull kelp... And it also marked safety, to not go near where the reefs are, the bull kelp - that was our marker."[249]

In "A Lifetime with Bulb Kelp," Rosemary Georgeson writes about growing up in Geogreson Bay:

[248] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[249] Ibid.

I remember as a kid growing up in Georgeson Bay at the bottom end of Active Pass

there used to be so much bulb kelp that it looked
like you could walk across the bay on it

all of Active Pass was lined on both sides from one end to the other

with big kelp beds

as the children of a fisherman from a long line of family who call the water home

we were raised to know that these beds of kelp
were so important to our way of life

the bulb kelp beds were medicines for us

they helped guide us as we learned to move up and down the coast

they were a place we would look to when we needed food
like other creatures such as the otter

when he could smell the kelp patches
he knew his dinner was right there in front of him"[250]

Many interviewees identified kelp beds as key habitat for important marine species. Karen explained to us:

"We come and we fish a lot of lingcod. And those lingcod live in the bottom of the ocean. And those kelp beds were really important to the rockfish. Kelp beds were very, very important."[251]

[250] Sandilands, C., & Georgeson, R. (2020). A Lifetime with Bull Kelp. In *Rising tides: Reflections for climate changing times*. essay, Harbour Publishing.
[251] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

Over the past century, scientists have documented serious declines in the extent and populations of bull kelp in the Salish Sea,[252] which have also been observed locally. Charlie Head remarked:

> "The kelp beds have disappeared, a lot of them. Used to be huge kelp beds, now there's not very much."[253]

Interviewees who spoke on the topic felt that the loss of kelp ecosystems had negative impacts on fish. Levi Wilson explained to us:

> "Cod is the type of fish around here that doesn't make it into the big narratives around the Gulf Islands. We talk a lot about salmon, but cod gets left out. The first time I went fishing, we went jigging for cod. We always get cod around kelp forests. And now that the otters are gone... the urchins don't get eaten, kelp forests get a lot smaller, the cod have less habitat to hide in. And they spread out in different ways and they don't congregate as much."[254]

Richard Charlie echoed this sentiment:

> "It's harder to try and catch lingcod nowadays, because - we don't know what's happening - it's probably because... bull kelp, where's their food going?"[255]

Rosemary Georgeson writes:

[252] Berry, H. D., Mumford, T. F., Christiaen, B., Dowty, P., Calloway, M., Ferrier, L., Grossman, E. E., & VanArendonk, N. R. (2021). Long-term changes in kelp forests in an inner basin of the Salish Sea. *PLOS ONE*, *16*(2). https://doi.org/10.1371/journal.pone.0229703

[253] Head, C., Baines, L., Georgeson, J., Wilson, R., & Wilson, S. (2021). Charlie Head, Loyd Baines, and John Georgeson Interview - Coast Salish Peoples of Galiano Society.

[254] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

[255] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

“and with these huge beds of kelp getting smaller and smaller

to the point of not existing in Active Pass

also went the homes and food for all the creatures and ourselves
we were losing our way of life in the pass
cod got less
kelp beds got less until we rarely saw any.

What was getting bigger were the BC Ferries getting longer and deeper

they were churning up more of the bottom
and as they made their daily runs through the pass
there was more noise more vibration
also more ferries going through the pass every hour

one ferry was coming and one ferry was going all the time.

We knew the water was getting warmer on the coast

we were seeing new species coming
following the warmer water and their feed

with the water getting warmer there were changes

such as ocean acidification
changing the natural habitat and natural balance

we watched the migration of California sea lions into our bay and Active Pass

taking over where the kelp beds used to be
we saw mackerel move onto our coast
these things did not belong here

as we watched these changes happening

we also watched the loss of bulb kelp in our pass

> we were witnessing the changes that Dad and the old ones said were coming."[256]

The Galiano Conservancy Association is participating in a collaborative project to map and monitor kelp and eelgrass populations annually across the Southern Gulf Islands,[257] to better understand this issue and aid future restoration efforts. The idea of restoring kelp ecosystems came up in several interviews. Levi Wilson asked:

> "What do we need to do to bring back kelp forests? Because when they start coming back, then a lot of the fish resources that we need around here can start coming back."[258]

Our Takeaway is that some seaweeds, including bull kelp, are much less common in the waters around Galiano Island today than they were in the past. This loss has significant negative implications for Salish Sea marine ecosystems (as well as Galiano Island's marine biocapacity). Efforts to study and, if possible, reverse these declines could have significant benefits for regional communities and ecosystems.

Shellfish, Crabs, and Urchins

In addition to fish and seaweeds, Interviewees discussed several other key marine resources, including shellfish, crabs, and sea urchins. We have learned that hwulmuhw mustimuhw have harvested these marine foods since time immemorial, and physically altered coastal ecosystems to enhance their productivity. Levi Wilson spoke to us at one such location, Sum'nuw (Montague Harbour):

[256] Sandilands, C., & Georgeson, R. (2020). A Lifetime with Bull Kelp. In *Rising tides: Reflections for climate changing times*. essay, Harbour Publishing.
[257] For more information, see https://mayneconservancy.ca/kelp-bed-monitoring/
[258] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

"Montague Harbour is part of a manufactured landscape... My ancestors, other ancestors from around here, over the course of eight to ten thousand years, decided that they were going to change the shape of the land and actually constructed a lot of the environment that we're in now. And so you can see here where the original part of the land was, and then above it has been centuries and centuries and centuries of deposits of various shells [and] other refuse that the archaeologists in particular call 'midden.' But it's not just a dumping ground. I stress a lot, this wasn't just, 'we have all this garbage and we need somewhere to put it.' It was, 'we have all this stuff that can help us turn this environment into something that's more practical, more powerful, more plentiful for everybody that's coming later.'"[259]

Sum'nuw continues to provide habitat for shellfish, as do other beaches and bays on Galiano Island. For some Interviewees, consuming shellfish has been a regular feature of day-to-day life. Janice Wilson remembered:

"Growing up, my family lived off the land and ocean. It was easy to go out and catch a fish for dinner, whether it be some sort of salmon or cod. You know, shellfish, just to be able to go to the beach and get a bucket of clams whenever or pick up some oysters off of the rocks for dinner."[260]

All of the Interviewees who spoke on the topic observed that access to shellfish has become more difficult over the years. Janice remarked:

"It is not easy to get shellfish anymore."[261]

Bob Wilson said:

[259] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[260] Wilson, J., Wilson, R., & Wilson, S. (2021). Janice Wilson Interview - Coast Salish Peoples of Galiano Society.
[261] Ibid.

> "Earlier this year, I went to dig some clams and was very disappointed on how few clams there's left on the beaches."[262]

Interviewees observed similar difficulties in accessing sea urchins and crabs. Karen Charlie explained to us:

> "The sea urchins - there's no sea urchins on Penelakut. So we have to come here to Galiano for the xixwe - that's the big red sea urchin - and the skwithi' - that's the small little green ones. The skwithi' have a different taste to the xixwe. The xixwe are really big and salty; the skwithi' are smaller and salty sweet. There's been a really big change for the sea urchin, because of the kelp."[263]

Levi Wilson told us:

> "It used to be really easy to get crabs off the dock, on the inside - big, big crabs. We used to take down salmon heads when my grandpa would come back from fishing. We'd just take the head, tie a rope around it, tie it to a rock, and then just leave it at the bottom for five minutes. Then you pull it up real slow, and you get Dungeness and rock crab, all big enough that you can keep. They don't exist in there anymore... You can't get them that close. You gotta go way out now to find things like that."[264]

In addition to observing declines in access to and populations of these species, Interviewees expressed concern about the effects of pollution on their health and quality as foods. Emily Menzies told us that she has observed that the practice of boats illegally dumping septic waste in Montague Harbour is common and impacts shellfish:

[262] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.
[263] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[264] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

"Everybody likes to swim here, but they don't always know what they're swimming through. And I mean, part of what makes it so special, right, is the shells. People have been eating the shellfish here for thousands of years. And unfortunately, it's too polluted now with poop water. So my daughter, our daughter, we can't teach her that she can continue in the way of her ancestors to eat the shellfish here. You know, this place that's been specifically designed by human beings over thousands of years to be optimum conditions for cultivating shellfish, and yet, it can't be eaten because it's been poisoned."[265]

Emily expressed frustration with the lack of enforcement of existing laws:

"I mean, how hard would it be to actually enforce the law that exists to make sure that boats don't dump?... We recognize that it's an enclosed space, it's the encircling place, right? Sum'nuw, right? And that pollution just gets stuck in there, you know? We want to be able to swim in there, we want to be able to harvest in there."[266]

Karen and Richard Charlie expressed similar concerns about freighters, tankers, and bulk carriers that frequently occupy marine anchorages in the waters around Penelakut Island.

[265] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[266] Ibid.

> "I don't like the way they sit in our nice clean water where I'm eating. Probably three fourths of my food comes from the ocean, the clams and the oysters and the salmon. When we eat our skwithi' and xixwe out of the water, it's fresh out of the water. They come out of the water and they're still moving. We crack it open and we eat it and we're like drinking part of the water that's in them... One time I was sitting there eating and just enjoying my sea urchin and I'm looking over at the freighter and it's dumping out all its junk. They're polluting my ocean, [and] it's not just mine, it's for my grandchildren. It's for future and here they are just polluting and taking their garbage from wherever they were, passing through all different waters to come here, and sit for months, dirtying the area."[267]

Our Takeaway is that shellfish, crab, and urchins continue to be important food resources for the Galiano Island community, but that population declines, reduced access to harvest areas, and pollution threaten this relationship. Nevertheless, there is clear evidence that hwulmuhw mustimuhw were able to manipulate coastal ecosystems to enhance populations of these species. Efforts to restore these populations,[268] regulate pollutants, and enforce existing regulations could yield significant benefits in the short and long term.

[267] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

[268] For example, see Olsen, J. (2019). *2014-2020 W̱SÁNEĆ CLAM GARDEN RESTORATION PROJECT FINAL REPORT.* Retrieved on March 5, 2022 from *https://wsanec.com/wp-content/uploads/2020/03/Clam-Garden-Report.pdf*

Community

It is clear to us, from the first two themes of 'Land' and 'Water', that the Galiano Island community of today relies much less directly on the land and water to sustain itself than it did in previous decades, to say nothing of previous centuries (the notable exception to this trend is community reliance on local freshwater resources, although even this is changing - see 'Freshwater' section). The following sections outline topics from our interviews that touch on how the community has evolved over time, how it has changed, and what this means in terms of sustainability, reconciliation, and the Ecological Footprint.

Food 🍲

As is readily apparent from the 'Land' and 'Water' themes, the availability and accessibility of foods derived from Galiano Island ecosystems was the most-discussed topic for our Interviewees. We think this interest reflects community interest in the topic more broadly, but may also have something to do with the subset of people we spoke to, and their life experiences.

Right from the start, Emily Menzies explained to us that:

> "The reality is Galiano isn't and never has been self-sufficient unto itself. I mean, Indigenous people, no Indigenous person ever lived here and stayed here all year round. That's the point of the seasonal round, right, is that you move to where the resources are, when they are there. And it doesn't work if you're so tied to a little piece of property, and then you just kind of extract everything of value from it, and move on. That's not a very sustainable way of being, right?"[269]

While it may not be possible or desirable for the Galiano Island community to be fully self-sufficient in terms of food, it was clear to us from our interviews that most of the Interviewees felt that they were able

[269] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

to harvest much more of their food from Galiano's ecosystems in the past. Janice Wilson explained that this was an intergenerational activity:

> "We preserved food every year. You know, we'd jar salmon, halibut, we would freeze or jar deer meat for the winter months. It was an ongoing thing, we all get together and do it collectively. It was a learning experience, because the elders would teach the younger generation how to do it to keep it going within the family unit."[270]

Bob Wilson recalled:

> "We lived off the land and ocean a lot when growing up. And my dad used to always provide for us when we were little, and when we got a little bit older we contributed... Shooting deer was just something you did. We lived off the land shooting deer. We dug a lot of clams and picked oysters. We shot grouse, did a lot of fishing - cod fishing and salmon fishing. It was a good way to live... I think we all enjoyed it very much. It's quite a bit different than today."[271]

Bob expanded on this point:

> "I try to eat as much fish as I can. It's hard... I don't eat it as often as before, growing up. And that's not by choice. If I was able to have more access to wild game and fish and clams and ducks, crab, I would probably live off of that. But I don't have the freedom or the ability to do that. So I depend on Safeway now."[272]

Shar Wilson added:

> "There's so many barriers to doing that freely. Like, you can't just go get a deer or you can't just go and get a fish. There's a lot of costs and there's so many barriers in terms of a boat or a vessel. You can't just go out and do that... You know, we're fortunate, we can go out and we can get cod and we're fortunate that we can go out and get deer, but I know that a lot of people are having trouble doing that."[273]

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[270] Wilson, J., Wilson, R., & Wilson, S. (2021). Janice Wilson Interview - Coast Salish Peoples of Galiano Society.
[271] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.
[272] Ibid.
[273] Ibid.

She expanded on the point about lack of access to boats in a separate interview:

> "We were salmon people, we all had boats at one time. And suddenly, we just, we don't have boats. It's becoming out of reach, and we want to break that."[274]

We have learned that hwulmuhw mustimuhw in the Salish Sea have been speaking out about barriers to accessing traditional foods for a long time.[275] Karen Charlie shared with us:

> "I've had many battles with people trying to tell me to get off their beach. It's very different. When I see a stranger coming up on my land, I don't say 'Hey, what the hell are you doing here? Go on, get out of here.' It's not in me. It's not the way that I was taught to talk to people. But people have a real easy time saying that to me when I'm trying to harvest something that I've always harvested, something that's in me, that I know I need."[276]

Emily Menzies told us that lack of access to local foods is part of the reason why her family was living off of Galiano when interviewed spoke to her for this project:

> "We didn't figure it out on Galiano, fully, because there was this overlap, where at the beginning there were a lot of food resources within the family - like the salmon, you know? And then there was a moment where there was not, and where we were really having to buy a lot of the food and then you're faced with these really terrible choices."[277]

We have learned that reduced opportunities for the Galiano Island community to harvest food from the land and water is an especially pressing issue because there is relatively little suitable farmland available

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[274] Wilson, S., Smith, J. L., Huggins, A., & Thompson, M. (2021, August 21). Shar Wilson and James Smith interview - One Island One Earth Project.
[275] See Thom, B. (2003, March 27). *Contemporary & Desired Use of Traditional Resources in a Coast Salish Community: Implications for Food Security and Aboriginal Rights in British Columbia* [Paper presentation]. 26th Annual Meeting of the Society for Ethnobiology, Seattle, WA, USA.
[276] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.
[277] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

on the island. According to a recent report, "Early settlers found the soil unfriendly and water scarce and turned their attention to fishing, hunting, sheep, and fruit growing to make ends meet. Galiano was generally regarded as the least arable of all of the Southern Gulf Islands."[278] George Harris recalled:

> "We got here in '82, and I was like, 'Okay, we're going to be organic farmers'... And we had an orchard, because the person that sold us the place said 'oh, George, yeah, no, the orchard will make you a fortune,' and 'oh, you'll make a lot of money gardening.' So we waited and we waited until the plums were ready."[279]

After finding that he could not trade a full basket of plums for a deck of cards at the local grocery store at the time, George told us he reconsidered his plans.

> "So I went home and I said to my wife, 'Okay, forget the farming. We are not going to be farming to make a living!'"[280]

Even the most dedicated gardeners told us that full self-sufficiency was not an achievable goal in their experience on Galiano Island. Barabara and Gary Moore told us that they have grown as much food as possible and have had considerable success and satisfaction, but they also stated that you just can't do everything.

Levi Wilson told us that hwulmuhw mustimuhw in the Salish Sea developed a system of agriculture suited to regional soils and climate that expanded the area of what we now call "Garry Oak" ecosystems:

> "The point of those meadows was to grow camas bulbs, which was an important staple food for people... Indigenous peoples used that area - for food, for propagation, for cultivation - and actively maintained those sites, which was what made them as strong and vibrant as they were, made them as widespread as they were... Those ecosystems exist because Indigenous peoples created them and maintained them... It could go away if we're not careful."[281]

Camas meadow ecosystems are not the only form of agriculture that is in peril at a local level. Barry New told us that he felt there were fewer farms today than in the past:

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[278] Masselink, D., Lawseth, A., Murphy, J., & Devine, N. (2017). *Southern Gulf Islands Food and Agriculture Strategy*. Retrieved on May 5, 2022 from https://gulfislandsfoodco-op.org/wp-content/uploads/2018/09/SGI-Food-and-Agriculture-Strategy-2017.pdf
[279] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[280] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[281] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.

"People used to have far more going on with farming. I mean, more animals. Milk! There's been no milk cows on Galiano for so long, which is kind of weird. But restoring old farms, because there's so much potential there, I think especially young people that should get into it."[282]

On the positive side, some Interviewees told us that they've observed more people gardening and growing some of their own food today than they had observed in the past. Gary Moore told us:

"One thing I think is really good is that there are a lot more people doing their own gardens and their own small places. And so there's been a great kind of renaissance of the value of growing your own food."[283]

Geoff Gaylor observed:

"Food production - over the years that's gone a lot better, there's more people doing small scale food production, you know, like garlic and whatever, all sorts of stuff growing - which has been really good."[284]

Still, the reality for most Galiano Island residents is that most food now comes from off-island. Bowie Keefer told us:

"To some extent we live off the land, but only as a marginal pleasure. Because like everybody else we buy our groceries at the grocery store."[285]

The success of the Galiano Community Food Program,[286] the Galiano Conservancy Association's sustainable food systems program, and events such as Nettlefest suggest to us that the Galiano Island community remains invested in local food production and harvesting. When asked where they think the Galiano Island community can make significant improvements, "More Food Production" was one of the

[282] New, B., & Bzdresch, A. (2022, March 4). Barry New Interview - One Island, One Earth project.
[283] Moore, G., Moore. B., & Thompson, M. (2022, February 7). Barbara and Gary Moore Interview - One Island, One Earth project.
[284] Gaylor, G., & Bazdresch, A. (2022, January 31). Geoff Gaylor Interview - One Island, One Earth project.
[285] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[286] See https://galianoclub.org/food-program/

most common responses from participants in our Community Mail-Out Survey.[287] Some Interviewees told us they see food as an area that the community can come together around and settle differences. Jane Wolverton explained:

> "Part of the reason we started the Food Program was to address food security, but also to address the divide and to really try to bring people together through the medium of food, and to honour the skills that are here on the island and look at how we can pass on those skills, whether those are canning, growing, hunting - all those things that we do need."[288]

This spirit of coming together around food and sharing resources has been an important part of island life since time immemorial, Karen Charlie told us:

> "We fish for our people, we fish to feed our people. We catch our fish and then we bring it back to Penelakut and give it to the people that we know might be hungry - for feeding the people. And that's what we do with our deer meat too. Those are teachings that were passed down from our elders."[289]

Karen told us that, despite the apparent scarcity of fish and other important foods in the Salish Sea today, she feels that it's still possible to bring back local foods:

[287] See Appendix D
[288] Wolverton, J., Krug, K., & Thompson, M. (2021, October 1). Jane Wolverton Interview - One Island, One Earth project.
[289] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

> "I think if more people were on board with our way of thinking that everything will be revitalized, start coming back and regrow. I think there will be enough, and we have to believe that there will be enough. I believe that there's goodness out there for change."[290]

Richard Charlie added:

> "I agree with my wife that, you know, you're saying 'is there gonna be enough?' Well, I think the land and the sea will replenish. If more people cared about what's going on, and start looking after and leaving a cleaner, better environment. Because right now, the way we're going, our food is disappearing. And that's what I'm afraid of. If we get rid of all the stuff that pollutes our air, our ocean, our grounds, Earth will be a happier person, it'd replenish our foods again. So we'll have enough."[291]

🍲

Our Takeaway is that it has become harder, especially for hwumluhw mustimuhw, to harvest food from the land and waters that comprise Galiano Island. Pollution, lack of access, and depleted populations of important species are all implicated. The economics of local agriculture remain challenging. At the same time, we've observed growing interest in cultivating and harvesting local foods, and note that several local organizations are dedicated to supporting local food production, including the new Gulf Island Food Co-Op.[292] We see opportunities to support and revive both traditional hwumluhw and hwunitum food systems on and around Galiano Island, in ways that are complementary and mutually reinforcing.

