XETTHECUM ECOCULTURAL MAPPING PROJECT TOOLKIT

table of contents

1.0 – Territorial Acknowledgment

Galiano Island is located within the shared, asserted, and unceded traditional territories of the Pune'luxutth', Quw'utsun', Lamalchi, W̱SÁNEĆ, Hul'q'umi'num' and SENĆOŦEN-speaking people, and on the territories of the Coast Salish people of Galiano. The island also lies within the shared, asserted, and ceded traditional territories of the Tsawwassen First Nation. These nations, along with other Hwulmuhw Mustimuhw, continue to serve as the stewards of these lands and waters, having held rights and responsibilities here since time immemorial. We acknowledge that reconciliation is an active process that depends on an ongoing commitment to fostering healthy relationships of reciprocity and respect among Indigenous and non-Indigenous community members, in recognition of the sovereignty and right to self-determination of all Indigenous peoples in the Salish Sea and beyond.

2.0 – Project Overview

In partnership with Indigenous and non-Indigenous collaborators, we co-created an inclusive participatory mapping framework that integrates Indigenous ways of knowing with Western ecological science. This pilot project centered on the creation of an ecocultural map of Xetthecum Retreat Cove, Galiano Island, BC, Canada, with a focus on Hul'q'umi'num' species names and place-based stories. The open source framework we created integrates various sources of information, including historical and contemporary biodiversity data, terrestrial ecosystem mapping, written and spoken Hul'q'umi'num', stories of place, and other audio and visual media. Through this work we aimed to engage a diverse, multigenerational, and cross-cultural community in the documentation of Xetthecum's sensitive ecosystems and cultural keystone species. By fostering this diverse community of practice, and communicating this information in a format accessible to both land managers and the general public, we hoped to inspire a holistic approach to shle'muxun—a Hul'q'umi'num' word which means "guardian of the land" or "stewardship". Beyond this pilot project, we plan to adapt these practices and digital tools in partnership with Whiteswan Environmental and other stakeholders in the Spirit of the Sxwo'le (SOS) Coalition to create ecocultural maps of significant sites throughout the Salish Sea.

3.0 – Background

The Institute for Multidisciplinary Ecological Research in the Salish Sea (IMERSS) is working in partnership with the Indigenous-led nonprofit Whiteswan Environmental (WE) to develop digital mapping tools supporting the visualization of ecocultural information and storytelling about natural, cultural, and historical sites in the Salish Sea. To ensure appropriate cultural safety protocols are in place, WE has initiated the Spirit of the Sxwo'le (SOS) Coalition. Through this coalition, WE is collaborating with IMERSS and other Indigenous and non-Indigenous stakeholders to develop a cross-cultural community of practice based on protocols of respect and reciprocity, to restore traditional Indigenous practices and

access to place, supporting thriving cultures and coastal ecosystems for future generations. The SOS Coalition Leadership Organization Team (LOT) is 100% Indigenous, with SOS Coalition Content Working Groups (CWG) that include Indigenous and non-Indigenous individuals and organizations who work on projects in common, such as biodiversity and ecocultural mapping. IMERSS' involvement in this coalition is facilitated through the leadership role of Jeannine Georgeson, an Indigenous member of the Galiano community and member of IMERSS who leads the Xetthecum project. Through this pilot project we aimed to develop preliminary tools and resources to facilitate the broader regional work of the SOS Coalition, beginning in the local context of Retreat Cove, Galiano Island, BC. On the regional scale, members of the SOS Coalition intend to adapt the methodologies innovated through the Xetthecum pilot to support the longer term vision of a Coast Salish Tribal Heritage Field Institute: seven longhouses in the San Juan Islands and seven longhouses in the Gulf Islands.

We are grateful to the Access to Media Education Society, Capital Regional District, Community Engagement Fellows, Galiano Conservancy Association, Hunterston Farm community, Inclusive Design Research Centre, Indigenous Watersheds Initiative, Islands Trust Council, Southern Gulf Islands Community Resource Centre, MIT Solve Indigenous Communities Fellowship, Northeast Pacific Coastal Biodiversity Action Network, Social Sciences and Humanities Research Council, UBC BRITE Internship Program, and WE for making this work possible. We also thank our advisors, contributors, partners, Galiano Island community members at xe'xe'tth'uqum, and especially the Elders who have contributed to this project to date.—huy ch q'a sii'em!

4.0 – Goals

To create an interactive digital map of Xetthecum through a participatory approach that results in an accessible ecocultural mapping framework, which can be adapted to document other places of cultural and ecological significance in the Salish Sea

To meaningfully weave Indigenous wisdom and knowledge and Western scientific practice into this participatory mapping framework

To identify important ecological and cultural dimensions of the landscape as a framework for conservation and private land stewardship

To honour past efforts to document the ecocultural values of the Galiano Island landscape by building upon the outcomes of previous participatory mapping exercises and other local resources into our digital map

To promote intergenerational, cross-cultural, multidisciplinary, and transboundary skill-sharing and knowledge exchange, supporting ecocultural mapping as a professional conservation practice among the next generation of land stewards

To apply new technologies, including aerial drone and precision accuracy GPS systems, to improve the resolution of existing terrestrial ecosystem mapping data

To explore the potential for the development of ongoing biodiversity and ecocultural monitoring practices, in partnership with regional and local agencies, and members of the Galiano Island community, to help sustain this work into the future

5.0 – Deliverables

5.1 – Deliverable I: Online Ecocultural Map / Data Visualization

A GIS database and online ecocultural map of Xetthecum that builds upon existing terrestrial ecosystem mapping and biodiversity datasets, complementing past participatory mapping exercises undertaken by members of the Galiano Island community. Creating this online map will at once serve to elaborate an open source ecocultural mapping framework that can be adapted to meet the needs of Whiteswan Environmental and other Indigenous communities.

5.2 – Deliverable II: Project Documentation ('Toolkit')

Documentation of our efforts to plan, implement and synthesize the results of this project into the ecocultural mapping framework.

5.3 – Acceptance Criteria

Acceptance Criteria were established and assessed through the recommendations of project participants through each phase in the project's development, implementation and reporting. Content deliverables are to be accepted upon submission and approval by Puneluxutth' Knowledge-Holders, project sponsors, partners, and advisors.

Perhaps more important than the tangible deliverables we aimed to produce through this project, was the process of creating them. We envision this process as an intergenerational, cross-cultural, and multidisciplinary community of practice, promoting skill-sharing, and exchange of vital ecocultural knowledge that can support ongoing biodiversity and ecocultural monitoring practices for generations to come. We hope that these resources may prove useful to those interested in adapting these methods to map other important ecocultural sites throughout the bioregion.

6.0 – Project Participants

Table 1. Project Participants

Contribution	Name	Affiliation
Indigenous Participants	Florence James (Thiyuas)	Puneluxutth’
	Augie Sylvester	Pune’luxutth
	Johnny Aitken	Cowichan
	Austin Baines	Coast Salish and Sahtú Dene
	Jeannine Georgeson	Coast Salish and Sahtú Dene
	Rosemary Georgeson	Coast Salish and Sahtú Dene
	Mally Joe	Cowichan
	Sadie Olsen	Lummi
	Troy Olsen	Lummi
	Lorne Silvey	Galiano Island Community
	Augie Sylvester Jr	Puneluxutth’
	Bernie Sylvester	Puneluxutth’
	Eva Wilson	Galiano Island Community
	Shirley Williams	Lummi
	Levi Wilson	Gitga’at / Lamalcha / English and Scottish heritage
	Richard Wilson	Galiano Island Community
	Roo Wilson	Gitga’at First Nation
	Wave Wilson	Gitga’at First Nation / Lamalcha / English and Scottish heritage
Advisors	Fiona Beaty	UBC / Howe Sound/Átl’ḵa7tsem Marine Reference Guide / IMERSS
	Ellen Bradley	Tlingit / IMERSS

	Ginny Broadhurst	Salish Sea Institute / IMERSS
	Mairin Deith	UBC / IMERSS
	Kate Emmings	Islands Trust Conservancy
	Keith Erickson	Galiano Island Community
	Colin Grier	Washington State University
	Deblekha Guin	Access to Media Education Society
	Adam Huggins	Galiano Conservancy Association
	Joey Hulbert	Washington State University
	Michael Keefer	Keefer Ecological Services Ltd.
	Andy MacKinnon	IMERSS
	Chessi Miltner	Galiano Conservancy Association
	Deb Morrison	Islands Trust
	Briony Penn	UVic School of Environmental Studies
	Christine Stewart	Emily Carr / IMERSS
	Nancy Turner	UVic Professor Emeritus
	Lisa Wilcox	Islands Trust
	Jane Wolverton	Islands Trust
Contributors	Justine Apostolopolous	SGI CRC
	Hannah Carpendale	SFU / IMERSS
	Kailyn Chutka	SGI CRC
	Cody Clayton	Galiano Island Media
	Ally Cooley	SGI CRC
	Jack Garton	Galiano Island Community
	Cait Harrigan	Galiano Island Community
	Jim Hodgson	Vancouver
	Rhys Hutton	Galiano Island youth

