Restoring *Tl'chés*: an ethnoecological restoration study in Chatham Islands, British Columbia, Canada

by

Thiago C. Gomes
BSc., Universidade Federal do Paraná, 2007

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in the School of Environmental Studies

Supervisory Committee

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Abstract

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Chatham Islands are part of a small archipelago, *Tl'chés*, off the City of Victoria, southeastern Vancouver Island (British Columbia, Canada), in the Salish Sea, territory of the Songhees First Nation. Chatham and adjacent islands comprise nationally endangered Garry oak ecosystems, supporting a wide diversity of habitats for plant and wildlife communities. Chatham Islands are childhood home of Songhees elder Joan Morris [*Sellemah*], raised by grandparents and great-grandparents. *Tl'chés* has been uninhabited and untended for over 50 years now, entering in a process of rapid environmental change and degradation after Songhees residents left to live in the main Songhees Reserve in late 1950s. *Sellemah* longs to see the traditional gardens and orchards she remembers at *Tl'chés* restored, as well as her people's relationship with their environment, for healthier and more sustainable ways of life.

This thesis honours *Sellemah*'s vision by exploring best approaches for intervention in heavily degraded cultural landscapes in order to promote ecological and cultural integrity and long-term sustainability for people and ecosystems in *Tl'chés*, combining conventional ecological approaches with traditional ecological knowledge and wisdom (TEKW), cultural and participatory investigations, in the context of ethnoecological restoration. Ultimately, this research aims to provide assistance in the restoration of ecological and cultural features in Chatham Islands and within the Songhees First Nation, revitalizing traditional ecological knowledge on the landscape and reversing trends of biodiversity and cultural losses.

Keywords: ethnoecological restoration, traditional ecological knowledge and wisdom (TEKW), Garry oak ecosystems, Songhees First Nation.

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Acknowledgments

All my respect, greatest admiration and thanks to Songhees elder Joan Morris [*Sellemah*], all her family and relatives. I also lift my hands to partners Lekwungen Community Garden Coordinator Wilfred George, Songhees Band Councillor Rom Sam, and project volunteers and collaborators Sandy George, Johnny Horne, Anna Hong, Tiffany Charleson and Isaac George, Bonnie Quaite and Ellie Dion, and former Songhees Lands Manager Cheryl Bryce. *Hych'ka siem*, *amigos*!

It was a privilege and great honour to work under the supervision of Nancy Turner and Eric Higgs. You are both inspiring people inside and outside academia. Thank you for guidance and support during this special time in grad school.

I must also acknowledge the invaluable voluntary contribution of incredible people such as Marilyn and Phil Lambert, and Rod Davis for generosity, local advice and numerous zodiac rides to Chatham Islands; Bob and Verna Duncan for heritage fruit species identification; Madeira Island botanist Aida Pupo for fieldwork assistance; and plant specialist Matt Fairbarns for conversations and insights on local ecosystems.

It was a pleasure of having Cara Barter as LE,NONET indigenous research assistant. Daniel Brendle-Moczuk, Geo-Spatial & Social Sciences Data librarian assisted greatly with GIS issues. I thank David Beswick from Oceans Explorations for friendship, transportation to Chatham Islands and for a respectful way of doing business.

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To all my friends in Victoria, thanks for making life so warm and pleasant! Obrigado!

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Preface

My involvement in this project is the result of many fortunate encounters and events since my arrival in the University of Victoria, coming all the way from Curitiba, southern Brazil. I had the privilege of finding a place where people had been exploring questions I carried with me from previous academic experiences and endeavours back home.

Initially arriving at the School of Environmental Studies (SES) via the Restoration of Natural Systems (RNS) Programme, I could grasp what this new place was all about. It did not take much time until I sat with Dr. Eric Higgs, SES director at the time, and Dr. Nancy Turner and approached them about entering into grad school. Inspired by their individual work, I thought it would be a perfect combination to have them as co-supervisors in a project that merged their expertise. They agreed, and this journey began.

A few months later, I was introduced to the circumstances of a nearby island, where an indigenous woman was raised by her grandparents and there were some remnants of traditional gardens and some introduced orchard trees from her childhood. I remembered reading about this small archipelago in their work, in Earth's Blanket by Turner, and in Nature by Design by Higgs. Apparently this was an important place for local indigenous communities and to non-indigenous people too. Chatham Islands often brought smiles on people's faces. I was eager to know more about this place and its people.

Unfortunately, it took me a while until I was able to meet with the person who would become the main stakeholder and inspiration for this research project. She had been recovering from a surgery for months at home and was not able to meet with me earlier. From the first time I met Songhees elder Joan Morris, *Sellemah*, we exchanged ideas about commencing a study that dealt with ecological restoration and revitalization of local knowledge in her home-island. Community leaders and youth were shortly brought in. We built a powerful partnership with the Lekwungen Community Garden coordinator, Wilfred George, and volunteers. The work then developed, facing many challenges but achieving several accomplishments including a feature for a TV documentary.

It was very special to have the chance to visit Joan Morris' home-island several times, where we worked hard, celebrated with laughter and reflected and learned much.

I have truly learned much more than I ever expected. *Obrigado*.

1: Introduction

This study explores an ethnoecological restoration approach for *Tl'chés*[1], a small archipelago in the Inner Channels of the Salish Sea, off southeastern Vancouver Island, (British Columbia, Canada), territory of the Songhees First Nation. *Tl'chés* is comprised of Discovery Island, Chatham Islands and adjacent islets, situated off the Municipality of Oak Bay in the city of Victoria (Figure 1.1). These islands have been vital for the livelihoods and cultural expression of Coast Salish peoples in the region for countless generations. However, after the last Songhees resident families left for the main Songhees reserve in Esquimalt in early1960s, the islands have been left uninhabited and largely untended. Over the past 50 years they have entered into a rapid process of environmental change and degradation.

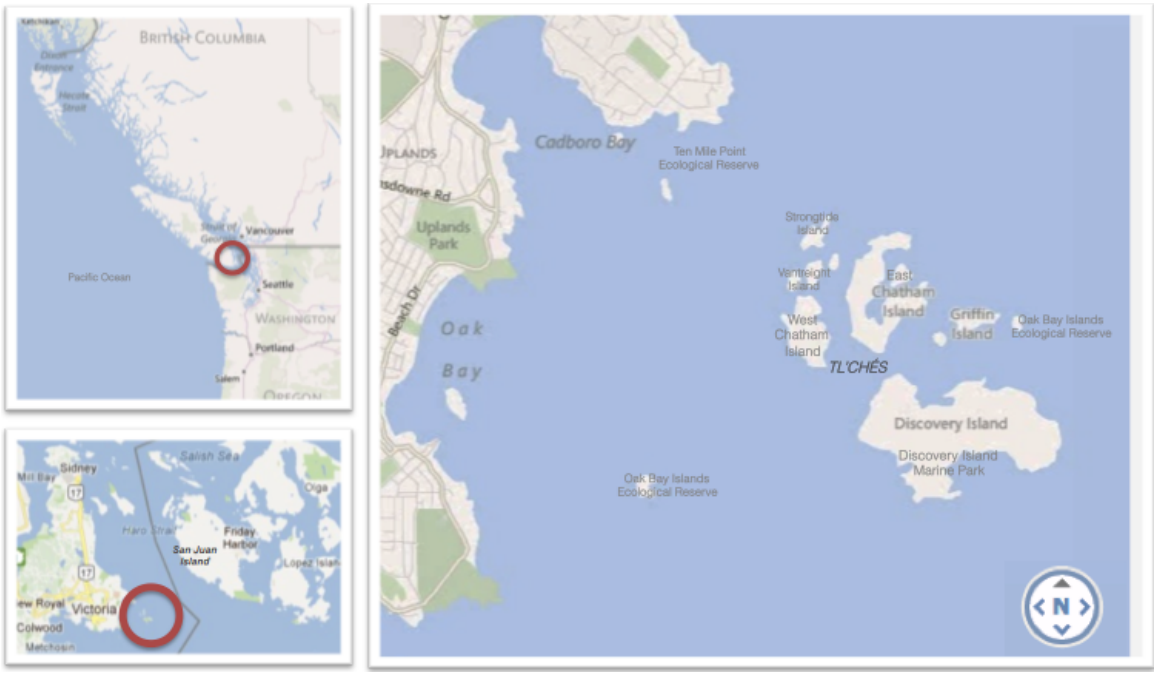

Figure 1.1: Location of *Tl'chés* - Southeastern Vancouver Island, British Columbia (top left 1:12500000; bottom left 1:500000, right 1:50000). Modified from Bing Maps (2012).

The Songhees First Nation is a Northern Straits Salish group whose traditional and historical territories extend across southernmost Vancouver Island, especially in the area

[1] Lekwungen and Coast Salish words are transliterated according to Mitchell (1968), Duff (1969) and Suttles (1974).

of the present-day City of Victoria, British Columbia, and urban vicinities, reaching as far west as Albert Head in Metchosin, BC, and east to San Juan Island, USA (Figure 1.2) (Suttles 1974, Songhees Nation 2010). The Songhees share cultural identity with neighbouring Coast Salish groups, and together with the Esquimalt Nation, they share the Lekwungen dialect (Songhees Nation 2010). Songhees have descended from seven distinct family groups – each of which owned specific resource sites and plank houses, with families moving regularly from place to place in the course of their annual round of harvesting and other activities (Duff 1969, Songhees Nation 2010). The Indian Act of 1876 divided the Songhees into three bands – the Esquimalt, Discovery Island and Songhees – tying each group to a different reserve. Later, the Discovery Island band (the people living at *Tl'chés*) merged with the Songhees (Keddie 2003, Lutz 2009). Together, these peoples are known as the Lekwungen.

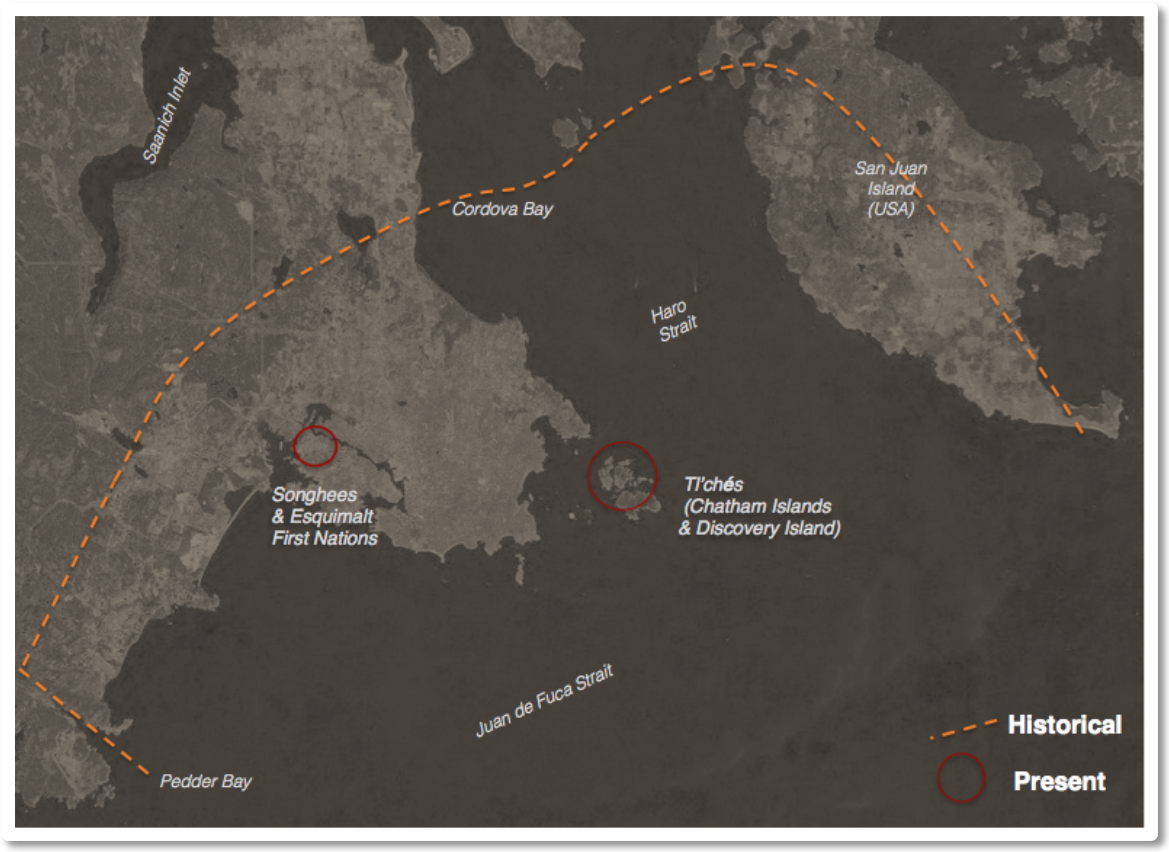

Figure 1.2: Territories of the Lekwungen. Modified from Lutz (2009:53).

Songhees lands today are limited reserves within mostly urban and semi-urban areas. Uninhabited Chatham Islands and northern half of Discovery Island, with approximately

120 ha, complete Songhees present territory, which totals about 200 ha. Adjacent islands and islets are under Provincial jurisdiction and BC Parks supervision, including Oak Bay Islands Ecological Reserve and Discovery Island Marine Park (designated in 1972), takes the southern half of Discovery Island, where a lighthouse station has been operating since 1886 (BC Parks 2010).

Today, the Songhees First Nation's main project is the construction of $13-million Wellness Centre facility, adjacent to their reserve in Esquimalt, a focal point for socio-economic and cultural activities (Times Colonist 2010). The centre would also promote cultural tourism business including, potentially, canoe tours around Chatham and Discovery Islands (Times Colonist 2010).

Tl'chés, the Lekwungen word for "one island", or simply "island" (Mitchell 1968, Bryce and Sam 1997), served the Songhees as a temporary refuge during 1862-63 smallpox epidemic – and later, became the site of permanent villages for a handful of families that established thereafter (Duff 1969, Lutz 2009).

The archipelago of *Tl'chés* represents an important Garry oak ecosystem remnant in the region. It is classified within the CDFmm (Coastal Douglas-fir moist maritime) biogeoclimatic zone, situated in the rainshadow of the Olympic Mountains. Therefore, the climate is submediterranean, with a significant summer drought and mild, moist winters. Soils in the region are moderately infertile, acidic, and of post-glacial origin (Fuchs 2001, GOERT 2010). These islands harbour an ecological mosaic of sensitive ecosystems: coastal bluffs, meadows, woodlands, vernal pools, lagoons and other wetlands. In fact, the largest areas of coastal bluffs in the Capital Regional District are found on West Chatham Island, 22.7 ha in total (Ward *et* al. 1998). Rare species have also been documented on West Chatham Island, such as endangered California buttercup (*Ranunculus californicus* Benth.) (COSEWIC 2008). Garry oak ecosystems play an important ecological role as habitat for particular fauna and invertebrates – over 100 native vertebrates are recognized in Garry oak and associated ecosystems, including sharp-tailed snake, a listed species (Fuchs 2001, CRD 2011).

Garry oak ecosystems are considered Canada's most at-risk terrestrial ecosystems, with less than 5% of the original habitat remaining today (Lea 2006, GOERT 2010) (Figure 1.3). Garry oak and associated ecosystems are believed to reflect the ecological

imprint of intensive indigenous management practices over thousands of years, including the use of frequent low-level fire regime to support the production of important root vegetables, such as camas (*Camassia quamash* (Pursh) Greene and *Camassia leichtlinii* subsp. *suksdorfii* (Baker) S. Watson (Green.) Gould), and also to maintain an open landscape and good deer forage for hunting (Boyd 1999, Turner 1999, Beckwith 2004, Anderson 2005, Deur and Turner 2005, McDadi and Hebda 2008, Anderson 2009).

Traditionally managed Garry oak-camas landscapes were not understood as cultured lands by European settlers at the time of contact, being often regarded as pristine and unused by people, and therefore, available for settling by colonists (White 1980, Lutz 1995, Beckwith 2004, Suttles 2005).

As a result of drastic social-ecological changes in the last century, including the encroachment on traditional lands of Songhees and other First Nations by European newcomers, and intensive urbanization (Lutz 2009), plus the introduction of a range of invasive species, most Garry oak ecosystem remnants are fragmented communities at best (Lea 2006), confined mostly to parks and preserves, void of traditional stewardship and management practices, such as traditional landscape burning. Restoration of these important ecosystems, therefore, requires meticulous strategic planning for their conservation, stabilization and recovery, including the consideration of ecological and cultural aspects.

Chatham Islands were the childhood home for Songhees elder Joan Morris, *Sellemah*; she was raised there until the age of 10 by her great-grandparents and grandparents. *Sellemah* only returned to *Tl'chés* in early 2000s, to participate on a traditional harvest and pitcook celebration organized by historian and former Songhees lands-manager Cheryl Bryce. They were accompanied by Dr. Nancy Turner, Dr. Brenda Beckwith, Dr. Eric Higgs, naturalist Marilyn Lambert, Songhees band members and youth, to partake on an important restoration initiative in the islands (Higgs 2003, Beckwith 2004, Senos *et al*. 2006). This experience revived *Sellemah's* connection to her home-island.

Sellemah longs to see traditional gardens and orchards in *Tl'chés* restored, as well as her people's relationship with their environment, for healthier and more sustainable ways of life. The existence of culturally significant sites and species in West Chatham Island, remnants of traditional gardens and orchard, make traditional ecological knowledge and

wisdom (TEKW), memory and community engagement fundamental in guiding the procedures for the development of this ethnoecological restoration study, thus promoting pathways to the renewal of cultural identity and ecological integrity for the Songhees First Nation and their traditional territories.

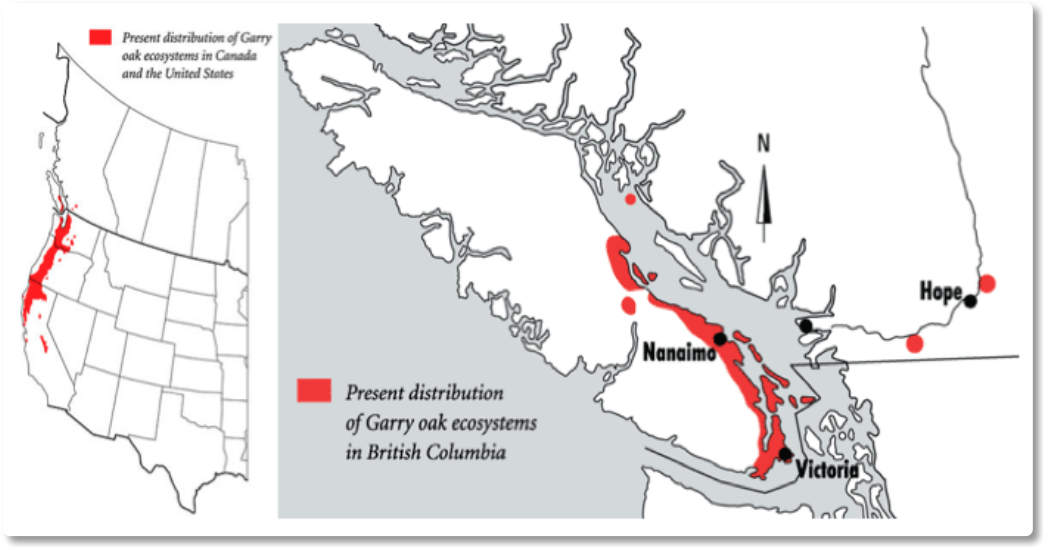

Figure 1.3: Present distribution of Garry oak ecosystems in the United States, Canada and British Columbia (Province of British Columbia 1993).

The proximity of the archipelago to adjacent urban areas in southeastern Vancouver Island, less than 5 km away from Willows Beach, Oak Bay Marina, and the Royal Victoria Yacht Club, makes the islands a desired route and destination for outdoor tourism. This has made the islands highly vulnerable to different elements of environmental change.

Over the years, *Tl'chés* has become susceptible to invasion of exotic invasive plant species and habitat degradation. These processes are among the main drivers for ecosystem change and biodiversity loss according to the Millennium Ecosystem Assessment (2005). Novel assemblages of species may emerge and change ecosystem structure, function and composition in an undesirable way (Hobbs *et al*. 2006). Moreover, long-term separation between Songhees people and the ancestral lands of *Tl'chés*, has lead to the loss of knowledge about traditional lifeways, management practices, and information on local species, as well as cultural values, otherwise referred as invisible

losses (see Turner *et al*. 2008). Altogether, ecological and cultural losses contribute to a cumulative reduction to biocultural diversity.