Energy 💡

Energy is a central issue in the process of mitigating and adapting to climate change. We have learned that, prior to the second half of the 20th century, Galiano Island was not connected to the Provincial grid. Don Robson recalled to us his early years as a student of the school at the south end of the island:

[290] Ibid.
[291] Ibid.
[292] See https://gulfislandsfoodco-op.org/

> "I can almost see where my desk is, or was. We had an oil barrel for heat in there in the winter. And one of the kids in grade eight would get the contract to split firewood and come early and light the fire. And that was a huge contract. I think you got $15 a month or something. So once you got that you were rich! "[293]

Carol Robson recalled the days prior to electrification:

> "It was an adventure. Every day was an adventure. There was no electricity. There was no phones. There was really - you were roughing it 100%. But also, there were beaches. There were some neighbours. It was an adventure every single day."[294]

Don explained to us:

> "If you wanted electricity you had to get your own little generator."[295]

He continued to tell us that the early days of electrification on part of the island came as a result of an oversized generator.

> "We owned the lodge down here, and my dad bought this big generator to run the lodge. And it was kind of an overkill. And he used to let this thing run 24 hours a day, which was unheard of... So my dad, they put [up] a few power poles, went up the road, up to the Bambrick store. And he was selling them electricity with no meter, just take a guess out and pay us so much. Then they got the idea to develop this thing further."[296]

Don explained:

[293] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[294] Ibid.
[295] Ibid.
[296] Ibid.

> "So the community formed this Galiano Light and Power Company... It was all co-op. So, you've got your house, 'you want to hook up?' ... You couldn't hook up unless you bought a share, but then you were a shareholder, and you got to go to all the meetings and it was power at cost. No profit made, just enough to have the guy who looked after the generators. My dad was the lineman volunteer, no pay. They would have a pole raising bee on a Sunday. So I remember them going up Whaler's Bay, they'd go up and they put maybe four or five poles in, string the line, all volunteer, guys climbing the poles, stringing the line, drilling the holes, setting the poles in. Then, following Sunday they'd go a little further down the road and down another road and gradually it got down Georgeson Bay road. And I think they ended up with like 120 customers."[297]

These early efforts resulted in the first consistent source of electricity for Galiano Island residents. However, then - as today - power outages due to winter storms were a common occurrence. Carol Robson remarked to us:

> "And then it became a nightmare, because once people got electricity, it's like heroin. 'I have to have it!' And the wind would blow and the power would go out, and our phone would start to ring. Ollie Garner and dad were the two guys that would end up going out in the middle of the night, and they always took a bottle of whiskey with them and got it fixed. But it got to the point that they were fed up with it. It was way too much work and not getting paid for it."[298]

Eventually, the Galiano Light and Power Company was absorbed in the Provincial grid. Despite having access to (more) reliable electricity, many Interviewees and survey respondents indicated to us that they still make use of the oldest energy source available on Galiano Island - wood. Gary Moore told us:

> "We also grow our own firewood. And that's pretty important... There's enough firewood as just deadfall and windfall to go around. But it's not true everywhere in Galiano and there's great, a lot of need."[299]

We have observed that many island residents are now installing energy-efficient heat pumps if they can afford it. George Harris told us:

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[297] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[298] Ibid.
[299] Moore, G., Moore. B., & Thompson, M. (2022, February 7). Barbara and Gary Moore Interview - One Island, One Earth project.

> "You know, putting in our heat pump was probably the greatest thing I've ever done. Yes, it's very good for the environment. But it's also very good for me, because I don't need to get firewood. And it uses, you know, much less energy and firewood or electricity or propane. And it's very comfortable, so the one thing that we should all do is put in a heat pump, it's kind of a no-brainer."[300]

During the course of this project, we have been made aware of Federal,[301] Provincial,[302] and local programs[303] designed to assist island residents in making energy-efficiency improvements to their homes. There are clearly significant resources being devoted to making improvements in this area. The Galiano Island community has also increased local solar capacity significantly in recent years: according to the Salish Sea Renewable Energy Co-Op,[304] at the time of writing there are four community solar installations and at least 52 households with private solar installations on the island, producing over 490,000 kilowatt hours per year of electricity and saving an estimated 160 $tC0_2e$ annually.[305]

💡

Our Takeaway is that the Galiano Island community has grown much more dependent on access to grid-based energy since the days of no electricity and oil drums for heating. With this dependence comes vulnerability to the impacts of climate change, winter storms, and changes to the grid. There are many pathways available to island residents to invest in electrification, improve energy efficiency, and increase local energy production. Organizations exist to support these efforts. Additionally, better forest management (see 'Forests' section) could ensure that adequate firewood supplies are available to all island residents in case of emergency.

Transportation 🛶

Access to a variety of integrated transportation options is essential for residents of island communities, and many Interviewees spoke on the topic. At the beginning of this report, Levi Wilson reminds us that, since time immemorial, canoe travel has been the primary transportation method throughout the Salish Sea:

[300] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[301] See https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/23441
[302] See https://betterhomesbc.ca/
[303] See https://transitionsaltspring.com/climate-action-coach-program/
[304] See https://ssrec.org/
[305] Mommsen, T. (Personal Communication, May 27 2022).

> "What I've been told is that the main source, the main lifeblood for connection, the main thing for connecting us was the waterways, was the ocean, was the different straits... So the whole island was accessed through our canoes... Your canoe is your connection."[306]

We have learned that Galiano Island was a key location for hwumluhw mustimuhw traveling between the islands and the mainland across the Strait of Georgia. Florence James told us that several bays known as Qw'xwulwis on the east side of the island were important gathering places to prepare for the journey across the water:

> "Yes, where the canoes used to go. They lived there in the summer, so they could go back and forth and fish. It was the easiest access. And my dad said it depended on weather, the north wind or the south wind, and then they'd move over to the north end and go to Porlier Pass because the tides would push. In the summertime it pushes like 8-10 knots and you can get across to the Fraser River really quick. But you gotta have both access, Active Pass or Porlier Pass. So that's why they were there."[307]

Today, however, other forms of transportation have largely supplanted the canoe. Levi told us that this shift has transformed the water into a barrier, instead of a connector:

> "Growing up, the water was a barrier, right? And traditionally, that wasn't the way it should be, the water should be the connection, the water should be the thing that allows us to travel to the various sites."[308]

Even as boats with various other methods of propulsion became more common than canoes in the early 20th century, marine transportation remained more practical than traveling over land for residents of the Salish Sea. Emily Menzies told us that this heavily influenced settlement patterns on islands like Galiano Island:

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[306] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[307] James, F., Fournier, S., & Thompson, M. (2021, November 16). Florence James Interview - One Island, One Earth Project.
[308] Ibid.

> "There's a reason why there's a south end hall and the north end hall. There's a reason why there's a south end ambulance and fire station and a north end fire station, and that they're separate entities and organizations. There were separate schools... And that is because the island was not passable."[309]

Don Robson told us that, even when a road was first constructed to connect the north and south Galiano communities, it was very rough:

> "So we, we didn't even know who lived in the north end - that was half a day trip to get up there and back again. The north end road, the best part was like the worst part of the Bluff road, where you can't pass each other. If you did meet another car - which was seldom - then you had to figure out how you were going to pass each other without going over a cliff or getting stuck in a big mud hole!"[310]

Janice Wilson recalled one island pastime that took advantage of these poor road conditions:

> "They used to have races to the north end and back on a dirt road. They would time themselves. I think the best was 15 minutes [to the] north end and back, on a dirt road. You didn't want to meet them on the corner!"[311]

Galiano Island today is largely a ferry-dependent community. We have learned that, in the 1950s, there were interruptions in the private sector ferry services that had been available previously. Don told us that during this time period:

> "If you were going somewhere, everybody flew. There were planes coming in left, right and centre, Whaler's Bay and down here."[312]

Carol Robson explained that intermittent ferry service limited who could live on Galiano:

> "We didn't have a lot of people not from here, because for a few years, we didn't even have a ferry. We were isolated."[313]

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[309] Ibid.
[310] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[311] Wilson, J., Wilson, R., & Wilson, S. (2021). Janice Wilson Interview - Coast Salish Peoples of Galiano Society.
[312] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[313] Ibid.

The creation of BC Ferries in 1960 ushered in an era of more reliable ferry service (and less flying), allowing more people to move to Galiano Island. At first, the island remained fairly quiet, Sheila Anderson told us:

> "There were busy times like on Friday, it would be a busy day, but otherwise it'd be very low traffic. It was like a sleepy little place. It'd be hours and hours before you heard a car."[314]

Sheila explained that, over the years, Galiano Island has become much busier:

> "I think that's the biggest first impact of the increase in population on the island to me, is how much traffic there is every day. And the noise from that, and the pollution from that, and that the little quiet side roads that we have are suddenly supporting much more traffic than they were built to do."[315]

Bob Wilson also spoke about the traffic:

> "The biggest change that I've noticed? Traffic! [laughs] It's just, I feel this island has been overpopulated for 20 years now, I would say, to my liking. I mean, people love coming and moving to the island and developing it, and a lot of people see that as a good thing. Personally, I would have preferred to keep it the way it was 30 or 40 years ago, myself. It was just like a nice, peaceful, good place to live back then."[316]

Sheila Anderson observed that the increase in traffic is not necessarily just limited to the roads on the island:

> "Now when I go, like in August, up to the Bluffs, the place looks trampled. You know, it never used to look like that... It just feels like there's too much traffic in some of those places."[317]

Our Ecological Footprint analysis shows that transportation is the biggest contribution to the Galiano Island community footprint. It also concludes that part-time residents and tourists effectively double the footprint of the island community, and that their transportation footprint is higher than full-time

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[314] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[315] Ibid.
[316] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.
[317] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.

residents. Sheila told us she feels that it's not just the increased traffic, but the character of the tourist traffic that is concerning:

> "So they're sort of in party mode- weddings or whatever, you know. There's a lot of driving around with that. And then all the guests come and then it's just everybody's in a hurry and all excited because it's a party, you know, and that's fine. But on a small island like this, that makes an impact that affects many, many people."[318]

While we've observed many residents and visitors to the island availing themselves of the various active transportation options available (including walking, biking, e-biking, and kayaking), most traffic on the island consists of personal vehicles, the majority of which are still fueled by gasoline. Barry New remarked:

> "Galiano is pretty resilient. But we need gas."[319]

We have observed that electric vehicles and electric vehicle chargers are becoming more common on Galiano Island. In terms of active transportation, a majority of respondents to our Community Mail-Out Survey[320] reported that they use active transport to get around at least occasionally, but a majority also reported that they feel unsafe biking or walking on island roads, especially during the summer tourist season. When respondents were asked where they think the Galiano Island community can make significant improvements, "Public Transport", "Bike Lanes", and "Electric Cars" were three of the top five responses. Sheila Anderson told us that active transport has long been a community goal:

> "The disappointment there is that years ago, back in I guess it was '93, we were asked as a community to identify what route we wanted for a bicycle lane. And we did that through the usual local government process, and it's pretty obvious - the main roads. And we were led to believe that from that point on, if any land was subdivided that was bordering on these routes, that they would have to insert a bike lane on that property. Never happened."[321]

The Capital Regional District has been in the process of creating a transportation integration plan for the Southern Gulf Islands during the course of this project, with the most recent survey results broadly supporting more integrated transportation options throughout the islands.[322] To date, bike lanes have yet

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[318] Ibid.
[319] New, B., & Bzdresch, A. (2022, March 4). Barry New Interview - One Island, One Earth project.
[320] See Appendix D
[321] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[322] See https://getinvolved.crd.bc.ca/sgi-transportation

to appear on the island, and public transportation initiatives appear to have had mixed success. We have observed, however, that organizations like the Galiano Trails Society,[323] the Galiano Parks and Recreation Commission (GIPRC),[324] the Galiano Club,[325] and the Galiano Conservancy Association have made significant efforts to connect the island via walking and hiking trails. Bowie Keefer told us:

> "So we are getting rather close to a trail network connecting this island from end to end, all the way from Sturdies Bay to Coon Bay. And that's because we're making progress."[326]

🛶

Our Takeaway is that the Galiano Island community has become highly dependent on fossil-fuel intensive personal vehicle, ferry, and air transportation to access the mainland and surrounding island communities. At the same time, alternative modes of transportation are slowly becoming more viable and being adopted by some island residents and visitors. We observe that significant efforts are being made to find ways to support decarbonization of transport, while increasing affordability, convenience, and recreational opportunities. We also note that, from our perspective, the Salish canoe remains a compelling model for active, decarbonized, versatile, and community-based transportation, and could be included in transportation integration planning.

Housing 🏡

During the course of this project, we've observed that housing (and the lack thereof) has been a key issue and a flashpoint for the Galiano Island community. Associated issues include the affordability of land, the price of construction, and concerns over water availability (see 'Freshwater' section) and traffic (see 'Transportation' section).

Several Interviewees addressed the topic directly. We note, before continuing, that this discussion of the price of land and the affordability of housing concerns the unceded territories of hwulmuhw mustimuhw, and that the history of settlement and privatization of land and housing is also the history of the violent displacement and disposession of hwulmuhw mustimuhw by hwunitum.[327]

Jane Wolverton recalled that when she first came to Galiano Island, land was affordable for many island residents:

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[323] See https://www.galianotrails.com/
[324] See https://www.crd.bc.ca/parks-recreation-culture/parks-trails/giprc/trails
[325] See https://galianoclub.org/
[326] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.
[327] For a detailed look at how this occurred in the Salish Sea, see Arnett, C. (1999). *Terror of the Coast - Land Alienation and on Vancouver Island and the Gulf Islands 1849 -1863*. Talon Books, Burnaby, BC.

> "At that time, people could come together and buy land. And I think a number of people did that, and that's enabled them to stay. So that option is really tough now, unless you've got some other place to borrow some money from."[328]

George Harris explained that, when he started operating the Hummingbird Pub, his staff could afford to buy land:

> "So the pub, in 1983, I think they were making about $5.50 an hour, and now they're making about $15.50 an hour. So that has gone up three times. Well, the price of a lot has gone from $25,000 to $400,000. So there's no possibility."[329]

The price of housing has increased alongside the price of land. George continued:

> "When you drive up the price of land and you drive up the price of housing, then it changes who can live here... So, the tragedy is that we will not have the diverse community, from an economic point of view, that we had 40 years ago, where anybody could make it."[330]

George told us that this effectively prices out the people who are employed in lower-wage occupations on the island:

> "My number one is we have to have housing for the people that work on this island, the people that can't afford $900,000 for a house. So housing was a crisis - it is now moved three or four steps beyond crisis. It's a human rights issue."[331]

The existence of two affordable housing organizations on the island,[332] the publication of numerous articles in the local Active Page newspaper, and the appearance of 'YIMBY' ("Yes In My Backyard") signs on Galiano Island during the course of this project suggest to us that there are many people who share this goal. Some interviewees also linked the lack of affordable housing to the growth of the short-term vacation rental market (i.e., AirBnBs) on Galiano Island. Carol Robson told us:

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[328] Wolverton, J., Krug, K., & Thompson, M. (2021, October 1). Jane Wolverton Interview - One Island, One Earth project.
[329] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[330] Ibid.
[331] Ibid.
[332] See https://gali.ca/ and https://gigarhs.org/

> “One thing I want to say is how destructive I believe AirBnBs are... To try and find a place to rent for people that don't want to own anything - impossible. And that's been a bit of a plague on everywhere - the whole planet, basically.”[333]

The Interviewees who spoke on the topic felt that the tension between affordability, development, and the desire to preserve island ecosystems is a defining issue for the Southern Gulf Islands region as a whole, and Galiano Island in particular. Sheila Anderson told us:

> "I feel these islands, all of them - and Galiano especially - can't just endlessly keep inviting more people to live here. There has to be kind of a limit, I understand that, at which point, you know, the ecological health of a place cannot adapt and work with it. Some people think, well, why can't all that forest there just be cut up into five acre lots and have houses out there? Well, because then there's no undeveloped open space for wildlife anymore. So you're going to lose that. And then we might as well just all move to Victoria."[334]

We have observed that the preservation of a forest land base on Galiano Island (see ‘Forests’ section) has imposed some restrictions on development. Nevertheless, development has continued. Bob Wilson recalled:

> "If you drive up [to] the north end and back in 1975, it would look totally different than if you drove up there today and back. It would be almost like a different place, because of the changes - more houses are being built, the roads are adjusted and paved. They weren't even paved all the way to the north end back then! So there has been a lot of physical changes through the land."[335]

Bob explained that this development has unintended impacts on island residents:

> “With the increase of housing and population, it's hard to hunt the way we used to on this island.” [336]

Don Anderson noted that, while development has continued, it would be much more intensive if island residents hadn’t organized to limit it:

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[333] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[334] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[335] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.
[336] Ibid.

> "We came *that* close. It was unbelievable. That's why the Islands Trust was even started in the first place, because you had Pillage Point... and Tragic Lakes."[337]

We have observed that these references to the 'Village Point' community on Mayne Island and the 'Magic Lakes' community on Pender Island are broadly representative of the Galiano Island community's dim view of suburban-style residential developments. Interviewees spoke not only of the amount of development, but the kind of development. Florence James observed:

> "The homes are elaborate compared to what the people used to build. You had just very ordinary, just a home."[338]

Sheila Anderson told us:

> "When I was a trustee, many years ago, there was a lot of talk about how to encourage sustainable living in the islands. And the end result was they published... this great big glossy book with lots of pictures of how to build your house, so it blends with the environment. And where is that? Who's gonna do that? Nobody. So I do think that in the future, we need something to protect us from megahome building. I really do... Digging a huge giant crater and having these massive two-storey bed and basement is ridiculous."[339]

Gary Moore observed that most, if not all, construction materials for homes are sourced from off of the island today:

> "You can compare it to, if we had controlled the forest, been able to produce building materials, build our own houses with local materials - that would be sustainable. As it is, every house that gets built here comes in on a truck from - most of it comes from the United States, frankly. So there's no way... I think we've pretty much sold out the underpinnings of sustainability."[340]

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[337] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[338] James, F., Fournier, S., & Thompson, M. (2021, November 16). Florence James Interview - One Island, One Earth Project.
[339] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[340] Moore, G., Moore. B., & Thompson, M. (2022, February 7). Barbara and Gary Moore Interview - One Island, One Earth project.

We have observed that the COVID-19 pandemic has exacerbated the issue of housing in nearly every respect, from demand to cost and availability of building materials. Jane Wolverton told us:

> "I'm encouraged [that] up to a couple years ago, it seemed that we were getting a lot more families and, you know, younger folks. And so I was really happy to see [that] because our median age was just growing and growing. But then, with COVID... the real estate stuff has really changed. That's been the last couple years, and that just changes your community."[341]

Returning to the fundamental tension between development (and housing affordability) and preservation (of ecosystems, water, community dynamics, access to harvest areas) that defines this difficult community discussion, George Harris asked:

> "How do you solve that? I don't know if there is any actual solution, because we don't want our forests to be turned into subdivisions. Is that fair? That is fair. It is not fair that we have all of this, and the rest of the world has so little, but you know, what my little contribution will hopefully be is at least getting some housing for people that need it."[342]

Our Takeaway is that the Galiano Island community has diverse and sometimes conflicting perspectives on how to strike the right balance between development, housing affordability, and the preservation of existing social and ecological values. We have observed broad agreement among island residents that the construction of large, resource-intensive houses for vacation use (by either part-time residents or tourists through short-term vacation rentals) is an increasingly common form of development that exacerbates this issue. Creative, island-tailored solutions to housing are available[343] and will be required to increase availability of affordable housing while reducing the (literal and figurative) human footprint on island ecosystems, but even the best approaches may require some tradeoffs.