	Hunterston Farms	Galiano Community Members
	Sophia Jackson	Whiteswan Environmental
	Lauren Magner	Galiano Island Community
	Emily Menzies	Restorative Education
	Bianca Perla	Vashon Nature Center
	Josha Petronis-Akins	Galiano Island Media
	Erika Preece	SGI CRC
	Francine Renaud	Galiano Island community
	Maggie Slein	UBC BRITE Intern
	Quynn Stafford	SGI CRC
	Tei Taiyarï	Access to Media Education Society
	Travis Tennessen	Community Engagement Fellows
	Sidra Treall	SGI CRC
	Karolle Wall	Emily Carr / former Retreat Island resident
	Tavish Wherley	SGI CRC
Coordinators	Jeannine Georgeson	IMERSS
	Andrew Simon	IMERSS
Partners	Dana Ayotte	Inclusive Design Research Center
	Antranig Basman	Inclusive Design Research Center
	Colin Clark	Inclusive Design Research Centre
	Ruth Elwood-Martin	Hunterston Farm
	Sadie Olsen	Whiteswan Environmental
	Troy Olsen	Whiteswan Environmental
	Lisa Spicer	Whiteswan Environmental
	Shirley Williams	Whiteswan Environmental
Sponsors		Capital Regional District

Galiano Conservancy Association

Hakai Institute

Healthy Watersheds Initiative

Indigenous Watersheds Initiative

Islands Trust Council

MIT Indigenous Communities Fellowship

Northeast Pacific Coastal Biodiversity Action Network

Social Sciences and Humanities Research Council

Southern Gulf Islands Community Research Centre

UBC BRITE Internship Program

7.0 – Project Scope

The Xetthecum pilot project centered around Retreat Cove: an area of ecological and cultural significance on Galiano Island, BC, Canada, known as Xetthecum in the Hul'q'umi'num' language. Our goal was to develop an ecocultural mapping framework that enabled the integration of ecological and cultural information into an interactive, online map of this place, which may be adapted for the purpose of mapping other sites in the Salish Sea. This framework was developed within the QGIS platform and extended to an online platform based on open source code developed in R and JavaScript, building upon a platform previously developed to visualize biodiversity datasets. To facilitate the mapping of Hul'q'umi'num' names and values ascribed to species present at Xetthecum, this project incorporated a substantial biodiversity dataset assembled by members of the Biodiversity Galiano project, including more than 4,000 species observations. This rich biodiversity dataset includes marine data collected through the Pacific Marine Life Surveys, a local salmonid inventory (Erickson, 2014) and other sources (Simon et al. 2022). We also included biodiversity data from a Bioblitz organized by the Hunterston Farm community at Xetthecum in 2010, a subsequent BioBlitz organized in 2023 through this project, and observations contributed via the community science platform iNaturalist.

The Xetthecum project area encompasses a portion of the Galiano Island landscape that is complex in its ecology, cultural history, and contemporary land-use. The project boundary is roughly delimited by the extent of the Greig Creek watershed, including the watercourse descending from Laughlin Lake to

Retreat Cove, which spans residential and agricultural lands, protected and covenanted areas, and a public shore access. Perspectives on the landscape include those of local Indigenous peoples, island residents, municipal and subregional government (CRD and Islands Trust), and a number of local and regional conservation groups, including the Islands Trust Conservancy, the Garry Oak Meadow Preservation Society, and the Galiano Conservancy Association.

8.0 – Project Phases Summary

This Toolkit represents the culmination of over three years of activity, conducted in three phases, from November 2020 to March 2024 (Table 2). Each phase in the project concluded with a review process involving key stakeholders and advisors, in order to satisfy the pilot project's Acceptance Criteria. To reach a broad readership, these activities have been communicated in general terms. In the future, detailed appendices will be prepared to document the more technical aspects of this project's implementation, to support knowledge mobilization and capacity building for Whiteswan Environmental and other communities interested in replicating this work.

Table 2. Summary of Pilot Project Phases

Phase	Start	End
Phase I: Planning, Outreach & Research	November 1 2020	March 31, 2021
Phase II: Prototype Development	April 1, 2021	March 10, 2022
Phase III: Participatory Mapping	January 2023	April 2024

Phase I of this pilot project began in November 2020, with support from the Southern Gulf Islands Community Resource Centre. Phase II began in early 2021, and Phase III in early 2023, with funding from the Healthy Watersheds Initiative / Indigenous Watersheds Initiative, the Capital Regional District, and the UBC BRITE Internship Program. The pilot project was completed in April 2024.

The phased timeline of this pilot, combined with difficulties associated with COVID, set challenging constraints on this project, making it difficult to do full justice to this place in the Salish Sea. We chose this location because we knew there was a fair amount of existing information regarding the area's biodiversity and cultural history, which allowed us to make a small gesture toward the longer term vision for this work. These resources included historical and contemporary biodiversity data, terrestrial ecosystem mapping data, published ecocultural resources, documentation from past participatory

mapping of the ecological communities of Galiano Island, as well as videography created by Karolle Wall and knowledge shared by Puneluxutth' elder, Thiyuas (Florence James).

Unfortunately, Florence James suffered a stroke in the early stages of our outreach in 2021. Though she had granted permission for us to include media she had previously shared about Xetthecum, it was not possible to continue consultation with her on the timeline of our initial grant through the Southern Gulf Island Community Resource Centre. Given the ongoing challenges we had been faced with, including COVID and Florence James' unfortunate health crisis, we decided to move away from a focus on "final deliverables" toward a focus on process—creating a mapping framework to support ongoing dialogue and learning about the ecological and cultural history of Xetthecum. We envisioned that our mapping framework would eventually take on a narrative-based "story-mapping" approach that could support dialogue about important ecological and cultural dimensions of Retreat Cove beyond the term of our grant funding.

Through Phase I of the project, our approach was to make the most of pre-existing resources, to develop a preliminary mapping framework as an early beta phase of this program. Through Phase II, we focused on continued outreach and consultation, the generation of multimedia content, the enhancement of our GIS using drone imagery, and the development of a prototype ecocultural map. Finally, in Phase III, we elaborated our prototype framework through a cross-cultural co-design process, engaging community members through working groups, a BioBlitz, and interviews. In Phase III, we also deepened the roots of this work through a couple of important gatherings. The first event, A Transboundary Gathering: Digital ecocultural mapping in the Salish Sea, took place in the San Juan Islands, situating the project in the context of Strait Salish Territories in honour of WE's vision for this work. This event was made possible through a Social Sciences and Humanities Research Council (SSHRC) Connections Grant obtained by the Inclusive Design Research Centre, IMERSS and WE. Finally, we organized another small gathering in Hul'q'umi'num' territories on Galiano Island, focusing on the cultural significance of Xetthecum, which was attended by several Indigenous community members, including Puneluxutth' elder Augie Sylvester.

Despite the constraints set on this pilot project, we did our best to build community connections throughout the Salish Sea, to foster a diverse, multidisciplinary, intergenerational, and cross-cultural community of practice to continue this work into the future. In the short term, we believed that we could achieve worthwhile results in the creative synthesis of existing ecocultural resources with what additional content we were able to respectfully weave together on the timeline of this pilot. We also aimed to foster intergenerational transfer of knowledge and skills, to help young Indigenous and non-Indigenous community members develop competency in baseline biodiversity inventory and eco-cultural mapping as a professional practice. Through this pilot we hoped to set an example for how this work might be undertaken despite limited resources in other small communities, informing methods that can be readily implemented using available biodiversity data and ecocultural information. As a starting point, we believe this framework holds much potential to be adapted and expanded through the continuation of this work.

9.0 – Phase I: Research, Outreach & Planning

9.1 – General Summary

Phase I of this pilot project focused on preliminary outreach, research, and planning, laying the foundation for the pilot project's implementation in Phase II. Our working group divided into teams to see through different aspects of Phase I. The following summaries outline related activities in sections that roughly correspond to the domain of each of these teams.

The major domains of activity undertaken by each team included: A) Communications & Research; B) GIS and Ecocultural Data Analysis; and, C) Education and Field Work.

The corresponding objectives of Phase I were:

A. To identify project advisors, stakeholders, and potential contributors, and to develop and implement a schedule of outreach supporting the project's planning, implementation, and review process; ii) to consolidate and tabulate existing ecocultural literature and documentation from past participatory mapping projects relevant to the study area; iii) to engage with Indigenous and non-Indigenous elders and community members, to invite their participation in this project; and, iv) to review past ecocultural mapping projects, to develop an understanding of best practices to guide the approach taken to this project;

B. To consolidate and integrate relevant biodiversity and geospatial data into a Geographic Information System (GIS); ii) to compare the tabulated outcomes of our literature review with corresponding geospatial features and species occurrence data, identifying knowledge gaps to be filled in Phase II; iii) to identify, in collaboration with the other teams, a preliminary list of important cultural keystone species and geographic features of Retreat Cove to be focused on in Phase II of the project; and, iv) to transfer this GIS dataset into javascript (geojson) format, to begin the preliminary phase of bridging our GIS project into a web-based map and data visualization;

C. To explore the potential for the Everyone Counts! curriculum developed by the Vashon Nature Centre to be adapted for our purposes, facilitating the involvement of several Galiano youth in this ecocultural mapping project; ii) to explore the potential for a partnership with Washington State University's Forest Health Watch program, to incorporate the monitoring of western redcedar, an important cultural keystone species, as one of the long-term, participatory aspects of this mapping initiative; and, iii) to explore the potential to apply new technologies (e.g., aerial drone, high precision GIS mapping systems) to improve the resolution of existing terrestrial ecosystem mapping data, advancing this ecocultural mapping initiative using cutting-edge technologies that promise to revolutionize the field of environmental science and land management.

The outcomes of each of these domains of activity are summarized in the following sections.

9.2 – Communications

The communications component of Phase I began with identifying key advisors, stakeholders, and potential project contributors, and outlining a schedule of outreach. Outreach was scheduled in accordance with priorities in the planning and implementation of this project, ensuring that requests for assistance and contribution were timely and fully informed with the aims and expectations of project stakeholders, to succeed in reaching the project's objectives.