Social-ecological connections are an important feature of *Tl'chés* landscape – evident in remnants of traditional management systems and place-based cultural knowledge.

Sellemah is the major inspiration behind this project, and this research honours her vision by combining conventional ecological assessments, TEKW contributions and participatory assessments towards the restoration of social-ecological features in this landscape, ultimately, promoting revitalization of traditional knowledge and reversing trends of biodiversity and cultural loss.

1.1 Thesis objectives and organization

This thesis is organized around an overarching question formulated to meet the manifold challenges of this study. The primary question: ***how to best intervene in heavily degraded cultural landscapes in order to promote ecological and cultural integrity and long-term sustainability for people and ecosystems in Tl'chés?***

Subsidiary questions emerged to achieve the main objective of this study, which is to investigate social-ecological dynamics, in the context of ethnoecological restoration, and in order to generate baselines for intervention strategies towards ecological and cultural recovery and long-term sustainability to people and target ecosystems at *Tl'chés*.

This first introductory chapter situates the reader, presents and contextualizes the problem, and also suggests approaches that address the problem of ecological and cultural losses adequately. These approaches will be explored thoroughly in following chapters.

Based on the primary question, three subsidiary questions arise to guide and lay out subsequent chapters: (Chapter 2) *Are the principles of "wild design" and the concept of "cultural keystone place" pertinent to determine the most appropriate intervention approaches to Tl'chés?* (Chapter 3) *What are the spatial attributes of present and historical ecological and cultural patterns, structures and processes, and what are the implications for restoration intervention in Tl'chés?* And (Chapter 4) *How can TEKW (Traditional Ecological Knowledge and Wisdom) initiate and guide the recovery of ecological and cultural features and promote community engagement at Tl'chés?*

In Chapter 2 I examine how emerging principles for restoration intervention such as wild design (Higgs 2003, Higgs and Hobbs 2010) and eco-cultural restoration (Higgs 2005, Turner 2005) relate to local principles inspired by Songhees elder Joan Morris' TEKW and the experience at *Tl'chés*. There is also a significant discussion presented on the concept of cultural keystone place (CKP) and its relevance for *Tl'chés* context.

Chapter 3 brings focus to spatial attributes and change of present and historical patterns, structures and processes that relate to the ecology and culture of Chatham Islands, and their implications for restoration. Based on ecological, geographical, historical, and cultural assessments, priority sites for restoration intervention are selected.

In Chapter 4 I evaluate the role of TEKW in initiating and guiding the recovery of ecological and cultural features for the promotion of community engagement, through participatory observation in endorsed activities (traditional pitcooks, mapping and restoration work) and semi-structured interviews with participants (elders and youth). I also investigate the vision for Tl'chés, especially from *Sellemah*, as a healing place.

Finally, in Chapter 5 are conclusions as regards ethnoecological restoration and intervention models for Chatham Islands and adjacent Songhees lands.

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2: Ethnoecological Restoration at *Tl'chés*

2.1 Introduction

In this chapter I present and discuss theoretical foundations and their applications for restoration intervention at *Tl'chés*. Here, I provide an overview of concepts and principles pertaining to the fields of ecological restoration and ethnoecology in the form of a literature review.

This literature review explores on themes such as "dimensions of ecological restoration", "focal practices", "wild design", "eco-cultural restoration", "traditional ecological knowledge", "cultural landscapes", "biocultural diversity", and "novel ecosystems". Here I investigate seminal publications on the aforementioned themes in order to arrive at models for intervention pertinent to the context at *Tl'chés*. Emphasis is given to assessing whether the principles of wild design and focal practices (Higgs 2003, 2010) are applicable to *Tl'chés*. I also investigate whether the concept and framework of "cultural keystone place"(CKP) can be of use for highlighting conservation and restoration values at *Tl'chés*.

Archival investigation was also carried with the purpose of generating a historical background with regards to the significance of *Tl'chés* archipelago to the livelihoods, history and culture of the Lekwungen (Songhees and Esquimalt) people. Socioeconomic and ecological dynamics and change were examined. These investigations focused on local history accounts, ethnographers' notes, newspaper records, and aerial and ground photographs. Collections from the University of Victoria Library, Royal BC Museum, and the BC Archives were all visited for thorough review and appraisal of related data.

The guiding question for this chapter is, ***"Are the principles of wild design and the concept of cultural keystone place pertinent to determine the most appropriate intervention approaches to Tl'chés?"*** I arrive at a response by presenting and comparing theoretical foundations for ethnoecological restoration and emerging local knowledge values and principles. Archival research related to the history and social-ecological significance of the islands also informs related discussions in this chapter.

2.2 Dimensions of Ecological Restoration

Ecological restoration is "*the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed*", with respect to its health, integrity and sustainability, towards its historical trajectory (SER 2004). Ecological restoration occurs along a continuum, from the rebuilding of totally devastated sites to the limited management of relatively unmodified sites (Hobbs and Hopkins 1990).

Over the years, restoration ecology has developed a solid theoretical framework that supports restoration practice. The Society for Ecological Restoration has assembled an international primer document on ecological restoration to serve practitioners worldwide, unifying the field around a common practical framework. This framework consists of well-defined stages for planning, monitoring and evaluation (see SER 2004, Apostol and Sinclair 2006, Parks Canada and the Canadian Parks Council 2008).

In recent years much has been under debate as to what *good restoration* is. Leading topics of discussion deal with ecological integrity, historical fidelity, intentionality, goal setting, people's engagement, alternative stable states, thresholds, matters of scale, concepts of "naturalness and wilderness", and novel ecosystems – all having ecological, social, political, moral, cultural and aesthetical implications (Hobbs and Norton 1996, Higgs 1997, Higgs 2003, Hobbs *et al*. 2009).

Innovative ideas such as *focal restoration* and *wild design* emerge within these discussions and are at the forefront of change in ecological restoration approaches. The first is presented as an antidote or precautionary alternative to technocratic restoration, rebuilding value through participation, strengthening human communities, ideally nourishing nature and culture; whereas the latter considers human agency and intentionality in restoration practice, working with and within natural processes for restoration planning and practice, allowing for natural processes to take over (Higgs 2003).

Another dimension of absolute importance for restoration is time. The SER Primer (2004) touches on the importance of historical references, of restoring an ecosystem to its historical and ecological trajectory. The works of Crumley (2003) and Balée (2006) on defining historical ecology and research, provide a holistic approach to human-environment relations and change, focusing on problems of "yesterday" as a way to better

understand and react to today's challenges, very pertinent to the restoration context. Higgs (2003) addresses *historical fidelity* and *historicity* – the quality of being historical – in restoration as essential for reference and guidance in planning for future in view of the dynamic nature of ecosystems. Normally, (near) natural areas adjacent to degraded ecosystems can serve as "reference ecosystems", to be used as model for restoring target degraded ecosystems towards ecological conditions prior to degradation. Historical records for description of ecosystems, biotic and abiotic conditions found in written accounts, photographs and maps can also serve restoration planning (SER 2004).

According to Higgs (2003) ecological restoration must encompass four keystone concepts – *ecological integrity*, *historical fidelity*, *focal practices* and *wild design* – which are most in tune with the dynamic and changing nature of social-ecological systems in present times. Integrity in ecosystems can be simply defined as the capacity of a system to be self-sustaining and self-regulating in terms of function, structure, and composition. The SER Primer (2004) lists nine attributes of a "restored" ecosystem that can lead into assumptions about what ecosystem integrity is, especially in ecological realms of structure, composition and function when compared to reference sites. Canada's National Parks Act (2000 c.32) defined ecological integrity in natural areas as "*a condition that is determined to be characteristic of its natural region and is likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes*".

Moreover, there is another dimension for integrity, especially in the framework of this research: cultural and societal. De Leo and Levin (1997) aver that integrity is a definition that reflects the capability of the system to support services of value to humans. It is based on measurable definitions presented earlier by Cairns (1977) as "*the maintenance of the community structure and function characteristic of a particular locale or deemed satisfactory to society*," and by Karr and Dudley (1981) as "*the capability of supporting and maintaining a balanced, integrated, adaptive, community of organisms having species composition, diversity, and functional organization comparable to that of natural habitats of the region*".

Finally, Parks Canada and the Canadian Parks Council (2008:13) recommend that, "*in order for it [ecological restoration] to avoid becoming a passing fad, it must ... depend*

on the development of authentic engagements between people and ecosystem; in other words, the development of a heightened place awareness". This points to a direction for encouraging the combination of scientific criteria and focal practices into wild design, accommodating conflicting dimensions of restoration for a better practice.

2.2.1 Wild Design

Wild design is an intervention framework for ecological restoration that comprises human agency and intentionality, working with and within natural processes for restoration planning and practice – allowing for natural processes to take over (Higgs 2003). Human agency, however, must happen within the understandings that: design is a process and product, not an end goal, and exists in order to facilitate genuine human engagement; that ecosystems are open, evolving systems – often more complex than we comprehend; that agency should be applied within focal practices – not superficially; and that wild design is not applicable to all ecosystems (e.g., remote or fragile areas for conservation) (Higgs and Hobbs 2010).

Wild design begins with ecological understanding in order to move towards the incorporation of generalized principles allowing societal values and uncertainty, so that place-specific wild design will be developed under adaptive processes of assessment and feedback (Higgs and Hobbs 2010) (Figure 2.1).

Fundamental to the process of wild design is the application of the seven principles and input from societal values and uncertainty displayed in Figure 2.1. This differentiates wild design from other intervention frameworks, allowing for the employment of focal practices. Wild design calls for a more intensive consideration of cultural and ecological values, embedded in a series of design principles – clarity, fidelity, resilience, restraint, respect, responsibility and engagement direct the process of defining intervention goals and implementation based on local characteristics (Higgs and Hobbs 2010).

Clear goals and objectives ensure transparency of values in the process. Fidelity to an ecosystem's historical and present conditions is central for defining appropriate interventions. Under conditions of rapid change, aiming for resilience ensures flexibility in interventions to maintain ecological integrity. Restraint is a necessary measure to allow natural processes to take over – less is more. Attention to ecological processes and

awareness of agency are respectful ways to acknowledge the overwhelming complexity and contingency of a system. Technical and ethical responsibility for intervention success or failure provides a potent reality-check for planners. Engagement of practitioners and wider public with local ecosystems provide valuable insights and build on reciprocal ties between people and ecosystems and contribute to the success and longevity of interventions (Higgs and Hobbs 2010).

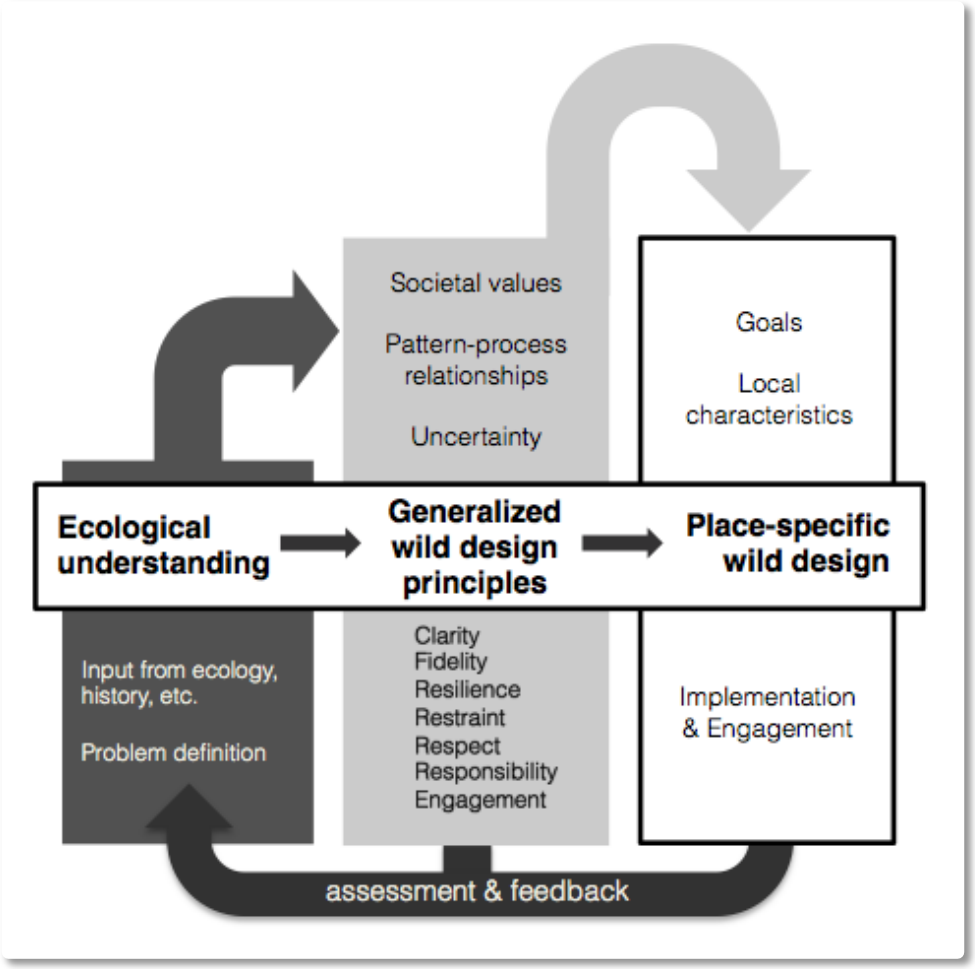

Figure 2.1: The relationship between ecological understanding, generalized wild design principles and place-specific wild design. From Higgs and Hobbs (2010:239).

If less intervention is better than more (Higgs and Hobbs 2010), then when is it appropriate to intervene? Higgs and Hobbs (2010) aver that decisions about whether, when and how to intervene should never been taken lightly. Learning and applying wild design principles will stimulate a more genuine engagement and choice for more resilient intervention approaches to specific locations.

2.2.2 Novel ecosystems

Novel ecosystems (also known as emerging or no-analog ecosystems) are defined as ecosystems that differ in species composition, abundance and function from present and past ecosystems, and that arise as a result of human action, environmental change, and the impacts of deliberate or inadvertent introduction of species from other regions (Milton 2003, Hobbs *et al*. 2006). Novel ecosystems can emerge either from the degradation or invasion of natural or 'wild' ecosystems, or from the abandonment of intensively managed systems (Figure 2.2).

The emergence of novel ecosystems poses special challenges to conservation and restoration intervention. While novel states emerge through human action and invasion of exotic species, potentially changing composition, structure and function beyond historical biotic and abiotic ecosystems thresholds (Milton 2003, Hobbs *et al*. 2006), ecological restoration, as intentional act, aims to mitigate abiotic changes and reverse biotic changes, to push the system back towards historical and highly valued composition and function (Hobbs *et al*. 2009). Currently, one of the greatest challenges is to identify and quantify real thresholds in face of different types of system states – historical, hybrid and novel.

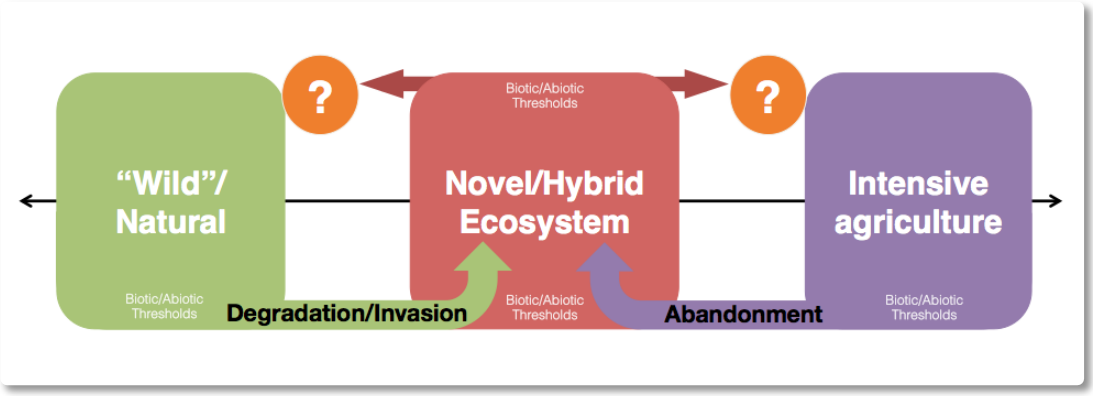

Figure 2.2: Novel ecosystems arise either from the degradation and invasion of "wild" or natural systems, or from the abandonment of intensively managed systems, surpassing historical biotic and/or abiotic thresholds. Modified from Hobbs *et al.* (2006:2).

From this reasoning, arises the argument that not all ecosystems are suitable for conservation or restoration. Nonetheless, it seems clear that hybrid ecosystems are most likely to be restored, and that novel ecosystems significantly altered exclusively in biotic

or abiotic features can be considered for restoration (Figure 2.3). In fact, Hobbs *et al*. (2009) propose some criteria to determine whether a novel ecosystem should be approached for restoration that touch on the maturity, resilience and energetic efficiency of ecosystems, as well as whether these provide goods and services, and the opportunity for individual or community engagement. In dealing with hybrid and novel ecosystems, Hobbs *et al*. (2009) wonder whether such activities are still considered to be restoration or have evolved into new types of intervention that are responding to the rise of drastically altered and novel ecosystems.

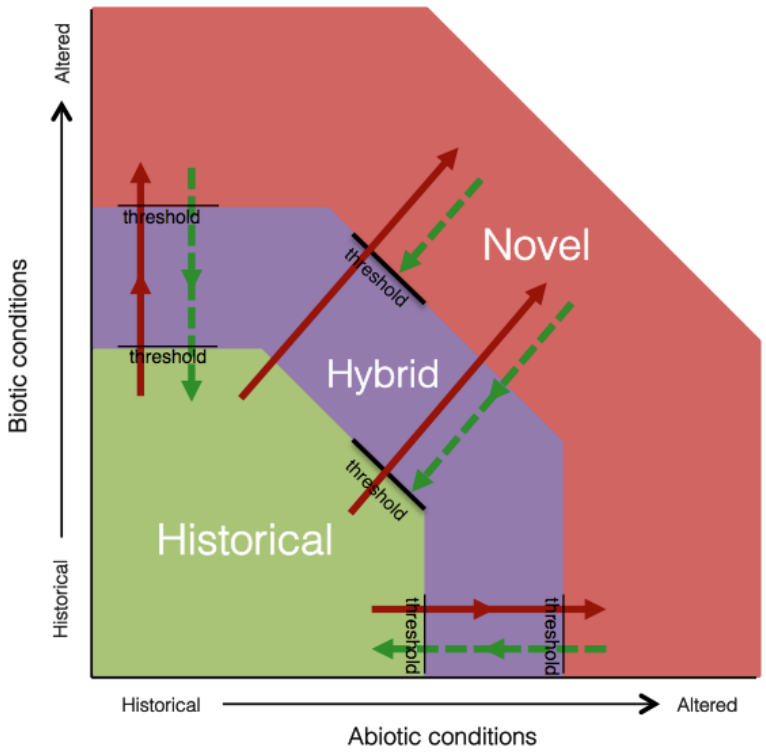

Figure 2.3: Model for ecosystem change under different levels of biotic and abiotic alterations. Modified from Hobbs *et al.* (2009:601). Red arrows: alterations; Green arrows: restoration efforts.

2.3 Ethnoecological Restoration

Ethnoecological restoration combines the interdisciplinary field of ethnoecology with the science of restoration ecology generating a holistic, integrative and objective approach. This novel approach aims to support recovery of degraded social-ecological systems and cultural landscapes.

Eco-cultural restoration – synonym most commonly employed in literature – was the first restoration approach to endorse an integrated restoration for ecological and cultural features (Rogers-Martinez 1992, Higgs 2005, Turner 2005).

These are evolving definitions, however, TEK-based restoration is characterized by the interplay between ecological and cultural fidelity, including concepts such as structural composition, functionality, community participation, cultural livelihood, language, place, health and well-being, traditional knowledge, and social justice (Higgs 2003:238). TEK can contribute to restoration practice by offering: *kincentric worldview* human ecological responsibilities towards their kin ecosystems and living beings; *identification of reference systems for restoration* based on pre-contact conditions informed by TEK practices and land use; *succession and disturbance understandings* which are integral part of TEK for resource and ecosystem management, especially fire ecology; and finally, *insights for scale definition* for most appropriate scale of operation (Turner 2005, Senos *et al*. 2006).