Consumables and Waste 💩

Living on a small island poses serious limitations on the disposal of any non-compostable wastes. The Ecological Footprint analysis views consumer goods and wastes as flipsides of the same coin. If the Salish canoe makes for an excellent local example of circular economy, the automobile may be its opposite: landbound, carbon-intensive, and made of materials that are not locally available and will not naturally

[341] Wolverton, J., Krug, K., & Thompson, M. (2021, October 1). Jane Wolverton Interview - One Island, One Earth project.
[342] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[343] See, for example, https://www.saltspringsolutions.com/housing

decompose. The evidence of tens of thousands of years of hwulmuhw mustimuhw habitation on Galiano Island is subtle but readily apparent to those who know what to look for; on the other hand, the evidence of less than two hundred years of hwunitum occupation is immediately obvious to anyone who has eyes (or feet to trip over it).

No Interviewee discussed septic fields. One area where the Galiano community appears to excel is in composting food and yard wastes,[344] but this topic also did not come up.

A few Interviewees spoke to us about non-biogenic waste. When he first came to the island, Don Anderson told us:

> "Nothing went off Island."[345]

Nothing, Sheila Anderson added, unless you count the ocean:

> "There were the people that threw it off the dock or took it out in their boat and sunk it. That was a common thing!"[346]

Sheila told us that, when she first came to the island, the community "dump" was located in a depression in what is now Bluffs Park:

> "It wasn't steep. It was just a slight slope. And you'd heave it as far as you could. So there was that. And then the other thing people did here before that - which we discovered on one of the properties we lived on - was they all had their own pit. And that's where they put all their [wastes]."[347]

We have also observed the results of this early practice, personally. Later, the Galiano Club established a landfill on a district lot owned by MacMillan Bloedel at the south end of the island. Don told us:

> "And that's where the recycling depot started, ironically."[348]

Sheila added:

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[344] See Nuckhady, B. (2021). *Key Findings (Descriptive Statistics): Understanding Household Food Consumption and Food Waste Management in Galiano Island*. https://galianoconservancy.ca/wp-content/uploads/2022/05/Galiano-Household-Consumption-Survey-results.pdf
[345] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[346] Ibid.
[347] Ibid.
[348] Ibid.

> "Just to the side of the dump. So maybe, 'no, don't throw that over. We'll take that."[349]

Eventually, Don told us, the landfill was shut down:

> "The whole reason it stopped was because of the CRD, [who] finally said there's no more landfills on the Gulf Islands. That's it. They regulated it, so it had to come off the island."[350]

Since then, island residents have hauled their garbage to off-island landfills. In the aftermath of the landfill closure, the Galiano Island Recycling Resources Society (GIRR)[351] was formed as a mobile operation. Eventually, Don explained, they were able to purchase a permanent location in 2002:

> "So finally, we bought the property across from the hardware [store]... and we just went from there. And it was the best thing that could happen."[352]

We have observed that the GIRR facility is a beloved institution on Galiano, and has been very successful at diverting recyclable and reusable materials from the landfill. Galiano residents take pride in the recycling and reuse culture that has been fostered on the island as a result. Nevertheless, as our Ecological Footprint results demonstrate, the island community remains a long way from having a truly circular economy, largely due to reliance on imported goods that are made from or packaged in non-compostable and non-recyclable materials. Many Interviewees expressed frustration with this issue, which they view as largely an upstream problem. Karen Charlie told us:

> "Some people don't care. They don't care about recycling, they don't care about what they buy is eventually seeping back into the ocean or going up into the air... Some companies are just mainly about making the almighty dollar, you know, they don't think about what they're really doing to the earth."[353]

Our Takeaway is that the Galiano Island community has been very successful in encouraging and supporting a culture of reuse and recycling. Unfortunately, due to past practices of dumping on the

[349] Ibid.
[350] Ibid.
[351] See https://galianorecycles.ca/about-us/about-girr/
[352] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[353] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

island, there is a significant "legacy" of non-recyclable waste distributed across island ecosystems. The requirement that non-recyclable waste be landfilled off-island appears to have a limiting effect on the amount of waste Galiano households produce; nevertheless, all residents buy, use, and rely on consumer goods and technologies that are not designed with a circular economy in mind. Efforts to produce sustainable products for local use and consumption could help reduce the generation of wastes and allow time for upstream (i.e., off-island) industries to make improvements to their material practices.

Economy and Connection 👋

Small island communities are often considered to have high levels of 'social capital', which can be defined as "resilience through dense social networks, collective action, norms of reciprocity, [and] relations of trust."[354] We have learned that reciprocity is a defining feature of hwumluhw cultures of the Salish Sea. Karen Charlie told us:

> "Everybody shared, we all shared with each other and that was a normal thing to do. So whenever we get anything, we're dragging our boat around through the reserve and give that elder some fish, that elder some fish, that elder some fish."[355]

Many Interviewees told us that living on a small island has always necessitated a culture of mutual aid. Carol Robson recalled:

> "There was always challenges: somebody's well is going dry, somebody's got a couple of deer they're ready to share. It was a community where everybody helped everybody. There was no doctor. There was a nurse... but that was it. So if you had a bad accident, everybody helped any way they could. Because things happen."[356]

Janice Wilson said, of her childhood:

[354] Petzold, J., & Ratter, B. M. W. (2015). Climate change adaptation under a social capital approach – an analytical framework for small islands. *Ocean & Coastal Management*, *112*, 36–43. https://doi.org/10.1016/j.ocecoaman.2015.05.003

[355] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

[356] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.

> "The island was much less populated at the time and [it] seemed like everybody knew everybody. You know, we did have the big family circle, but outside the family circle everybody kind of knew everybody. And it was a really nice place to grow up, Galiano Island."[357]

Sheila Anderson told us that fewer services were available on the island when it was less populated:

> "In those days, the hall was big enough to cope with any major event, and almost everybody could go (who would go, anyway). And then the shopping and supplies - we used to have, like, Friday's was it. That was the day you could get fresh veggies. And you couldn't just wander down to the vegetable store all the time, because they'd set up in the hall, and this was the beginning of Daystar... And if you didn't go Friday, you didn't get anything, you know, otherwise you shopped at the Corner Store. And that was it. And when I first came here, there wasn't even a liquor store... The guy came who lived, I think he lived on Mayne, and he'd come over with his boat and do a booze run."[358]

Several Interviewees mentioned the importance of sports and associated activities in maintaining connections within and between island communities. John Georgeson recalled:

> "Yeah. Fondest memories, holy christ! Sports was good here, the little bit we had, but it was great. Competitive, and that was a great inter-Island, that kept us all united in the other islands."[359]

Many Interviewees said they missed this small community, where services were more limited and every family knew every other family. John continued:

> "I think the community was a lot more community, I guess. You had the Rod and Gun, the north end and south end hall. See, just for instance, the New Year's dances and all the places were filled up. With a small population, that just says it, with the population it was more community back then."[360]

Janice Wilson shared:

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[357] Wilson, J., Wilson, R., & Wilson, S. (2021). Janice Wilson Interview - Coast Salish Peoples of Galiano Society.
[358] Anderson, D., Anderson, S., & Huggins, A. (2022, March 10). Sheila and Don Anderson Interview - One Island, One Earth project.
[359] Head, C., Baines, L., Georgeson, J., Wilson, R., & Wilson, S. (2021). Charlie Head, Loyd Baines, and John Georgeson Interview - Coast Salish Peoples of Galiano Society.
[360] Ibid.

> "I wish it was like it was before. Yeah, I wish Galiano wasn't so populated... I know it never will be, but that's my wish."[361]

Bob Wilson observed that a smaller community meant more open space to enjoy:

> "Everything seems to be private and fenced off now. Where before it was all open, it seemed like you could go wherever you wanted and not be bothered."[362]

Many Interviewees emphasized that social polarization following extensive clear-cutting by forestry giant MacMillan Bloedel in the 1970s and 80s (see 'Forestry' section) had a significant negative impact on community cohesion and access to natural areas. Nevertheless, Interviewees who arrived during this time still expressed a strong connection to the community. George Harris told us:

> "We moved here out of the blue really with no, we did no research or anything. Moved here in 1982 with a one and a half year-old and a two week year-old into a completely dilapidated cabin... It'll be 40 years in a couple of months. And I have been amazed how completely satisfied, and happy, and feeling like I won the lottery that I ended up here to raise my family."[363]

George shared that when his family first visited the island, they stayed with friend:

> "Then they said, 'Okay, well, there's a talent show tonight. Would you like to come with us?' And we said, 'Okay, let's go to the show.' So we went to the talent show at the community hall, and I swear, it was the worst talent - there was *no* talent. None, not nothing. And everybody is having so much fun! And I'm like 'Okay, this is a place that I could definitely see moving to.'"[364]

George continued:

[361] Wilson, J., Wilson, R., & Wilson, S. (2021). Janice Wilson Interview - Coast Salish Peoples of Galiano Society.
[362] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.
[363] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[364] Ibid.

> "We had the coffee shop, Burrill Brothers, which was the melting pot for Galiano. And it allowed for all different political, philosophical, cultural, religious - it was a tiny corner of the local general store. And we'd go in there and you'd be like, on benches, and you'd just jam yourself in there. And that was one of the most magical places that I've ever hung out in. Lunch was grilled cheese and tomato soup. That was it, and you got both... You just said "lunch," you didn't have to kind of decide what to eat."[365]

Many Interviewees discussed their favourite community gather places and institutions, some of which are gone and some of which remain to this day. Jane Wolverton explained that the Galiano Community Loan Fund[366] took its inspiration from a couple that decided:

> "Rather than invest money in, you know, stocks and bonds and so on, they would invest in this community. So Jane [Rule] did start a bit of a fund. And she lent money to people who couldn't get loans from conventional sources. But she also worked with them to get their finances in order."[367]

Jane (Wolverton) told us that the Galiano Island community in general relies a lot on these kinds of proactive, volunteer-driven services:

> "You know, most of what we do here runs on volunteers. So it's a great opportunity to meet people and also to keep this great place going."[368]

She continued to say that one benefit of a growing community has been an increase in cultural diversity:

> When I was first here, you had sort of the hippies and then you had some of the longer-term residents, and not much diversity in anything. And I'd say we're not a very diverse community, even, you know, racially, now. But then it was even less so, I think. But I think culturally, there's been much more diversity, there are more things that people have got involved with and things that kind of have sprung up organically."[369]

On the other hand, Jane said, she worries about the direction the economy has taken as the island population has grown:

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[365] Ibid.
[366] See https://galianofund.ca/index.html
[367] Wolverton, J., Krug, K., & Thompson, M. (2021, October 1). Jane Wolverton Interview - One Island, One Earth project.
[368] Ibid.
[369] Ibid.

> "Tourism is a concern that I have, and I've been a tourist in other parts of the world, I know the impact that tourism has, and it's not great. I hope we can slowly transition to some other kind of economy that's not so tourism dependent. I mean, we had the resources, you know, resource industries, the logging and fishing. And we've always had some tourism, but it's become a more dominant thing. And I think that, unfortunately, it doesn't always add a lot to the community - people coming and going, coming and going, and it taxes our water resources quite a lot."[370]

George Harris also told us that the loss of traditional industries on Galiano Island had negative impacts on the community:

> "I'm very optimistic about the island itself. You know, there's far less environmental degradation going on now than there was 30 years ago, and there's far more awareness as well, so that's all good. But it's this, you know, not being able to afford to move here and live here. And, you know, the kids that grew up here, they can't stay here because they can't buy a house, they can't get a job, whereas before there was industries that supported that. They could go into fishing, they could go into logging, they could go into marijuana growing. So that was a big part of our economy in the 70s and 80s. That's gone."[371]

Some Interviewees told us that the loss of these industries was particularly difficult for hwumluhw mustimuhw, and that more needs to be done today to acknowledge hwulmuhw mustimuhw living on Galiano Island. Bob Wilson said:

> "Today I want to see more Indigenous events, more gatherings, more acknowledgement. In the near future, I think that's going to happen because of the society that we've started. But today, there's not enough."[372]

During the course of this project, we've witnessed hwulmuhw mustimuhw living on Galiano Island launch organizations, events, and exhibits to engage and educate the Galiano Island community, including the Coast Salish Peoples of Galiano Society,[373] the grand opening of the Galiano Museum,[374] and The Water

[370] Ibid.
[371] Harris, G., & Bazdresch, A. (2022, February 6). George Harris Interview - One Island, One Earth project.
[372] Wilson, B., Wilson, R., & Wilson, S. (2021). Bob Wilson Interview - Coast Salish Peoples of Galiano Society.
[373] See http://www.saraughtanaogh.ca
[374] See https://galianomuseum.ca/

We Call Home exhibit.[375] We've observed that these initiatives and events have been well-received by many hwunitum residents in the community. Carol Robson told us:

> "I think that what's happening with the First Nations [has] really been a long time coming. We grew up with the kids from the north end. And when they closed the school, they were bused... We'd never seen each other before."[376]

She continued:

> "It was the baseball that really brought us all together... and the dances at the hall."[377]

As a result, she told us:

> "Then we all fell in love with each other. And that created a bit of worry for the parents on both sides. Nobody really got married because it was kind of taboo. But our parents knew that we were hanging out together and they opened a basement up in the lodge for us to have parties. And everybody was welcome."[378]

We have observed that, despite the tight-knit community relationships that bind the island community together, there are several critical fault-lines that are cause for significant division and disagreement, and some of these fault-lines feature in this report (see the 'Forestry' and 'Housing' sections). When we look around, however, we see many examples of community members bridging these gaps. Emily Menzies shared a story with us about the start of her relationship with Levi Wilson:

[375] See https://www.thewaterwecallhome.com/
[376] Robson, D., Robson, C., Krug, K., & Thompson, M. (2021, September 27). Don and Carol Robson Interview - One Island, One Earth project.
[377] Ibid.
[378] Ibid.

> "When Levi and I got together and we showed up, our first public appearance was at the wine festival, and we were like locked in arm-and-arm. And, like, people's jaws literally *dropped*. Like, I've never seen that before or since in my life, you know, you hear about it or read in a cartoon, but like, I literally saw people's jaws drop. Because I had been here at least a year, and so people knew that I worked for the Conservancy. Levi had lived here... you know, he's a redneck, is how people thought of him, then. You know, at the time, a lot of the Indigenous families on the island were not publicly Indigenous. There was folks within the Conservancy, for example, that really liked the idea of First Nations people, but really did not like the actual Indigenous people on the island, because they associated them as being like loggers and fishers and wood cutters... So, we literally created some sort of cognitive dissonance for person after person as we walked together."[379]

Emily told us she felt optimistic about community members overcoming their differences:

> "There's so many opportunities to heal this political divide, this social cultural divide, and it's so nice that it has been progressing over the last 10 years, right? It's a different community than it was 10 years ago."[380]

Our Takeaway is that, over the years, the Galiano Island community has developed, grown, and become somewhat more racially and economically diverse. Many residents cherish the volunteerism, unique talents (or lack thereof), and close-knit relationships that undergird community activities and services - this 'social capital' is clearly a very important part of island life. At the same time, the island community has become much more dependent on tourism to sustain itself, and traditional industries - including fishing and forestry - have been (nearly) lost, with negative impacts on the local economy and on hwulmuhw mustimuhw. Affordability for younger and less affluent residents has become a major concern. These and other pressing issues create opportunities for the island community to overcome divisions, organize around solutions, and to foreground the efforts and voices of hwulmuhw mustimuhw in the community.

Footprint 👣

One of the last questions we asked Interviewees to answer was whether they felt the Galiano Island community was living sustainably. Responses ranged quite widely, with a general consensus that many

[379] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[380] Ibid.

Galiano residents are working very hard to live sustainably, but that the community as a whole is a long way from true sustainability. Barbara Moore told us:

> "Some people are very frugal and aware and work to have a very small footprint. But it's all over the map, and others are quite heavy consumers. Probably one could say that the proportion of people who are living sustainable lifestyles is perhaps a little higher on Galiano than it may be in the city, but in so much as Galiano is a microcosm of the rest of the world, none of us is living a really sustainable lifestyle, or we wouldn't be in this pickle! [laughter]"

Gary Moore chimed in:

> "I acknowledge that everyone is trying it. At the place they find themselves, everyone's doing something, wants to help do a little bit more. And that, I think, is being cultivated more than it was 35 years ago."[381]

Geoff Gaylor told us:

> "I wouldn't say we live off the land. No, we can't, you can't do that here. But, you know, I think we [are] really fairly gentle to the environment, it's what I call sustainable."[382]

Bowie Keefer responded:

> "Humanity has the power to actually manage this, become wise stewards of the planet. And we've thus far not been wise, but I'm optimistic that we are capable of smartening up. And this community, I think we're smartening up. We've got an ethic that we all share - almost all, I think we all share. It's quite a strong ethic of preserving and protecting. And we can get smarter in terms of actually mobilizing the effort to do really good stewardship."[383]

Several Interviewees felt that living on a small island meant that the Galiano residents need unique approaches to sustainability. Jane Wolverton told us:

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[381] Ibid.
[382] Gaylor, G., & Bazdresch, A. (2022, January 31). Geoff Gaylor Interview - One Island, One Earth project.
[383] Keefer, B., & Thompson, M. (2022, January 17). Bowie Keefer Interview - One Island, One Earth Project.

> "As islands, we're kind of a contained environment. You know, it's not like we're on the mainland, and you've got the mountains, you've got snowpack, you've got other options. You know, we are IT. And what we do here... we need to be always thinking of that and thinking how we can repair."[384]

Emily Menzies told us:

> "Maybe capitalism isn't always the answer for a small community? Maybe we need to look at more cooperative and overlapping food cultures and food systems in order for the ecological footprint metaphor and models to really work."[385]

Levi Wilson shared with us:

> "So, as I've been told by several Elders from many different nations, we didn't just have the right to exist in certain places, it was our responsibility to make sure that those resources persisted, existed, and were maintained. We talked about that with how Montague is a manufacturing landscape, and how camas meadows are a manufactured ecosystem, and how all of this was developed so that future generations have more food, more access. It is your responsibility to leave the area that you're using in the best possible shape for whoever comes next."[386]

This message about intergenerational stewardship resonated with many Interviewees. Karen Charlie observed that:

> "You know, everybody that lives in this world has a footprint, eh? They're leaving a footprint. Everywhere you walk you leave a footprint. But I always try to think of how I'm leaving this world for my grandchildren."[387]

She continued:

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[384] Wolverton, J., Krug, K., & Thompson, M. (2021, October 1). Jane Wolverton Interview - One Island, One Earth project.
[385] Wilson, L., Menzies, E., Huggins, A., & Thompson, M. (2021, July 21). Levi Wilson and Emily Menzies interview - One Island One Earth Project.
[386] Ibid.
[387] Charlie, K., Charlie, R., Huggins, A., & Thompson, M. (2021, November 5). Karen and Richard Charlie interview - One Island One Earth Project.

"So try and leave the place as good as it was or even better than when you first arrived. We're just passers by in this world. Try and do good, be good, be nice, be kind, be humble. Because you're just one speck in this world."[388]

Our Takeaway from these closing thoughts, and from this first attempt to capture an Ecological Fingerprint for a small island community, is that we as people are much more than just the sum total of our impact on the environment. As individuals, we all have basic (and sometimes extravagant) demands that must be met by our community and environment, but as members of a larger community we also all have knowledge, skills, and resources to contribute. Our challenges are significant, but each challenge creates opportunities, and it's up to us to meet these challenges in creative, inclusive, decolonial, and effective ways. We hope this report makes a contribution to recognizing and addressing these challenges, as well as recognizing the good work that has been done, that is being done, and that we believe will be done.

Interviewees

What follows is a brief introduction to the people we interviewed for this report, in their own words. When Interviewees didn't mention something of note concerning their background, we add it in italics. We are grateful to the community members who spoke with us - huy ch q'u!