Through our outreach, we were granted permission to include the film "Imush Q'uyatl'un", a collaboration between Puneluxutth' elder Florence James and filmmaker, Karolle Wall. The film draws on Hul'q'umi'num' words and song to document the interconnectivity of the human and non-human, with a focus on the eelgrass community at Xetthecum. This song represented the first example of multimedia content to be incorporated into our ecocultural map. We then aimed to include additional multimedia content (audio and/or video) to illustrate other facets of the ecological and cultural history of Retreat Cove. Because Hul'q'umi'num' species names are a central component of the mapping framework, we moved forward with a focus on gathering audio recordings of Hul'q'umi'num' words, in addition to place-based stories, through interviews. This approach was appropriate given the regulations in place due to COVID, as it was possible, though not ideal, to gather this information remotely.

Meetings were held with advisors and project stakeholders at regular intervals throughout Phase I of this project, to develop a common understanding and trust among those involved, clarifying the purpose and objectives of this project. A list of project participants is provided in Table 1. Table 3 outlines key communications tasks undertaken during Phase I of the pilot project (note: many processes continued through Phase II).

Table 3. Phase I Communications Tasks

Task	Start	End
Connect with potential advisors	November 2020	January 2021
Compile list of potential project stakeholders	November 2020	December 2020
Schedule outreach (Phase I, Phase II)	November 2020	December 2020
Compose project summary	December 2020	December 2020
Conduct Phase I outreach	December 2020	January 2021
Create preliminary Toolkit	December 2020	January 2021

Plan project implementation (Phase II)	November 2020	January 2021
Submit Phase I material for review	January 2020	January 2021
Review advisor input - Phase I	January 2021	January 2021

9.3 – Preliminary Research

The research component of Phase I began with the consolidation of data necessary to produce a map and ecological inventory of Retreat Cove. These data included several layers of terrestrial ecosystem mapping, other environmental geospatial data, and species occurrence records, all of which were incorporated into a geographic information system (GIS)—detailed further in Section 9.4.

We also consolidated the following: i) existing ecocultural resources, including Hul'q'umi'num' Treaty Group (2011), Turner (2014) and Luschiim (2021) (preprint shared by Nancy Turner prior to publication); ii) documentation from a previous participatory mapping project on Galiano Island (Emmings & Erickson, 2004) which complemented the creation of Galiano Island's Land Classification dataset; and, iii) resources describing the sensitive ecosystems of the southern Gulf Islands (Islands Trust, 2020). Table 4 provides a summary of key resources incorporated into this project to date.

Table 4. Key Resources

Name	Type	Source
1999 / 2000 Urban Salmon Habitat Program Final Report	Species occurrences	Erickson, 2014
Hunterston Farm Stewardship Report (and dataset)	Species occurrences	Hunterston Farms, 2010
iNaturalist biodiversity data	Species occurrences	Biodiversity Galiano Project 2021
Toward an Atlas of Salish Sea Biodiversity	Species occurrences	Simon et al., 2022
Eelgrass Extent at Select Sites in the Southern Gulf Islands (2009–2020)	Geospatial data	Mayne Island Conservancy, 2020
Galiano Landscape Classification Mapping	Geospatial data	Emmings & Erickson, 2004
Ancient Pathways, Ancestral Knowledge	Literature	Turner, 2014

Ecosystem Guide: a Hul'q'umi'num' language guide to plants and animals of southern Vancouver Island, the Gulf Islands and the Salish Sea	Literature	Hul'q'umi'num' Treaty Group, 2011
Galiano Island Landscape Classification and UP-CLOSE Workshop Series Final Report	Literature	Emmings & Erickson, 2004
Islands Trust Sensitive Ecosystem Guide	Literature	Islands Trust, 2020
Luschiim's Native Plants	Literature	Luschiim, 2021

To facilitate the ecocultural mapping process using these existing data, we identified key ecological features and attributes in the available geospatial data which corresponded to content in our source literature. This content was tabulated to map the correspondences between these geospatial attributes and metadata / content from the source literature. As an example of the outcome of this work, Table 5 summarizes four ecological communities emphasized in Emmings & Erickson (2004), which are highlighted in our ecocultural map. The process of tabulating content from these source documents based on key features and attributes in our GIS allowed us to integrate outcomes of these past participatory mapping workshops into our online map and data visualizations, adding value to our pilot project by honouring the legacy of this work.

Table 5. Key Ecological Communities Documented in Emmings & Erickson (2004)

Ecological Community	Corresponding 'Site Class' geospatial attributes
Freshwater	Lakes (LC), Riparian (RI), Streams, Wetlands (WN)
Forest	Mature Forests (MF), Young Forests (YF), Pole Sapling (PS), Recently Harvested (RH)
Garry Oak Meadows	Woodlands (WD), Cliffs / Rock outcrops (CL)
Marine and Foreshore	Marine (unmapped in Land Classification) and Littoral (LT)

A similar process was taken to tabulate ecocultural information for species, including Hul'q'umi'num' names and cultural values of species. Three sources of literature were reviewed for this purpose, including Hul'q'umi'num' Treaty Group (2011), Turner (2014) and Luschiim (2021), the content of which was tabulated with reference to the scientific names of species and broader taxonomic groups—e.g., grass, Poaceae, called sáxw əl in the Cowichan dialect of the Hul'q'umi'num' language (Turner, 2014).

Finally, we reviewed previous ecocultural mapping projects, considering sessions from the Indigenous Science Working Tools Seminar Series, and documentation from the UP-CLOSE Workshop Series Final Report, which complemented the development of the Land Classification dataset for Galiano Island

(Emmings & Erickson, 2004). We were also briefed by Briony Penn on approaches taken to other ecocultural mapping projects in the region, such as the management plan developed for Helliwell Provincial Park, Hornby Island, BC, in collaboration with Comox elders. Finally, we developed a preliminary Data Management Plan in consultation with Mairin Deith at UBC. Table 6 summarizes the key research tasks undertaken during Phase I of this project.

Table 6. Phase I Research Tasks

Task	Start	End
Consolidate existing resources (ecocultural literature, geospatial data, biodiversity data, past participatory mapping reports)	November 2020	December 2020
Tabulate Hul'q'umi'num' species names and cultural values based on existing resources	November 2020	January 2021
Tabulate information corresponding to key features and attributes represented in geospatial datasets	November 2020	January 2021
Research past ecocultural mapping projects and adapt outcomes and practices to support this ongoing work	November 2020	January 2021
Develop a preliminary Data Management Plan	November 2020	November 2021

9.4 – GIS and Data Analysis

The GIS and data analysis component of Phase I began with the creation of a GIS database using the open source mapping application QGIS. This GIS database incorporates several layers of relevant geospatial data and species occurrence records, summarized in Table 4. A preliminary map of the ecological communities represented at Xetthecum is presented in Figure 1.

Figure 1. Preliminary map of Xetthecum (Retreat Cove, Galiano Island, BC) project area, highlighting important ecological communities as previously mapped through the UP-CLOSE participatory mapping workshops (Emmings & Erickson 2004). Important natural features identified during Phase I of this project include: 1) Greig Creek; 2) Laughlin Lake; 3) Retreat Cove caves; 4) Retreat Cove eelgrass bed; 5) Retreat Island. Note: the basemap (Open Streetmap) behind this map distorts the colours representing each community in the legend because of the overlay in transparencies. Figure 3 shows the updated styles adopted for the final version of the online map.

We reviewed geospatial layers in our GIS and identified key features and attributes that could be mapped with content identified in our review of the literature (e.g., sensitive ecosystems documented in the Islands Trust Sensitive Ecosystem Guide). These resources were then tabulated based on common variables represented in the geospatial dataset, in order to facilitate the incorporation of these resources into our interactive map.

Once existing ecocultural datasets had been tabulated, we ran algorithms to examine the overlap / correspondence between species present in the project area and information attributed to species in the available ecocultural literature. A total of 524 species are documented in the project area, represented by 1,845 occurrence records. Through our review of the available literature, we tabulated ecocultural information for a total of 303 species. Between these two datasets, there was a one-to-one mapping or correspondence between 45 species (Table 7).

Table 7. Species Present at Xetthecum vs Species Represented in Ecocultural Literature

Species Documented at Xetthecum	Species documented in Hul'q'umi'num' Treaty Group (2011) and Turner (2014)	Correspondence
524 spp.	303 spp.	45 spp.

Based on the tables produced through this analysis, we integrated the results of our literature review with the biodiversity data collected from the study area, to visualize ecocultural content for a small subset of the species represented on our map of Retreat Cove (Table 8). Additional sources of biodiversity data were later included through ongoing outreach, research, and field surveys. Species documented in the ecocultural literature which were not found in our initial species inventory of Xetthecum (= 258 taxa) were sought through inventory work conducted during Phase II.

Table 8. Correspondences between Local Species Occurrences and Species Documented in Ecocultural Resources (Phase I). Note: the orthographies used for Hul'q'umi'num' names are inconsistent between sources.