Higgs (2005) advocates for a broader approach to restoration that requires respect for other kinds of knowledge than western science, and especially the recognition of a moral center that is beyond the scope of science to address fully. Turner (2005) also provides a comprehensive list of elements fundamental for eco-cultural renewal, based on case studies and her vast experience working with local First Nations. These are: *humans within nature*, *rooted cultures, elders' wisdom and experience, youth and education, local languages, ceremonial recognition, diversity, and patience and persistence*.

Ethnoecological restoration in North America's Pacific Northwest is observed in a diverse array of applications and scales such as watershed restoration, fuel reduction/control as part of indigenous fire management, wildlife restoration, fisheries habitat restoration, invasive and exotic species management, and native edible plant restoration (Turner 2005, Senos *et al*. 2006, Joseph 2012).

TEK applications, including ethnoecological restoration, are better suited to projects that draw together social and ecological communities through an adaptive management framework in order to restore degraded systems or organisms (Berkes *et al*. 2000).

2.3.1 Ethnoecology and TEK (Traditional Ecological Knowledge)

Ethnoecology is an interdisciplinary field that studies people's knowledge of the relationships between humans and their environments, including all other life forms. Etymologically, ethnoecology is the study (*-logy/logos*), of people (*ethno-*), and their home (*-eco-*). In other words, ethnoecology is the study of Traditional Ecological Knowledge systems – TEK – making use of a scientific approach to investigate elements of local peoples' perceptions and practices, which coevolved with related ecosystems. Together with the sibling multifaceted fields of ethnobiology and ethnobotany, ethnoecology has been playing an important role in encouraging innovative conservation strategies, promoting and supporting co-management systems that integrate and respect conventional and traditional resource management practices (Berkes and Folke 1998, Nazarea 1999, Hunn *et al*. 2003, Berkes 2012).

Arriving at a definition for Traditional Ecological Knowledge (TEK) is as complex as understanding these systems of knowledge. Although there is evident ambiguity in the term itself, which places *traditional* and *ecological knowledge* side by side, Berkes (2012) reached the most widely accepted definition in the literature for Traditional Ecological Knowledge as follows:

> *"[TEK is] a cumulative body of knowledge, practice and beliefs, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment"* (Berkes 2012:7).

According to this definition, TEK has characteristics very distinct to the ones of conventional western scientific knowledge. The fact that TEK is based on data generated by "resource users" adds to this system of knowledge a set of moral, spiritual and symbolic components, generating a more integrative and holistic approach to knowledge as opposed to the reductionist, value-free and mechanist approach of conventional science (Berkes 1993, 2012).

Under the perspective of integrating TEK as complementary to western science (Knudson and Suzuki 1992), numerous ethnoecological studies are aiming to reconcile

both for generating alternative and innovative approaches to conservation as well as adaptation to environmental change (Berkes 2012). Berkes *et al*. (2000) aver that TEK embodies capacity for adaptive management, especially under the umbrella of "management for resilience". They suggest that the qualitative approach present in TEK management, a consequence of historical experience with surprise, is analogous to alternative scientific management models (western science-based) that focus on resilience and ecological processes of regeneration. Berkes *et al*. (2000) are emphatic about the potential of using the adaptive management framework in order to integrate TEK into current "mainstream" management endeavours. Successful examples of new approaches to management are reported in Berkes and Folke (1998), and Hunn *et* al. (2003).

In order to achieve such an adaptive feature to ecological processes, societies have gone under a process of coevolution with physical and biological environments. TEK has been attained through social-ecological relationships for livelihood and subsistence of both human and non-human beings. Berkes and Turner (2006) propose two conceptual models for the rise of conservation knowledge in TEK, the *depletion crisis model* and the *ecological understanding model*. The first is that conservation learning often follows a resource crisis, when environmental limits are extrapolated. The second is that the development of conservation learning arises from the accumulation and elaboration of environmental knowledge by a group of people, being a result of a response to ecological understanding rather than generated by catastrophic resource depletion (see Berkes and Turner 2006, Turner and Berkes 2006 – a pair of papers).

On the other hand, the combination of accelerated changes in knowledge systems due to acculturation, loss of indigenous languages, loss of opportunities and time to participate in traditional practices, participation in wage economy, increased urbanization of indigenous populations, loss of access to traditional resources, forces of industrialization and globalization, and more recently, climate change, are all part of a vicious circle for TEKW loss and loss of biocultural diversity (Turner and Turner 2008, Turner and Clifton 2009, Maffi and Woodley 2010).

2.3.2 Biocultural diversity

Biocultural diversity is defined by Maffi (2007) as: "*the diversity of life in all of its*

manifestations – biological, cultural, and linguistic – which are interrelated (and likely coevolved) within a complex socio-ecological adaptive system". Biological and cultural diversity are believed to be strongly connected and to express a positive correlation. The Declaration of Belém (1988) mentions "*an inextricable link*" between biological and cultural diversity. UN's Environment Programme has assimilated the concept into its discourse stating that, "*Biodiversity also incorporates human cultural diversity, which can be affected by the same drivers as biodiversity, and which has impacts on the diversity of genes, other species, and ecosystems"* (UNEP 2007:160).

Biocultural diversity loss is a worldwide trend (Maffi and Woodland 2010). Apparently, the same processes of change that are degrading ecosystems and driving some into novel configurations are also behind the erosion of social-ecological resilience in cultural landscapes. Protection of these landscapes, and conservation and restoration of their unique biocultural features are vital for potential contribution to alternative techniques of sustainable land-use, which enhance natural values in the landscape, and support greater biodiversity and local knowledge, as well as providing options for the future, in the face of drastic environmental change (Posey 1999, UNESCO 2010).

2.3.3 Feedback between TEK and restoration

Observations during field outings in *Tl'chés*, whether fieldwork activities or celebration gatherings, have revealed important connections between TEK, ecological recovery, cultural revival and community engagement. All of the above are integral elements for eco-cultural or ethnoecological restoration models (Higgs 2003, Turner 2005).

Here I explore the relationship between TEK and restoration practice. The premise is that this relationship is regulated by the presence of degradation in a social-ecological system. In these systems, TEK and change (or disturbance) are integral parts (Berkes *et al*. 2003). Therefore, when a system is void of degradation, TEK and disturbance coexist through processes of adaptive management, without the need for applied restoration (Figure 2.4a). Once disturbances surpass a threshold and cause damage to a system, the need for restoration emerges (Figure 2.4b). Social-ecological degradation can displace or deplete TEK in the system to some extent. I aver that restoration practice is an adaptive

TEK response to conditions of system degradation, based on moral values and principles of stewardship. Moreover, TEK systems can benefit from "outer" systems of knowledge (i.e.: scientific knowledge, restoration ecology) to be mutually reinforcing towards management of change and recovery of degraded social, cultural and ecological features.

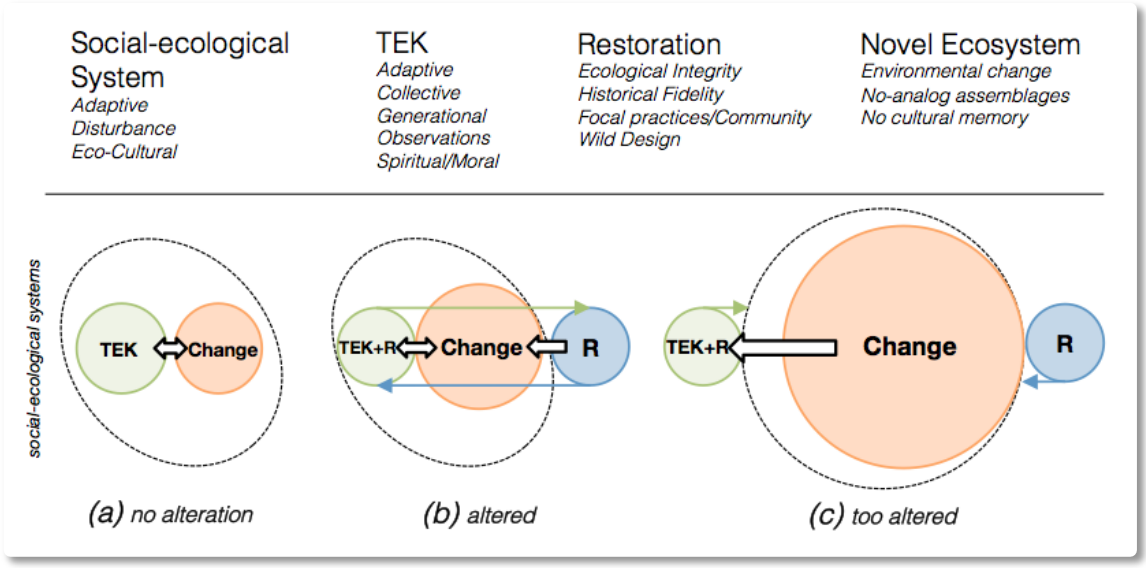

Figure 2.4: Model for Traditional Ecological Knowledge (TEK) and Restoration (R) relationships in changing social-ecological systems.

Nevertheless, changes can be drastic and rapid, not allowing for a system's adaptation. Knowledge structures, including TEK adaptive restoration, can become irrelevant in sight of altered structure, function and composition of ecosystems (E.g., in novel ecosystems). Novel social-ecological systems also pose a challenge to ecological restoration of any kind, for the lack of local knowledge insight, community participation, historical references, and, therefore, adaptive strategies (Figure 2.4c).

2.4 Cultural landscapes

Cultural landscapes are regions of the world that express a long and intimate relationship between peoples and their natural environments, reflecting specific techniques of sustainable land-use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation with nature (UNESCO 2010). These places evolved under the joint influence of natural processes and

sustainable human cultural practices, which maintained biodiversity and productivity (SER 2004). *Tl'chés* embodies these features of a cultural landscape, being a remnant of important human-environment relationships and sustainable land use over time.

In this context of exploration, the concept of cultural keystone species (CKS) proposed by Garibaldi and Turner (2004) plays an important role in unveiling the relationships between local communities and environments at a local scale. Camas (*Camassia quamash* and *C. leichtlinii*) is an example of a CKS for southeastern Vancouver Island (Garibaldi and Turner 2004). Cultural keystone species (CKS) is defined as *"culturally salient species that shape in a major way the cultural identity of a people, as reflected in the fundamental roles these species have in diet, materials, medicine, and/or spiritual practices"* (Garibaldi and Turner 2004).

Present and historical cultural landscapes, such as *Tl'chés*, provide a perfect ground for understanding connections that support long-standing social-ecological sustainability.

2.4.1 Tl'chés as a Cultural Landscape

> *Once there were no seals and the people were starving […] Two brave youths said to each other, "Let us go and see if we can find any salmon." They embarked in their canoe and headed out to sea, not caring in what direction they travelled. They journeyed for three and a half months. Then they came to a strange country. When they reached the shore a man came out and welcomed them, saying, "You have arrived." "We have arrived," the youths answered, though they did not know where they were. They were given food to eat, and after they had eaten their host led them outside the house and said, "Look around and see what you can see." They looked around and saw smoke from* ***q'əx̲mín*** *(Indian consumption plant) that the steelhead, sockeye, spring and other varieties of salmon were burning, each for itself, in their houses.*
>
> *The youths stayed in the place about a month. Their hosts then said to them, "You must go home tomorrow. Everything is arranged for you. The salmon that you were looking for will muster at your home and start off on their journey. You must follow them." So the two youths followed the salmon; for three and a half months they travelled, day and night, with the fish. Every night they took* ***q'əx̲mín*** *and burned it that the salmon might feed on its smoke and sustain themselves. Finally they reached Discovery Island (****Ktces)****, where they burned* ***q'əx̲mín*** *all along the beach; for their hosts had said to them, "Burn* ***q'əx̲mín*** *along the beach when you reach land, to feed the salmon that travel with you. Then, if you treat the salmon well, you will always have them in abundance."*
>
> *Now that they had plenty of salmon at Discovery Island they let them go to other places - to the Fraser River, Nanaimo, etc. Because their journey took*

> *them three and a half months, salmon are now absent on the coast for that period. The coho said to the other salmon, "You can go ahead of us, for we have not yet got what we wanted from the lakes." That is why the coho is always the last of the salmon.*
>
> *The young men now had salmon, but no good way of catching them. The leaders of the salmon, a real man and woman, taught them how to make* ***sx̲wələ7*** *(purse nets), and how to use* ***q'əx̲mín****. They also told the young men how their people should dress when they caught the salmon, and that they should start to use their purse net in July, when the berries were ripe. So today, when the Indians dry their salmon they always burn some* ***q'əx̲mín*** *on the fire (or on top of the stove); and they put a little in the fish when they cook it. Also, when they cut up the salmon, before inserting the knife they pray to the salmon, that they may always be plentiful.* (Straits Salish story; Jenness, n.d.: 94)

This Straits Salish (Saanich) narrative on the "Origin of Salmon" and ceremonial use of ***q'əx̲mín*** (Indian consumption plant, or "Indian celery" – *Lomatium nudicaule* (Pursh) J.M. Coult. & Rose) unveils important elements in local Indigenous culture. It speaks of a kinship between humans and animals (salmon), and the importance of this relationship for the nurturing of the other; Salmon People would offer themselves if humans fed them with smoke of ***q'əx̲mín*** burning seeds. It speaks of passing on knowledge about native plants use and local technology. *Lomatium nudicale* seeds are known as a medicine for respiratory problems as well as for ceremonial purposes in drying salmon among coastal First Nations in BC (Turner 1995, 2005). This story also speaks of respect as Indigenous Peoples still pray before killing the salmon and preparing it for consumption (pers. notes November 2011).

Part of this story takes place at *Ktces*, or *Tl'chés*. It is possible that the place where the youth reached after travelling three and a half months following salmon and burned ***q'əx̲mín*** all along the beach was either Discovery or Chatham Islands, since the indigenous name, *Tl'chés*, often refers to the "oneness" of this group of islands.

Tl'chés is not only significant for Straits Salish and Lekwungen culture as the "homeland" for the story of the Origin of Salmon (and use of ***q'əx̲mín***). It has always been present in social, economic and ecological history of the Songhees people. Table 1 summarizes significant historical marks in the islands, assembled from archival and ethnographical sources, in relation to important historical periods and events in Canada and the world.

Table 1: Significant historical periods and events in *Tl'chés*, Canada and worldwide.

Date	*Tl'chés*	Source	Canada World
Before Contact	Fishing village sites or winter villages of the *sqəŋi'nəs* people.	Boas (1890), Hill-Tout (1905), Suttles (1974).	James Cook explores Pacific Coast (1776); French Revolution begins (1789).
1790s	Spanish explorer Quimper's ships passed the islands of Haro Strait and explored the islands and straits east and north of Esquimalt.	Lutz (2009)	George Vancouver explores mainland and coast of British Columbia.
1850s	Douglas Treaties: the Lekwungen exchanged their land for a sum of three blankets for each male head of family, with additional blankets to the "chiefs," for a total price of 371 blankets, plus a cap. Total Pop: 700.	Lutz (2009)	Fort Victoria built (1843); Canada and US sign reciprocity treaty.
1862-3	Smallpox epidemic: several Songhees families took refuge in the islands and settled there after that. Six families built a large plank house.	Suttles (1974), Duff (1969), Lutz (2009)	USA Civil War begins; BC joins Confederation.
1865	Land Title and Survey Authority visit *Tl'chés*: Long houses and gardens.	Land Title and Survey Authority (1865)	Indian Act enacted (1876).
1890s	Encroachment of camas prairies: islands became only source of bulbs. Later, sheep on some of the larger islands spoiled the camas beds.	Boas (1890), Hill-Tout (1905); Suttles (1974); Beckwith (2004)	Gold discovered in the Yukon; Aboriginal potlatches made illegal under the Indian Act.
Early 1900s	Most of the fishing was done by the group that resettled in Discovery Is.	Suttles (1974)	2nd wave of Jewish immigration to Palestine.
1901	Songhees Jimmy Chicken died and was buried in Chatham Islands graveyard	Keddie (2003)	First wireless transatlantic radio signal from England to Newfoundland.
1910s	Department of Indian Affairs: Songhees and "sub-families" of Esquimalt and Discovery Islands with a population of 140. They are "chiefly engaged in fishing, hunting, stevedore work, farming, working in saw-mills and factories.	Keddie (2003)	World War I begins; Royal Canadian Navy formed; Songhees Reserve relocated (1911).
1912	Capt. Beaumont bought land on Discovery Island	Times Colonist (1969)	*Titanic* sinks.
1913	Villages of fishermen. Pop. 25 people. Over 180 sheep, 100 chicken and foul. About 5 ha of cultivated land and 10 ha of pasture in all islands. Gardens behind ranchers house.	McKenna-McBride Commission Transcripts (1913)	WWI begins (1914).
1915	Census: 22 people on D. Is. Memorandum of the Royal Commission in 1915: Tom James fishes for 4 months a year off Discovery. Is.	Duff (1969)	Canadian forces - First Nation soldiers fought in Europe during WWI.

1920s-40s	Kelp (or red laver seaweed, *Porphyra)* collected off Discovery Islands and brought to Oak Bay to be sold to Chinese immigrants.	Keddie (2003)	US grants citizenship to Native Americans born; World War II begins.
1940s	Tom James lived on Chatham Islands from 1940s-1957	Keddie (2003)	End of WWII.
1950s-60s	"Modern potlatches": every Saturday night throughout the winter; smaller dances were held every night at many locations – possibly at *Tl'chés* too.	Suttles (1974), Lutz (2009)	Korean War; Elizabeth II is crowned; Treaty of Rome: Europe Economic Community.
1960s	Discovery Island people have always been considered as part of the Songhees band, and in recent decades they have rejoined the others on the new Songhees reserve.	Duff (1969)	Canadian Bill of Rights; Native people living on reserves gain the right to vote in federal elections in Canada.
1961	Tom James of Discovery Island died April 3, 1961. His death certificate gives his age as 99 and lists him as being born in "Esquimalt". His father's name was "James". He was also reported as age "104" at death. Tom's father was "Dr. Jim" a Songhees, and his mother *Wuqwalquluq* was from Valdes Is.	Suttles (1974), Keddie (2003)	East Germany begins construction of Berlin Wall; Yuri Gagarin first person in space.
1962	Accidental fire caused by campers burns West Chatham Island.	Higgs (2003), Joan Morris pers. comm. (2011)	Trans-Canada Highway opens.
1966	Capt. Beaumont died.	Times Colonist (1973:13)	CBC introduces colour broadcasts.
1969	Songhees questions land ownership of Discovery Island and claim its ownership.	Times Colonist (1969:30)	Neil Armstrong walks on the surface of the moon.
1972	Discovery Island Marine Provincial Park inaugurated.	BC Parks	Canada adopts policy of multiculturalism.
1974	Songhees closes off *Tl'chés* for public visitation due to littering, fires and desecration of graves in Chatham Islands.	*Times Colonist* (1974:13)	Watergate scandal (USA)
1980s	Youth summer programmes/camps in Discovery Island.	Joan Morris pers. comm. (2011)	Canada's First Nation petition Queen to recognize aboriginal rights in Constitution.
1990s	Last few sheep killed on Chatham Islands by BC SPCA.	Joan Morris and May Sam pers. comm. (2011)	Canadian forces join in Gulf War (1991)
Early 2000s	Joan Morris revisited the islands after 50+ years. First restoration activities led by former Songhees land-manager Cheryl Bryce (November 2002).	Joan Morris pers. comm. (2011); Higgs (2003)	NYC 9-11 (2001)
2010	Joan Morris talks to Nancy Turner about her vision for *Tl'chés.*	N. Turner (pers. comm.)	Vancouver Winter Olympic Games
2011	Ethnoecological Restoration Study	-	Arab spring.

Historical accounts reveal that the Songhees were and still are a people connected to the land and sea, and depend their very existence on them. Fishing was the mainstay of their subsistence. Even though the Douglas' Treaties dispossessed Songhees of their lands, accounts stress that the Aboriginal People were guaranteed their village sites, enclosed fields and the rights "to fish as formerly" (British Columbia 1875; Lutz 2009).