Barbara and Gary Moore:

"We're at our dining table where all our important events happen. [laughs] Gary and Barbara Moore - I'm Barbara. And we're here in our house that we built in Therah about 35 years ago... And so we've, yeah, we've been here a long time. And the north end of Galiano and Therah is 160 acres of collectively owned and managed land: a cooperative community, we'll call it an intentional community. So that's where we are, in our house."

Barry New

"My name is Barry New. My family has a long history on Galiano... My grandfather arrived in 1913, and raised a family here. And my dad grew up here. And then my dad went to the big city, Vancouver, married - wife, kids - and we, my brothers and myself, grew up in Richmond. And I lived there till my 20s and traveled, and my dad retired... And so we live, it's called Rip point on Active Pass on Gulf Drive. And so that was my grandparents' retirement home. And my dad moved in when he retired. And my brothers came with him. So two arrived in the 80s and I returned from my travels in 2008, and I've been living here

[388] Ibid.

full time since 2008. And I never really wanted to live anywhere else. I had like 25 years, 30 years in England, and had a good time, good experiences. But I always wanted to come back here, there's nowhere better I found."

Bowie Keefer:

"I'm Bowie Keefer and I have been involved with Galiano for about half of my life. I'm now 78 years old... I had a research business, which I'm still in, working on environmental technologies such as water purification and such as renewable energy and CO2 capture, and presently looking at possible strategies for stabilizing polar ice sheets against sea level rise. Anyway, we, we lived in Vancouver and we'd come to Galiano with our kids and they'd go horseback riding at Bodega ridge. And, and we were thinking, wouldn't it be great to live on Galiano? And about 28 years ago, we were able to buy some land which happened to be forest land on Galiano. And we, from that point, I've been living part time and then full time on Galiano ever since."

Carol and Don Robson

"I'm Carol May Robson. I was born in 1943 at St. Paul's in Vancouver. And my parents moved here when I was two. So that would have been 1945. And my parents lived here my whole life, our whole life."

"I'm Don Robson. I was born at St. Paul's Hospital in Vancouver in 1918 [laughter] - no, 1939, and moved to Galiano to start grade 2, and here we are."

Charlie Head, John Georgeson, and Lloyd Baines

Charlie, John, and Lloyd are members of the Coast Salish Peoples of Galiano Society.

Emily Menzies and Levi Wilson

"My name is Emily Menzies. I met Levi here on Galiano through floor hockey, actually, but we quickly realized that we had a really, a common interest in changing the status quo of the understanding of folks on the island around just what makes this place so special, and that people have been here cultivating this place for 1000s and 1000s of years... Prior to that, I came from Vancouver, which is where I mostly grew up. And I was born up in the Yukon Territory. My ancestors on my father's side are Scottish, for the most part, and on my mother's side are Scandinavian, Norwegian, Irish. And it's, it's been a real privilege to kind of work with Levi as, like, life and educational partners to kind of do this work together, and for raising our daughter that is off screen, but in the background there."

"Levi Wilson. And I'm a member of the Gitga'at First Nations with strong family connections to the Lamalcha peoples of what's now known as Penelakut Island. I lived most of my life on Galiano, save for a

few years when I've now gone off and done my careers elsewhere, being a teacher. And for most of my time on Galiano, being a carpenter and learning to be an educator."

Florence James

"I was born in 1947. I can describe to you how it looked where I was. I was only two years old."

From her bio for th Watersheds Forum:[389] *Florence James is a Coast Salish elder and educator from Penelakut Island, B.C. She is a fluent speaker of the Coast Salish dialect, Hul'q'umi'num. She has lived her life in the Gulf Islands, on Galiano and Penelakut Island, in the traditional territory of Puneluxutth'. She is an educator and lifelong learner who draws on both her traditional gifts and teachings from the Ancestors and her university-based education. Florence is a highly respected Elder in her community, widely known for her cultural expertise, her knowledge of and dedication to the environment, and her commitment to the care and education of young children.*

Geoff Gaylor

"We are on Galiano Island at a beautiful piece of property that we own here, three families. My name is Geoffrey Gaylor and I came here in 1975... In the past I've been pretty active, being the President of the Chamber of Commerce at one point. I've been in almost every board on this island from the golf course to the Health Care Center, and very active politically. And I, my history was to, my family bought a very small building supply here and expanded into a major business on the island where it supplies both home goods plus thing, and I recently just sold it, so my present thing is I'm retired."

George Harris

"My name is George Harris... Moved here in 1982 with a one and a half year-old, and a two week year-old into a completely dilapidated cabin. And so that's, all, it'll be 40 years, in a couple of months. And I have been amazed how completely satisfied and happy and feeling like I won the lottery that I ended up here to raise my, my family. Yeah, I just, I just can't. I don't know how, I don't know how it ended up here, but I'm sure happy I did."

George is also a former Galiano Trustee. Among other things, he created the Hummingbird Pub and the Gulf Islands Film and Television School (GIFTS).

Jane Wolverton

"My name is Jane Wolverton. I've been connected with Galiano since 1979. I'm a full time resident now."

[389] See https://watershedsforum.ca/speaker/elder-florence-james/

Jane is, at the time of writing, a Galiano Trustee, as well as a Community Evaluator for this project.

Janice Wilson

“My name is Janice Wilson and I grew up on Galiano Island. I lived here for most of my life. I moved away about 20 years ago, but I do spend a lot of time here still because I feel it's my home... my parents are Mary and Pat Wilson. Mary's mother was Georgina Bertie Georgeson, whose mother was Ellen Georgeson... My father's mother was born on Galiano Island. Her name was Rose Cook and she, her parents owned the Cook farm halfways up the island.

Karen and Richard Charlie

“Hello, my name is [Sha’altenaat] - that's my Hul'qumi'num name. I am Coast Salish. My English name is Karen Charlie and I come from Penelakut. And I have a big connection here to Galiano. My husband's mom lived here at one point and this was also his home in his younger years, this is my husband.”

“My name is [Thaythits]. That's my Indian name. My English name is Richard Charlie. I'm from Penelakut, but yes, I'm also from here, Galiano. My mom lived in Porlier Pass when she was a young teenager and I also lived here with my auntie down on Porlier Pass for a good many years as a young child. It's good to be back home.”

Shar and Bob Wilson

“Bob Wilson - lived on Galiano all my life except for a few years that I've moved away and then came back again... My parent's names were Pat Wilson and Mary Wilson. My grandparents were Bertie Head, Tom Head, and my dad's parents were Rose Cook and Andy Wilson.”

“My name is Wihl Buun, Shar Wilson, and I'm Gitxsan, but I've been married into the Galiano family for over 36 years now... quite a while. So, we've been on and off Galiano for a few years but just recently moved back.”

Shar is the Manager of the Coast Salish Peoples of Galiano Society, as well as a Community Evaluator for this project and an artist. Her artwork is included in this report.

Sheila and Don Anderson:

“Sheila Anderson is my name and I have been on Galiano, I first came to Galiano in 1965... My parents knew Galiano because my mother had had an uncle who lived here in the First World War. So they came here and actually purchased a property - in those days, it was quite affordable - and built a cabin. And that was where we spent our summers until I left, you know, grew up and left home... And Don and I, as a couple moved here later.”

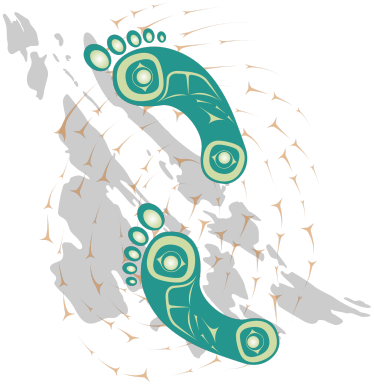
“1979! Don Anderson, I followed Sheila around the islands. And then we finally ended up on Galiano after several tries, at different islands... I got a job on a ship so I could accumulate time off. And it allowed us to live here. And she was able to bring up three young girls without me for 24 days [laughs] or thereabouts. And I'd come home for 24 days and go away again for 24 days. So it was probably a pretty good deal. And I did that for 21 years.”

Sheila is a former Galiano Trustee, and currently sits on the Board of the Galiano Conservancy Association.

Part V: One Earth?

June 2022
Galiano Conservancy Association

Summary & Recommendations



One Island 🌎

This report considers the Biocapacity, the Ecological Footprint, and the Ecological Fingerprint of the Galiano Island community. To perform this analysis, a certain amount of reductionism was necessary: **we looked at Galiano Island in isolation, as a microcosm of the planet**. We recognize, however, that examining one island by itself can only tell us so much, especially given the countless ecological, cultural, social, economic, and political entanglements that characterize the many communities of the Salish Sea. In this final part of our report, we zoom out to consider what we learned during the course of the **One Island, One Earth** project, and what we think it means.

Two Questions 🔍

The results we have presented reflect the questions we asked. The original purpose of the project was to answer the question: **"Is the Galiano Island community living sustainably within and relative to the resources provided by Galiano Island?"**

As the project developed, we added a second question: **"What can the Ecological Footprint of a small island community tell us, and what are its limitations?"**

Three Goals 🎯

Our analysis and our recommendations reflect three goals that we believe will resonate with many members of the Galiano Island community. We intend these goals to address actions that could be taken at the community level; actions at the individual, Provincial, Federal, and International level are beyond the scope of this report.

1. **Contribute at a local level to less than 1.5 ℃ of warming globally**

   We view the Climate Crisis as the defining issue of our time. Our recommendations reflect our current understanding of how the Galiano Island community is best positioned to contribute to the International target of reducing warming to less than 1.5 ℃ at a planetary scale.

2. **Contribute at a local level to less than 1.5 gha per capita globally**

   Ecological Footprint analysis demonstrates that climate change is a *symptom* of a larger issue, which is referred to as **Overshoot** – the Ecological Footprint term for human demands outstripping the regenerative capacity of the biosphere. The concept of Overshoot points to (a)

the use of the Earth's resources faster than they are regenerated, and (b) a lack of equity in the (over)use of these resources. Our recommendations reflect our current understanding of how the Galiano Island community is best positioned to contribute to the target of reducing the Ecological Footprint to less than 1.5 gha/ca at a planetary scale.[390]

3. **Advance climate resilience, equity, and decolonization at a community level**

   We believe that community actions taken to *mitigate* the impacts of the Climate Crisis and Overshoot must also help the Galiano Island community *adapt* and become more resilient and equitable. The ongoing effects of colonization, wealth inequality, and environmental degradation demand consideration in any community decision-making process, and our recommendations reflect our understanding of the need to do so, while acknowledging that we cannot do so on our own. Our goal here is to contribute to ongoing discussion at the community level.

Five Key Findings 📊

We believe that this report communicates several important insights.

1. **Galiano Island's ecosystems contribute disproportionately to the biosphere**

   Our Biocapacity analysis demonstrates that the lands and waters that comprise Galiano Island are highly productive relative to their size and geographic location, contributing 14,373 global hectares (gha) to the planet. Roughly half of this biological productivity is terrestrial, and the other half is marine. Conservation plays a large role, with a third of island Biocapacity existing under some form of protection; threats to Biocapacity include land conversion, unaddressed ecosystem degradation, climate change, and declining marine productivity. Interviews with community members affirmed that these lands and waters have supported thriving human populations since time immemorial.

2. **The Galiano Island community's Ecological Footprint is less than the Canadian average, but more than double the global average and more than four times an equitable "One Planet" scenario**

   The Galiano Island community requires 6.8 global hectares per capita (gha/ca) to support itself at its current standard of living, compared to a Canadian average of 8.2 gha/ca and a world average of 2.8 gha/ca. Globally, only 1.6 gha/ca are available to support sustainable, equitable "One Planet Living." Interviews with community members revealed that the Galiano Island community relies much less on local resources (some of which have been declining) than it has historically, which - coupled with increases in consumption - has resulted in a high footprint.

[390] According to the Global Footprint Network, there are approximately 1.6 gha available to each person on the planet at the time of writing. However, this does not allow for any Biocapacity to be set aside for wild nature. Therefore, we consider a global target of less than 1.5 gha/ca to allow for preservation of some amount of biodiversity.

3. **The large number of part-time residents and tourists doubles Galiano Island's Ecological Footprint, thereby exceeding the island's Biocapacity**

   The full-time resident population of Galiano Island accounts for roughly half of the total footprint (9,700 gha), while the other half is attributable to part-time residents and tourists (8,900 gha). In total, our Ecological Footprint estimate of 18,600 gha total exceeds the Biocapacity of Galiano Island by 29%.[391] While Galiano has a small full-time population, the "full-time equivalent" population almost doubles when days from part-timers & tourists are taken into account. Interviewees associated this increased population with increased traffic and development, increased water use, decreased availability of housing, and decreased access to harvesting areas are associated with increased population; at the same time, Interviewees recognized some economic and cultural benefits provided by the seasonal population.

4. **About 40% of the Ecological Footprint remains outside of local community control**

   Senior government services comprise 40% of the Galiano Island community's footprint. This portion of the footprint is beyond the direct influence of the Galiano Island community, and is the responsibility of elected representatives and the body politic. Several factors affecting the remaining 60% of the footprint are also beyond direct community control. Interviews with community members highlighted a number of important areas where local livelihoods and lifestyles are impacted by factors beyond community control (e.g., loss of fishing and forestry industries).

5. **About 60% of the Ecological Footprint is responsive to community action**

   We estimate that 11,100 gha of the Ecological Footprint, or roughly 60%, is responsive in some way to community action. In fact, the Galiano Island community is already outperforming its neighbours in some areas. The local footprints of food and consumables & waste are below average for BC jurisdictions. On the other hand, developed area, electricity use, and air travel are above average. Transportation is the largest contributor to the footprint, and substantial improvements are possible in this and other areas. Interviews with community members suggested to us that, while barriers do exist, the community is motivated to address the challenges it faces and has a long history of taking the initiative to do so.

Ten Recommendations 📋

We suggest the following ten recommendations for action at the community level, acknowledging that significant progress has been made in some of these areas, and that work on others is ongoing. These

[391] We stress that this is a relative comparison, and not a direct comparison. The Galiano Island community currently imports resources to meet most of its basic needs, greatly reducing the pressure on local Biocapacity.

recommendations are informed by both the CHRM Consulting / BCIT Centre for Ecocities "One Planet Scenario" (see Part III of this report) and our Ecological Fingerprint assessment (see Part IV of this report). The specific targets that are discussed below stem from the "One Planet Scenario," and would require further community consultation and collaborative goal setting to achieve traction.

1. **(Re)connect across islands and shared territories through the waters of the Salish Sea**

   The words of Levi Wilson at the beginning of this report remind us that **no island community is "an island unto itself."** We have learned that One Planet Living is not possible to achieve on one island in isolation; instead, we believe that it is now essential to (re)connect and (re)knit the islands together through the Salish Sea waters that define them, following the lead of hwulmuhw mustimuhw.[392] We see increased interdependence among island communities as key to local resilience, and increased collaboration among islanders as key to setting and achieving regional targets through regionally-tailored solutions

2. **Protect, steward, and enhance island ecosystems**

   The lands and waters that comprise Galiano Island are highly productive, despite having been impacted by industrial forestry, road building, land conversion, pollution, and depletion of marine resources. Currently, one third of the island's Biocapacity has some form of protection. Efforts to protect intact ecosystems, restore degraded areas, enhance productivity, and apply ecosystem-based management will help to ensure that Galiano Island continues to be a *Biocapacity reserve* for the biosphere. Future efforts to protect ecosystems should not preclude hwumluhw mustimuhw or other community members from making sustainable use of island resources. We believe that islanders can be exemplary "stewards of Biocapacity" for the planet, and propose a **new target of 50% protection of island Biocapacity.**

3. **Support existing island organizations, initiatives, and programs**

   Many of the issues discussed in this report already have dedicated community programs and/or organizations dedicated to addressing them. For example, the Galiano Club's Community Food Program and the Galiano Island Recycling Resources Society are two examples of grassroots organizations that are already playing an important role in lowering the island footprint. BCIT's "One Planet Scenario" calls for an **80% reduction of food waste and a 50% reduction in solid waste** production, to be achieved through local production, meal planning, use of all food parts, and sharing and reuse of consumer goods. Both of these organizations are foundational to efforts to meet these targets, and we encourage community members to continue to support these and other vital local institutions.

[392] Indigenous People. See "xwulmuxw mulstímuxw" in https://www.sfu.ca/~gerdts/papers/HulquminumWords.pdf

4. **Activate, electrify, and share transportation**

   Transportation is the single largest contributor to the local footprint. BCIT's "One Planet Scenario" calls for a **50% decrease in vehicle fleet and 100% electrification of transport** (including vehicles, watercraft, and ferries). Advocating for ferry electrification, creating active transport infrastructure, supporting the adoption of electric vehicles, improving public transportation options, and experimenting with island-adapted transport solutions (e.g. electric truck co-op, delivery services, vehicle sharing, revival of canoe culture) will all contribute to reducing the footprint of transportation. After considering the results, we feel that **transportation is the area where the community has the potential to make the most impact.**

5. **Reduce the overall footprint of human infrastructure**

   One challenging result of our analysis is that the Galiano Island community claims a very large spatial area relative to its population for roads, structures, clearings, and other infrastructure to support human occupation. This "rural sprawl" has negative implications for ecosystem connectivity, island biodiversity, and access to harvest areas. The BCIT "One Planet Scenario" calls for an **85% reduction in residential developed area and an 80% reduction in non-paved roads.** However, there is no fast or easy solution to this state of affairs, and limitations in groundwater availability pose a serious obstacle to densification that can and must be addressed. We believe that creative solutions to reduce the spatial footprint of settlement across the island will significantly reduce the Ecological Footprint, while also potentially addressing other issues such as housing affordability, ecosystem fragmentation, and access to harvest areas.

6. **Make improvements to existing infrastructure**

   Electricity use on Galiano Island is higher than average for BC jurisdictions. Installation of heat pumps to replace fossil fuel heating and/or inefficient baseboard heating will lower the footprint and ghg emissions, as will improved insulation of dwellings. Low-carbon renovation options and aeration of septic fields would have an impact on reducing local ghg emissions. BCIT's "One Planet Scenario" calls for a **50% reduction in septic emissions and 100% electrification** of operating energy for buildings. We observe that supporting these small (but often expensive) upgrades will play a key role in footprint reduction.

7. **Invest in a circular economy across the Southern Gulf Islands**

   In many respects, the Ecological Footprint is a measure of the environmental impacts of all the goods and services that are *not produced locally* within a given community. Re-localizing the production of essential goods does not necessarily eliminate, but greatly reduces the footprint of everything from food to fibre and even energy. Currently, many products and services that are provided locally are targeted at the seasonal population; we think that re-orientation of even

some of this energy towards generating local necessities across and between the Southern Gulf Islands will lower the footprint while benefiting island resilience.

8. **Adopt and normalize currently underutilized technologies and practices**

   Rainwater harvesting and composting toilets are two examples of proven technologies and practices that address the very real challenges and opportunities presented by island living. We feel that these approaches could and should be adopted much more widely than they currently are, and that efforts to normalize (and/or formalize) their adoption at a community scale will reduce the footprint while also addressing limited groundwater availability and other pressing issues.

9. **Reorient and revive traditional industries and lifeways**

   Our interviews with community members identified fishing and forestry as historical foundations of the Galiano Island economy that have now been effectively "lost." The silver lining to the loss of these industries has been widespread recognition of the negative impacts of industrial clear-cutting and overfishing on Salish Sea ecosystems. Nevertheless, we think it would not be too much of a stretch to describe Galiano Island as "a small rock in the ocean covered in trees and surrounded by fish." With this in mind, we believe that it is essential to the long-term sustainability of the island community to revive a local economy for forest and marine resources, with an orientation towards ecosystem health and community benefit. While the feasibility of this recommendation is affected by economic and regulatory factors that are outside of community control, we invite consideration of potential avenues for community action.