Group	Scientific Name	Common English name	Hul'q'umi'num' Name	Source
algae / kelp	Nereocystis luetkeana	bull kelp	q'amʔ (Cowichan)	Turner 2014
birds	Anas platyrhynchos	mallard	Tunuqsun	Hul'q'umi'num' Treaty Group 2011
	Athyrium filix-femina	lady fern	lə́q'ləq'ʔey'	Turner 2014
	Cygnus buccinator	trumpeter swan	S-hwuw'qun	Hul'q'umi'num' Treaty Group 2011
crustacean	Cancer productus	red rock crab	Kwakwatl'shun	Hul'q'umi'num' Treaty Group 2011
fishes	Hexagrammos decagrammus	kelp greenling	Tth'umuqwa'	Hul'q'umi'num' Treaty Group 2011
	Ophiodon elongatus	lingcod	Eeyt	Hul'q'umi'num' Treaty Group 2011
mammal	Lontra canadensis	river otter	Sqeetl'	Hul'q'umi'num' Treaty Group 2011
mollusks	Ariolimax columbianus	banana slug	Q'uyatl'un	Hul'q'umi'num' Treaty Group 2011
	Mollusca	molluscs (general)	Q'uyatl'un	Hul'q'umi'num' Treaty Group 2011
	Panopea generosa	geoduck clam	Pun'eq'	Hul'q'umi'num' Treaty Group 2011
plants	Achillea millefolium	yarrow	tɬ'əlíqw'əɬp (Cowichan)	Turner 2014

Arbutus menziesii	arbutus	Qaanlhp	Hul'q'umi'num' Treaty Group 2011
Camassia leichtlinii	great camas	spánxw (Cowichan)	Turner 2014
Carex obnupta	slough sedge	pshάyʔ (Cowichan)	Turner 2014
Cirsium vulgare	bull thistle	xəw'xəwíɬp (Cowichan)	Turner 2014
Cornus sericea	red-osier dogwood	sháalʔəɬp (Cowichan)	Turner 2014
Corylus cornuta	beaked hazlenut	P'qw'axw	Hul'q'umi'num' Treaty Group 2011
Equisetum telmateia	giant horsetail	Sxum'xum'	Hul'q'umi'num' Treaty Group 2011
Fritillaria affinis	chocolate lily	stɬ'əlts'ə́ ləqw 'əs (Cowichan)	Turner 2014
Gaultheria shallon	salal	T'eqe'	Hul'q'umi'num' Treaty Group 2011
Goodyera oblongifolia	rattlesnake plantain	ʔeləʔnáw (Cowichan)	Turner 2014
Holodiscus discolor	ocean spray (ironwood)	Qethulhp	Hul'q'umi'num' Treaty Group 2011
Lilium columbianum	tiger lily	Sxamelexwthelh	Hul'q'umi'num' Treaty Group 2011
Lysichiton americanus	skunk cabbage	ts'ákw'aʔ (Cowichan)	Turner 2014
Oemleria cerasiformis	bird cherry	məə́ ɬxəəl' (Cowichan)	Turner 2014
Phalaris arundinacea	reed canary grass	sáxw əl (Cowichan)	Turner 2014
Poaceae	grass (general)	sáxw əl (Cowichan)	Turner 2014
Prunus emarginata	bitter cherry	st'əə́ ləəm (Cowichan)	Turner 2014
Pteridium aquilinum	bracken fern	Suqeen	Hul'q'umi'num' Treaty Group 2011
Quercus garryana	Garry oak	P'hwulhp	Hul'q'umi'num' Treaty Group 2011
Ribes bracteosum	stink currant	Sp'eetth'	Hul'q'umi'num' Treaty Group 2011
Ribes divaricatum	coastal black gooseberry	t'ám'xw, t'émʔxw, t'ém'xw (Cowichan)	Turner 2014
Rubus armeniacus	Himalayan blackberry	sqw'óolməəxw (Upriver Fraser)	Turner 2014
Rubus leucodermis	blackcap raspberry	Tsulqama'	Hul'q'umi'num' Treaty Group 2011
Rubus parviflorus	thimbleberry	T'uqwum'	Hul'q'umi'num' Treaty Group 2011
Rubus spectabilis	salmonberry	Lila'	Hul'q'umi'num' Treaty Group 2011
Scirpus microcarpus	small-flowered bulrush	pshάyʔ (Cowichan)	Turner 2014

Spiraea douglasii	hardhack	T'eets'ulhp	Hul'q'umi'num' Treaty Group 2011
Symphoricarpos albus	snowberry	P'up'q'iyasulhp, P'up'q'iyas, T'ets'ulhp	Hul'q'umi'num' Treaty Group 2011
Thuja plicata	western redcedar	Xpey'	Hul'q'umi'num' Treaty Group 2011
Tsuga heterophylla	western hemlock	Thq'iinlhp	Hul'q'umi'num' Treaty Group 2011
Urtica dioica	stinging nettle	Tth'uxtth'ux	Hul'q'umi'num' Treaty Group 2011
Vaccinium parvifolium	red huckleberry	Sqw'uqwtsus	Hul'q'umi'num' Treaty Group 2011
Zostera marina	eelgrass	chəələəm (Cowichan)	Turner 2014

To inform subsequent search efforts, we identified potential locations of culturally significant species present in the study area based on the ecological communities represented in our GIS. Phase II field work later involved the selection of sites representative of each of the key ecological communities summarized in Table 5, which were inventoried with a focus on the ~300 species documented in Hul'q'umi'num' Treaty Group (2011), Turner (2014) and Luschiim (2021), in order to generate a rich ecocultural dataset for the purpose of this pilot project. Florence James was consulted regarding the names of additional species, or variations of those documented by Hul'q'umi'num' Treaty Group (2011), Turner (2014) and Luschiim (2021). Residents in the Retreat Cove neighbourhood were also invited to participate in this biodiversity mapping initiative via iNaturalist. (Later, we teamed up with Hunterston Farms and other partner organizations to plan a BioBlitz at Xetthecum during Phase III of this project.)

Finally, we identified a preliminary list of natural features to be documented in this project, identified in Figure 1, which may hold ecological and cultural value in the eyes of project participants. We continued the work of inventorying potentially important natural and cultural features of the landscape through Phase II. In Phase I, we also began the process of exploring ways in which visual art produced by project participants may be integrated as layer styles / tiling for each ecological community, and to illustrate other features of our digital map (continued during Phase II). Table 9 presents a summary of tasks related to GIS and ecocultural data analysis completed during Phase I.

Table 9. Phase I: GIS and Data Analysis Tasks

Task	Start	End
Create GIS framework based on existing geospatial datasets	November 2020	December 2020
Compile historical and contemporary species occurrence records for project area	November 2020	March 2022

Identify key features and attributes of geospatial datasets to facilitate ecocultural mapping	November 2020	January 2021
Identify important natural and cultural features unrepresented in existing geospatial datasets (gaps to be filled through project)	November 2020	January 2021
Explore approaches to integrating visual art into ecocultural map	November 2020	March 2022
Summarize correspondences between ecological and cultural datasets, identifying strengths and gaps in available ecocultural information	January 2021	January 2021
Identify key cultural species and ecological communities to focus on in Phase II field work	January 2021	March 2022

9.5 – Education and Field Work

The education and field work component of Phase I began with the exploration of Vashon Nature Center's Everyone Counts! curriculum. Bianca Perla from the Vashon Nature Center provided a briefing of this program, detailing how the Everyone Counts program was implemented and possibilities for its adaptation to meet the needs of our eco-cultural mapping project. The education and field work team trialled this program with two Galiano Island youth, Austin Baines and Rhys Hutton. Jeannine worked with Rhys and Austin through the first four sessions of Everyone Counts together at Bluff Park on the south end of Galiano Island. As the pandemic impacted in-person meetings, the youth continued the Everyone Counts program at their homes. Both enjoyed the sessions that they completed because it gave them the opportunity to stop and focus on their area of observation. Rhys and Austin have had a lot of opportunities in the past to be out in the field and conduct observations of species and the space around them but had not incorporated mindful practices into their observations before. Both felt incorporating mindful practices into their observations was a bit of a challenge, but it did provide them with a different perspective when out in the field. We are working with Rhys and Austin to implement their suggestions into Phase III of our project once we connect with more community members and youth.

In addition to exploring the Everyone Counts! curriculum, we coordinated with Joey Hulbert of Washington State University's Forest Health Watch Program to consider the potential of incorporating their methodology for monitoring the health of western redcedar (xpey') at later stages of this project. This program promised not only to generate useful data in the context of this monitoring program, but also to enhance our efforts of community engagement through its focus on a culturally significant species that is currently exhibiting signs of stress on the landscape. Finally, we explored the application of aerial drone imagery to improve the resolution of ecological mapping of the project area (Figure 2). Table 10 summarizes the key tasks associated with education and field work undertaken during Phase I.

Table 10. Phase I: Education and Field Work tasks

Task	Start	End
Explore potential for biodiversity mapping curricula developed by Vashon Nature Center to guide youth involvement in project	November 2020	January 2021
Identify potential community science monitoring protocols (focus: Thuja plicata, western redcedar, Xpey')	December 2020	January 2021
Generate orthoimagery using drone to improve the resolution of terrestrial ecosystem mapping data.	December 2020	June 2021

Figure 2. Drone ortho-imagery of Xetthecum (Retreat Cove) shoreline

10.0 – Phase II: Prototype Development

10.1 – General Summary

Phase II of this pilot project focused on continued outreach and consultation with Indigenous knowledge-holders and other community members, and the creation of multimedia content to bring to life the cultural dimensions of the framework. We formed a Design Working Group and Cultural Education working group to pursue these objectives, coming together during community meetings and events to collaboratively implement this evolving framework. We also formed an Ecocultural Mapping working group which focused on adapting content from previous participatory mapping exercises, in conjunction with perspectives and values documented through preliminary consultation with Indigenous community members, to map out cultural values across the landscape. Our goal was not to produce an "end product" but rather a prototype ecocultural map that could form the basis for ongoing consultation and intergenerational, cross-cultural learning, to deepen our understanding and appreciation for the ecological and cultural significance of this place.