Fishing was paramount to all Coast Salish and other coastal groups, and reef-netting was a key fishing technology of the Straits Salish peoples. The Songhees had plenty of salmon, and halibut that were once very plentiful on the shallow offshore banks from Victoria harbour to Discovery Island (Keddie 2003). Cultivation of native bulbs such as camas and other plants also played an important part in Songhees nutrition and landscape management, both on Vancouver Island and adjacent islands (Beckwith 2004). The Songhees maintained prairies behind their winter villages where they could get camas and other bulbs. But they also went to the islands for food harvesting. After white settlers began encroaching upon the mainland (Vancouver Island) prairies, and these were usually the first places to be settled. The islands became the only major source of bulbs. Later, sheep on some of the larger islands spoiled the camas beds (Boas 1890, Hill-Tout 1905, Suttles 1974, Beckwith 2004).

Perhaps the most important episode for *Tl'chés* so far happened during the 1862-3 smallpox epidemic. This disease had killed many Indigenous Peoples in coastal British Columbia, and probably was not the first time it reached Vancouver Island (Lutz 2009). Songhees took refuge at *Tl'chés* – where some had formerly lived – and escaped from the consequences of this epidemic (Duff 1969, Suttles 1974, Keddie 2003, Lutz 2009). Following this episode, some families chose to stay and resettled the islands, forming what was for a time regarded a third band. In his seventies, Tom James, who was *Sellemah*'s grandfather, told anthropologist Wayne Suttles that six families, including his own, had moved to the islands before he was born and built a large plank house, with a shed roof and six sections separated by planks (Suttles 1974).

The resettlement of Songhees in the islands happened during a time of encroachment on their traditional lands and prohibition against traditional rituals and celebrations. Nevertheless, this was a moment for the revival of their culture. There are estimations that in Coast Salish territory, traditional dances and potlatches happened every Saturday

night throughout winter (Suttles 1954, Lutz 2009). There are archaeological sites, especially graveyards in both Discovery Island and Chatham Islands (Keddie 2003) that still deserve deeper archaeological investigations.

Urban encroachment and fire suppression caused Garry oak ecosystems and traditional livelihoods to change dramatically since European settlement (MacDougall *et al*. 2004, Lutz 2009). Although the present oak-camas meadows might not be very representative of historical conditions (see Vellend *et al*. 2008), *Tl'chés* and nearby islands are important remnants of these ecosystems, comprising a mosaic of coastal bluffs, vernal pools, wetlands, meadows and woodlands, harbouring culturally important and rare species (GOERT 2010).

Figure 2.5: *Camassia quamash* (Pursh) Greene, flowering in Victoria area. Photo by T.Gomes (2011).

Traditional management by Coast Salish peoples of Garry oak savannah and associated ecosystems has sustained and maintained the natural landscapes around southeastern Vancouver Island, rich in plant diversity and habitat for wildlife (Turner 1999, Beckwith 2004, Deur and Turner 2005). These ecosystems sustained a wide array of edible and medicinal plants, including camas (*Camassia* spp.) a staple food – highly appreciated for its rich nutritional value – a keystone species for this local economy and culture (Turner 1995, Beckwith 2004) (Figure 2.5). Among these, also figure chocolate

lily bulbs (*Fritillaria affinis* (Schult.) Sealy), bracken fern rhizomes (*Pteridium aquilinum* (L.) Kuhn), Hooker's onion (*Allium acuminatum* Hook.), silverweed rhizomes (*Potentilla egedii* Wormsk.), springbank clover (*Trifolium wormskioldii* Lehm.), ***q'ə̲xmín*** or "Indian celery" (*Lomatium nudicaule*), and Pacific yew (*Taxus brevifolia* Nutt.) (Turner 1995). Indigenous resource management was undertaken in intentional and specific ways for different plants or plant assemblages. In camas beds, for example, management included turning/loosening the soil, weeding grasses, mulching with seaweed, and prescribed burning to reduce competition and increase productivity (Turner 1999, Beckwith 2004, Deur and Turner 2005, Suttles 2005).

2.4.2 Cultural Keystone Place

Here, I respond to Garibaldi and Turner's (2004) cultural keystone species (CKS) concept with an extrapolation of this idea, inspired by reflections on landscape ethnoecology (Johnson and Hunn 2010) and on-ground considerations about *Tl'chés*, regarding the cultural importance of a place for cultural identity and social-ecological resilience of a people.

The CKS concept was coined as metaphorical parallel to the ecological keystone species concept, which is defined as a species whose impact on its community or ecosystem is large, and disproportionately large relative to its abundance (Paine 1969, Mills *et al*. 1993). Although subject of concerns for being interpreted as overly broad and weak concept, CKS model has been successfully employed in land reclamation context by offering a mechanism to integrate social, spiritual, and ecological values of people, reinforcing the significance of these species to local people and contributing to the re-engagement of people with the landscape (Garibaldi 2009).

Platten and Henfrey (2009), however, broaden the discussion asserting that a cultural keystone should not be simply regarded as a biological species per se - that can influence greatly the cultural identity of peoples (Garibaldi and Turner 2004) - but rather a complex of both material and non-material system elements.

Cultural Keystone Place (CKP), as proposed here, is not only a place where CKS can be found, but also a place that carries a sense of *homeland,* the *oikos* (house) in the landscape (see Johnson and Hunn 2010), encompassing cultural, historical and social-

ecological value, and because of this, has a disproportionate or irreplaceable effect on the continuation of a culture or a people's social-ecological resilience. Therefore, a CKP is a place central for safeguarding cultural identity of a people, generally for representing a locale with vital historical and cultural role, where cultural memory and practices can be accessed, allowing for renewal of cultural, ecological and socioeconomic processes. The concept of CKP heightens conservation and restoration values of these particular places, especially for its focus on long-standing and place-based social-ecological processes.

Tl'chés is a place that carries such significance. Evidence for the concept of CKP and its importance in the context of conservation and ethnoecological restoration will be explored in following chapters, and a conclusion for this matter will be presented in Chapter 5.

2.5 Ethnoecological Restoration & Intervention in *Tl'chés*

The ethnoecological approach to restoration and intervention, as proposed here, attempts to shorten the distance between humanistic and scientific thinking in restoration (Higgs 2005), as well as to respond to the trend of biocultural diversity loss experienced by local indigenous communities worldwide. The premise is that it is not possible to restore a landscape that has coevolved with cultural influence without considering the human component; nor it is attainable to revive cultural aspects without recovering the landscape. *Intervention* is a broader term that encompasses restoration and all allied conservation practices including those that attempt appropriate interventions in systems spatially and temporally dynamic (i.e., novel ecosystems); whereas *restoration* refers specifically to practices where historical information and knowledge is a key element (i.e., with hybrid and historical ecosystems) (Hobbs *et al*. 2011).

According Moreira *et al*. (2006), restoration interventions in cultural landscapes such as *Tl'chés*, focus on mosaics of land use and ecosystems at broader spatial scales; include cultural and scenic values, as well as biodiversity and economic productivity among main objectives; may be very effective in restoring ecosystems and species populations that depend on landscape structure; focus on landscape composition and configuration; may include preservation of degraded patches (ecosystem level); may include maintenance of alien species; and, considers traditional land management more valuable than modern

techniques.

Therefore, appropriate intervention and restoration approaches will necessarily have to address ecological and cultural integrity, historical and cultural fidelity, incorporating wild design and focal practices as well as promoting the merging of TEKW systems and restoration science in order to achieve desired goals. Moreover, this approach will have to address social-ecological adaptability for change and novelty, responding to the challenge of combining traditional with new, historical with novel.

Ethnoecological restoration interventions at *Tl'chés* will focus on social-ecological resilience and will likely assist in the identification and understanding of social-ecological thresholds in these systems. Integrity is tackled within the spheres of ecology and culture. Solid ecology and restoration science will support the assessment of ecosystem condition in ecological, biological and physical terms. Ethnoecological assessments not only offer cultural perspectives, but may also reveal the intersection of these realms, providing tools for elaborating on eco-cultural or social-ecological connections, integrity and resilience.

Higgs (2003, 2005) and Senos *et al*. (2006) presented the case of Discovery Island, British Columbia, as an example of how ecological and cultural elements can merge in restoration. I aver that reinstating traditional practices in cultural landscapes, in systems such as remnants of gardens and orchards at *Tl'chés,* incorporating and revitalizing TEKW, is the application of focal principles and wild design to particular ecosystems, under certain cultural influences. The engagement and participation of communities will naturally strengthen communities themselves around traditional practices, likely guaranteeing long-term sustainability and promoting innovative strategies for restoration. Moreover, historical and cultural fidelity are fully addressed through the integration of narrative and TEK in this approach.

Thus, a framework that generates a place-specific wild design for *Tl'chés* (see Figure 2.6) should retrieve *ecological understanding* especially from TEKW and narrative, as well as conventional ecology, and history; and would also benefit greatly from consulting the fields of archaeology, anthropology, ethnobotany and geography.

With respect to *principles* for intervention, this framework should refer to Higgs and Hobbs' (2010) list of generalized wild design principles (see Figure 2.1), accompanied by

Higgs' (2003) eco-cultural restoration values, Turner's (2005) eco-cultural renewal components, and, finally, emerging local knowledge principles and values embedded into *Sellemah*'s vision for "healing the land, healing the people" (see Chapter 4.2). Although resulting from distinct processes, these different sets of principles and values are closely related and complimentary to some extent (see Figure 4.1).

The combination of the aforementioned principles and values find common meaning and application, and will inform *Tl'chés* wild design framework in guiding the establishment of goals, highlighting awareness of local characteristics, and leading to the implementation of an adaptive intervention plan, inspired by ethnoecological understanding, abiding within such principles and values (Figure 2.6).

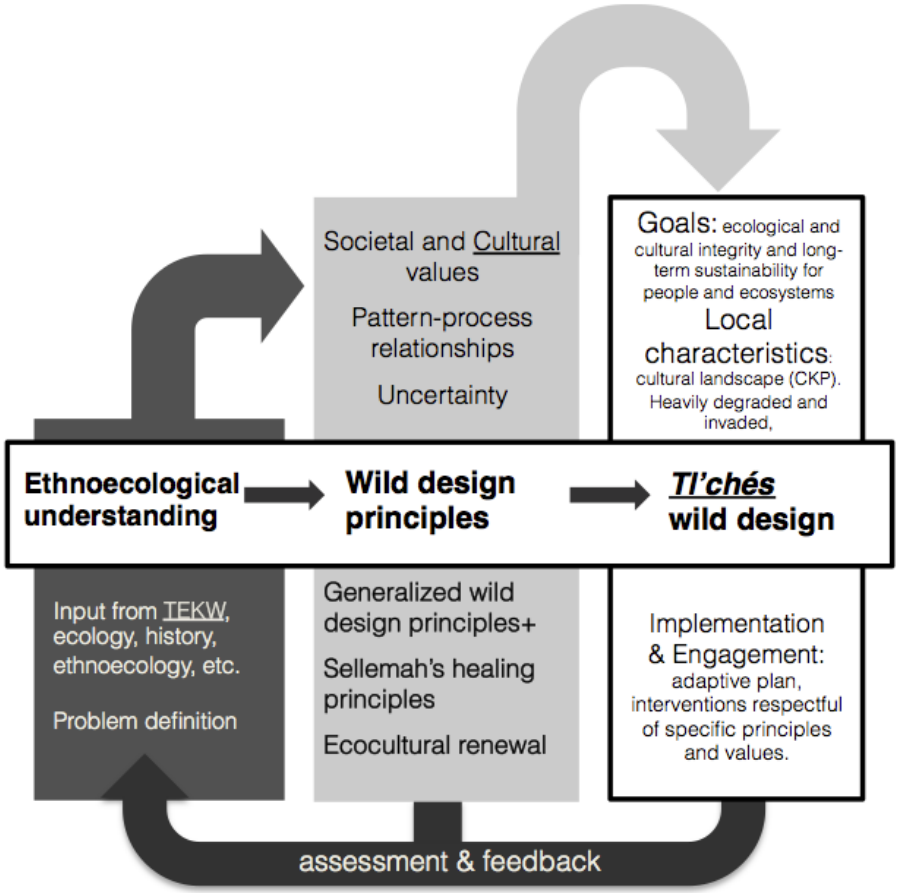

Figure 2.6: Wild design framework for *Tl'chés*: integrating generalized wild design principles (Higgs and Hobbs 2010), *Sellemah's* principles for "healing the land, healing the people" (Joan Morris pers. comm. 2011), and ecocultural renewal principles (Turner 2005). Modified from Higgs and Hobbs (2010:239).

Finally, ethnoecological restoration supports a holistic, integrative and pragmatic

approach that allows for novel avenues of inquiry and supports more sustainable results in target social-ecological systems. Regardless of all the opportunities and challenges this new approach can bring, "*it is prudent to respect several delicate balances: between ecosystem services and natural processes, and between ecological integrity and cultural values*" (Hobbs *et* al. 2009:604). For now, the ethnoecological restoration approach and wild design will allow for achieving intervention strategies that best fit the challenges of restoring cultural landscapes under this new ecological world order.

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3: Space and time in *Tl'chés*

3.1 Introduction

In this chapter, I explore the historical and current spatial attributes of ecological and cultural patterns, structures and processes that are pertinent to guiding ethnoecological restoration and intervention in *Tl'chés*. Assisted by the use of GIS (Geographical Information System), field surveys, aerial and ground photographs, historical information and TEKW, I aim to generate spatial and historical references to inform restoration of social-ecological systems in the islands. Landscape and land use change are briefly described for the time interval of about 150 years, according to the availability of resource references. Thereafter, I discuss the implications of ecological and cultural change in relation to present conditions for restoration intervention. Finally, five priority sites for intervention are suggested and selected in order to support and promote recovery of ecological and cultural integrity, based on TEKW, environmental and ecological assessments (degradation, disturbance, sensitive species, and invasive species), and cultural and historical significance.

GIS can be a powerful tool for communities and planners to allow for a better understanding of ecosystem patterns, structures and processes. The merging of TEK, historical ecology, and conventional ecological methodologies into the process of generating spatial data and maps allowed for a suitable way to respond to this chapter's guiding question: **"*What are the spatial attributes of present and historical ecological and cultural patterns, structures and processes, and what are the implications for restoration intervention in Tl'chés?*"**

3.2 Methodology

Here, I combine a set of different methodologies to investigate the ecological and cultural conditions of ecosystems at *Tl'chés* – past and present. A combination of archival research, semi-structured interviews and field surveys were employed in order to generate maps and relevant data to inform restoration planning for *Tl'chés*.

3.2.1 Archival research

With the purpose of generating historical data for spatial attributes of *Tl'chés*, I conducted a research for historical aerial and ground photographs, maps, drawings, textual and audio documents related to Discovery and Chatham Islands. Archives and collections from the University of Victoria's Maps Library, the BC Archives and the Anthropology Audio-Visual Collection at the Royal British Columbia Museum were visited. Ethnographic and anthropological literature was also consulted in order to better understand livelihoods, social-ecological and cultural processes in the islands.

Surveys were conducted in two distinct phases. The first, from November 2010 to January 2011, focused on obtaining textual accounts, historical maps, drawings and ground photographs, for initial evaluation. During the second phase, from April to August 2011, I was assisted by University of Victoria's LE,NONET research apprentice, Cara Barter, in gathering and organizing historical aerial and ground photographs of Chatham Islands, as well as extra and more specific textual, audio, and ethnographical information. A total of 12 two-hour visits were made to all archives and collections, from November 2010 to August 2011, totalling 2 audio interviews with Ned Williams, 3 maps, 3 drawings, 8 ground photographs, 18 aerial photographs, and 13 newspaper articles.

Aerial photographs for the last 80 years (since 1930) were available in nearly decadal intervals for West Chatham Island. I selected the best resolution photographs in order to analyse and illustrate a gradient of landscape change, vegetation dynamics and disturbance to some degree. The photographs were taken under different weather conditions, tide heights and slightly different angle views.

3.2.2 Semi-structured interviews

For this chapter, semi-structured, open-ended interviews were carried with three elders, *Sellemah,* Skippy and May Sam. These elders have lived in *Tl'chés* for a part of their lives and are descendants of the Discovery Island band people. They were interviewed about memories, experiences and TEKW related to place – with the purpose of generating a more precise and complete understanding about historical events cultural and social ecological change.

Interviews were conducted in groups or individually, depending on the occasion.

Many interviews with elder Joan Morris, *Sellemah*, were carried on the field, during fieldwork activities or celebrations in West Chatham Island. Sometimes meetings were arranged at the university campus, other times at the Songhees Nation reserve. Interviews with elders Skippy and May Sam were carried both at their home in West Saanich, and also on *Tl'chés*.

Audio-visual records of interviews were made with permission of participants as set out in the Ethics agreement and Participant Consent forms (see Appendix 1). Interviews followed interview guides (see Appendix 2), and were carried allowing for a "freewheeling quality of informal conversations" as recommended by Bernard (2002:5).

Interviews were analysed after each interview meeting, in a continuous process, and allowed for better understanding and improved planning of future meetings. Interviews were then transcribed and organized in files for processing and further analysis. Analysis of qualitative interview data followed classic methodology for identifying themes, patterns and relationships in each interview separately, subsequently crossing and comparing with other interviews in order to check for consistency of information (Bernard 2002, Ryan and Bernard 2003). Digital archives and printed versions of the transcribed interviews will be handed back to participants (see section *3.2.6*).

3.2.3 Terrestrial Cultural Ecosystem Mapping (TCEM)

This interdisciplinary study demanded an integrative approach to surveying and mapping local ecosystems and cultural elements. Therefore, a methodology inspired by the Sensitive Ecosystem Inventory (SEI), Terrestrial Ecosystem Mapping (TEM), the Field Manual for Describing Terrestrial Ecosystems procedures (Province of British Columbia 2006, 2010), and Rapid Rural Appraisal (Cunningham 2001) was adapted for enhancing surveying and mapping capacity for ecosystems within cultural landscapes of *Tl'chés*. This novel methodology is here called Terrestrial Cultural Ecosystem Mapping (TCEM). It builds on the suite of conventional ecological valuations, observations and descriptions for terrestrial ecosystems, providing additional cultural perspective to ecosystem assessments. In practice, it means adapting recommended site visit form FS1333 (see Province of British Columbia 2010) to this context, adding fields for cultural and historical significance observations in site visit form (see Appendix 3), as well as

considering and embracing cultural protocols during fieldwork activities. More importantly, it means that most site visits for terrestrial ecosystem surveys and mapping were made alongside Songhees community members aware of cultural dimensions of the islands. In case of not having a community member alongside in fieldwork, I consulted with *Sellemah* about sites of interest prior to fieldwork activities.

Field surveys started in early summer of 2011 and went throughout late fall of 2011. A total of 6 visits were made to West Chatham Island in order to map and identify different features in the landscape with the use of GPS unit and TCEM site visit forms. The main objective of this survey was to provide data for producing visual and spatial illustrations of present and historical ecological and cultural attributes for decision making in the context of conservation and restoration.

Following TCEM procedures, it was possible to provide a more detailed classification of ecosystems present in West Chatham Island. The CDR – Capital Regional District's (2005) assessment distinguished only coastal bluffs and woodlands ecosystem types, whereas this present study identified 10 different ecosystem subtypes, based on environmental physiognomy, plant associations, location, cultural and historical significance.

Field assessments followed environmental and ecological appraisal standards and procedures from the Field Manual for Describing Terrestrial Ecosystems (Province of British Columbia 2010) as well as cultural protocols (see section 4.2.1). The TCEM site visit form was designed to be completed during field outings, and incorporated geographical location and descriptions of sites, environmental conditions, successional status, plant associations, partial species list, cultural and historical significance, general comments and site diagram (Appendix 3).

A GPS unit recorded tracks for all paths travelled during fieldwork, and waypoints were intentionally marked in places of important observations noticed by surveyors (Figure 3.1). Pre-selection of sites to be surveyed in each field outing was done with the use of maps and GIS software, allowing for subdivision and selection of regions remotely. Descriptive photographs and plant collections accompany waypoint field notes.

The lack of random survey plots was compensated for encouragement of a more fluid approach, allowing local informants' insights and direction in the likes of a rapid

appraisal (Cunningham 2001, Herrick *et* al. 2005), identification, and mapping of ecosystem types, environmental conditions, dominant species, indicator species, invasive species and culturally significant species, as well as cultural and historical features in the landscape. Please refer to section *3.2.4* for methodology limitations clarifications.