10. **Reconciliation, resurgence, and landback should guide action and take precedence**

    Our interviews with Indigenous islanders reinforce that Galiano Island has been home to many, diverse hwulmuhw mustimuhw since time immemorial. From an Ecological Footprint perspective, the Indigenous lifeways that were practiced in the Salish Sea prior to colonization provide the ultimate, locally-adapted example of "One Planet Living." From the perspective of the Truth and Reconciliation report, "Reconciliation is not an Aboriginal problem; it is a Canadian one. Virtually all aspects of Canadian society may need to be reconsidered."[393] We thank the individual hwumluhw mustimuhw who shared their time and knowledge with us during the course of this project, and we make our recommendations with the understanding that they may be improved upon or reconsidered entirely pending further input from the Indigenous peoples who include Galiano Island as part of their territory. We hope our work here may be of some use to the ongoing process of accounting for and addressing the harms of colonization.

[393] Truth and Reconciliation Commission of Canada. (2015). *Honouring the Truth, Reconciling for the Future: Summary of the Final Report of the Truth and Reconciliation Commission of Canada.* Retrieved on May 16, 2022 from https://ehprnh2mwo3.exactdn.com/wp-content/uploads/2021/01/Executive_Summary_English_Web.pdf

Discussion

Questions and Answers ❓

The two questions that we opened this report with can now be answered with some confidence:

"Is the Galiano Island community living sustainably within and relative to the resources provided by Galiano Island?"

We find that, at this point in time, the answer is "no." In a direct sense, the Galiano Island community has become increasingly untethered over time from the actual resources provided by the lands and waters that comprise Galiano Island. As a result, at the time of writing, the vast majority of essential (and inessential) resources are imported to the island, with the notable exception of water. In an indirect sense (i.e., in relative terms), the estimated combined Ecological Footprint of the full-time, part-time and tourist populations currently exceeds the estimated Biocapacity of the island. **If the Galiano Island community were to decrease its overall footprint by 29%, it would match our estimate for island Biocapacity;** a 63% reduction of the island community footprint would be necessary to hit the global target of less than 1.6 gha/ca.

"What can the Ecological Footprint of a small island community tell us, and what are its limitations?"

We find that the Ecological Footprint and Fingerprint, together, can provide a striking illustration of the challenges and opportunities small island communities face on their journey towards sustainability and equity. We believe that, were this assessment to be applied to other small islands in the Salish Sea, patterns of similarity and difference would emerge that might help to clarify the extent to which these challenges and opportunities are shared among islands, and reveal circumstances unique to each island. In some areas, such as freshwater availability, the Ecological Footprint is completely silent, and other methods must be used to investigate these further.

Broadly speaking, our results are in the same "ballpark" as results from nearby urban communities. Uniquely, our use of the Ecological Fingerprint imbues our Ecological Footprint results with life, history, and purpose. In summary, we find that at the island scale, **Ecological Footprint results are instructive, but *only make sense* when contextualized by the Ecological Fingerprint.**

We encourage other islands in the Salish Sea to extrapolate from our results, or even to apply a similar assessment themselves. It may be reasonable to, for example, generate a basic Ecological Footprint for the Islands Trust Area based on extrapolation of these results, with some modification to account for inter-island differences. **We view the potential for improved collaboration (and friendly competition) across islands to be significant.** Interested island organizations should contact oneisland@galianoconservancy.ca for assistance in this process.

Sticking Points and the Devil in the Details 😈

A number of difficult questions arose in the process of completing this project. Here are just a sampling of the decisions we faced that influenced our results in significant ways:

- Where does an island begin, and where does it end?
- How much marine area should be included in this analysis?
- What defines a "community member?" Who should be included: full-time residents, part-time residents, visitors, or all of the above?
- Should senior government services be included in the footprint total?
- What percentage of community members need to be surveyed for results to be representative?
- How should surveys be designed to ensure accurate and representative information is collected, and surveys are accessible and comprehensible to diverse community members?
- How many people should be interviewed, and what questions should be asked?
- Who should be interviewed, and how should their knowledge be included?
- Is it possible to discuss Ecological Footprints without putting "blame" on individuals for issues that are global in scale?
- How should issues of population size and "carrying capacity" be handled?

The decisions that we ultimately made regarding each of these questions are implicit in this report, and are discussed in the relevant sections. Different decisions can reasonably be made on these questions.

Like our GCA forebears, we also identified several tensions in the "balance between overlapping issues."[394] These tensions are critical to understanding the Galiano Island community, and striking the appropriate balance between different priorities - potentially through implementing novel solutions - is essential to acting on the recommendations of this report. Here are a few of these tensions, and how we chose to consider and in some cases resolve them through our recommendations:

Water Availability v. Density / Housing Affordability

In Interviews, on surveys, and in conversation, community members frequently brought up concerns around housing affordability and water availability, at times in the same breath. These issues are sometimes framed oppositionally and having direct bearing on how the Galiano Island community approaches the proposed target of reducing the total built area on the island. Most community members that we spoke to acknowledged that limited groundwater availability imposes some environmental limits on development (and, by extension, island population), but there are varying perspectives on where these thresholds lie. Some areas of the island experience annual water deficits,

[394] See Emmings, K., & Erickson, K. (2004). *Galiano Island Landscape Classification and UP-CLOSE Workshop Series Final Report.* Galiano Conservancy Association, Galiano Island, BC. https://galianoconservancy.ca/wp-content/uploads/2016/11/final_report_complete.pdf

while others enjoy year-round surplus, so the threshold shifts depending on what part of the island is being discussed.

We heard different perspectives on the degree to which rainwater harvesting, greywater reuse, composting toilets, and other water-conserving technologies can resolve this tension. In this report, we recommend widespread adoption of all of these technologies, accompanied by incremental reductions in the built area to be gained through some degree of densification. The implicit **goal is to have more full-time residents securely and affordably housed, with reduced reliance (and pressure) on groundwater, and a reduced spatial footprint of development.** This goal raises questions about the extent to which the island community should continue to support an economy based around large numbers of seasonal visitors (who put pressure on groundwater supplies during the summer drought) and large houses occupied by part-time residents (which greatly extends the built area).

Solar v. Hydro

Ecological Footprint assessments consider hydroelectric power to be a low-emission source of renewable energy. While this is certainly true in comparison to energy derived from fossil fuels, hydroelectric power has significant negative environmental and social impacts that deserve consideration. Community members on Galiano Island started the Salish Sea Renewable Energy Co-Op (SSREC) to transform the Southern Gulf Islands into a "solar powerhouse." Tom Mommsen of SSREC advised us that, while reducing overall electricity use and improving home energy efficiency through installing heat pumps and improving insulation should be first on the energy agenda, transitioning to an electric vehicle and installing solar panels are a close second, with significant co-benefits. **Local solar energy has the potential to reduce community reliance on off-island energy sources** and contribute to transitioning British Columbia away from the negative consequences of continued large-scale hydroelectric development. We recommend that the community continue to invest in local renewable energy production, but in step with electrification and improvements in energy efficiency: these transitions should proceed together.

Population v. Carrying Capacity

The question of **carrying capacity** is often brought up in the context of discussions around the Ecological Footprint. Carrying capacity is defined as "the number of people, animals, or crops which a region can support without environmental degradation. Carrying capacity is frequently applied in the biological sciences, but we caution that it cannot be so easily applied to localized human populations. Human beings live at a remarkable variety of material standards (as illustrated by the comparison of Ecological Footprints), and these standards can change quickly. Trade networks allow human communities to overcome local limitations in resources that cannot be overcome by other species, and globalization has greatly increased humanity's ability to displace resource generation from consumption. From the perspective of the Ecological Footprint, then, **the global scale is the most relevant scale at which to consider human carrying capacity**. If the human population of the planet uses more resources than the environment can generate, environmental degradation occurs, and the human population is

considered to be in overshoot; this is the Ecological Footprint equivalent for exceeding planetary carrying capacity. The global human population is currently in overshoot, and as such, Ecological Footprint analyses cast significant doubt on the notion that increases in population are benign at the global level.[395] At the local scale, carrying capacity depends on living standards and community values, which cannot be easily quantified.

Some community members that we spoke to expressed deep concern around the fact that the human population of the island has been steadily increasing; others felt that the growth of the community yields benefits in terms of economic and cultural / social diversification. At the local level, we argue that the Ecological Footprint is ambiguous on the topic of population growth: population increases inevitably contribute to the total footprint of a community, but **if approached with sustainability in mind, population growth can reduce per capita footprints in a small community,** and help to set the stage for further per capita reductions. Implementing the recommendations put forward in this report requires the involvement of diverse, dedicated, skilled, and energized community members.

This report demonstrates that **part-time residents and seasonal visitors effectively double the footprint of Galiano Island** relative to its full-time population. We believe that under the right set of circumstances and incentives, the Galiano Island community could continue to grow its full-time population while reducing its economic reliance on (and the effective population of) tourists and part-time residents. To do this, the energy of the full-time population would need to be invested in **generating local employment in fields that help to reduce the local footprint and emissions.** We caution that, for this approach to succeed, the community would need to **prioritize preserving and increasing access to harvest areas for hwulmuhw mistumuhw** and other non-Indigenous community members.

Next Steps

In this report, we attempt to put the Galiano Island community's Ecological Footprint into context at local, regional, national, and global scales. We identify components of the footprint that can be addressed at the community level, and provide recommendations for how the community might approach reducing its footprint in ways that reflect its history, culture, economy, and daily realities. We do not, however, purport to speak for the community.

What the Galiano Island community does with this information remains to be seen. Next steps could include:

- Generating consensus around priority actions and reduction targets for Galiano Island
- Adopting a climate/footprint action plan, *or* joining other islands[396] in adopting a regional plan
- Identifying which individuals, organizations, and levels of government are best positioned to act on community-determined priorities, and providing support and accountability

[395] See Rees, W. E. (2020). Ecological Economics for humanity's plague phase. *Ecological Economics*, *169*, 106519. https://doi.org/10.1016/j.ecolecon.2019.106519

[396] See Transitional Salt Spring's Climate Action Plan 2.0: https://transitionsaltspring.com/climate-action-plan-2-0/

The Galiano Conservancy Association[397] will continue to provide resources to the community in the areas of ecosystem conservation, water conservation, ecological restoration, sustainable food systems, renewable energy, forest management, and climate resilience. We will seek out opportunities to collaborate on shared objectives across islands, implement projects and programs that deliver on the recommendations of this report, and engage the Galiano Island community.

We've created an online survey to collect community feedback on the results and recommendations of this report as a step towards building consensus around priority actions and targets. If you consider yourself a member of the Galiano Island community, please tell us what you think HERE.

Glossary

Key Terms

Biocapacity - Biocapacity represents the productive potential of an area's biologically productive land and water surface; in other words, the capacity for ecosystems to regenerate plant matter. Biocapacity is measured in global hectares (gha).

BCIT Centre for Ecocities - An arm of the British Columbia Institute of Technology with the mission "to help cities and communities close their sustainability gap."

Tonnes of Carbon Dioxide Equivalent (tCO_2e) - Carbon Dioxide Equivalence expresses the impact of each different greenhouse gas in terms of the amount of CO_2 that would create the same amount of warming when released into the atmosphere. This enables reporting total greenhouse gas emissions with one measurement.

Carbon Sequestration - A natural or artificial process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form.

Carrying Capacity - The number of people, animals, or crops which a region can support without environmental degradation.

Climate Crisis - Refers to the planetary threat posed by continued anthropogenic emissions of greenhouse gases into the atmosphere; the term has come to replace 'climate change' and 'global warming' in discourses concerning global climate.

Consumption-based Emissions Inventory (CBEI) - A form of greenhouse gas emissions inventory that enables a region to quantify the emissions that are attributable to activities of individuals that reside

[397] Visit www.galianoconservancy.ca

within that region. CBEIs do not replace traditional 'territorial' inventories (see below), but rather they are complementary to them. CBEIs include the emissions that are generated during the production, shipping, use and disposal of all goods consumed in the region, regardless of where they are produced, as well as the impacts of residents and local businesses while they are travelling outside the community's borders.

ecoCity Footprint Tool - A tool developed by Dr. Jennie Moore, with the capacity to create multiple outputs for a community using "bottom-up" data sets: a territorial greenhouse gas emissions inventory, a consumption-based greenhouse gas emissions inventory, and an ecological footprint. See ecocityfootprint.org

Ecological Fingerprint - An evaluation of the particular attitude, self-image and intrinsic values a community adopts with respect to global resource use.

Ecological Footprint - An estimate of how much biologically productive land and water area an individual or population needs to produce all the resources it consumes and to absorb the waste it generates; in other words, the area that would be required to support a defined human population and material standard indefinitely. It is measured in global hectares (gha), where a global hectare is a biologically productive hectare with globally averaged productivity for that year.

Ecosystem Services - The direct and indirect contributions of ecosystems to human well-being. Ecosystems services including provisioning, regulating, supporting, and cultural values.

Embodied Energy - Energy used in creating and delivering a material (e.g., consumable good or infrastructure), including energy used for extraction of raw materials, manufacturing and transportation of the end product.

Embodied Emissions - Greenhouse gas emissions associated with creating and delivering a material (e.g., consumable goods or infrastructure), including those associated with energy used for extraction of raw materials, manufacturing and transportation of the end product.

Exclusive Economic Zone (EEZ) - The area of the sea in which a given nation state asserts special rights regarding the exploration and use of marine resources. In Canada, the EEZ extends 370 kilometers offshore.

Food Miles - The distance food travels from where it is grown or made to where it is purchased or consumed by the end user.

Global Hectares (gha) - A global hectare (gha) is a unit of biocapacity, representing the productivity of a bioproductive hectare on earth with average productivity. There are just over 12 billion biologically productive hectares on Earth. Global hectares are often expressed in terms of global hectares per capita (gha/ca).

Global Footprint Network - An international nonprofit organization founded in 2003 with a mission "to help end ecological overshoot by making ecological limits central to decision-making."

Islands Trust - The Islands Trust is a special purpose government mandated to preserve and protect over 450 Islands in the Salish Sea. The Province of British Columbia created the Islands Trust in 1974 in response to the potential environmental effects of dense residential subdivisions that were in development in the Gulf Islands. The mandate of the Island Trust is "to preserve and protect the Trust Area and its unique amenities and environment for the benefit of the residents of the Trust Area and of British Columbia in cooperation with municipalities, regional districts, improvement districts, First Nations, other persons and organizations and the government of British Columbia."

Net Primary Production - The difference between the energy fixed by autotrophs and their respiration; most commonly equated to increments in biomass per unit of land surface and time.

One Planet Living - A lifestyle that, if adopted by everyone, could be supported indefinitely by the regenerative capacity of Earth's ecosystems.

Operating Energy - The energy used in the function of a product, building, vehicle, etc.

Operating Emissions - The greenhouse gas emissions associated with operating energy.

Overshoot - Global overshoot occurs when humanity's demand on nature exceeds the biosphere's regenerative capacity or supply. Such overshoot leads to a depletion of Earth's life-supporting natural capital, including the buildup of waste such as ocean acidification from excessive CO_2 or climate change from greenhouse gas accumulation in the atmosphere.

Rockfish Conservation Areas - Areas designated by Fisheries and Oceans Canada where any fishing activities that impact on rockfish, lingcod, or their habitat (including activities resulting in bycatch of these species) are prohibited.

Senior Government Services - Services provided by Federal and Provincial governments to the citizenry; in Canada, this includes military, health care, administrative, and other high-level services that aren't accounted for at the local level.

Sustainability Gap - The difference between the estimated Ecological Footprint of a population and the Ecological Footprint that would achieve "One Planet Living" (see above).

Territorial Emissions Inventory - Also known as a Sectoral Inventory, a territorial inventory identifies direct greenhouse gas (GHG) emissions from all sources within a region. This is the standard type of GHG emissions inventory compiled by local, regional, provincial and federal governments.

A standardized approach to territorial inventories is prescribed by the GPC (Global Protocol for Community-Scale Greenhouse Gas Emissions Protocol).

Two-eyed seeing - According to Mi'kmaw Elder Albert Marshall: " to see from one eye with the strengths of Indigenous ways of knowing, and to see from the other eye with the strengths of Western ways of knowing, and to use both of these eyes together

Acronyms

BCIT - British Columbia Institute of Technology

CBEI - Consumption-based Emissions Inventory

CRD - Capital Regional District

CSPGS - Coast Salish Peoples of Galiano Society

CO_2/Co_2e - Carbon dioxide/Carbon dioxide equivalent

EF - Ecological Footprint

eF Tool - ecoCity Footprint Tool

EEZ - Exclusive Economic Zone

GCA - Galiano Conservancy Association

GFN - Global Footprint Network

gha - Global Hectares

gha/ca - Global Hectares per Capita (person)

ghg - Greenhouse Gas

GIRR - Galiano Island Recycling Resources

GPC - Global Protocol for Community-Scale Greenhouse Gas Emissions Protocol

ICBC - Insurance Corporation of British Columbia

MSW - Municipal Solid Waste

NPP - Net Primary Production

RCA - RockFish Conservation Area

SSREC - Salish Sea Renewable Energy Co-op

Appendices

One Island, One Earth Project

June 2022

Galiano Conservancy Association

Appendix A: Biocapacity Data Collection

Land Use Mapping

In 2004, the Galiano Conservancy Association published a Landscape Classification for Galiano Island in its UP-CLOSE Workshop Series Final Report,[398] based primarily on interpretation of 1998 and 2002 aerial photography and subsequent ground-truthing throughout 2000 to 2003.

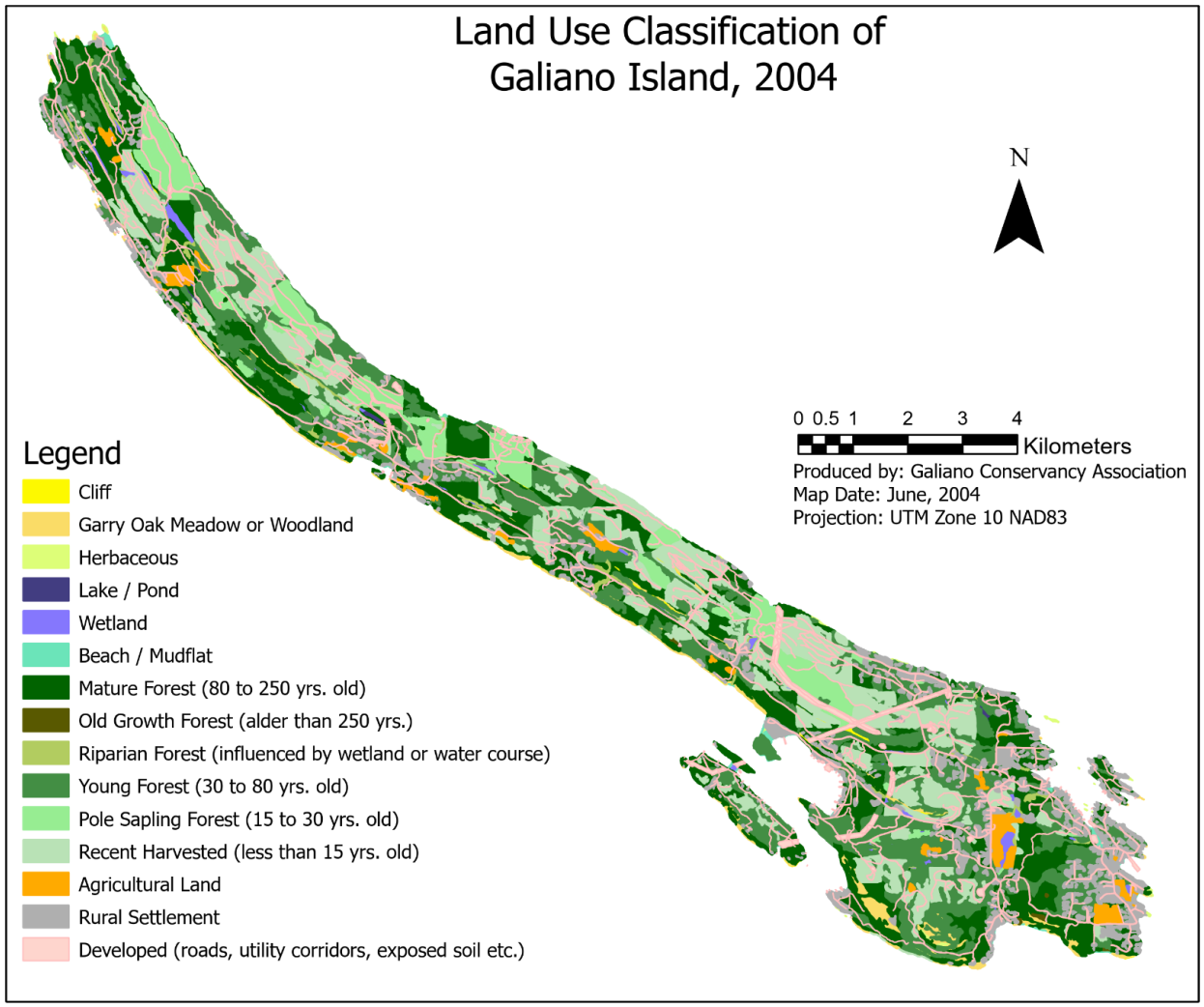


Figure 35. 2004 Land Use Map of Galiano Island.