Major developments on the timeline of this phase of the project included the elaboration of the GIS framework, improved mapping of Retreat Cove shoreline based on drone ortho-imagery, the creation of multimedia content focusing on Hul'q'umi'num' names and cultural values of species, field recordings of Xetthecum soundscapes, and the design and implementation of a graphical user interface (GUI) for the ecocultural map. We also revisited the UP-CLOSE report (Emmings & Erickson, 2004) and developed a survey methodology to interview Indigenous community members to identify important cultural values in relation to Xetthecum and surrounding ecological communities. Through thematic analysis, we began to map out these cultural values across the landscape, adapting and synthesizing content from the UP-CLOSE report, while beginning the process of decolonizing and Indigenizing representations of the landscape based on the perspectives of Indigenous community members.

10.2 – Ecocultural Design Working Group

Before initiating the Ecocultural Design Working Group, a community meeting was held to review existing materials and set objectives for the creation of a minimal viable prototype on the timeline of Phase II. All project participants convened to orient to the overarching goals of Phase II, forming teams based on specific objectives identified during the community meeting. The Ecocultural Design Working Group was formed to see through the design and technical implementation of the ecocultural mapping prototype.

The Ecocultural Design Working Group began by identifying key dimensions of the mapping framework to be developed, thematized around essential mapping classifications and features of the landscape that had been identified as holding cultural and ecological values (Figure 1). Interactive design elements were proposed, considered and prioritized based on the following criteria: i) bringing forward and respectfully representing Indigenous cultural content; ii) optimizing inclusive and intuitive interactions with the GUI; and iii) ensuring the fidelity of both ecological and cultural content. We prioritized design elements and functions that we identified as being key to achieving a minimum viable prototype in the short term, while also taking note of any desired feature requests that could not be delivered on the timeline of Phase II. Table 12 summarizes the tasks completed by this working group.

Table 12. Phase II: Design Working Group Tasks

Task	Start	End
Set objectives to create "minimal viable prototype" on timeline of Phase II	January 2022	January 2022
Identify dimensions of mapping framework (e.g., land classifications) that can be Indigenized with Hul'q'umi'num' names and perspectives	January 2022	March 2022
Continue tabulation of ecological and cultural attributes and values based on ongoing field work and cultural mapping exercises	January 2022	March 2022
Digitize new features (marine, shoreline) based on drone-based ortho-imagery collected in 2021	January 2022	January 2022
Thematize / simplify GIS to frame map in terms of ecological and cultural regions of interest	January 2022	February 2022
Update GIS and export to GeoJSON format for javascript-based digital map creation and data visualization	February 2022	March 2022
Design map tiles to reflect ecological communities	January 2022	March 2022
Organize alternating design and community meetings to refine vision and design of GUI with input from project participants	January 2022	March 2022
Implement design concepts into GUI	February 2022	March 2022
Weave ecological and cultural multimedia content into GUI	March 2022	March 2022

The Design Working Group collaborated closely with the Cultural Learning Working Group and Ecocultural Mapping Working Group to ensure any content generated by these working groups had a place reserved within the evolving ecocultural mapping framework. Parameters and data standards were set for multimedia content generated by the latter working groups (e.g., audio, video, textual, and tabulated data). This working group also workshopped its own content, such as the design and implementation of map tiles and symbology to reflect ecological communities and cultural values of species (Figure 3). Indigenous participants were consulted in all aspects of the ecocultural mapping framework design, including map tiles (e.g., camas bulbs to represent woodlands) and icons to represent the values of culturally important species. Community meetings were scheduled to bring together all project participants to review progress being made at regular intervals, and input was also sought from key project stakeholders. Finally, this working group was charged with the task of weaving together the ecological and cultural multimedia content generated by the other working groups into the online map.

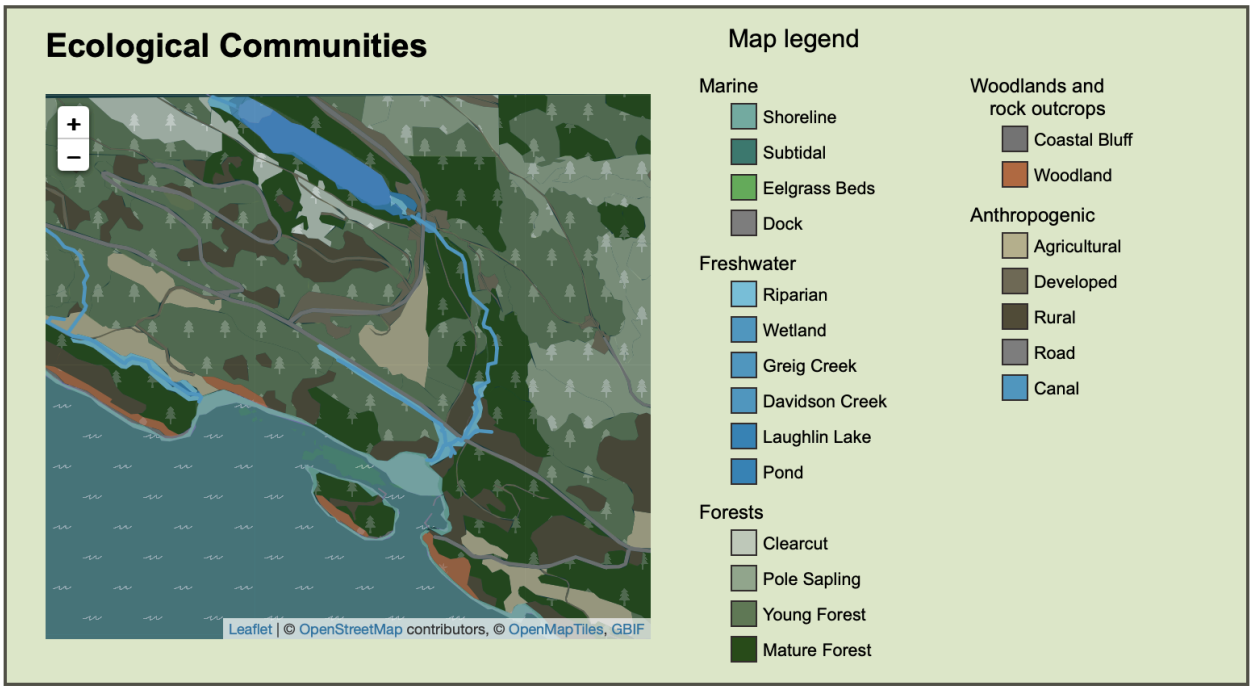

Figure 3. Map panel showing map symbology and tiles for several ecological communities represented at Xetthecum. Note the high definition contours of marine foreshore, digitized based on drone ortho-imagery. Woodlands are represented with a camas bulb icon (spánxw), to highlight this cultural keystone species, and the forests represented with ts'sey (Douglas-fir).

10.3 – Cultural Learning Working Group

Despite difficulties associated with COVID (such as some of our Indigenous participants catching Omicron and not being able to participate in planned activities), Phase II of the Cultural Learning Working group featured a breakthrough event during the family day weekend, February 18-21, 2022. By providing accommodations and support for travel, we were able to bring together an important mix of Indigenous family members connected with Galiano who have not had the chance to see each other much throughout the COVID pandemic, let alone for the purpose of searching out and sharing the locations, cultural significance and Hul'q'umi'num' names of a variety of species found in the Xetthecum area. These multigenerational extended family members had an enjoyable and rewarding time sharing and practicing their ancestral language, recording and filming each other sharing culturally significant content for the map, and getting the opportunity to meet non-Indigenous landholders to walk their ancestral land in friendship and common purpose with these community members.

The Indigenous community members who participated in this program at Hunterston Farm included Levi Wilson and his five year old daughter Gladys, Richie Wilson and his teenagers, Jordie and Caleb, and Jeannine Georgeson, who brought her teenager, Austin. Non-Indigenous

landholders were joined by the original authors of the Up Close report, Kate Emmings and Keith Erickson, along with their son Dylan. The kids played together while hunting for speenhw (camas) to add an observation to the map. Guided by the landholders through a fairly athletic climb along the rocky shoreline, we were able to locate and identify a bed of camas, and dug up one of the bulbs to show the children. Everyone was invited to share an impromptu picnic lunch and tea with the Hunterson Farm families, while all shared their various understandings about camas. Jeannine and Austin then toured Laughlin Lake with Levi, learning from and teaching each other about a variety of other culturally significant species. They were joined by Jack Garton, Indigenous teenager Roo Wilson's music teacher, and co-created a plan to engage Roo in the project via his passion in music, through editing soundscapes for the map.

Through the Cultural Learning Working Group, we explored the digital classroom of flipgrid as a means of teaching, sharing and generating additions to our video dictionary of Hul'q'umi'num' names of plants and animals. We also experimented with a glowforge at Emily Menzies' school to have students research and co-create plant signs that feature their Hul'q'umi'num names by displaying QR codes that would link to the Xetthecum map, and the cultural information videos and pronunciations that Levi Wilson recorded for this project. Table 13 summarizes the tasks completed by this working group.

Table 13. Phase II: Cultural Learning Tasks

Task	Start	End
Explore the pragmatics and sensitivities of cross-cultural intergenerational learning to develop an effective language learning framework to complement this mapping project	January 2022	February 2022
Plan and deliver a place-based language learning program at Xetthecum (Hunterston Farms and Laughlin Lake)	February 2022	February 2022
Explore the potential for other language-learning and creative resources to complement project goals (e.g., Flipgrid videos, Glowforge signs)	January 2022	December 2023
Generate multimedia content, including audio and video recordings of language-learning activities, as well as field recordings of Xetthecum soundscapes	February 2022	March 2022

10.4 – Ecocultural Mapping Working Group

The primary goal of the Ecocultural Mapping Working Group was to adapt content from the UP-CLOSE report (Emmings & Erickson, 2004) in conjunction with knowledge shared by Indigenous community members, to map out cultural values across the Xetthecum landscape.