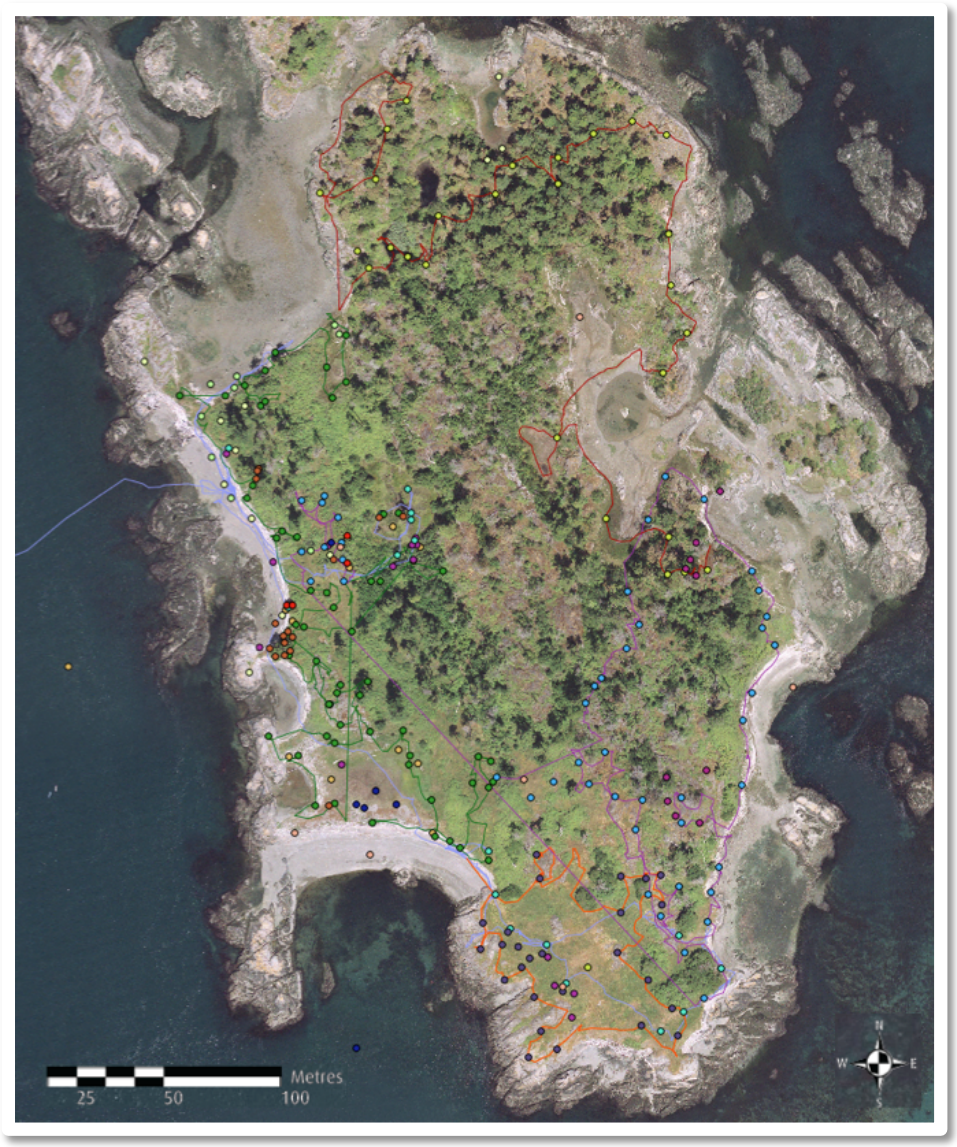

Figure 3.1: GPS tracks and waypoints in West Chatham obtained in fieldwork surveys: different colours represent different day visits.

Voucher specimen collections followed ethnobotanical procedures and classic botanical methodologies (Cunningham 2001, Bowles 2004). Specimens were identified

and organized in a field herbarium and will be deposited in the Ethnobotanical Collection at the University of Victoria's Herbarium.

All site forms completed during field outings were digitalized and organized in spreadsheets to assist data analysis and processing of spatial information (see *3.2.4*).

3.2.4 Spatial data processing: Quantum GIS

Spatial data processing and map design required GIS (Geographical Information System) software. QGIS (Quantum GIS) open-source software was employed.

Capital Regional District's Public Atlas website (viewer.crdatlas.ca/public/home) makes available high-resolution WMS (Web Map Service) orthophotograph layer (from 2005) and spatial data about sensitive ecosystems and rare species distributions for *Tl'chés*, which are used as a base layer for map building in this study.

This software also allowed geo-referencing a suite of 11 historical aerial photographs of West Chatham Island (1930-1980) obtained in archival work. Waypoints and tracks captured with the use of a GPS unit were downloaded to QGIS to be processed and included in the map as layers. Information associated to waypoints assisted the outline of polygons for different ecosystem types, invasive species distribution and other landscape features. All polygon areas were automatically calculated. In total, 62 layers were used to produce different maps employed in this chapter, of which 58 were developed using GPS and historical data obtained during this study. QGIS plug-in EVis© was used to organize individual information and photographs for all waypoints. This plug-in allows the user to easily "travel" from point to point, visualizing information and photographs in the same window viewer (Appendix 5).

QGIS allows for open migration of files (*.dbf*, *.prj*, *.qpj*, *.shp*, and *.shx*) to different GIS platforms. This will allow for continued use of present data for future projects. Transfer of aforementioned files to the Songhees Nation are described in section *3.2.6*.

3.2.5 Methodology scope and limitations

General recommendations are made to all islands of the archipelago, however, GIS procedures and Terrestrial Cultural Ecosystem Mapping (TCEM) assessments were only employed in West Chatham Island due to time and resource limitations. Another key

factor for concentration on West Chatham Island is because this is the island where the main guide and informant for this research, Songhees elder Joan Morris, *Sellemah*, lived during her childhood years.

Sampling methodology would ideally incorporate random plots throughout the island's territory, however, due to heavily invaded and overgrown condition of many sites, random sampling could not be done in a rigorous way. Thus, this study relies on qualitative detailed assessments using particular methodology and approach (TCEM). A few sites were not easily accessible through available transportation during fieldwork visits, therefore, were not surveyed. Moreover, surveys focused mostly on terrestrial ecosystems. Upper tidal and nearshore ecosystems were rapidly accessed and only briefly described in this study.

There is a growing concern among the Songhees Nation regarding the publication of exact locations for rare species, or species at risk. In order to honour this concern, only partial plant species lists were made available in this publication, and location of rare species were undisclosed, according to the agreement in the University of Victoria's Human Research Ethics Protocol 11-220.

3.2.6 Data storage and return to the community

In accordance to University of Victoria's Human Research Ethics Protocol 11-220, Songhees wish to retain data for future use and archiving. Therefore, research data storage and its use after the completion of this study is of Songhees' responsibility. It is desirable that interview, archival and spatial data is kept as part of this research record, so that it may be used in future endeavours regarding the restoration of ecological and cultural features at *Tl'chés*.

All research data were compiled and organized in a file box and handed to main informant and stakeholder of this study, Songhees elder Joan Morris, *Sellemah*. Physical copies of interviews, guides, consent forms, field notes, photographs, survey forms, and all related information were included in as a physical data package, as well as digital package in two DVDs and a data stick. An explanatory text accompanies both physical and digital data packages handed back to *Sellemah*, detailing conditions of use, and special assistance with spatial data files' use (see Appendix 4).

A couple of events (lunch and dinner) were held at the Songhees Community Garden House, organized by Community Garden Coordinator Wilfred George, for Songhees community to receive information on project results. Unfortunately, attendance was low.

3.3 Land-use and change at *Tl'chés*

Tl'chés is a dynamic social-ecological system – a cultural landscape. Such systems are considered multi-equilibrium, occurring in diverse combinations, of social and ecological relationships, which are dynamic and cyclical (Berkes and Turner 2006), and upon which depend the very subsistence of both cultural and ecological entities.

Human influence, presence or absence, has guided ecosystem structure, function and processes at *Tl'chés* for thousands of years. Here I focus on historical land-use and change over the last 200 years investigating different land-use patterns and disturbance events over this interval of time.

One of the earliest, and most detailed oral-history accounts found for *Tl'chés* was registered by anthropologist Diamond Jenness (n.d.). The story entitled "Origin of Salmon (and Use of Indian Consumption Plant, or "Indian celery" – *Lomatium nudicaule*)" details information on geography, salmon ecology and seasonal availability, fishing technology and traditional use and ceremonial significance of native plants in *Tl'chés* (Turner 2005:50). Portrayed information in this story is corroborated by ethnographers' accounts and knowledge holders interviewed today.

Boas (1890), Hill-Tout (1905) and Suttles (1974:20) point to an early occupation of the islands as temporary or permanent fishing villages. In the following years, after contact and Douglas' Treaties, Songhees lifeways and livelihoods changed dramatically with the encroachment of traditional lands and fishing rights' limitations, as well as the implementation of waged work for indigenous peoples in agriculture, fishing, canneries and housekeeping (Lutz 2009). The arrival of introduced plant and animal species and new technologies in the region (White 1980), have also influenced indigenous livelihoods greatly. Lutz (2009) speaks of a "*moditional economy*" practiced by indigenous peoples in the surroundings of Fort Victoria. This meant working for salaries during a certain time of the year, participating in a "wage economy", in order to maintain traditional practices for the rest of the year, and boost traditional potlatch "prestige economy". This

very hybridization is present in economics and ecology in *Tl'chés*, according to informants. For example, the islands were important for the continuation of traditional culture during times of potlatch prohibitions (Suttles 1974, Lutz 2009, Joan Morris pers. comm. 2011). Islands' historical hybrid land use has merged traditional technology and native species with introduced practices and new species for local livelihoods and resilience.

Chatham Islands were managed by *Sellemah*'s immediate family until the first half of the twentieth century. Fishing was the main source of subsistence. Paired with a more intensified use of terrestrial ecosystems and hybrid agricultural techniques, sheep were raised for wool, chickens and seagulls provided eggs, native bulbs and rhizomes would be produced concurrently with introduced tubers, bulbs, and vegetables in separate locations; native berries would be harvested throughout the islands, whereas heritage apple and plum varieties were cultivated in an orchard area, adjacent to the homestead.

Sellemah speaks of her days in Chatham Islands, when introduced chickens and sheep shared space with native frogs, snakes, otters, seals, seagulls, crows and other birds. Likewise, "*every kind of vegetable*" – peas, potatoes, carrots, onions, rhubarb, celery, turnips, cabbage, along with barley, boysenberries, raspberries and loganberries, and heritage apples and plums – were tended simultaneously with camas and chocolate lily, silverweed and springbank clover, bracken fern and native berries, such as salmonberries, salal, and red huckleberries, as well as clam beds, and sea urchins in kelp forests offshore (Joan Morris pers. comm. 2011).

Although *Tl'chés* has been central for indigenous people's fishing of salmon, halibut, reef-netting technology, harvesting of kelp, eelgrass, seaweed, sea urchins, oysters and clams in the region, it was also a place of sheep husbandry during the first half of 1900s (Joan Morris pers. comm. 2011, Skippy and May Sam pers. comm. 2011). Tom James, *Sellemah*'s grandfather, reported to the McKenna-McBride Royal Commission that he fished salmon, halibut and cod for four months, and would sell his catch to the local market, however only making enough to pay off gas expenses for his boat. Tom James also worked at the cannery in Esquimalt and would travel for 2-3 weeks to the American side to work on hop picking. If he needed to make extra money, he would sell some of his sheep (McKenna-McBride Royal Commission 1913). Commissionaires noted that locals

lived as fishermen, with little cultivation – only about 5 ha of "a few gardens and grass spots adjacent to ranchers" – and about 10 ha of pasture for over 180 sheep, about 100 chicken and fowl, a few cows and one horse, in all islands of *Tl'chés*, about a hundred years ago (McKenna-McBride Royal Commission 1913).

According to *Sellemah*, "the only thing they lacked in the islands was flour, sugar, canned milk, coffee and tea", which would be exchanged with island goods (seaweed, seal meat and oil or sheep wool) in Chinatown or a local market, in an informal economy (Joan Morris pers. comm. 2011, cf. Ommer and Turner 2004). Moreover, she recalls relatives and visitors bringing diverse gifts such as native "candy", soapberries – or "Indian ice-cream" – and canned candy.

Sheep shearing and salmon season would be the busiest times at *Tl'chés* (Joan Morris pers. comm. 2011). With salmon following currents that pass by east side of Discovery Island (British Colonist 1908), relatives from all over Vancouver Island, from Cowichan Bay and beyond, would come to participate in the fishing for months at a time in the summer. Likewise, in sheep shearing time, relatives would come to help and receive their share of wool and meat (Joan Morris pers. comm. 2011). Men would cross from West to East Chatham Island at low tide to the area by the old radio tower, where they could gather sheep and shear them while listening to the radio from the tower nearby.

Travelling between the islands was quite common (Joan Morris, May Sam and Skippy Sam pers. comm. 2001). In low tide, it was possible to cross over from West to East Chatham, and Discovery Island, in the right time of day and year (Joan Morris pers. comm. 2011). *Sellemah* remembers going to Discovery Island to visit the late Ned Williams. She would bring him rabbits as a gift, and take the gooseberries he grew there. Dugout canoes and gasoline fishing boat were used to travel longer distances to mainland (Vancouver Island) and elsewhere. The few memories *Sellemah* has about travelling a dugout canoe was with her great-grandmother and grandmother, leaving *Tl'chés* early in the morning and paddling around to the new Songhees reserve in Esquimalt (Joan Morris pers. comm. 2011). Elder May Sam speaks of her mother-in-law, Maryanne Williams, who she calls "*water woman*", for she "*lived off the canoe in Discovery Island*", teaching her children to do the same (May Sam pers. comm. 2011).

According to informants, a significant environmental episode in late 1950s forced

families to gradually move back to the inland reservations. Fresh water availability dramatically changed in cisterns and wells in both Chatham Islands and Discovery Islands (Joan Morris pers. comm. 2011, Skippy and May Sam pers. comm. 2011). These structures were likely fed by rainwater, especially underground filtered. *Sellemah* says the "well went dry", so her family did not have enough water to support themselves and animals in the island. Earlier, Harry Williams noted that water quality was an issue for raising cows, for some of the cattle brought to the island had died (McKenna-McBride Royal Commission 1913). A climatic condition of recurrent drier summers accompanied by potential fluctuation in rainwater was determinant to the movement of the last Songhees families out of *Tl'chés* (Joan Morris pers. comm. 2011, Skippy and May Sam pers. comm. 2011).

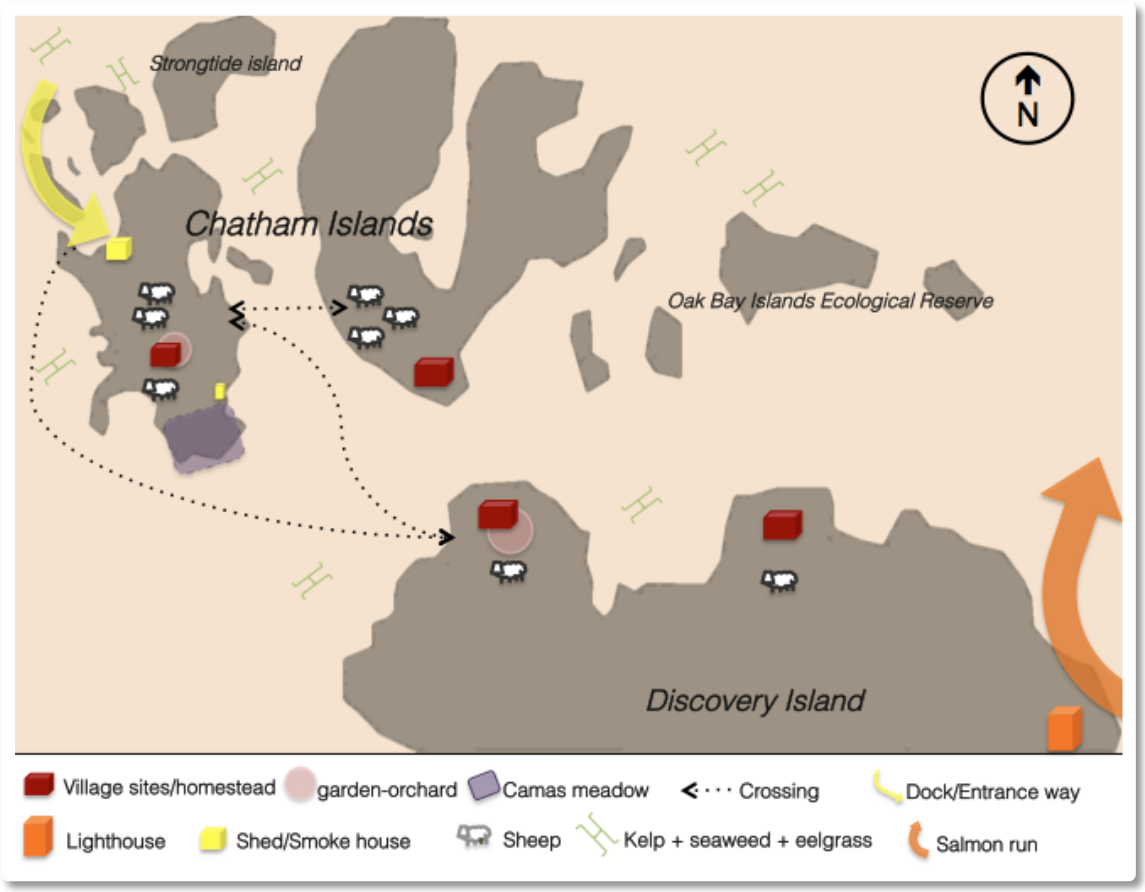

Figure 3.2: Map of historical land-use patterns for *Tl'chés*.

Figure 3.2 attempts to rebuild and illustrate land use patterns and resource locations over the last century, based on interviews and historical accounts. There were at least five

Big Houses in Discovery Island, spread in two main locations – likely the main places for winter dances (Keddie 2003, Joan Morris pers. comm. 2011). *Sellemah* recalls a story told about the *Sasquatch* banging on each Big House door in Discovery Island, "*but no one went to see, for they were scared*" (Joan Morris pers. comm. 2011). The lighthouse on southeastern Discovery Island is a legacy from 1886, built to mark the junction between Haro Strait and Juan de Fuca Strait for shipping (BC Parks 2010). Lighthouse and other structures were built in the southern portion of the island, bought later by Capt. E. G. Beaumont, who lived there from 1912 to the time of his death in 1967 (Times Colonist 1969, 1973). Chief Dick Kay told the McKenna-McBride Royal Commission that when *Tl'chés* was first made a reservation, a white man established a store where many Indians, even from across the border, would come and buy their groceries and supplies – many on credit. When time came for surveyors to lay limits of the reservation, in 1878, the storeowner stated Indians had not paid the goods purchased from him, so "he took the biggest and best part of the land" of Discovery Island, which he sold to white men who came and built on it (McKenna-McBride Royal Commission 1913). Later, in 1972, Discovery Island Marine Park was inaugurated in this piece of land donated by Beaumont to the province (Times Colonist 1974, BC Parks 2010).

A well-documented visit to Discovery and Chatham Islands in 1908 provides rich information about the landscape, fauna and flora at the time. The *British Colonist*'s article reports only a few "Indians" inhabiting the islands, with no signs of white men's invasion, except for the lighthouse on Discovery Island (British Colonist 1908). The author, Warburton Pike, explained that the moderate height of the conifer trees was due to soil poverty and prevalence of southeasterly gales, and described the abundance of deciduous trees, including oak, maple, alder and willow, as well as the "plentiful" arbutus. He also identified some flowering bushes, including *Ribes* sp. (possibly *R. divaricatum* Dougl. or *R. sanguineum* Pursh.), syringa (mock orange, *Philadelphus lewisii* Pursh.), spiraea (possibly *Holodiscus discolour* (Pursh.) Maxim., or *Spiraea douglasii* Hook.) and mentions the small cactus (prickly-pear, *Opuntia fragilis* (Nutt.) Haw.) reaching its northern limit of existence (although its range extends up to Texada and Mitlenach islands in the Salish Sea). In low water, tidal wetlands are covered with *Zostera marina* L. (eelgrass) – beloved by "wild fowl" (waterfowl, such as brant geese,

Branta bernica). Avifauna was also mentioned by Pike, highlighting spring visitors brant geese and the ubiquitous northwest crows (*Corvus caurinus*), which apparently found refuge and food there. Other birds noted were long-tailed ducks, scaups, golden eyes, surf scoters, harlequin duck, gulls, cormorants, divers, grebes and guillemots; plovers and other wading birds rest for a day or two during autumn migration (British Colonist 1908). Pike also mentioned that waters adjacent to *Tl'chés* were well stocked with fish, mostly cod, and that banks with shallow soundings in Haro Strait have supplied the local market with halibut for 40 years. When visiting the islands, visitors climbed to the top of the lighthouse and observed salmon running, like *"… acres of leaping fish, and Indians taking their harvest of salmon to be smoked for winter use, paddling their dugout canoes on the edge of the strong tide, and dropping back into the eddy as their forefathers did before the white man came*" (British Colonist 1908).