We generated an updated 2021 Land Use map based on the Landscape Classification from 2004 by reviewing aerial orthophotography taken by the Islands Trust and Capital Regional District in 2002, 2017, and 2021; additional sources for interpretation included Government of British Columbia's 2019 LIDAR

[398] Emmings, K., & Erickson, K. (2004). *Galiano Island Landscape Classification and UP-CLOSE Workshop Series Final Report.* Galiano Conservancy Association, Galiano Island, BC. https://galianoconservancy.ca/wp-content/uploads/2016/11/final_report_complete.pdf

layer, a 2015 Islands Trust building footprint layer, and 2020 ArcGIS World Imagery. We ground-truthed areas for which land use remained unclear in 2021. Wise, Charles, Sphinx and Julia islands were not included in the 2004 Land Use map, but are included in the new 2021 Land Use map.

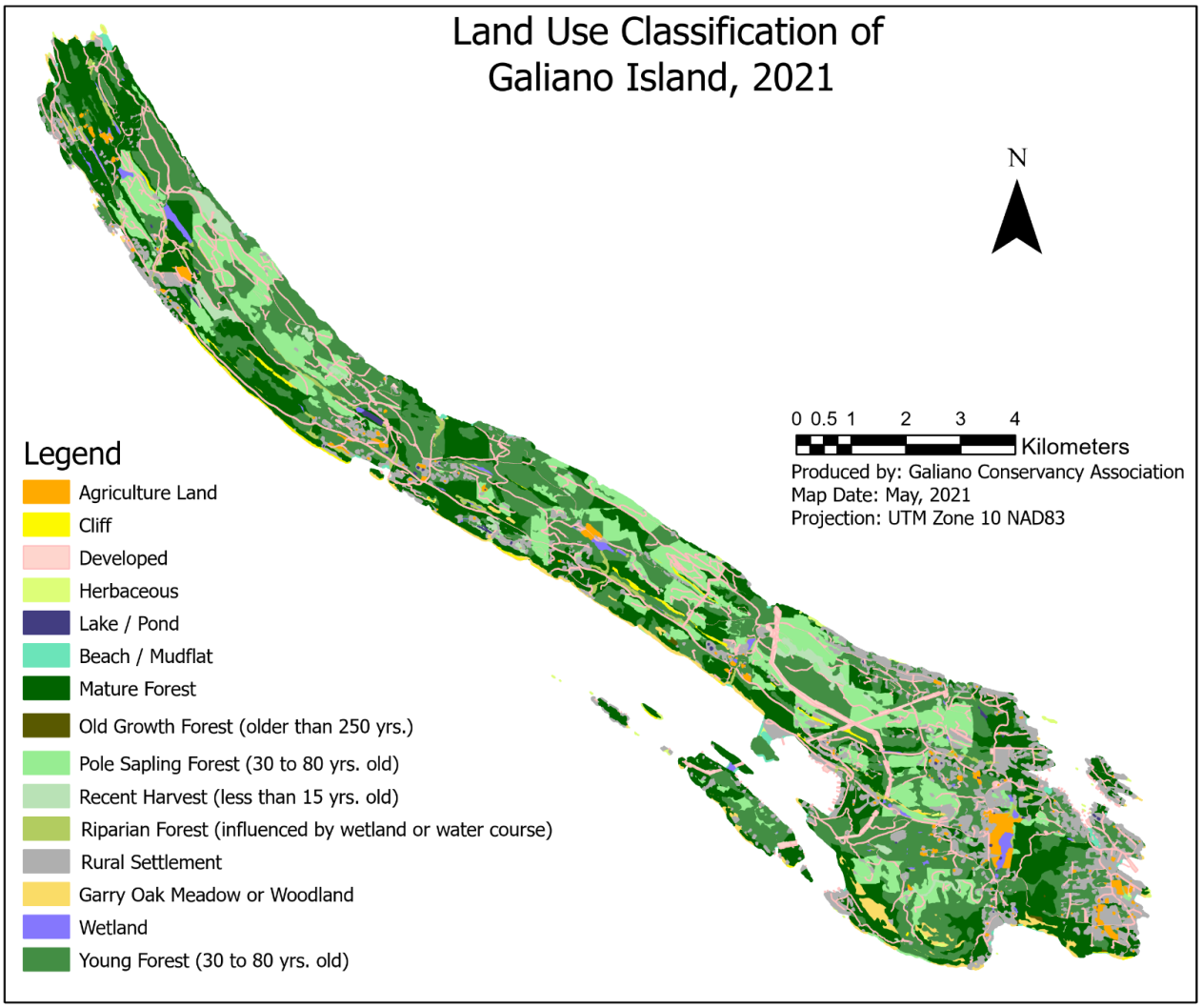


Figure 36. 2021 Land Use Map of Galiano Island.

We assumed that areas which were forested in 2004 and remained forested in 2021 had aged approximately two decades, and updated our classifications of these forested areas accordingly:

- Recent Harvest (0 to 15 years old) -> Pole Sapling (15 to 30 years old)
- Pole Sapling (15 to 30 years old) -> Young Forest (30 to 50 / 80 years old)

Young Forest was mostly retained within this category, but in select cases was upgraded to Mature Forest based on interpretation of LIDAR imagery and ground-truthing.

We created four new land use subcategories to increase specificity with respect to human land use:

RH - r = Restoration: Land where restoration has taken place.
AG - c = Cropland: Land used to cultivate crops.
AG - p = Pasture: Land used for grazing by domesticated livestock.
AG - g = Garden: A small piece of ground used to grow vegetables, fruit, herbs or flowers for use by a household.

Definitions of all of the land use categories can be found below.

Land Use Definitions

Table 7. Land Use Definitions

Natural Ecosystems - Landscape units with little or no human development. In the Trust Area these are usually rare and/or Fragile ecosystems	
Class	**Subclass**
OF - Old Growth Forest Large patches of forest that have not been subject to recent human disturbance (in the last 150 years). Areas display a wide variety of tree sizes, spacing and age. Old veteran tree comprise a major component of the site. Characterized by large dead standing and dead fallen trees of varying states of decay, canopy gaps, understory patchiness high organic matter accumulations, and multiple canopy layers. Average tree age of the dominant canopy is 250 years or more.	**co - Conifer**: > 75% of tree cover is coniferous
	mx - Mixed: mixed with broadleaf component >25%.
MF - Mature Forest Large patches of forest where old-growth characteristics are beginning to develop. Usually with multi-storied canopies, well developed understories, and diverse structural features such as large dead standing and dead fallen trees. Average tree age is 80 - 250 years.	**co - Conifer**: > 75% of tree cover is coniferous
	mx - Mixed: mixed with broadleaf component >25%.
WD - Woodland Dry, open stands of deciduous forest, generally with between 10 and 25% tree cover. Woodlands may include non-forests openings, often with shallow soils and bedrock outcropping.	**mx - Mixed:** mixed with conifer component > 15%
	Bd - Broadleaf: Dominant Broadleaf
HB - Herbaceous Non-forested ecosystems with less than 10% tree	**mx - Mixed:** mixed with conifer component > 15%
	cs - Coastal herbaceous: Rocky shoreline,

cover. Most have shallow soils and bedrock outcrops.	influenced by the marine environment and characterized by grasses, forbs, mosses and lichen.
	sp - Spit: Sand and gravel deposits with low to moderate cover of grasses and herbs.
	du - Dunes: Sand Dunes with a low cover of grasses.
	sh - Shrub: Shrubs account for more than 20% of the vegetation.
RI - Riparian Streamside areas along creeks, streams, gullies, canyons and larger floodplains.	**fl - Low bench**: areas flood at least once every two years for part of the growing season; plants are adapted to extensive flooding and abrasion.
	fm - Medium bench: areas flooded every one-six years for short periods (10 - 25 days); usually deciduous or mixed forests with trees tolerant of flooding and sedimentation.
	fh - High bench: areas periodically and briefly inundated by high waters; typically conifer-dominated floodplains of larger coastal rivers.
	ff- Fringe: Narrow, linear areas along open water bodies (River, lakes and ponds).
	gu - Gully: where the watercourse is in a steep V-shaped gully.
ST - Stream Watercourse formed when water flows between continuous, definable banks.	**fp - Perennial:** Creek or stream that flows continuously throughout the year. **fs - Seasonal:** Stream that flows only at certain times of the year, (e.g.,when the groundwater table is high and/or when it receives water from springs).
WN - Wetland Areas characterized by daily, seasonal or year-round water at or above the surface	**bg - Bog:** Shrubby or treed, nutrient-poor peatlands with distinctive communities of plant species adapted to highly acid and oxygen-poor soil conditions.
	ff - Fen: Peatlands where groundwater inflow maintains a high mineral content within the rooting zone.

	ms - Marsh: shallowly flooded mineral wetland dominated by emergent grass-like vegetation.
	sp - Swamp: Forested, mineral wetland dominated by broadleaf shrubs and trees on sites with a flowing, semi-permanent, near surface of water table.
	sw - Shallow Water: Aquatic ecosystems dominated by rotted, submerged and floating aquatic plants.
	wm - Wet Meadow: Seasonally inundated wetlands, dominated by grasses, sedges, or rushes. They generally occurs on mineral soil and have little or no peat accumulation. Tree cover is less than 10%.
CL - Cliffs Steep, vertical or overhanging rock face -sparse vegetation may occur in crevices or on ledges.	**cc - Coastal Cliffs:** cliffs with a marine interaction. Generally near vertical bedrock with accumulation of soil limited to fissures and ledges.
	ic - Inland Cliffs: Typically formed as a result of erosion, catastrophic failures or mass wastage. Generally characterized by rapid drainage and the accumulation of soil that is limited to bedrock fissures and ledges.
LC - Lacustrine Lacustrine ecosystems are freshwater ecosystems where total vegetated cover of the surface area is less than 5%.	**la - Lake:** a naturally occurring static body of water, greater than 2m deep in some portion.
	pd - Pond: A small body of water greater than 2m deep, but not large enough to be classified as a lake. Most ponds in our dataset are artificial in origin rather than natural, but both are categorized here.
LT - Littoral Ecosystems are marine influenced where total vegetated cover of the surface area is less than 5%.	**mu - Mudflat:** Flat, plain-like areas dominated by fine-textured sediments and exposed at low tide; includes estuaries.
	Be - Beach: Area that expresses sorted sediments, reworked by wave action in recent times.

Modified - Landscape units with human development or disturbance.	
Class	**Subclass**
YF - Young Forest Self-thinning has become evident and the forest canopy has begun to differentiate into distinct layers (dominant, main canopy, and overtopped); vigorous growth and a more open stand than in the pole sapling stage; begins as early as age 30 and as late extends to 50-80 years. Young Forest that was designated in the 2004 land classification has retained its classification as Young Forest.	**co - Conifer:** > 75% of tree cover is coniferous
	mx - Mixed: Neither coniferous or broadleaf account for > 75% of tree cover.
	bd - Broadleaf: > 75% of tree cover is broadleaf
NYF - New Young Forest Self-thinning has become evident and the forest canopy has begun to differentiate into distinct layers (dominant, main canopy, and overtopped); vigorous growth and a more open stand than in the pole sapling stage; begins as early as age 30 and as late extends to 50-80 years. The New Young Forest classification has been automatically applied to all areas that were classified as Pole Sapling in the 2004 Land Classification data.	**co - Conifer:** > 75% of tree cover is coniferous
	mx - Mixed: Neither coniferous or broadleaf account for > 75% of tree cover.
	bd - Broadleaf: > 75% of tree cover is broadleaf
PS - Pole Sapling Dense regeneration of clearcut area between 15 and 30 years old, but can range upwards of 50 years if growing under poor conditions. Trees are greater than 10m tall and have overtopped shrubby and herbaceous vegetation.	**co - Conifer:** > 75% of tree cover is coniferous
	mx - Mixed: Neither coniferous or broadleaf account for > 75% of tree cover.
	bd - Broadleaf: > 75% of tree cover is broadleaf
	cc - Clearcut: This describes areas that were automatically updated to the Pole Sapling class (clearcut subclass from those that were designated as Recently Harvested in the land classification data published in 2004. Aerial imagery from 2017 and LiDAR from 2019 confirm the successful regeneration of dense stands of trees, however no ground truthing has been done so species composition cannot be verified.
	gs - Group Selection: This describes areas that were automatically updated to the Pole Sapling

	class (group selection subclass) from those that were designated as Recently Harvested in the land classification data published in 2004. Aerial imagery from 2017 and LiDAR from 2019 confirm the successful regeneration of dense stands of trees, however no ground truthing has been done so species composition cannot be verified.
	st - Seed Tree Retention: This describes areas that were automatically updated to the Pole Sapling class (seed tree subclass) from those that were designated as Recently Harvested in the land classification data published in 2004. Aerial imagery from 2017 and LiDAR from 2019 confirm the successful regeneration of dense stands of trees, however no ground truthing has been done so species composition cannot be verified.
RH - Recent Harvest Stands less than 15 years of age that are undergoing the initial stages of regeneration (Usually dominated by shrubby and herbaceous vegetation, trees species less than 10m tall) in areas where timber has been removed.	**cc - Clearcut:** Clear-cuts and heavily logged areas, mostly or all stripped of native vegetation, may be replanted or naturally regenerating. Naturally regenerating sites are dominated by seedlings , shrubs and herbaceous species (usually with a large component of exotic species). Replanted sites will vary in composition depending on silvicultural applications. Includes human caused serious erosion areas.
	st - Seed Tree Retention: Clear-cuts where individual trees or groups of trees have been retained for regeneration or aesthetic purposes.
	gs - Group Selection: Areas where timber harvest has occurred using group or individual tree selection methods including commercially thinned forest.
	r - Restoration: Land where restoration has taken place. Area may or may not have been cleared recently, but attempts to restore natural ecological processes have begun within the last 15 years.
RW - Rural Area in which human developments are interspersed with forest range, farmland, and native vegetation or cultivated crops.	**se - Settlement:** Residential, commercial or other structures are interspersed with native vegetation farmland or cultivated crops.
	gc - Golf Course: Grass-covered fairways and open

	areas for the playing of golf.
	pk - Park: Groomed areas including parks, playgrounds, aesthetic areas, and cemeteries.
	ar - Arrested Reforestation: Area previously deforested which has failed to return to forest after more than a decade. Instead of tree species, area dominated by grasses, forbs, shrubs, and/or bare soil. Likely cause deer browse, invasive plant species, and/or compacted soils. Up to 10% tree cover/regeneration.
AG - Agriculture Area where dominant use is for agriculture purposes.	**co - Cultivated Orchard:** An agricultural area composed of single or multiple tree species planted in rows.
	cv - Cultivated Vineyard: Vineyard
	c - Cropland: Land used by commercial enterprises (most crops are sold rather than consumed by household) to cultivate crops and livestock feed.
	p - Pasture: Is land used for grazing by domesticated livestock. 2021 update: we included backyard poultry in this category.
	g - Garden: A small piece of ground used to grow vegetables, fruit, herbs or flowers for use by a household.
	n - Nursery: Mixture of covered and open spaces for propagating agricultural plants
	r - Restoration: Agriculture using only native plants
DP - Developed Areas where human features or disturbance are dominant.	**ca - Canal:** Artificial watercourse created for transport, drainage, and/or irrigation purposes.
	sz - Developed/Occupied Foreshore: Dock marina or shellfish lease.
	rz - Road Surface: Area cleared and compacted for vehicle transport.
	gp - Gravel Pit: Area exposed for the removal of sand and gravel.
	ur - Urban/suburban: Area in which residences

	and other human developments form an almost continuous covering of the landscape.
	uc - Utility Corridor: Area permanently altered to allow for the passage of a public or private utility.
	es - Exposed Soil: Area of exposed soil; not included in any of the other definitions.
	lq - Unrestored landfills and quarries: Includes large-scale soil, rock and debris dumping, gravel/rock quarries, major ditching disturbances.

Appendix B: Ecological Footprint Data Collection

Transportation

ICBC provided the make and model for all of the registered vehicles on Galiano Island for 2020. Data from our Odometer Survey was applied and stratified to reflect the vehicle class distribution on Galiano Island from ICBC's data. The Odometer Survey provided mileage for the most popular car types: Small Passenger Car (Gasoline), Small Passenger Car (Electric), Light Trucks, Vans and SUV (Gasoline) and Motorcycle (Gasoline). Those four categories represent 92% of the cars on Galiano. For car types where there was no data, either a proxy was used or phone calls were made to local businesses and farmers to have them estimate their vehicles mileage (e.g., Heavy Duty Trucks (Diesel) and Tractors).

In the Community Mail-Out Survey we also asked about the use of other modes of transportation.

The Community Mail-Out Survey asked questions about the following topics:

- Personal boat ownership
    - Yearly fuel consumption
    - Type of fuel
- Individuals ferry trips
    - Most common trip destination
        - Trip Purpose
    - Other destinations
        - Trip Purpose
- Individuals air travel (in a non-Covid year)
    - Trip destinations

Waste and Recycling

We compared the results of our Waste Tracker survey to data provided by Galiano Island Recycling Resources (GIRR). GIRR's data gave us a better understanding of how to scale our Waste Tracker survey data, which was used to estimate the recycling footprint for the Galiano Island community. To get a better understanding of how much garbage the Galiano Community takes off-Island to landfills, we received data from the Garbage Gals (an on-island garbage collection business).

The Community Mail-Out Survey asked questions about the following topics:

- Percentage of recycling taken to GIRR vs. percentage taken off-island

Buildings & Stationary Energy

Built area was classified using the 2015 building footprints data set and the 2019 zoning layer provided by the Islands Trust. Data was extracted using ArcGIS pro.

The Salish Sea Reneable Energy Co-op (SSREC) provided a rough estimate of energy produced on-island from solar panels on an annual basis. Superior Propane shared data on the quantity of propane delivered on the island in 2020. BC Hydro provided data on electricity use for 2020/2019.

The Community Mail-Out Survey asked questions about the following topics:

- Method of household heating
- Household propane use
- Household heating oil use
- Household wood use
- Household square footage

Food

The results from the Food Diary were projected for the entire population of both the full-time and part-time residents, based on the assumption that part-time residents have a similar diet to full-time residents. Canadian average diet was assumed for tourists

Suggestions for Improvements to Future Surveys

Odometer Survey

- The second survey should have an option for cars that have been sold, or have been taken to the junkyard.
- Ask how many people use this vehicle as their primary vehicle.