Before beginning this process, the UP-CLOSE report was carefully reviewed and a survey design and protocol for consultation with Indigenous community members was developed. We decided to use a reflexive, developmental approach in our research methodology (Mariam Attia & Julian Edge, 2017). We also kept in mind noted Indigenous research methodologies, such as Fyre Jean Graveline's (2000) Circle as methodology: Enacting an Aboriginal paradigm.

Our Indigenous team members shared that very few, if any, of their family members have ever attended, let alone participated in public consultation or decision-making processes, much less research or mapping projects. Rather than publicly invite Indigenous community members to participate in a group process, we carefully approached individuals based on networks of established relationships, which fostered trust and openness in sharing. Invitation to participate in a workshop at a public venue, even a circle-based one, was considered an inappropriate approach to this work, not only because of the challenges associated with COVID, but also because of the reluctance of Indigenous community members to participate in such social functions outside of familiar contexts for knowledge sharing. Because of this reality, we realized that it would not be helpful to use a public outreach strategy for this initial phase of consultation with Indigenous community members. Instead we prioritized immediate connections within the community, and especially our relationship with Thiyuas, Puneluxutth' Elder Florence James, to co-develop a knowledge-sharing process that would work for Indigenous knowledge holders.

Questions asked during the UP-CLOSE workshop series focused primarily on values ascribed to ecological communities. In our approach, we instead prioritized questions about the favourite places, activities, interests, livelihoods and passions of those interviewed (Table 14). Interviews were then reviewed and thematically analyzed to group values in relation to the ecological communities and sites of significance represented at Xetthecum.

Table 14. Phase II: Interview Questions

UP-CLOSE Workshop Questions (Emmings & Erickson, 2014)	Questions
1. What is valuable to you about the ecosystem highlighted in this workshop?	1. What is valuable to you about this place (highlight Xetthecum (Retreat Cove) on the map of Galiano)
2. Why are these values important?	2. What do you like to do on Galiano? What have you (or people you know) done on Galiano in the past?....How about in the Xetthecum area in particular?

3. What do you and people you know do in the ecosystem? (walk, gather wood, paint, etc.)	3. What kind of activities have you done on Galiano / in Xetthecum in the past that you hope to do again in the future?
4. What places are special to you on Galiano Island and why?	4. What changes have occurred that prevent you from doing the activities you once did on Galiano / Xetthecum?

Content from thematized interviews was then synthesized with content generated during the UP-CLOSE workshop series to generate textual summaries of the cultural values associated with ecosystems and places. This process was critical, reflexive and creative, taking the following approach: i) Honouring past participatory mapping exercises by drawing excerpts from the UP-CLOSE report as base content for a summary of cultural values associated with each ecosystem; ii) Decolonizing concepts and assumptions embedded in past representations of the landscape by reimagining ecologies more inclusive of a variety of Indigenous perspectives; and, iii) Indigenizing summaries with specific cultural knowledge shared by Galiano-related knowledge holders through the interview process. Through this process, any assumptions and theories were ultimately replaced by testimonials and direct knowledge shared and organized through thematic analysis of interview notes and transcripts, adding nuance and complexity to the summary.

Those interviewed during Phase II of this project included: Florence James, Jeannine Georgeson, Rosemary Georgeson, Fred Wilson, and Lorne Silvey. These respondents then helped us to identify other potential participants, based on this initial successful and mutually beneficial experience.

Because of the sensitivities associated with this process, the work of consulting, thematizing, adapting, and synthesizing cultural values and stories of place remained ongoing by the end of Phase II with content that had not been finalized nor fully integrated into the online framework. For the rest of Phase II, we prioritized completion of the mapping prototype, based on content gathered during this phase of this project, to serve as a guiding framework and reference point for continued consultation during Phase III. Table 15 summarizes the tasks completed by this working group.

Table 15. Phase II: Ecocultural Mapping Tasks

Task	Start	End
Continue tabulation of ecological and cultural attributes and values based on ongoing field work and cultural mapping exercises	January 2022	March 2022
Compile excerpts of cultural content from UP-CLOSE report as base content for cultural values associated with ecological communities and places	February 2022	March 2022

Develop survey design complementary to that implemented during UP-CLOSE report, but tailored to reach local Indigenous community members	February 2022	February 2022
Create a list of all known Indigenous community members and knowledge holders with connections to Galiano. Group names by interests, family connections and level of trust in relationships with those Indigenous community members who are already involved in the Xetthecum project.	February 2022	March 2022
Conduct preliminary interviews with Indigenous community members within immediate circle of relationships, who are the most likely to participate confidently and freely and feel comfortable giving feedback and advice on the mapping process, with the least risk of damaging trust.	February 2022	March 2022
Thematize outcomes of interview process in relation to ecological communities and important sites and features at Xetthecum	February 2022	March 2022
Synthesize base content generated from excerpts of UP-CLOSE report with thematized outcomes of the interview process	March 2022	December 2023
Ensure permissions are granted for incorporation of cultural knowledge into project framework. Instead of asking participants to sign a waiver prior to interviews, we asked them to grant permission after they can see the content generated from their contributions.	February 2022	Ongoing

11.0 – Phase III: Participatory Mapping

11.1 – General Summary

The third phase of our project focused on deepening community engagement through a co-design working group and participatory mapping process, centered on Xetthecum's biodiversity and cultural values. Our goal, as stated during Phase II, was not to produce an "end product" but rather a prototype ecocultural map that could serve as a foundation for ongoing consultation and intergenerational, cross-cultural learning, enriching our understanding and appreciation for the ecological and cultural significance of this place.

Our efforts began with organizing a BioBlitz in collaboration with local neighbors, community organizations, and volunteers. With help from UBC BRITE intern Maggie Slein, the BioBlitz was successfully carried out in and around the Xetthecum project area, drawing a significant turnout and

substantially increasing our knowledge of the area's biodiversity. Maggie and other team members also participated in cultural humility training facilitated by Indigenous youth through the work of Community Engagement Fellows and Whiteswan Environmental (WE).

Building on this success, we established a partnership with AMES (Access to Media Education Society), who supported the storyboarding process through which we wove together the content we had gathered into a narrative for our story map. Over the summer, our team made significant progress, culminating in a presentation of our work in Strait Salish territories during the Transboundary Gathering hosted by WE. At this gathering, we showcased elements of the design draft, emphasizing community involvement, the integration of traditional wisdom with contemporary practices, and our collaborative approach.

Following this milestone event, our team continued to refine the storyboard with the assistance of AMES staff. Despite logistical challenges, we also organized a gathering involving knowledge holders from Pune'luxutth in February 2024. Facilitated through a collaboration between AMES and IMERSS, this small event helped to strengthen our community partnerships and relationships with knowledge-holders among the Pune'luxutth.

11.2 – Community Engagement

Phase III of this project focused on community engagement. To meet the goals of this initiative, we organized two events: i) a BioBlitz, which aimed to increase our knowledge of Xetthecum's biodiversity; and ii) a gathering including Indigenous knowledge-holders, to expand our knowledge of the cultural values of Xetthecum. Originally, we intended for both of these events to coincide, however the logistics were complicated, and we realized that to properly honour the presence of Indigenous elders and knowledge-holders at the gathering, it would be best not to hold a BioBlitz alongside this event. This experience underlined the challenges of weaving practices of Western ecological science with the practice of sharing Indigenous knowledge and wisdom. Although there are complementary aspects to these two ways of seeing the world, we realized that each would require the dedication of their own unique forms of mindfulness, care and attention. Thus, to honour each activity, we decided it was best to allow them to unfold in their own dedicated context. Table 16 summarizes the tasks undertaken to deepen our work through the engagement of community members.

Table 16. Community Engagement Tasks

Task	Start	End
Planning 2023 BioBlitz at Hunterston Farms	January 2023	May 2023
WE Indigenous Youth Community Engagement Fellows	February 2023	February 2023
BioBlitz event	May 2023	May 2023

BioBlitz 2023 reporting	June 2023	ongoing
Planning gathering at Xetthecum on Galiano Island	September 2023	February 2024
Gathering	February 2024	February 2024

11.2.1 – BioBlitz

In May 2023, with support from the Capital Regional District and the UBC BRITE Internship program, IMERSS teamed up with several organizations to plan a BioBlitz, which was generously hosted by the Hunterston Farm community at Xetthecum. The Bioblitz engaged over a hundred people, including expert naturalists and members of the public, to make a significant contribution to our knowledge of Xetthecum's biodiversity. By the end of Phase I of this project, we had documented a total of 524 species at Xetthecum, including 45 culturally important species (represented by 1,845 occurrence records) (Table 8). After our BioBlitz, we had documented over a thousand species, including over 100 species of cultural significance (represented by 4,320 occurrence records). Thus, the BioBlitz effectively doubled our knowledge of the area's biodiversity. Through this effort, we were also able to follow up historical surveys conducted during the 2010 BioBlitz at Hunterston Farms. Partner organizations included the Galiano Conservancy Association, Galiano Naturalists, Hakai Institute, Northeast Pacific Coastal Biodiversity Action Network, and Swim Drink Fish. This event happened under the banner of the UN Decade on Ocean Conservation.