By the time the McKenna-McBride Royal Commission arrived in *Tl'chés*, in June 10th, 1913, almost one-hundred years ago, and spoke with Songhees Chief Dick Kay, through Harry Williams and Tommy James, Warburton Pike was likely a resident of Discovery Island, where he built a one-storey house in 1913 – later bought by Capt. Beaumont – and where Harry Williams dug him a well the year before (McKenna-McBride Royal Commission 1931, Chamberlin 1993). Landscape was described as "covered with brush and small logs, only fit for firewood", by Harry Williams, when asked if the lands were good for stock raising (McKenna-McBride Royal Commission 1931).

A map produced by Capt. G.H. Richards (1864) describes with detail the contour of the islands, tide movements, distribution of kelp forests and tree heights (see Appendix 5). This was possibly the first topographical map for *Tl'chés* and also brings drawings of horizontal views of Chatham Islands. Spring tides would rise up to 10-12 ft (about 3-3.5 m). Trees would reach up to 100 ft (30 m or more) on the Chatham Islands and up to 120 ft (36 m or more) on Discovery Island. Bull kelp was portrayed in large aggregations, especially in channels between Chatham Islands, the northwest shore of West Chatham Island and surrounding Oak Bay Islands Ecological Reserve - northeast of Discovery Island. Horizontal views of Chatham Islands illustrated the abundance of bluffs, as well as an enclosed canopy of uniform conifer species, probably shore pine and Douglas-fir.

Aerial photographs from the last 80 years represent important resources that illustrate a

gradient of landscape change, vegetation dynamics and disturbance to some degree (Figure 3.3). 1930 aerial photograph (Flight line A3066) depicts denser woodlands compared to subsequent decades, especially in western half of West Chatham Island. It also shows a well-defined outline of a house and surrounding structures and fences, probably for sheep husbandry and gardens. There is also a structure that looks like a dock in the northwest beach of the island. Another central element of this photograph is the darker coloration in the southern bluff, possibly indicating indigenous prescribed fire.

1954 aerial photograph (Flight line BC1671) shows the landscape of Songhees elder Joan Morris', *Sellemah*'s, childhood years. Homestead buildings and fencing are more spread out, reaching the northwest bluff and beach. There are lines in central vernal pond area, suggesting some type of cistern structure. A small structure, perhaps a shed, appears at the southeastern bluff. A wider pathway from the homestead towards dock area can be seen. Vegetation in the surroundings of the homestead is sparser than in the previous photograph, especially in western and northwestern woodlands.

1968 aerial photograph (Flight line BC5287) is the first post-abandonment photograph and portrays the effects of an uncontrolled fire earlier in the decade. According to informants, there was a fire inadvertently caused by stranded campers who needed rescuing and whose fire signal got away, burning the entire island (Higgs 2003:234, Joan Morris pers. comm. 2011). House and dock are burnt down. Woodland understorey looks more open and clearer than before. Herb and shrub layers appear to be sparser.

1980 aerial photograph (Flight number BCC248) suggests a landscape under ongoing ecological succession processes. Establishing herb and shrub layer and "thickening" understorey are well distinguished in this photograph. Northwestern woodland seems to have decreased in tree cover as well.

Landscape gradients observed in aerial photographs in the last 80 years or so, combined with historical accounts and interviews allow for a more inclusive social-ecological spatial analysis of land use in the islands, specifically West Chatham Island. It is likely that in 1930s, a hybrid farmstead was already in place. This social-ecological system remained until the last Songhees families left the West Chatham Island in late 1950s. Fences around the plank house possibly divided areas of food gardens and orchard

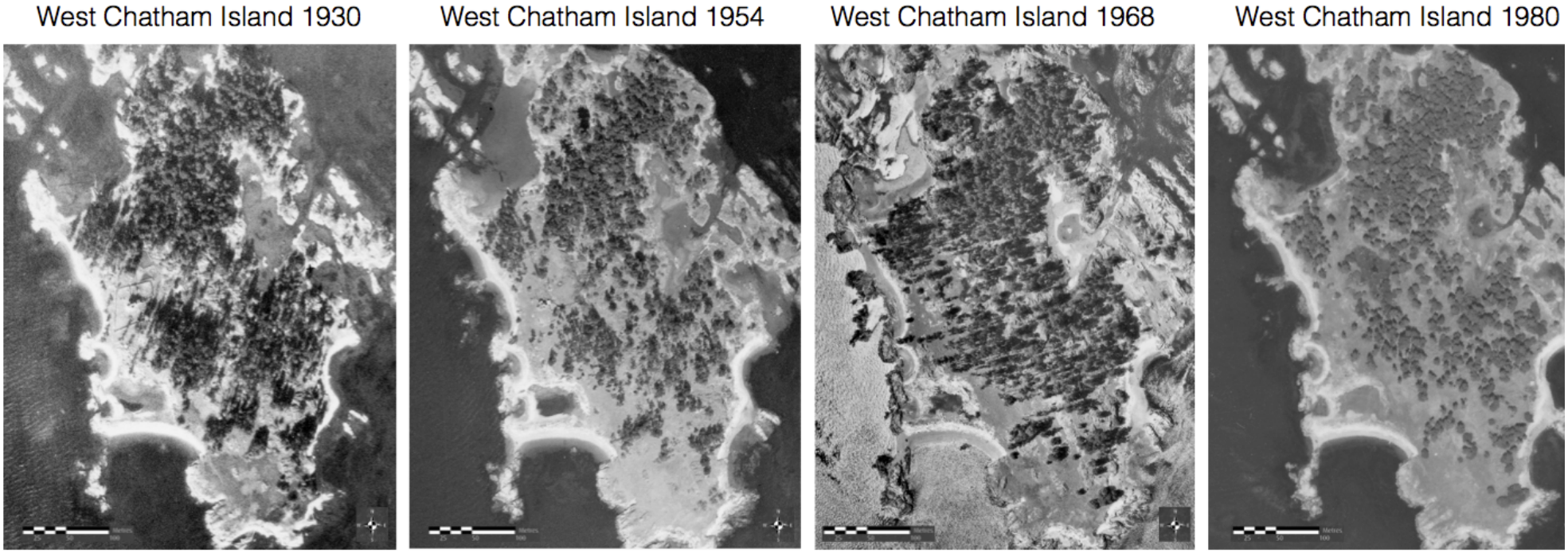

Figure 3.3: West Chatham Island historical air photographs, 1930, 1954, 1968 and 1980.

surrounding the house and excluded chickens and sheep. The southern bluff did not show any visible change, corroborating with the idea that it was tended as a traditional meadow for camas and other native species (Joan Morris pers. comm. 2011). Similarly, the northern woodland did not show signs of major physiognomic alteration, possibly preserved due to sacred features in the area.

A common trend shown in this gradient is the reduction in tree cover and the variation in shrub and herb layers. Use of timber for building structures in farmstead, docks and possibly canoes, and the need for open space for sheep grazing, have likely played an important role on thinning some woodland areas. *Sellemah* remembers woodland understorey more open and clearer than today (Joan Morris, pres. comm. 2011). Grazing within fences likely depleted vegetation biomass, and introduction of agronomic grasses to supply fodder for the sheep was a common practice in the region (White 1980). Land abandonment and accidental fires were fundamental in guiding the direction of change in the islands, especially facilitating the introduction and establishment of invasive Himalayan blackberry from the 1970s onwards.

In late 1990s there was a movement for landscape management restoration led by the Songhees Nation, especially reinstating the use of fire and harvesting of determined species to increase production and control of invasive species such as Himalayan blackberry. Unfortunately, more detailed information on treatment and locations were not made available to the present research.

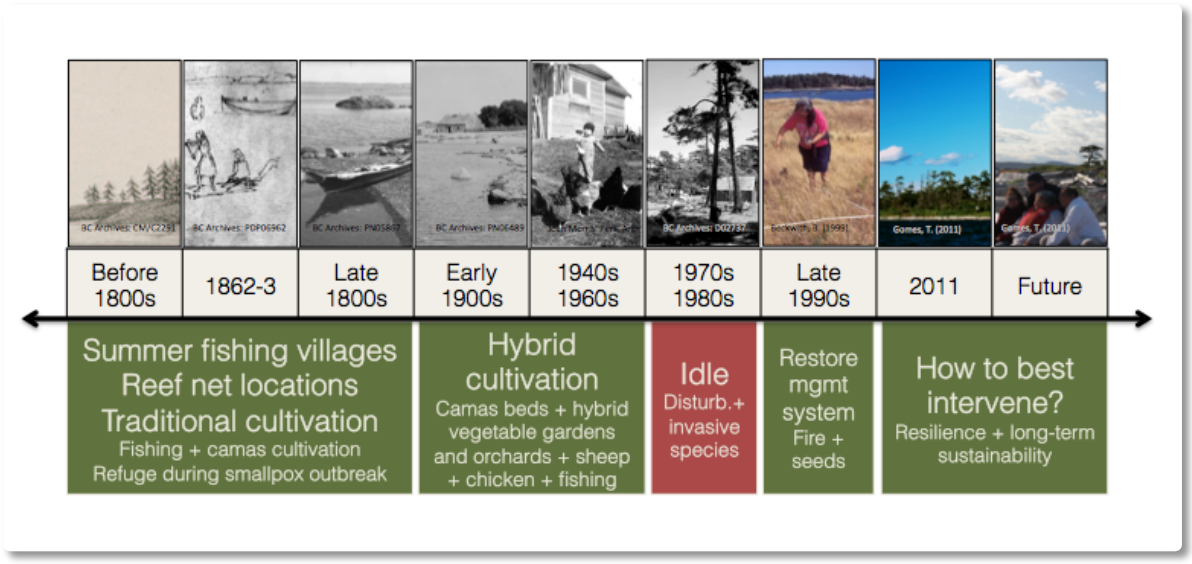

Figure 3.4: West Chatham Island timeline for land use change.

In all, it is possible to aver that West Chatham Island have been through dynamic succession processes guided by human influence, abandonment and disturbances. Figure 3.3 summarizes land use change in the islands over the last 200 years, up to the present moment, endorsing the primary question of this investigation.

3.4 Terrestrial Cultural Ecosystem Maps

Assisted by field surveys and remote sensing, maps for West Chatham Island were generated in order to illustrate ecological and cultural features present in the landscape, mainly to inform intervention planning.

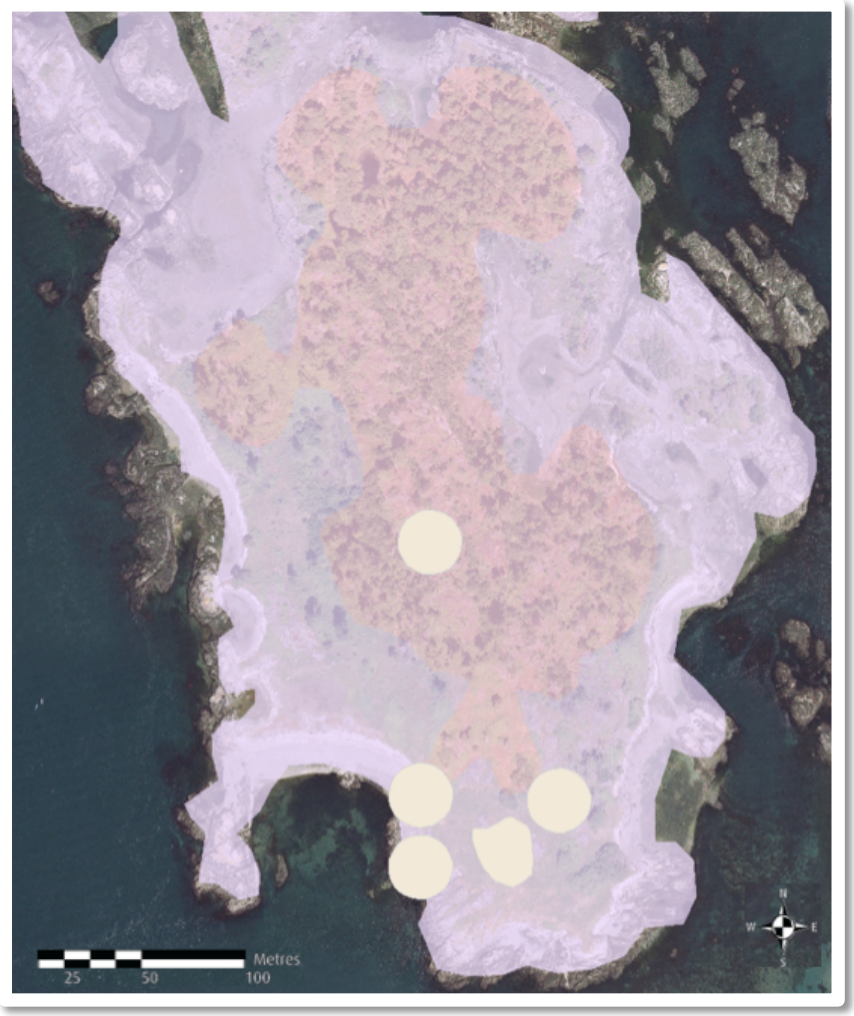

Figure 3.5: West Chatham Islands Sensitive Ecosystems and rare species distribution (CRD 2011). Purple: coastal bluffs, brown: woodlands. Beige circles: Rare species identification undisclosed in accordance to agreement in Ethics Protocol 11-220.

Field surveys provided environmental/vegetation physiognomy information, species composition, historical and cultural uses, and disturbance history. Aerial photography analysis, historical surveys and interviews have also informed map elaboration. Final maps were created via QGIS software, based on CRD (Capital Regional District) high-resolution orthophotograph and baseline information from 2005 about ecosystem types and species distribution (Figure 3.5).

Two-fold ecosystem classification provided by CRD (2005) of coastal bluffs and woodlands, was detailed in 10 different subtypes, based on environmental physiognomy, plant associations, location, cultural and historical significance (Figure 3.6).

Each ecosystem type received a reference number and a name based on ecosystem type and location. Table 2 shows the different ecosystem types identified in this study, their correspondent site-series (plant associations), area in hectares, percentage cover of the total island surveyed area, and dominant species.

Table 2: Ecosystem types in West Chatham Island.

#	Ecosystem Type	Site Series	Area (ha)	% Cover	Dominant
1	Meadow-bluff	Willow-HBB-Agrass	1.5	8.3	*Bromus tectorum* L.
2	Sparse woodland-bluff	Dfir-Arbt/HBB-Agrass	1.2	6.5	*Rubus armeniacus* Focke
3	Coastal bluff	Dfir-HBB/SB-Agrass	1.8	9.6	*Rubus armeniacus* Focke
4	Rocky outcrop-woodland	Dfir-HBB-Agrass	4.6	25	*Rubus armeniacus* Focke
5	Woodland	Dfir-Aspen-Willow	0.7	3.7	*Populus tremuloides* Michx.
6	Bluff	Dfir-Plum-HBB	1.0	5.5	*Rubus armeniacus* Focke
7	Sparse woodland-bluff	Dfir-Arbt-HBB	1.2	6.6	*Rubus armeniacus* Focke
8	Older woodland-bluff	Dfir-ShrPine-Arbt	3.2	17.5	*Arbutus menziesii* Pursh.
9	Tidal wetlands	SlvrW-VrnlGrass	3.0	15.4	*Anthoxanthum odoratum* L.
10	Vernal ponds	SlvrW-Clubmoss	0.4	2	*Potentilla egedii* Wormsk. L.
West Chatham Island			18.6	100	*Rubus armeniacus* Focke

Site series codes: HBB=Himalayan blackberry; Agrass= agronomic grasses (cheatgrass, vernal grass, velvet grass); SB= Scotch-broom; ShrPine=Shore pine; Arbt: arbutus; Dfir=Douglas fir; SlvrW=Silverweed; VrnlGrass=vernal grass.

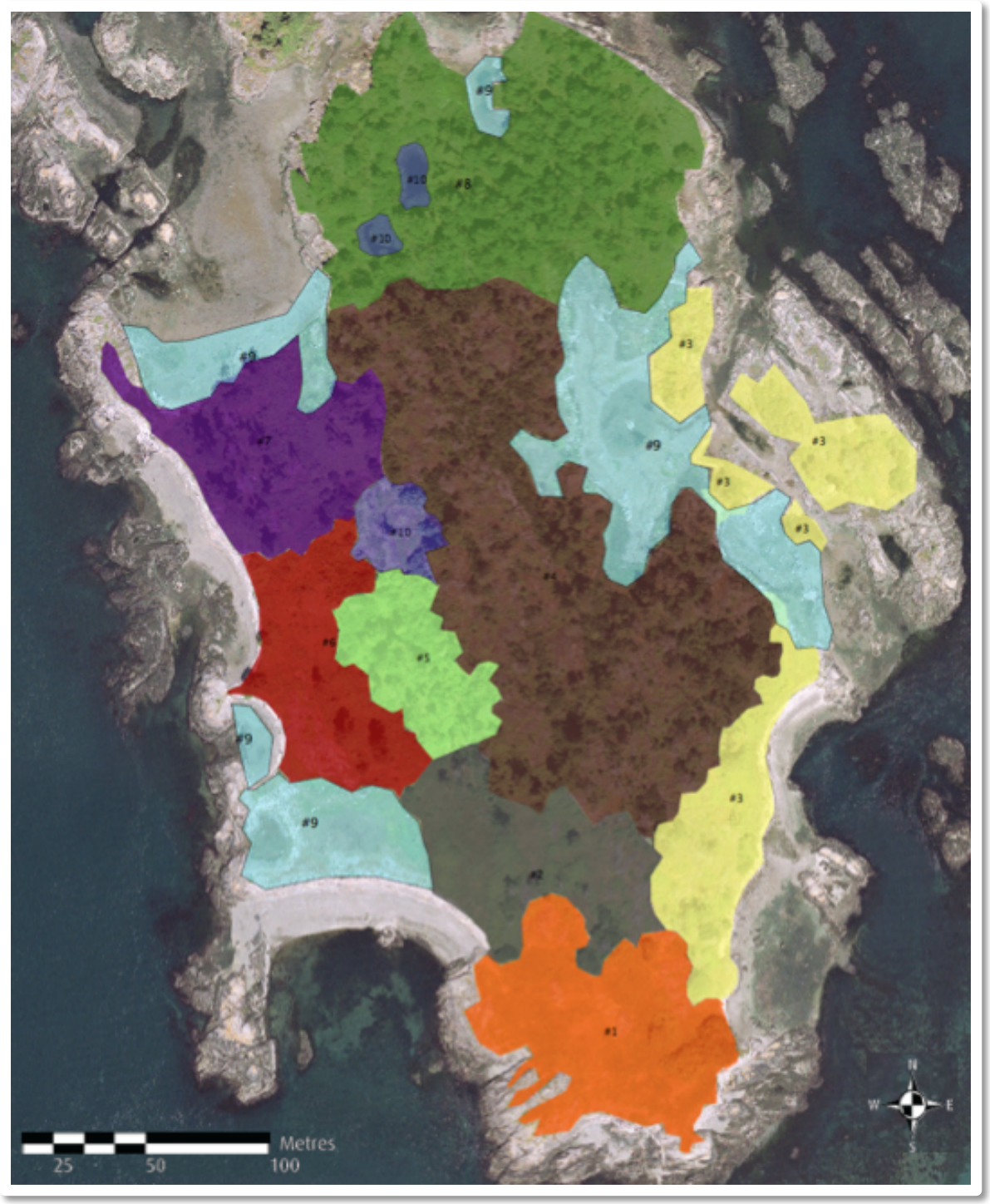

Figure 3.6: Ecosystem (sub-)types in West Chatham Island. 1: Southern Meadow-bluff; 2: Sparse woodland-bluff (south); 3: Coastal bluff (east); 4: Rocky outcrop-woodland; 5: Aspen-alder woodland; 6: West-central bluff; 7: Sparse woodland-bluff (west); 8: Older woodland-bluff; 9: Tidal wetlands; 10: Vernal ponds.