Food Diary

- Create more user-friendly servings sizes

Community Mail-Out Survey

- Ask participants to self-identify as part-time or full-time residents.
- Ask if part-time residents rent out their space when they are away.
- Flights - First ask how many flights participants have taken this year, then follow up about whether this is a normal pattern and ask participants to explain why or why not.
- Ask if participants make use of seaplane travel between the island and the mainland.
- Ask if participants use a composting toilet.
- Ask whether particiaptns purchase propane on-island or off-island.
- Ask participants about the capacity of rainwater collection systems.
- Ask participants about the frequency of trips taken on cruise ships.

Waste Tracker

- Align recycling categories the categories of the local recycling centre.

Appendix C: Ecological Fingerprint Data Collection

Oral History - Interview Questions

Oral History Guiding Questions

One Island, One Earth Project

Could you please introduce yourself and tell me where we are?

What has been your relationship with Galiano? Past and present?

What environmental changes have you seen during your time on Galiano?

In the past how much did you rely on the land and sea? How has that changed?

Who was the oldest person that you remember living on Galiano? What was their life like?

Why are you living here (Galiano) today?

Do you think that you are currently living a sustainable lifestyle? If not, what are your barriers?

What changes would you like to see happen in the future?

Do you feel optimistic about the future?

Is there anything that you want to tell people? Final comments?

**Towards the end of interviewing a few additional questions were asked about waste, transportation and invasive species.*

Interview Dates

Table 8. Interviews were conducted from July 2021 - March 2022.

Date	Interviewee	Interviewer(s)
July 21, 2021	Levi Wilson & Emily Menzies	Adam Huggins & Michelle Thompson
Sept 27, 2021	Carol & Don Robson	Kris Krug & Michelle Thompson
Oct 1, 2021	Jane Wolverton	Kris Krug & Michelle Thompson
Nov 5, 2021	Karen & Richard Charlie	Adam Huggins & Michelle Thompson
Nov 16, 2021	Florence James	Suzanne Fournier & Michelle Thompson
Jan 17, 2022	Bowie Keefer	Michelle Thompson
Jan 31, 2022	Geoff Gaylor	Ana Bazdresch
Feb 6, 2022	George Harris	Ana Bazdresch
Feb 7, 2022	Gary & Barbara Moore	Michelle Thompson
March 4, 2022	Barry New	Ana Bazdresch
March 10, 2022	Sheila & Don Anderson	Adam Huggins
2021	Charlie Head, Lloyd Baines and Johnny Georgeson	Richard Wilson & Shar Wilson
2021	Janice Wilson	Richard Wilson & Shar Wilson
2021	Bob Wilson	Richard Wilson & Shar Wilson

2021	Bob & Shar Wilson	Richard Wilson

Appendix D: Survey Results

Odometer Survey Results

Table 9.

Vehicle Type	Sample Size	Average annual km/vehicle
Small Passenger Car (Gas)	16	4657.19
Small Passenger Car (Electric)	4	5471.5
Light Trucks, Vans, and SUV (Gas)	40	5180.05
Motorcycle (Gas)	1	847

Community Estimates

Table 10.

Vehicle Type	Sample Size	Average annual km/vehicle
Heavy Duty Trucks (Diesel)	3	5755
Tractor	1	80

Food Diary Results

The survey represented 39 males and 47 females. Two participants did not specify gender.

Table 11.

Age Groups	Participants
0 - 14	12
15 - 64	47
65 - 84	19
84 - 100	1

Table 12.

Household Size	# of Households
1	5
2	15
3	7
4+	3

Both spring and summer 2021 survey results are included below. 88 people (43 households) completed our Food Diary surveys. Food Diary survey forms can be found in Appendix E. Serving sizes for each food group were projected for the year, averaged, and divided to represent one person. Participants were asked to identify whether servings were produced locally (grown or harvested on the island) or originated from off-island. The chart below shows an averaged estimate of a Galiano Island community member's food consumption by weight over an entire year.

Table 13.

Food Group	On Island (kg/ca)	Off Island (kg/ca)	Annual projection for one Galiano Island community member (kg/ca)
Fruits and Vegetables	35.18	75.38	110.56
Rice	0.00	9.72	9.72
Wheat & Other Cereals	0.00	41.69	41.69
Fish/Seafood	0.66	4.74	5.41
Beef or Veal	0.00	3.50	3.50
Pork	0.00	4.65	4.65
Lamb/other	0.22	0.40	0.62
Poultry	0.53	5.67	6.20
Venison/Game Meat	0.22	0.18	0.40
Eggs	7.45	7.39	14.83
Milk, Yogurt, Cottage Cheese	3.09	27.76	30.85
Cream	0.00	1.18	1.18
Cheese	0.12	4.57	4.69
Butter	0.00	1.18	1.18
Oils	0.00	2.65	2.65
Seeds	0.02	1.19	1.21
Nuts	0.22	12.29	12.51
Legumes	0.46	14.17	14.64
Sugar	0.00	2.67	2.67

Honey	0.19	0.41	0.60
Maple Syrup	0.00	0.69	0.69
Coffee	0.00	1.65	1.65
Tea	0.06	0.41	0.47
Cocoa	0.00	0.17	0.17
Wine	0.44	15.16	15.60
Beer	0.00	44.55	44.55
Spirits	0.00	2.69	2.69
Soft drinks/Sugar sweetened beverages	2.17	3.26	5.44
Juice	2.73	8.81	11.54
Bottle Water	0.00	10.34	10.34
Soy, almond, coconut or other dairy alternatives	0.00	33.88	33.88

Waste Tracker Results

46 females and 45 males were represented in this survey.

Table 14.

Age Groups	Participants
0 - 14	7
15 - 64	47
65 - 84	20
85 - 100	2
?	15

Table 15.

Household Size	# of Households
1	8
2	19
3	11
4+	3

Both spring and summer 2021 survey results are included below. 41 households completed the Waste Tracker Survey which represents 91people. Waste Tracker survey forms can be found in Appendix E. Survey data was projected for the entire year and scaled down for one Galiano Island community member.

Table 16.

Waste Category	Method/Waste Type	Annual Projections for one Galiano Island community member
Yard Waste (kg)	Burn	1041.43
	Compost	1290.00
	Dispose	535.00
Tires (#)	Dispose	2
Recycle Compost (kg)	Paper	1701.986
	Metal	805.246
	Glass	2817.698
	Plastic	1009.606
	Food Compost	7233.85
	Textiles	218.4
	Other	18.98
Burn (kg)	Paper	551.356
	Wood Waste	1.04
	Other	0

Listed below are all of the large appliances, small appliances, batteries, and hazardous waste that survey respondents reported disposing of or recycling within the year 2021.

Table 17.

Category	Disposed	Recycled
Large Appliances	1 Fridge	1 Printer/fax
	1 Electric Stove	1 Range
	1 Couch	1 Washer
	1 Fridge	
	1 Rug	
	1 500g fibreglass tank	

	1 Washer	
	1 Drier	
	Chair	
	3 Tarps	
Small Appliances	1 Electric Kettle	2 Small Appliance
	1 Landline	2 Toaster Oven
	Computer cords	1 Sound Bar
	2 Phones	1 Computer
		1 Blender
		CD Player

Table 18.

Battery Type	Disposed
AA	158
AAA	118
C	8
D	12
12V	1
Car Battery	2
Misc.	65
Alkaline	20

Table 19.

Hazardous Materials - Disposed
8 gallons of paint
15 oil changes
1 pale of wood stain
1L anti-freeze
2L chainsaw oil
1 fluid flushing

Community Mail-Out Survey Results

Demographics

A total of 135 surveys were completed, representing 282 people, including 145 females, 121 males, and 16 people who did not report their gender. Within the survey, 12 participants identified as minorities and

7 identified as Indigenous. For the purpose of this survey, full-time residents were defined as residents that spend more than 180 days annually on Galiano Island, whereas part-time residents spend less than 180 days annually on Galiano Island. The survey represented 229 full-time residents and 53 part-time residents.

Table 20.

Age	# of Respondents
0 to 14	21
15 to 30	20
31 to 45	30
46 to 64	72
65 to 84	93
84 to 100	9
Unknown	26

Table 21.

Household Size	# of Respondents
1	33
2	77
3	10
4	10
5	5
6+	0

Food

Below is an average of responses to the question: "If someone in your household produces/grows their own food, how much land area and greenhouse square footage is used for production?"

Table 22.

Type of Resident	Average Garden/Greenhouse Space (sqft)
Full-time Residents	5644.31
Part-time Residents	95.73

Active Transportation

Below is the spread of responses to the question: "What percentage of on-island trips do you use active transportation (Biking and Walking)?"

Table 23.

On-Island Active Transport Trips	# of Respondents
0%	20
1 % - 10%	60
11% - 25%	19
26% - 50%	13
51% - 75%	10

76% - 99%	8
100%	2

Below is the spread of responses to the questions: “Do you personally feel safe biking on public roads around the island?” and “Do you personally feel safe walking on public roads around the island?”

Table 24.

Biking	Yes	30
	No	70
	Other	23
Walking	Yes	78
	No	36
	Other	16

Boat Fuel

Below is an average of responses to the question: “How much fuel does your boat(s) consume in a typical year?”

This response represents 25 out of 135 households, with respondents providing answers in terms of both quantity and cost.

Table 25.

Fuel Type	Quantity (L)	Cost ($)
Gas	6307	2550
Diesel	3360	1480

Ferry Travel

Below is an average of responses to the question: “In a typical non-Covid year, how many round trips by ferry do you personally make off-island per year?”

Table 26.

Type of Resident	Annual roundtrip journeys by ferry
Full-time Residents	22.16

Part-time Residents	17.69

Air Travel

115 full-time residents provided information on their annual flying habits. We assumed that all flights departed from YVR.

Below is a summary of full-time resident responses to the questions: "In a typical non-Covid year, how many one-way flights do you personally take per year (including seaplanes)?" and "Where are the flights to? (If possible please provide the city or country)."

Table 27.

Flight Distance	Destination	One-Way Trips
Short 500 km	Prince Rupert	8
	Kelowna	6
	Galiano to Vancouver	2
	Kamloops	5
Medium 500 - 3700km	Calgary	19
	Edmonton	6
	Kitchener, On	2
	Ottawa	6
	Toronto	27
	Thunder Bay	1
	Winnipeg	3
	Montreal	6
	L.A.	4
	San Francisco	5
	Appleton, Wis	2
	USA	14
Long 3700+ km	Hawaii	12

	Mexico	10
	Puerto Vallarta	3
	Europe	14
	UK	4
	Geneva	2
	France	4
	Germany	3
	Austria	2
	Nicaragua	3
	Cuba	2
	Dominican Republic	2
	Hong Kong	3
	Asia	5
	Japan	6
	Africa	5
	Uruguay	2
	New Zealand	2

20 part-time residents provided information on their annual flying habits. We assumed that all flights departed from YVR.

Below is a summary of part-time resident responses to the questions: "In a typical non-Covid year, how many one-way flights do you personally take per year (including seaplanes)?" and "Where are the flights to? (If possible please provide the city or country)."

Table 28.

Flight Distance	Destination	One-Way Trips
Medium 500-3700km+	Kitchener, On	4
	Ottawa	2
	Montreal	2

	Fredericton, NB	2
	Halifax	20
	San Francisco	2
	Orlando	2
	New York	4
Long 3700+ km	Amsterdam	5
	Germany	1
	Europe	2
	Asia	2

Energy

Below is a summary of responses to the questions: "What is your household's estimated annual consumption of wood?", "What is your household's estimated annual consumption of heating oil?", and "What is your household's estimated annual consumption of propane?"

Table 29.

Fuel	Full-time residents (115 HH)	Part-time residents (20 HH)
Wood (cords)	196.61	16.8
Propane (lbs)	5784	770
Heating Oil (G)	5784	0

Sustainability

Below is a summary of responses to a question about participation in various "sustainable lifestyle choices." Respondents were able to select multiple responses.

Table 30.

Sustainable Lifestyle Choices	Respondents	Percentage of Respondents
Preserve my own Food	96	71.11%
Hunt/fish locally	28	20.74%
Own an e-bike	18	13.33%
On-grid Solar	14	10.37%
Off-grid Solar	9	6.67%

Wind Turbine	4	2.96%
Compost Toilets	21	15.56%
Personal Compost	98	72.59%
Dual System Toilets	23	17.04%
Rain Barrels	69	51.11%
Greywater Systems	23	17.04%
Cistern (Rainwater)	51	37.78%
Well	109	80.74%

Qualitative Questions

Below is the spread of responses to the question: "Do you think climate change will personally affect you?"

Table 31.

Answer	Responses
Yes	132
No	0
Not Sure	1

Below is a summary of responses to the follow-up questions: "If yes, how do you anticipate it will affect you? Are you already being impacted? If so, how?" Respondents were able to select multiple answers, and were also able to provide their own answers to the question.

Table 32.

Response Theme	# of Respondents	Response Theme	# of Respondents
Water Accessibility	69	Mental Health	4
Heat Waves/Temp	46	Less Travel	4
Fire	39	Lifestyle Change	4
Agriculture Water Supply/Poor growing conditions	36	Harsh Winters	4
Extreme Weather	29	Every Aspect	4
Food Production/Availability	25	Decreased Hunting and Fishing	3

Air Quality and Smoke	18	Power Outages	3
Increased Food Prices	14	Immigration & World Conflict	3
Biodiversity/Wildlife	13	Increased Insurance	3
Cedar (negative impacts)	11	"We should all work together"	1
Food Diversity	9	Climate Migration	1
Rising Tides	8	Will affect my Job	1
Increase energy consumption and cost	8	Pressure on Emergency Services	1
Marine (negative impacts)	6	Misinformation	1
Firs (negative impacts)	5		

Below is the spread of responses to the question: "Do you think that Galiano Residents are living sustainably?"

Table 33.

Response	# of Respondents
Yes	11
No	48
Other (I don't know)	58

Below is a summary of responses to the follow-up question: "Where do you think the Galiano Island Community can improve?" Respondents were able to select multiple answers, and were also able to provide their own answers to the question. 108 respondents provided answers.

Table 34.

Response Theme	# of Respondents	Response Theme	# of Respondents
Transit	19	Forest Thinning	2
Bike Paths	16	Less Tourism	2

Increased Programs and Awareness*	15	Rainwater Catchment	1
More Food Production	15	Car Pooling	1
Electric Cars	12	Electric Boats/Ferry	1
Water Conservation	10	More Local Economy	1
Solar	9	Easier Rezoning	1
Affordable Housing	7	Sustainable Forestry	1
Reduce Waste	5	Indigenous Practices	1
EV Charging Stations	3	Land Back	1
Improve Heating Systems	3	Wind Turbines	1
Increase Energy Production	2	Public Docks	1
Hunting and Foraging	2	Limit Population	1
Gardening	2	Affordable Food On Island	1

*Below are comments that were provided with some of the "Increased Programs and Awareness" responses.

- "Discussion/education about sustainability"
- "Education for all landowners to conserve, resume & whatever we have to do to be able to all live together on Galiano Island."
- "Better education by locals who have short term visitors so the visitors conserve more"
- "We need more education about our freshwater resources and the fact that we are all holding hands on our aquifers' ability to sustain us."
- "Very concerned about the lack of knowledge and awareness of freshwater resources by our PT, FT residents, and visitors."
- "Learn about ecosystem capacity"
- "Having more on-island resources"
- "I'd like to see programs and awareness seminars around water conservation, local ecology including land restoration and sustainable foraging, fire risk reduction, burning consequences."

Data Extracted from ArcGIS Datasets

Below is the data extracted from datasets that were provided by the Islands Trust using ArcGIS pro: Structure Points, 2017 and Zoning, 2019.

Table 35.

Zoning	# of Structures
Residential	1771
Commercial	65
Institutional	37
Agricultural	14

Below is the data extracted from the Islands Trust, 2019 Zoning dataset and the GCA's 2021 Land Use Map.

Table 36.

Zoning	Area (km^2)
Residential	6.30
Commercial	0.14
Institutional	0.11
Agricultural	0.13

Below is the data extracted from the following datasets: CRD Roads, the Galiano Trail Network Master, 2020 and MLC Trails, 2021.

Table 37.

Transportation	Area (km^2)
Trails	0.12
Paved Roads	0.25
Non-Paved Roads	2.78

Appendix E : Community Surveys

Odometer Survey - Part 1

1. Date (include day, month, year):

2. What is your email? (We will use this email to invite your family to record your odometer reading again in Fall 2021)

3. In a typical week, how many days do you spend on Galiano Island?

4. How many vehicles does your family own?

5. Depending on how many vehicles your family owns, complete the boxes below:

Vehicle 1

What is the odometer reading of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

What unit is your odometer reading expressed in? (please check the correct box)

- ☐ Kilometers
- ☐ Miles

What is your vehicle Year, Make and Model? (e.g., 2010 Ford Explorer, 2006 Honda Civic, 2018 Nissan Leaf)

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _

What is the primary use of your family's vehicle? (please check the correct box)

- ☐ Personal

☐ Commercial

What is the Year, Make, and Model of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Vehicle 2 (if your family has two vehicles)

What is the odometer reading of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

What unit is your odometer reading expressed in? (please check the correct box)

☐ Kilometers
☐ Miles

What is your vehicle Year, Make and Model? (e.g., 2010 Ford Explorer, 2006 Honda Civic, 2018 Nissan Leaf)

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _

What is the primary use of your family's vehicle? (please check the correct box)

☐ Personal
☐ Commercial

What is the Year, Make, and Model of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Vehicle 3 (if your family has three vehicles)

What is the odometer reading of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

What unit is your odometer reading expressed in? (please check the correct box)

☐ Kilometers
☐ Miles

What is your vehicle Year, Make and Model? (e.g., 2010 Ford Explorer, 2006 Honda Civic, 2018 Nissan Leaf)

_ _ _ _ _ _ _ _ _ _ _ _ _ _

What is the primary use of your vehicle? (please check the correct box)

- ☐ Personal
- ☐ Commercial

What is the Year, Make, and Model of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Odometer Survey - Part 2

Thank you for participating in the Galiano Conservancy's data collection initiative to estimate the amount of vehicle kilometers traveled by the Galiano community! All information collected will remain anonymous.

You are receiving this survey because you submitted your odometer reading in the Winter/Spring (Part 1). Now we are asking you to resubmit your odometer reading to complete Part 2. We will calculate the difference between your two odometer readings to estimate how many kilometers the Galiano community drives in a year.

The data collected in this study will be used to contribute to the calculation of Galiano Island's ecological footprint. Only aggregated data will be presented - no individual information or data will be distributed. Study results will be presented at public events and in public reports, and may be submitted for publication in scientific journals.

If you do not wish to have your data included in this study, please exit the survey now. If at any point in the future you wish to have your results removed from the study, please email oneisland@galianoconservancy.ca.

1. Date (include day, month, year):

2. What is your email? (We will use this email to invite your family to record your odometer reading again in Fall 2021)

Vehicle 1

a) What is the odometer reading of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

b) What unit is your odometer reading expressed in? (please check the correct box)

- ☐ Kilometers
- ☐ Miles

c) What is your vehicle Year, Make and Model? (e.g., 2010 Ford Explorer, 2006 Honda Civic, 2018 Nissan Leaf)

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _

d) What is the primary use of your family's vehicle? (please check the correct box)

- ☐ Personal
- ☐ Commercial

e) What is the Year, Make, and Model of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Vehicle 2 (if your family has two vehicles)

a) What is the odometer reading of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

b) What unit is your odometer reading expressed in? (please check the correct box)

- ☐ Kilometers
- ☐ Miles

c) What is your vehicle Year, Make and Model? (e.g., 2010 Ford Explorer, 2006 Honda Civic, 2018 Nissan Leaf)

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _

d) What is the primary use of your family's vehicle? (please check the correct box)

- ☐ Personal
- ☐ Commercial

e) What is the Year, Make, and Model of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Vehicle 3 (if your family has three vehicles)

a) What is the odometer reading of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

b) What unit is your odometer reading expressed in? (please check the correct box)

- ☐ Kilometers
- ☐ Miles

c) What is your vehicle Year, Make and Model? (e.g., 2010 Ford Explorer, 2006 Honda Civic, 2018 Nissan Leaf)

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _

d) What is the primary use of your vehicle? (please check the correct box)

- ☐ Personal
- ☐ Commercial

e) What is the Year, Make, and Model of your family's vehicle? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

One Island One Earth

Summer Food Diary Initiative

Thank you for participating in the Galiano Conservancy's Food Diary activity and contributing to the *One Island One Earth* Ecological Footprint Initiative. The instructions and data recording sheets for the activity are included in this package.