11.2.2 – Gathering

On February 23–25, 2024 we held a small gathering on Galiano Island with Puneluxutth' elder Augie Sylvester, members of his family, and a few Galiano community members to share our work and get feedback on our approach to ecocultural mapping. We also recorded Augie's stories of the history and cultural values at Xetthecum. Our discussions with Augie revealed that there are multiple perspectives on Retreat Cove, depending on who is telling the story and what their purpose was for visiting this place. There are also many missing stories about this place. We acknowledge that these missing pieces are a result of colonization, and are a part of the story that we need to tell. This experience also confirmed that the story map we created cannot be conclusive. We acknowledged this reality from the outset of our pilot project, and this remains a central lesson as we continue this work. Ideally, future iterations of this ecocultural mapping framework will better accommodate multiple perspectives, reveal gaps and missing pieces, and help to facilitate continued dialogue about culturally significant places in the Salish Sea.

11.3 – Design and Implementation

A priority for the Phase III development of the ecocultural mapping framework was to incorporate more of the language and cultural content that had been gathered through interviews with Puneluxutth' elders and knowledge holders. It became clear that our prototype needed to take a narrative approach in order to incorporate these stories of place. In reworking the design of the prototype, it was important that the

story would not be secondary or decorative, rather it needed to be woven into the resource in a way that reflects its important cultural role in sharing and understanding Indigenous knowledge.

The gathering held in Strait Salish territories (A Transboundary Gathering: Ecocultural Mapping in the Salish Sea, August 2023) further highlighted the need to incorporate stories of place as well as the connection of story to place-based learning. This gathering, attended by several Xetthecum team members and supported by a SSHRC Connections Grant, provided a forum for showcasing the prototype produced during Phase II, and discussing issues of data sovereignty and cultural safety in the context of ecocultural mapping. Social learning circles and design clinics (led by the Western Washington University Center for Community Learning) provided a structure for these discussions. In addition to providing an opportunity for essential relationship building and the creation of collaborative connections, the gathering allowed the design team to gather feedback about the tool and to understand it in the larger context of the Salish Sea region. Discussions included issues of cultural sensitivity and how to design data sovereignty into the tool such that sensitive and sacred cultural knowledge could remain private and other knowledge be made public, as determined by Indigenous elders and knowledge keepers.

With the newly directed emphasis on storytelling, the team began to collaboratively design a narrative-based mapping framework that would create a foundation for weaving ecological science into an overarching narrative shaped by Indigenous knowledge. We initially decided to take a “scrolly-telling” design approach (see examples here and here) and use this as a foundation for incorporating the biodiversity data included in the original prototype within a narrative framework. Antranig Basman and Andrew Simon had developed a scrollytelling framework for other similar projects and we felt this framework would meet our needs and provide a basis for the Xetthecum story map. The team then met regularly over the next few months to collaboratively develop the storyboard, pulling in interview content, themes identified in the interviews, biodiversity data, images, videos and more, with the aim of creating an engaging, cohesive and compelling story of Xetthecum.

Over the course of Phase II and into Phase III of the project, the team had many discussions about how to make the ecocultural storymap more engaging and welcoming to a broad audience. Given the large amount of information we had gathered, as well as the unique interactive approach of the framework, we were concerned that landing on the interactive map for the first time could be overwhelming and confusing for many. In addition to the creation of a how-to tutorial (part of our next steps), the design team worked on an interactive onboarding sequence rooted in the symbolism of the Coast Salish spindle whorl (see Figma prototype here and screen capture here), which aimed at providing a creative and engaging introduction to the story map and its content.

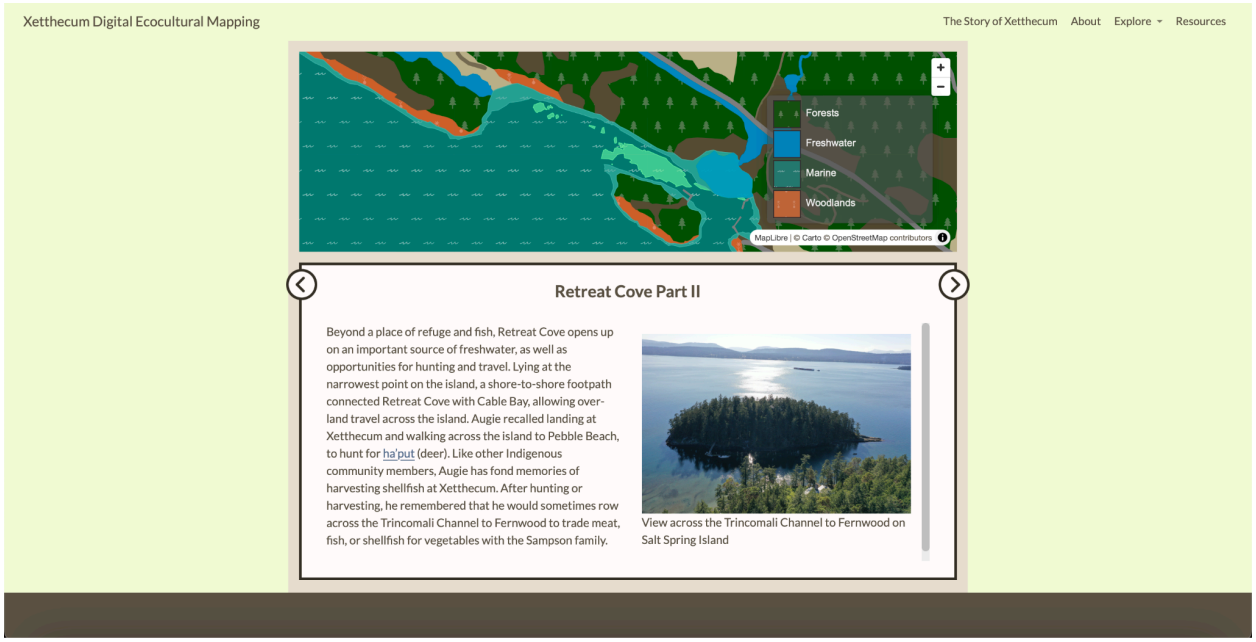

Figure 4. Story Map visualizations created during Phase III of the Xetthecum pilot project, framed in the website portal which offers multiple approaches to exploring content.

In order to improve the accessibility of the storymap, we sought to provide a diversity of entry points, including the ability to begin at a simple starting point and then dive into deeper layers of interaction and information. This approach would provide the basis for a non-linear narrative experience through hyper-linking (see Next Steps). The educators on the team also felt that this way of organising the data would be particularly useful in a formal educational setting, where teachers and students could directly access biodiversity data as well as stories of place. Thus, the design focus shifted from the onboarding welcome sequence to the creation of a "portal" into the story map, which took the form of the Xetthecum Ecocultural Mapping website. This website allows visitors to learn about the project aim and background, and to directly access biodiversity data and stories of place as well as the story map itself (Figure 4).

In developing the ecocultural mapping framework (latest version here) we considered a number of different approaches and designs towards creating an accessible and inclusive experience for a broad audience. We acknowledge that one version of the framework is inadequate and that having a flexible framework that welcomes community contributions and that can be adapted to different needs, purposes and contexts is essential in the longer term. Next steps in the design of the framework will be to gather more community input through a community event being planned on Galiano Island in the Fall of 2024. Our aim has been to build a framework that is itself a scaffold to support further story gathering, which we can continue to elaborate in the longer term. This framework is not an end unto itself, but an ongoing collaborative process that we are documenting through this Toolkit. We hope this Toolkit will support others in adapting this ecocultural mapping framework in a way that is appropriate for their location and context. Table 17 describes the tasks undertaken in the design and implementation of our ecocultural storymap.

Table 17. Ecocultural Mapping Design and Development Tasks

Task	Start	End
Community design consultation for storymap onboarding interactive sequence	March 2023	August 2023
Transboundary Gathering - organising meetings	Sept 2022	July 2023
Transboundary Gathering in Strait Salish territories	August 2023	August 2023
Storyboard framework design and development	August 2023	April 2024
Incorporate interview content and cultural values into story map	October 2023	ongoing
Storyboard framework design refinement	January 2024	ongoing
Design and implement Ecocultural Mapping website/portal	January 2024	April 2024
Gather with Indigenous knowledge holders from Pune'luxutth to reflect on the story map design and content, identify gaps where we might learn more	February 2024	February 2024

11.4 – Next Steps for Design and Creative Future Possibilities

As an outcome of the Design and Implementation phase of this project, we developed a set of design recommendations to guide future iterations of this work. These follow below.

Narrative Development and Multimedia Integration:

- Further development of the narrative and addition of audio and video stories.
- Add more interactive elements to the map, such as audio or video stories linked to specific locations, species observations, and images.

Community Engagement and Collaboration:

- Collaboratively develop creative and engaging ways to represent multiple (often conflicting) stories and perspectives.
- Increase community contributions and engagement with the tool, considering combinations of "in real life" events that feed back into the tool in a circular manner.
- Develop a creative handbook to support other communities in creating an ecocultural map in their location.
- Incorporate the SOS (Spirit of the Sxwo'le) Memorandum of Understanding (MoU) into the narrative.

- Consider creative engagement through design to make the tool welcoming to Indigenous individuals and others, including elements like images of a longhouse, nature soundscapes, and gathering around a campfire.

Structural and Content Considerations:

- Develop ways to experience non-linear narratives, including through hyperlinking and weaving cross-cutting ideas/elements/dimensions into vignettes.
- Include the stories of the team through bios based on prompt questions to build trust with the audience.
- Consider alternative ways of structuring content rooted in Coast Salish culture, such as incorporating swirling, interconnected narratives and metaphorical weaving mats, as recommended by Indigenous Creative Director, Johnny Aitken.