West Chatham Island area totals about 35 ha, of which 22.7 ha are coastal bluffs and

9.4 ha are woodlands (Ward *et al*. 1998). Total area surveyed in this research corresponded to about 18.6 ha of terrestrial ecosystems. A few sites were not easily accessible through available transportation during fieldwork visits, therefore, were not surveyed. However, a smaller, more focused survey area allowed for a more detailed observation and description of different types of ecosystems, plant associations, processes, and patterns.

Coastal bluff ecosystems correspond to a larger portion of ecosystem types in West Chatham Island. Woodlands, tidal wetlands, rocky outcrops and vernal ponds complete the list respectively. It is surprising, however, that invasive species such as Himalayan blackberry (*Rubus armeniacus*; syn. *R. discolor*), cheat grass (*Bromus tectorum*) and sweet vernal grass (*Anthoxanthum odoratum*) figure within site-series and among dominant species in different ecosystem types.

Voucher specimens were collected during field activities for site characterization and mapping (see Appendix 7). Informal observation of avifauna was also done with assistance of bird specialist and volunteer, Marilyn Lambert. The list of bird species identified for July 1st, 2011 can be found in Appendix 8.

3.4.1 Meadow-bluff

This 1.5 ha meadow-bluff ecosystem is better described as an early successional coastal bluff, maintained by southeasterly winds and saltspray, shallow soils, geese landing and grazing, and recent fire treatment (part of restoration effort in early 2000s). This site has invaluable significance as an important remnant of traditional bulb cultivation – camas (*Camassia leichtlinii* and *C. quamash*), chocolate lily (*Fritillaria affinis*), and associated species (Figure 3.7).

The site is heavily invaded by agronomic grasses (*Bromus tectorum*, *Holcus lanatus*, and *Anthoxanthum odoratum*) and Himalayan blackberry (*Rubus armeniacus*). Together, these species correspond to almost half of vegetation cover in this area. There is also an established invasion of Canada thistle (*Cirsium arvense* L. (Scop.)) in southeastern boundary and a recent Scotch broom (*Cytisus scoparius* (L.) Link) towards northwestern limits (Figure 3.8).

Figure 3.7: Southern meadow-bluff looking at Olympic Mountains.

This site was the object of restoration activities in late 1990s-early 2000s, aiming to reestablish the use of fire and traditional harvesting for increased production of native species and control of invasive. High populations of yarrow (*Achillea millefolium* L.) and bracken fern (*Pteridium aquilinum* (L.) Kuhn) confirm the recent fire treatments. Presence of culturally significant species edible or medicinal such as camas, chocolate lily, "Indian celery" (***q'ə̲xmín***, *Lomatium nudicaule*), yerba buena (*Clinopodium douglasii* (Benth.) Kuntze.), Nootka rose (*Rosa nutkana* C. Presl), Saskatoon (*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roem.) and trailing blackberry (*Rubus ursinus* subsp. *macropetalus* (Douglas ex Hook.) Roy L. Taylor & MacBryde) support the information that this site was used as a traditional cultivation area (Joan Morris pers. comm. 2011). Moreover, stones arranged as burial mounds indicate this area as a possible site for archaeological interest.

During a fieldwork visit, this was the place where *Sellemah* and other Songhees team members were able to re-discover camas and chocolate lily bulbs in a natural environment – some of them for the first time in their lives.

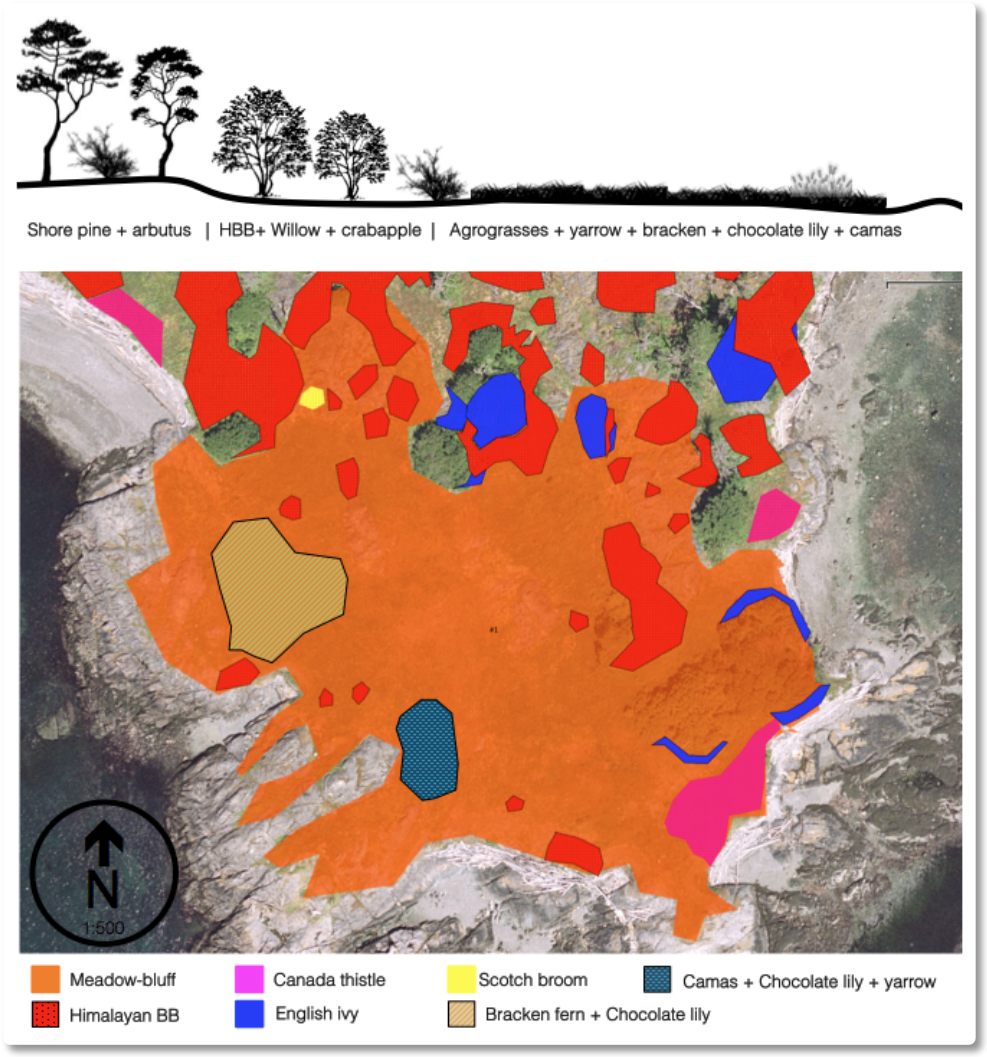

Figure 3.8: Southern Meadow-bluff horizontal and aerial diagram

3.4.2 Sparse woodland-bluff (south)

This sparse woodland-bluff is not the only ecosystem of its kind in West Chatham Island. Plant composition and environmental conditions differ this southern transitional sparse woodland-bluff from its northwestern bluff sibling. The site totals 1.2 ha, and has well established populations of invasive agronomic grasses (cheatgrass and velvetgrass) and Himalayan blackberry. English ivy (*Hedera helix* L.) and Canada thistle infringe a less accentuated invasion. Associations between Himalayan blackberry and English ivy were noted in southeastern boundary of the site.

Figure 3.9: Sparse woodland-bluff looking northwest.

The site, with average elevation of 3.6 m, is partially within historical *Camassia* spp. cultivation zone – recalled by *Sellemah* as an area restricted for her and other children to play at (Joan Morris pers. comm. 2011). Site shows signs of recent fire treatment, with tall Himalayan blackberry shrubs, bracken fern and fire scars on pine trees (Figure 3.9).

There is visible regeneration of arbutus (*Arbutus menziesii* Pursh.) and a large population of willow trees (*Salix* sp.). In fact, arbutus seedlings are the second most abundant species in the area, only surpassed by invasive Himalayan blackberry (Figure 3.9). Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) regeneration was also noted in smaller quantities. Decaying shore pine (*Pinus contorta* Douglas ex Louden var. *contorta*) and Douglas-fir trees are present in sparse woodland areas. In southeastern boundary, there is the largest population of fireweed (*Epilobium angustifolium* L.) found on the island, thriving amidst Himalayan blackberry thickets and Canada thistle stalks (Figure 3.10). Pacific tree frogs (*Pseudacris regilla*) were found in willow trees, adjacent to fireweed area – relatively far from vernal pond sites.

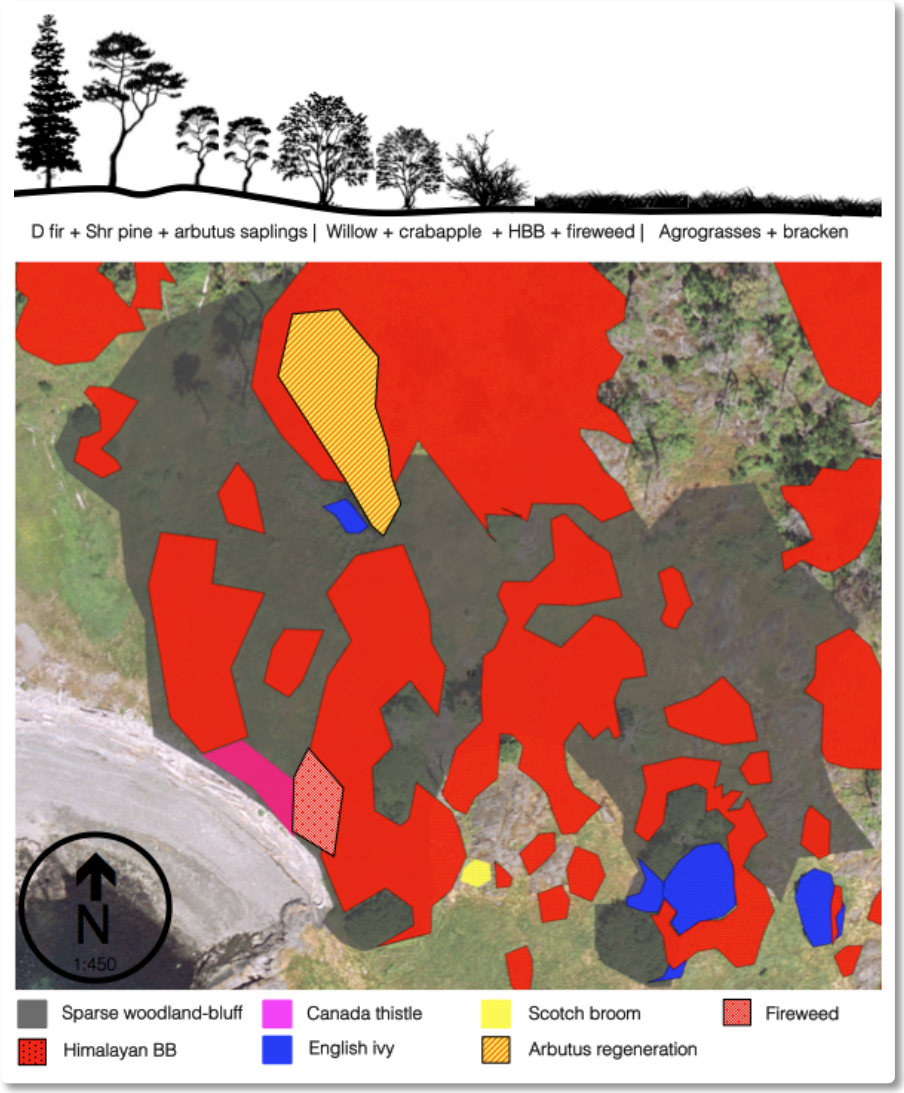

Figure 3.10: Sparse woodland-bluff (south) horizontal and aerial diagram.

3.4.3 Coastal bluff (east)

This site is an early successional coastal bluff with standing Douglas-fir (*Pseudotsuga menziesii*), shore (lodgepole) pine (*Pinus contorta* var. contorta) and arbutus (*Arbutus menziesii*) trees. This coastal bluff is a combination of detached bluff areas in eastern side of West Chatham Island, with same environmental conditions and similar plant composition. Soils are very shallow and rocky throughout. These coastal bluffs total about 1.8 ha in area, and are experiencing erosion of banks in many sites along the eastern coast.

Figure 3.11: Coastal bluff – Typical bank. Bonfire by unauthorized visitors the night before.

Most abundant species are again represented by Himalayan blackberry (*Rubus armeniacus*) and Scotch-broom (*Cytisus scoparius*) that dominate shrub layer in the site. It is likely that initial invasion of these species occurred after a fire that opened space for their arrival. Agronomic grasses (*Bromus tectorum* and *Holcus lanatus*) and English ivy (*Hedera helix*) also represent a problem invading herb layer. Willow trees (*Salix* sp.) are abundant in southeastern coast, and are target of heavy invasion of English ivy.

A few trees in southwestern boundary have fire scars, possibly a sign of fire treatment in early 2000s, or vandalism (Figure 3.11). Arbutus and Douglas-fir (*Pseudotsuga menziesii*) are less abundantly regenerating. Garry oak trees (*Quercus garryana* Douglas ex Hook.) are present in small islets in combination with Scotch-broom and silverweed (*Potentilla egedii*). Native trailing blackberry and Saskatoon (*Rubus ursinus* subsp. *macropetalus* and *Amelanchier alnifolia*) are spread throughout the site, towards southern and western boundaries with rocky outcrop (Figure 3.12).

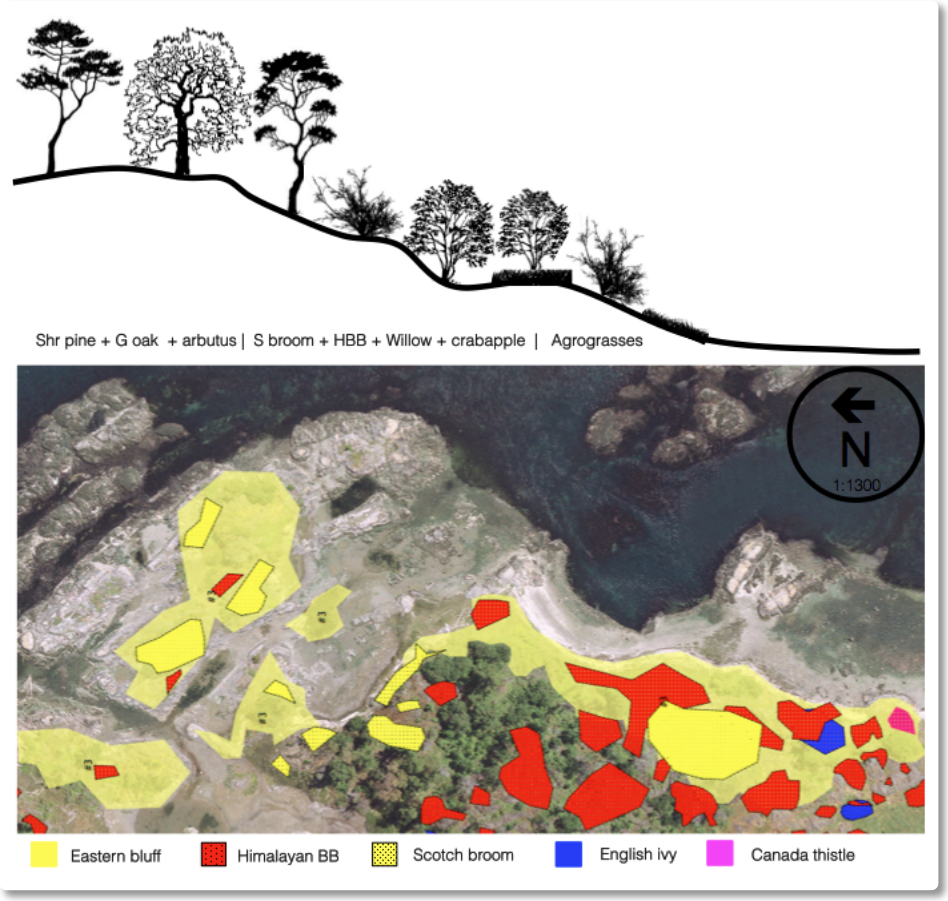

Figure 3.12: Coastal bluff (east) horizontal and aerial diagram.

An unauthorized camping site was located in an enclosed area, near the shore on the western tip of bluff. The area had a full barbecue grill, a table, log benches and bonfire structure; it was filled with litter, toilet paper, empty beer cans, and oyster shells. Around this area, there is a considerable concentration of Pacific crabapple (*Malus fusca* (Raf.) C.K. Schneid) associated with willow trees (*Salix* sp.). A few meters north, Scotch-broom dominates the understorey.

Dynamic and rapid tide variation, exposing or submerging bluff areas, is an important phenomenon in the process of plant distribution and dispersal in the smaller islets.

3.4.4 Rocky outcrop-woodland

This site corresponds to the central portion of West Chatham Island, and is the largest site mapped on this study, with an area of about 4.6 ha. Some of the highest elevation points in the island are within these areas – up to 10.7 m above sea level (Figure 3.13).

Dry conditions and shallow soils prevail in central areas - sparsely vegetated – deepening towards site boundaries – with standing Douglas-firs (*Pseudotsuga menziesii*), arbutus trees (*Arbutus menziesii*), shore pines (*Pinus contorta* var. *contorta*) and willow trees (*Salix* sp). This area is influenced by southern winds, and seasonal landing and grazing of Canada geese (*Branta canadensis*). As a matter of fact, geese populations appear not to be leaving for migration north or south due to the abundance of food and resting area (Marilyn Lambert pers. comm. 2011).

Figure 3.13: Rocky outcrop-woodland panoramic view looking southwest.

Throughout the rocky outcrop agronomic grasses (*Bromus tectorum* and *Holcus lanatus*) dominate, whereas in boundary areas, Himalayan blackberry (*Rubus armeniacus*) is the most abundant understorey species – encroaching arbutus seedlings, Pacific crabapple (*Malus fusca*) and oceanspray (*Holodiscus discolor*) shrubs. It is also important to note well-established Garry oak (*Quercus garryana*) trees on top of rocky cliffs, dividing space with decaying shore pines (*Pinus contorta* var. *contorta*) and Douglas-firs (*Pseutosuga mensiezii*) (Figure 3.14). Some of these conifers present deep fire scars on trunk base.