Food Diary Datasheet Instructions

Step 1: Read over the Food Diary Data Recording Sheet to familiarize yourself with how foods are grouped, and how serving sizes are defined. Generic serving size guidelines are provided for food groups as a whole; these sometimes differ from serving size guidelines provided for specific items. When there is a discrepancy, use the serving size guideline for the specific items (e.g., rice) rather than the group (e.g., Grains & Cereals).

Step 2: Put the Data Recording Sheet on your fridge (or somewhere else accessible) with a pen nearby. You can use the same Data Recording Sheet for your entire household.

Step 3: Each time you eat something, place a tick mark in the corresponding box on the Data Recording Sheet. One tick mark is equal to one serving size. Please only tally **once**.

- If you eat one Galiano Produced serving (Ingredients) place a tick in the box on the right.

If you eat one Off-Island serving, place a tick in the left box.

Definitions for the purpose of this study

Off-Island Food: All food (ingredients) produced off of Galiano Island.

Galiano Produced Food: Food grown on Galiano Island – foraged or hunted on Galiano, grown in your backyard, harvested from a community garden, purchased from the local farmers market, or labeled as produced on Galiano at the grocery store.

Step 4: Continue to track everything you eat for **1 week**.

Important Notes:

(a) Do not track partial servings. If you eat less than half a serving, do not count it. If you eat over half a serving, count it as one. Spices and condiments are generally less than half a serving, so you do not need to track them.

(b) For processed food items, such as chips, salsa, jam/jelly, or ice cream, only include the item in the category of the primary ingredient (i.e., each processed food item goes in one category). For example, the primary ingredient for many ice cream brands is either milk or cream. Ice cream is not listed as an example under the dairy product categories, so use the generic dairy product serving size, ½ a cup. Depending on if the primary ingredient is cream or milk, place one tick in the appropriate box for every ½ cup you consume.

(c) If there is something you would like to share about your eating habits that you feel isn't captured (e.g., you make efforts to purchase food from local BC food producers, you bake your own bread etc.), please share in your answer to the survey question on page 15: Is there anything else we should know?

Tips:

(1) If you are cooking a dish for the week, such as soup, it can be easier to add your tick marks ahead of time when cooking, rather than each time you eat a serving of the soup.

(2) You may find that using a different colour pen for different people in your household, or for different days of the week, will help you to keep track of what has been recorded (this is optional based on your preference).

Step 5: After 1 week, count the tick marks in each box, and neatly write the number of ticks in the bottom corner of the box.

**All information collected as a part of this activity will remain anonymous. Only aggregated data will be presented in our public results. The food groupings, serving size information, and definitions presented on the Data Recording Sheet are provided by the BCIT Centre for Ecocities.*

Galiano Food Consumption Summer Survey

Please write your response to each question in the boxes below and fill out the Data Recording Sheet.

1. During a typical week, how many days do you spend on Galiano Island? (highlight the correct response, if it depends on the season, please specify)

1 2 3 4 5 6 7

2. How long have you lived on Galiano? (please highlight the correct answer)

Less than 1 year 1-4 years 5-10 years 11-20 years more than 20 years

3. How many people are represented on your Data Tracking Sheet? What are their ages and gender identities?

4. How many people live in your household, and what type of dwelling(s) do you live in? (e.g., single detached home, mobile home, motor home, other)

Number of people in your household:

Type of dwelling(s):

5. What part of the island do you live on?

North Middle South

6. If you produce your own food, how much land area is used for production?

7. Typically, what portion of your food do you purchase (or forage/hunt/grow) on island, and what portion do you purchase (or forage/hunt) off island?

% on Galiano: % off island:

8. Were there any food items missing from the Data Tracking Sheet? (Please list)

9. What worked well with the food diary activity, what could be improved?

10. Is there anything else we should know?

11. What is your email? (we will use this to enter you in a monthly draw)

Summer Food Diary - Data Recording Sheet

Please track the number of food servings you eat over **one week** using the categories listed below:

	Notes/Examples of One Serving	Off-Island Servings	*Galiano Produced Servings
FRUITS AND VEGETABLES	**1 serving = 0.5 cups raw or 0.25 cups dried** (roughly 66g) *This is equivalent to:* 8 cups of popped popcorn, 20 potato chips, 6 asparagus spears, 4 cauliflower/broccoli/gai lan florets, 1 apple/orange/banana/ear of corn/large carrot/stalk of celery, ½ avocado/mango/ grapefruit/potato/pepper, or 1 cup of raw (1/2 cup cooked) lettuce/spinach/leafy greens. *Include fresh/frozen corn as a vegetable (products made from corn flour are included with grains).*		
GRAINS & CEREALS	**1 serving = 0.5 cup or 1 slice of bread** (roughly 40g) *This is equivalent to the examples listed below:*		
Rice	*Include products with the primary ingredient of rice.* 1/4 cup of **cooked** rice.		
Wheat & Other Cereals	*Include products with the primary ingredient wheat, corn, quinoa, millet, barley, rye, oats, spelt, kamut and all other grains (other than rice). Do not include cookies or cake (they are counted with sweeteners).* 1 cup of breakfast cereal, a slice of bread, **half** a bagel or pita, a granola bar, 13 soda crackers, ½ cup of **cooked** pasta or ramen noodles, ¼ cup of **cooked** quinoa, millet, or barley.		

FISH/SEAFOOD, MEAT, EGGS	**1 serving = 0.5 cup (cooked) or 2 eggs** *This is equivalent to the examples listed below:*		
Fish/Seafood	1 piece of cooked fish similar in size to a deck of playing cards (cooked serving weight=75g, raw serving weight=130g – excluding bone)		
Beef or Veal	1 piece of cooked beef or veal similar in size to a deck of playing cards (cooked serving weight=75g, raw serving weight=130g – excluding bone)		
Pork	1 piece of cooked pork similar in size to a deck of playing cards (cooked serving weight=75g, raw serving weight=130g – excluding bone)		
Lamb/other	1 piece of cooked lamb similar in size to a deck of playing cards (cooked serving weight=75g, raw serving weight=130g – excluding bone)		
Poultry	1 piece of cooked chicken, turkey, duck similar in size to a deck of playing cards (cooked serving weight=75g, raw serving weight=130g – excluding bone)		
Venison/Wild Game Meat	1 piece of cooked venison/wild game meat similar in size to a deck of playing cards (cooked serving weight=75g, raw serving weight=130g – excluding bone)		
Eggs	2 eggs		
DAIRY PRODUCTS	*This does not include products derived from soy, almond, coconut or other alternatives to dairy products (which are included in beverages), nor chocolate (which is counted with sweeteners).* **1 serving = 1/2 cup, one-inch cube, or 1 'pat'** *This is equivalent to the examples listed below:*		

Milk, Yogurt, Cottage Cheese	½ cup of any animal milk, yogurt, or cottage cheese (cow, goat, sheep, all fat levels, lactose reduced, etc.)		
Cream	1 tbsp of cream or 1 individual container		
Cheese	1 one-inch cube of cheese or cream cheese		
Butter	1 'pat' or 1 tsp of butter		
OILS, NUTS, SEEDS, LEGUMES	**1 serving = 1 tbsp, 0.5 cup or a handful** *This is equivalent to the examples listed below:*		
Oils	1 tbsp of oil		
Seeds	1 tbsp of shelled seeds		
Nuts	20 (1/2 cup) almonds or a similar sized handful of shelled tree nuts or peanuts, 5 tbs nut butter		
Legumes	1/2 cup of cooked beans, lentils, soybeans/tofu		
SWEETENERS	**1 serving = 2 tsp of sugar/sweetener** (8g) *This is equivalent to the examples listed below:*		
Sugar	2 tsp of sugar, 1 square inch of chocolate, 2 regular sized cookies, or ½ of a slice of cake		

Honey	2 tsp of honey		
Maple Syrup	2 tsp of maple syrup		
COFFEE, TEA, COCOA	**1 serving = 1 cup of tea, coffee or cocoa** *This is equivalent to the examples listed below:*		
Coffee	1 tbsp of coffee grounds		
Tea/Kombucha	1 teabag, 1 tsp of loose tea, 1 cup of Kombucha		
Cocoa	1 tbsp of cocoa		
OTHER BEVERAGES	**1 serving = 1 cup/250 ml, or 1 can/bottle** *This is equivalent to the examples listed below:*		
Wine	250 ml		
Beer/Cider	1 can/bottle of beer/Cider (340-355 ml)		
Spirits	1 single shot or 44 ml		
Soft drinks/Sugar sweetened beverages	1 can/bottle of pop (340-355 ml)		

Juice	1 individual juice box (~ 250 ml)		
Bottled Water	1 bottle		
Soy, almond, coconut or other dairy product alternatives	250 ml		

Notes: - **Do not track partial servings**. If you eat less than half a serving, do not count it. If you eat over half a serving, count it as one. Since spices and condiments are often less than half a serving, you do not need to track them.

- For processed food items, such as chips and salsa, ***only*** include it in the category of the primary ingredient. For example, potato chips, corn chips and salsa would each be listed under the vegetable category; chocolate, cookies, and cake would be listed under the sugar category.

***Galiano Produced Food:** Include food grown on Galiano – foraged or hunted on Galiano, grown in your backyard, harvested from a community garden, purchased from the local farmers market, or labeled as produced on Galiano at the grocery store.
Do not include food prepared on Galiano with ingredients from elsewhere (e.g., bread you made with flour from off-island).

The food groupings, serving size information, and definitions presented on this sheet are provided by the BCIT Centre for Ecocities.

Summer Household

Waste Tracking Initiative

Please write your response to each question in the boxes below and fill out the Data Recording Sheet.

1. During a typical week, how many days do you spend on Galiano Island? (highlight the correct response, if it depends on the season, please specify)

1 2 3 4 5 6 7

2. During the two-week waste tracking program, how many days did you spend on Galiano Island? (please highlight the correct response)

1 2 3 4 5 6 7 8 9 10 11 12 13 14

3. How many people live in your household? What are their ages and gender identities?

4. What type of dwelling(s) do you live in? (e.g., single detached home, mobile home, motor home, other)

5. What part of the island do you live on?

(please highlight the correct answer)

North Middle South

6. Typically, what portion of your recycling do you bring to the Galiano Recycling Centre, and what portion do you bring off island?

% Galiano Recycling Centre:

% off island:

7. If you have a wood stove, how many cords of wood do you typically burn over the course of a year?

8. Over the course of a year, what volume of yard waste do you typically burn, compost, and dispose of? (see images to help with your estimate of volume)

- Burn –
- Compost –
- Dispose –

9. Please list any large appliances or household items (e.g., a couch, washing machine) you disposed of over the course of 2020, and indicate how you disposed of it (e.g., sold to someone on Galiano, brought to landfill off island, storing for future disposal):

10. Please list any small appliances or electronics (e.g., toaster, computer, phone) you disposed of over the course of 2020, and indicate how you disposed of it (e.g., recycled, sold to someone on Galiano, brought to landfill off island, storing for future disposal):

11. Over the course of 2020, approximately how much of the following materials did you get rid of?

- *Tires* - disposed _____; recycled _____
- *Batteries* – Disposed (please list type and quantity):

  Recycled (please list type and quantity):

- *Hazardous Materials* (cans of paint, automotive fluids etc.):

  Disposed (please list each item and specify estimated volume):

  Recycled (please list each item and specify estimated volume):

12. What is your email? (we will use this to enter you in a monthly draw)

13. Is there anything else we should know?

Thank you for your participation!

Start Date:

End Date:

Data Recording Sheet - Household Waste Tracking

Please indicate the weight of the waste you collected over two weeks. *Make sure to include which unit you are reporting in* (e.g., lbs, kg)

Category	Description/Examples	Weight (unit: lbs, kg etc.)
Garbage - Solid Waste Disposed of that will end up in a landfill		
Garbage	Anything you dispose of via garbage drop-off on Galiano, garbage pick-up at your Galiano residence, and garbage you take from Galiano to dispose of off-island.	
Recycling and Compost - Solid Waste Diverted from the landfill		
Paper Products: fibre paper/boxboard, corrugated cardboard, mixed paper	**coffee cups, milk cartons, juice cartons**, frozen food boxes, cereal boxes, egg cartons, drink trays, pulp produce trays, pizza boxes, mail delivery/ product packaging boxes, brown retail/grocery bags, printed paper, magazines, telephones directories, newspaper, envelopes, office paper, etc.	
Metals: ferrous food/drink packing, ferrous other, non-ferrous and bimetallic, mixed metals	soft drink cans, beer cans, food cans (beans, soup, peaches etc.), metal parts, etc.	
Glass	food/drink packaging (pickle jars, sauce jars, wine bottles, liquor bottles), etc.	

Plastic: PET, HDPE, durable plastic, film, other	bottles and jugs (drinks, cooking oil, shampoo, etc.), yoghurt containers, clear food containers (muffins, berries etc.), flexible film (bread bags, grocery bags etc.), etc.	
Food Compost	uneaten food, fruit and vegetable peels & cores, bones, etc.	
Natural Fiber Textiles	wool, cotton, silk, etc.	
Other: Please specify		
Waste Accumulated that you Plan to Burn - do not include yard waste		
Paper Products: fibre paper/boxboard, corrugated cardboard, mixed paper	see examples listed above	
Wood Waste	A wooden bowl, box, picture frame etc. *Not* construction or demolition waste (e.g., Pallets, furniture), *not* wood chopped specifically for the wood stove (this is captured later)	
Other: Please specify		

Note: The following items are not listed in the table above as they will be captured in the survey, where you will provide an annual estimate: tires, batteries, electronics, appliances, furniture, hazardous waste, yard waste, wood chopped for wood stove.

Community Mail-Out Survey

Project Description

This year, the Galiano Conservancy is working with the BCIT Centre for Ecocities to document the **Ecological Footprint of Galiano Island.** The project will capture the impacts that our community places on natural resources, including: resources needed to grow food, regenerate timber, build infrastructure, and absorb greenhouse gas emissions from burning fossil fuels.

We need your help to do this! Existing ecological footprint methodologies are currently tailored towards the urban context, requiring access to centralized data records which Galiano doesn't have. That's where you come in - helping us build these records from the ground up.

How will your data contribute?

By participating in this survey, you are:

- Helping Galiano be the first Island in North America to document its Ecological Footprint
- Starting the conversation about Galiano Island's own Climate Action Plan
- Creating a blueprint for other small island communities to follow our lead

Survey Details

The survey will take about 10 minutes to complete. Both part-time and full-time residents can participate. All information and data collected will remain anonymous. Only aggregated data will be presented publicly - no individual information or data will be distributed. If you do not wish to have your data included in this study, please do not submit your results. If you decide you would like your results removed from the study after submission, please contact the GCA.

Demographic Information

1. How many people live in your **household**? What are their ages and gender identities?

2a. During a typical week, how many days do **you** spend on Galiano Island? (highlight the correct response, if it depends on the season, please specify)

1 2 3 4 5 6 7

2b. What months of the year do you occupy this residence?

3. Please identify how many people in your **household** self-identify as an Indigenous person.

0 1 2 3 4 5 6 7 8

4. Please identify how many people in your **household** self-identify as a visible minority.

0 1 2 3 4 5 6 7 8

Transportation

5. What percent of on island trips do **you** personally use active transport? (walking or biking)

0% Less than 10% 11%-25% 26%-50% 51%-75% 76%-99% 100%

6. Do **you** personally feel safe _____ on public roads around the island?

Biking Yes No

Walking Yes No

7a. In a typical non-COVID year, how many **one-way** flights do **you** personally take per year?

7b. Where are the flights to? (If possible please provide the city or country)

8a. In a typical non-COVID year, how many trips by ferry, do **you** personally make off island per year?

8b. Where are the majority of the trips to?

8c. Where are the other trips to?

8d. What is the primary purpose of those trips? (Select all that apply)

- ☐ Groceries & Products
- ☐ Vacation
- ☐ Visit Family
- ☐ Work
- ☐ Waste Disposal
- ☐ Medical Appointments
- ☐ Other

Energy, Water, Waste, and Food

9a. Where does your **household** get the majority of your potable water

- Well – Untreated
- Well – Treated (Filtration system, water softener, distillation systems, disinfectant)
- Bottled Water
- Rainwater Harvesting

9b. Do you ever run out of water?

Yes No

10. Does your **household** have a septic tank?

Yes No

11. What is the square footage of your residence on Galiano Island?

12. In the Fall, Winter and Spring – Estimate what percent of your total household food consumption is Galiano produced?

13. In the Summer – Estimate what percent of your total household food consumption is Galiano produced?

14a. How do you heat your home? (Check all that apply)

- ☐ Heat pump
- ☐ Wood stove
- ☐ Electric heater(s)
- ☐ Heating oil
- ☐ Propane
- ☐ Other

14b. What is your **household's** estimated annual consumption of:

Propane (lbs):

Heating Oil (Tank Size or Gallons):

Wood (Cords):

15. Typically, what portion of your recycling does your **household** bring to the Galiano Recycling Center, and what portion do you bring off island?

% Galiano Recycling Center:

% off island:

16. If someone in your household produces/grows their own food, how much land area and greenhouse square footage is used for production?

17a. What are the barriers for **you** to buy food locally? (Tick all that apply)

	First Choice	Second Choice	Third Choice
No barriers, I buy locally as much as possible			
Kinds of food available			
Year-round availability			
Cost			
Lack of processed or pre-made foods			
Lack of connection to local producers			
Other			

17b. If other, please specify.

18a. Do you or anyone in your **household** own a personal boat(s)?

No Yes – 1 Boat Yes – Multiple Boats

18b. How much fuel does your boat(s) consume in a typical year? (Please specify if your answer is in Liters or Dollars)

18c. What type of fuel?

Sustainability

19a. Do you think climate change will personally affect **you**?

Yes No

19b. If yes, how do you anticipate it will it affect you? Are you already being impacted? If so, how?

20a. Select all that apply to your household:

- ☐ Preserve my own food
- ☐ Hunt/fish locally
- ☐ Own an e-bike
- ☐ On-Grid Solar Panels
- ☐ Off-Grid Solar Panels
- ☐ Wind Turbine
- ☐ Compost Toilet(s)
- ☐ Use a personal Compost
- ☐ Dual System Toilets
- ☐ Rain Barrels
- ☐ Greywater Systems
- ☐ Cistern/Tanks
- ☐ Well

20b. If you have solar panels or wind turbines, please estimate how much energy (kWh) your household produces in a year?

21a. Are there any sustainable lifestyle changes that **you** would like to make but are currently out of reach? E.g Electrical car, solar panels, grow your own food

21b. What barriers are **you** currently facing? (Select all that apply)

	First Choice	Second Choice	Third Choice
Lack of knowledge			
Cost			
Not the property owner			
Geographical			
Time and Capacity			
Accessibility of Contractors and Trades workers			
Other			

21c. If others please specify.

22a. Do you think Galiano Island residents are living **sustainably**?

Yes No Other

22b. Where do you think the Galiano Island community can improve?

23. Is there anything else that you think we should know? We would love to hear your comments and ideas.

24. We will be conducting Oral History interviews to highlight the voices of those whose experience can provide insight on the past, present, and future of the Galiano Island Community. Do you know someone that we should interview?

Contact Information

25. What is your email address? (we will use this to enter you in a monthly draw)

26. Would you like us to email you about our other data collection initiatives? The first 40 households to complete all 4 initiatives will get a **$20 gift card** to the GCA.

Yes No

Thank you for your participation!