11.5 – Guiding Principles

Making a commitment to working in alignment with the principles of cultural humility and safety is foundational to all change-based work. The following guidelines outline some of what we have learned (are learning) about how these principles need to be enacted within the specific context of eco-cultural work. We offer these guidelines out of humility and respect for the difficult yet deeply meaningful nature of this work:

Genuine Respect for Diversity:
Respecting diverse cultural perspectives, practices and protocols related to the environment means acknowledging:

- The cumulative wisdom of Indigenous communities who have had eco-cultural and land-based practices that have guided their ways of life and environmental stewardship protocols since time immemorial.
- The nuances and diversity within and between different cultures, Nations and communities and their unique understanding of and interactions with the natural and more than human world.

Effective Collaboration:
Eco-cultural work often involves partnerships and collaboration between individuals and communities from diverse cultural backgrounds. Working towards cultural safety and humility means fostering an environment where:

- All parties feel valued and respected, and can work together towards shared goals of reconciliation and environmental protection.
- Open dialogue is actively encouraged about the power imbalances and systemic inequalities that exist or that surface within and between partners and different knowledge systems.

Avoiding Harm: Working to mitigate against, and ideally ensure that eco-cultural initiatives do not inadvertently harm or disrespect the cultural beliefs, practices, or rights of different communities being engaged. This requires:

- Developing a deep understanding of the historical and cultural contexts in which environmental challenges have arisen, with a particular focus on the expropriation, extraction and degradation of traditional lands and territories.
- Seeking guidance from Indigenous leaders / knowledge-holders to ensure that:
    - Cultural safety is incorporated into all aspects of the project design (including processes, protocols, and 'products').
    - Indigenous data sovereignty is maintained.
    - Long-held exploitative and extractive research and data collection practices are acknowledged and disrupted.
- Deepening awareness of the ways settler organizations and individuals have tended to assert dominance and assume positions of higher knowledge and authority in this sector, and proactively working to ensure that these power dynamics aren't replicated.
- Centreing Indigenous ways of being and knowing, and not merely 'accommodating' or engaging Indigenous communities in tokenizing ways (i.e., including stories and cultural artifacts as 'decorations', curios, or project 'enhancements').

Building Trust over the long term requires:

- Cultivating active listening skills with a view to truly understanding different viewpoints and experiences.
- Avoiding making assumptions.
- Embracing the opportunity to learn from others through meaningful dialogue and story sharing.
- Recognizing and openly admitting one's own cultural biases and knowledge-gaps.
- Adapting or completely overhauling long-standing mindsets and research and design approaches as needed.

Given the gravitational pull of dominance, and the fact that many organizations that have been involved in environmental protection and habitat restoration are white dominated, it is important to formalize a commitment to actualizing the principles of cultural humility and safety at the outset. This can be done through processes such as community agreements and memorandums of understanding, as we have established with WE, through their SOS Coalition. Beyond these formalities, it remains equally important to plan for continual reflection, (re)assessment, and 'course correction' in pursuing this work.

There are no easy fixes, formulas or maps for undertaking transformative eco-cultural initiatives, or undoing environmental degradation and cultural harms that have taken place over multiple decades. This work is on-going and generational. That said, eco-cultural approaches that meaningfully integrate traditional knowledge systems, and embed the principles and practices of cultural safety and humility are more likely to:

- Be culturally relevant and resilient.
- Empower communities to take ownership of environmental issues and solutions.
- Support long-term partnerships, and sustainable change over the long term.

12.0 Conclusion

Our project achieved significant outcomes, including the development of an interactive digital map of Xetthecum through a participatory approach, integrating Indigenous wisdom with Western scientific practices. This map documents biodiversity and cultural significance of this area in the Salish Sea region, providing a valuable framework for conservation efforts. Leveraging past mapping exercises and local resources, we enriched our map with insights, fostering skill-sharing and cross-cultural collaboration. We also explored the use of technologies like drones to enhance map resolution and detail. Furthermore, we investigated ongoing monitoring practices to ensure sustained stewardship. Our project prompted critical examination and perspective shifts, emphasizing broader significance and community engagement. Through data collection and analysis, we laid the groundwork for future resource development and dissemination, reflecting our commitment to holistic and sustainable eco-cultural mapping and conservation.

12.1 – Outcomes

Interactive Digital Map of Xetthecum:

We created an interactive digital map of Xetthecum to demonstrate the potential of the ecocultural mapping framework our team co-designed through this pilot project.

Open Source Ecocultural Mapping Framework:

The open source platform we developed is a novel JavaScript extension of R Markdown/Quarto that allows one to publish maps and data visualizations that integrate biodiversity data, geospatial data, multimedia content, as well as virtually any data visualization or analysis that one can implement in R. The platform is based on WebGL for mapping and is highly responsive across platforms. This preliminary framework elaborates a comprehensive, albeit imperfect, methodology for documenting biodiversity, ecocultural resources, and stories of culturally important places in the Salish Sea.

Integration of Indigenous Wisdom and Western Scientific Practice:

Our participatory mapping framework effectively incorporates Indigenous wisdom and knowledge alongside Western scientific practices, ensuring a holistic and inclusive approach to understanding and stewarding the landscape.

Identification of Ecological and Cultural Dimensions:

The project has identified important ecological and cultural dimensions of the landscape, serving as a valuable framework for conservation efforts and private land stewardship initiatives.

Building Upon Past Efforts:

By leveraging previous participatory mapping exercises and local resources, we have built upon past efforts to document the eco-cultural values of the Galiano Island landscape, enriching our digital map with valuable insights and knowledge.

Promotion of Skill-sharing and Knowledge Exchange:

The project has fostered intergenerational, cross-cultural, multidisciplinary, and transboundary skill-sharing and knowledge exchange, nurturing eco-cultural mapping as a professional conservation practice among the next generation of land stewards.

Integration of New Technologies:

We successfully applied new technologies, including the use of drones to capture aerial orthoimagery, enhancing the resolution of existing terrestrial ecosystem mapping data and improving the accuracy and detail of our digital map.

Exploration of Ongoing Monitoring Practices:

Through collaboration with regional and local agencies, as well as members of the Galiano Island community, we have explored the potential for developing ongoing biodiversity and eco-cultural monitoring practices. This collaborative effort aims to sustain our work into the future, ensuring continued stewardship of the landscape.

These outcomes reflect our commitment to holistic, inclusive, and sustainable approaches to eco-cultural mapping and conservation, driving positive impacts both for the environment and communities involved.

12.2 – Lessons Learned

Skill Development and Collaboration:

- Recognizing the need for skill development and collaboration with other land-stewardship programs to merge local knowledge effectively, considering the project's goals and objectives.

Tool Development and Accessibility:

- Developing a "broadly accessible" story map tool to cater to various audiences, including elders, language learners, scientists, and educators, within the framework of the project.
- Recognizing the need for multiple pathways and interaction options within the story map to accommodate different accessibility preferences, such as minimizing complexity for elders, while integrating scientific data with Indigenous knowledge.

Framework Design and Integration:

- Acknowledging the complexity of designing a framework that respects diverse knowledge systems without hierarchy, particularly in the context of eco-cultural initiatives.
- Addressing the challenge of integrating Indigenous wisdom into the story map without relegating it to mere decoration or marginalization, specifically within the GIS framework of the project.

Critical Examination and Perspective Shift:

- Engaging in the critical examination of technologies and their role in place-based learning within the project's context.
- Grappling with the perspective shift inherent in traditional GIS mapping, which emphasizes colonial viewpoints, and exploring ways to create culturally sensitive mapping tools that align with the project's goals.

Project Objectives and Cultural Awareness:

- Understanding the shift in project goals towards restoration rather than a narrative of loss, and the importance of navigating the line between appreciation and appropriation, aligning with the project's evolving objectives.
- Emphasizing the project's broader significance in fostering connections across generations and cultures, reflecting its impact beyond immediate outcomes.
- Questioning the assumption that more data always leads to better outcomes, particularly within the context of place-based, knowledge-based learning emphasized by the project.

12.3 – Next Steps

Community Engagement and Collaboration:

- Collaborate with Galiano Island Parks and Recreation Society to develop signage featuring species names in Hul’q’umi’num’ and English, cultural values, QR codes to site, and additional pertinent information.
- Launch a Fall exhibition and workshop at Yellowhouse Makery.
- Consult with Indigenous community members to finalize the Data Management Plan, ensuring permissions for incorporation of cultural knowledge into the project framework.

Data Collection, Analysis, and Story-mapping:

- Transcribe video footage and interviews with Augie Sylvester, and gather data on eelgrass and clam bed restoration and protection, including diverse uses such as hunting, gathering, harvesting, and medicinal purposes. Consider language diversity, repatriation, and the impact of human and marine traffic.
- Supplement database of Hul'q'umi'num' names for species and other map features based on The Cowichan Dictionary of the Hul'qumin'um' Dialect of the Coast Salish People.
- Complete curation of 2023 Bioblitz data and incorporate side-narrative regarding BioBlitz outcomes into the project.
- Update Xetthecum story map to include more perspectives from Indigenous community members, including more threads shared by Augie at our recent gathering.

Resource Development and Dissemination:

- Consult with Whiteswan Environmental regarding opportunities to adapt this framework to serve their visions of mapping ecocultural information and storytelling about culturally significant sites in the Salish Sea.
- Consider developing different versions of the project to promote usefulness and accessibility for different groups.
- Explore the possibility of compiling stories that encompass both traditional and modern knowledge of the area into a book.
- Develop an improved content management system to ensure the protection of intellectual property and respect for the practices and protocols of Indigenous communities.
- Once we have completed review and consultation with contributing Puneluxutth' Knowledge-Holders, project sponsors, partners, and advisors, satisfying our Acceptance Criteria, we will share the website with the public.