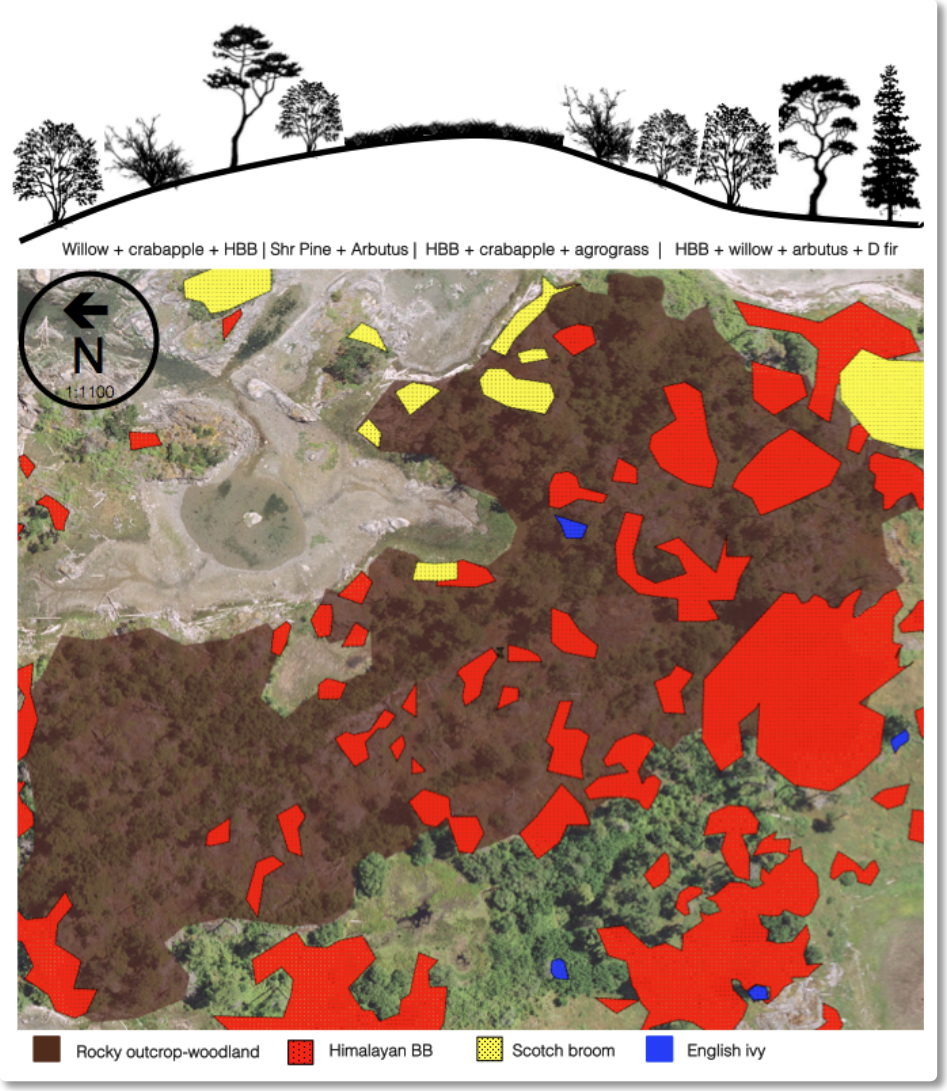

Figure 3.14: Rocky outcrop-woodland horizontal and aerial diagram.

3.4.5 Central woodland

Trembling aspen (*Populus tremuloides*) and red alder (*Alnus rubra* Bong.) are the most representative species in this moderately moist woodland site (Figure 3.15). Other species such as willow (*Salix* sp.), shore pine (*Pinus contorta* var. *contorta*) and arbutus (*Arbutus menziesii*) are also present in smaller numbers. This seems to be a young seral woodland. Colonization and establishment of current species possibly resulted from a fire disturbance at about 30-40 years ago. Aerial photographs depict an increase in vegetation cover in this very area in the last decades.

Not differently from other sites in the island, Himalayan blackberry (*Rubus*

armeniacus) is present in central woodland. This invasive species is well-established in southern boundary. Curiously, Himalayan blackberry is dying in the northern side of the site. Perhaps, shaded and wetter conditions towards north boundary hinder the blackberry to thrive. On the other hand, invasion of English ivy (*Hedera helix*) is likely to increase in all areas of this woodland. Moreover, a new species invasion, *Daphne laureola* L., common in Victoria and Oak Bay, was identified in western boundary of the site (Figure 3.16).

Pacific yew (*Taxus brevifolia*) was observed thriving among aspen woodland. Himalayan blackberry plants were observed dying in a wetter, shaded area, under aspen woodland. Remnants of fence poles lie within the same area.

Figure 3.15: Aspen-alder woodland: fall and summer 2011.

Aspen and alder, shrubs and other tree species seem to be competing for space, light, and nutrients in the natural processes of succession. It is expected that this enclosed woodland will be gradually become more open. It is possible that future availability of light in sparser woodlands allow for Himalayan blackberry conditions to thrive as an understorey species. However, the trend observed is that blackberry is one of the first species to be "replaced" in recent successional history of this woodland.

Arbutus saplings and firs are regenerating in southern boundary, where there is relatively more space – hefty competition with Himalayan blackberry. In this area, pines and firs show fire scars – possibly from accidental fires a few decades ago.

From the top of some rocky cliffs, it is possible to see Oak Bay and Willows Beach in westwards and East Chatham Island and Discovery Island across the channel.

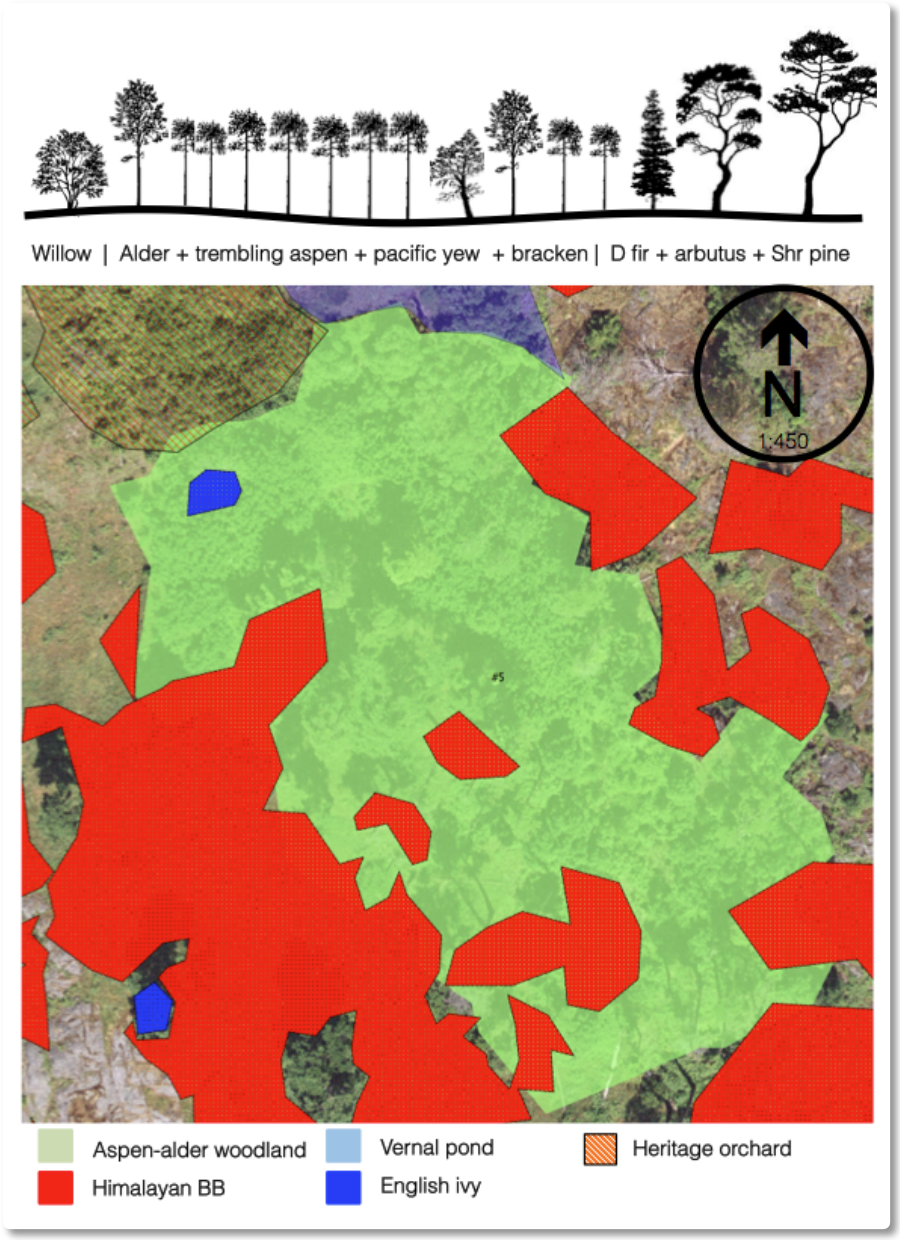

Figure 3.16: Aspen-alder woodland horizontal and aerial diagram.

3.4.6 West central bluff

West central bluff is possibly the most altered site in the island. This is due to a long history of intense hybrid (traditional and conventional) land use, disturbance and abandonment. The 1 ha site encompasses remnants of old homestead, house foundations, fences and introduced heritage apple, plum and domesticated crabapple varieties – from an old orchard (Figure 3.17). There are no detailed ecological accounts prior to the construction of the old plank house in West Chatham Island. Supposedly, there was some

disturbance in the area for preparation of house foundations and harvesting of timber for house, fences and other farmstead related uses (fuel, tools). This site is partially influenced by southern winds and saltspray. Canada geese (*Branta canadensis*) often use the open areas of the site for landing, resting and grazing. Unauthorized visitors and campers evidently visit the site from time to time.

Figure 3.17: West-central bluff: house and orchard site.

Himalayan blackberry (*Rubus armeniacus*) and agronomic grasses (*Bromus tectorum* and *Holcus lanatus*) dominate the site. Himalayan blackberry is spreading to open areas. Other invasive (potentially invasive) species such as English ivy (*Hedera helix*), daphne (*Daphne laureola*), common English hawthorn (*Craetegus monogyna* Jacq.), Canada thistle (*Cirsium arvense*), wild carrot (*Daucus carota* L.), and field garlic (*Allium vineale* L. subsp. *vineale*) are found in the west central bluff. Arbutus (*Arbutus menziesii*), Douglas-fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis* (Douglas ex D. Don) Lindl.) are regenerating along the boundaries of the bluff (Figure 3.18).

Shell middens are profuse throughout the site. A few mounds were observed especially in the area where the old house used to be and within near shore banks.

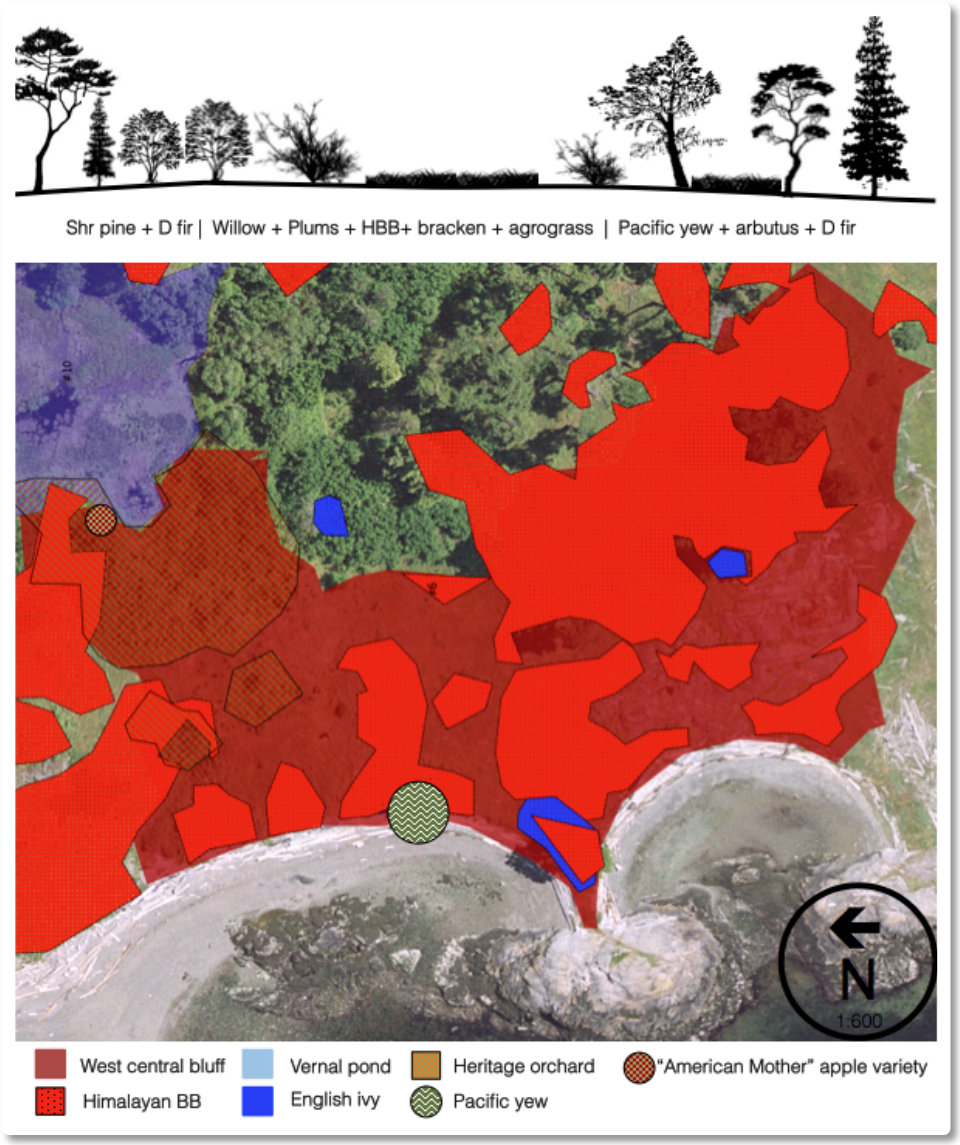

Figure 3.18: West-central bluff horizontal and aerial diagram.

A young plum woodland was formed in the eastern boundary of the site. A few older plum trees, remnants of the 1940s orchard, have proliferated by sending new sucker shoots and there are now more than 100 saplings averaging about 1.5-2 m tall. Two different varieties of heritage plums were observed, one with yellow fruit, the other with reddish to purple fruit. These varieties could not be properly identified, however, it is likely that the plum varieties might be a hybrid heritage cultivars (Figure 3.19).

Figure 3.19: Heritage plum orchard. Yellow plums (*Prunus domestica*).

Among the numerous plum saplings and mature plum trees, a couple of non-native unidentified crabapple cultivars (*Malus* L.) and cherry and saplings (*Prunus avium* (L.) L.) are found. Further into the orchard, an old heritage apple tree thrives in wetter soil, surrounded by Himalayan blackberry shrubs. This is a mid-1800s "American Mother" apple variety, original eastern United States (USDA 2011). This tree produced only two apples over the observation season (Figure 3.20).

A large Pacific yew (*Taxus brevifolia*), another culturally and ecologically significant species, is located in a peculiar area, in the westerly boundary of the site, in the line between bank and pebble beach. Actually about 40% of above ground biomass grows gnarly towards the beach. This tree's DBH (diameter at breast height) is 64.3 cm, no taller than 8 m, placing this individual much above the average DBH of 30 cm (Pojar and McKinnon 2004). Tree was surrounded on the east side by an invasive association of Himalayan blackberry and English ivy; and on the west by beach pebbles and an eroding bank – a serious problem throughout this side of the island, noted by Songhees surveyors (Figure 3.21). The tree also had various logs placed in between branches, likely to have been the result of a careless attempt to build a tree house. Finally, the presence of a few *Camassia* sp. stalks support *Sellemah*'s memories of old gardens (hybrid: native and exotic plants) adjacent to homestead.

Figure 3.20: Heritage "American Mother" apple variety (*Malus domestica*).

.

Figure 3.21: Pacific yew tree (*Taxus brevifolia*) on central beach in West Chatham Island.

3.4.7 Sparse woodland-bluff (northwest)

This 1.2 ha coastal bluff is mainly influenced by winds, salt spray and slightly by tide fluctuation. On the northern boundary, the bluff meets a small bay that was used as main dock by the last Songhees families. To the west sits the longest beach on West Chatham Island. To the south is the old orchard site, and towards east boundary the site tends to become wetter – with a nearby tidal wetland – and then rockier.

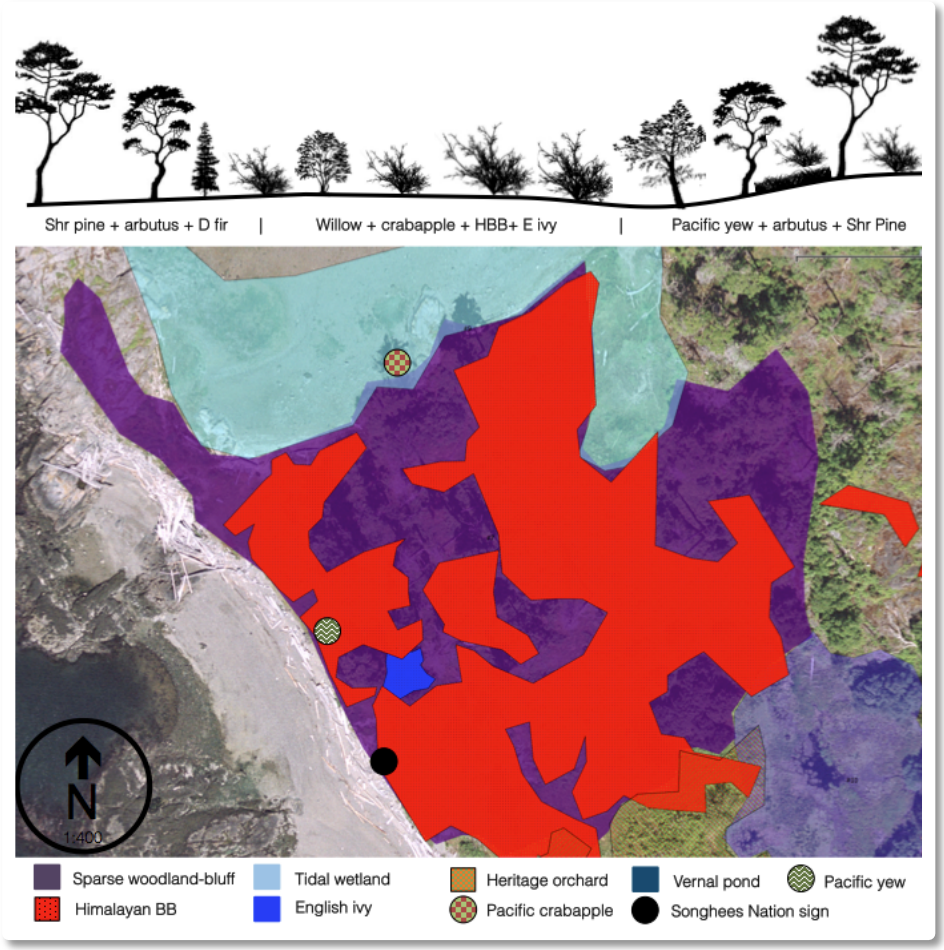

Figure 3.22: Northwest sparse woodland-bluff horizontal and aerial diagram.

In general, the site is heavily invaded by Himalayan blackberry (*Rubus armeniacus*). Himalayan blackberry is well established and covers more than 60% of this site area. Trees are very sparse. Regeneration is less accentuated due to blackberry rapid and heavy invasion since major fire event in 1960s. This event allowed for regeneration of local vegetation, but also the arrival and establishment of invasive species such as Himalayan blackberry, which has been outcompeting native species and continuing to spread into

open areas. Some Douglas-firs (*Pseudotsuga menziesii*) have fire scars, probably from back then, and a few are decaying. Arbutus saplings (*Arbutus menziesii*) and young firs are thriving in spaces surrounded by Himalayan blackberry. English ivy is present in many areas – some inaccessible – and invasion is likely to increase (Figure 3.22).

In northeastern and northwestern tips of the site there are surprisingly large populations of arbutus saplings. At each point more than 50 young trees, averaging 3m tall, are thriving inside invasive blackberry territory. In fact, below arbutus sapling aggregations, blackberry stalks are somehow reduced if not absent.

In northern tip of the bluff, almost into the beach, a large Pacific crabapple tree (*Malus fusca*) was identified. The tree is remarkably large, growing gnarly, spreading branches from bluff towards the beach. It receives tides regularly and apparently is well adapted to the extreme conditions of the site. This is an older tree and is sending shoots from its base into the bluff. There are approximately 20 saplings coming from larger tree.

Towards the southwestern boundary, there is another Pacific yew (*Taxus brevifolia*) tree amongst Himalayan blackberry thickets. This tree is partially dead – shaded portion facing east has dried up.

Figure 3.23: Songhees First Nation Sign on sparse woodlands facing central beach. Reads: "*Songhees First Nation: no camping or trespassing allowed. By order of chief and council.*"

Songhees First Nation has put a sign (Figure 3.23) on a Douglas-fir, in the western portion of bluff, which reads: "*Songhees First Nation: no camping or trespassing allowed. By order of chief and council*." The sign is easily readable by someone on the beach, however, not very effective for people in the water, travelling by boat or kayak, who might dock at different sites of the islands.

3.4.8 Older woodland-bluff (north)

This is perhaps the least altered site of all sites surveyed in this study. It is an older woodland-bluff in the northernmost portion of West Chatham Island, and has an area of approximately 3.2 ha, the second largest ecosystem (sub-)type (Figure 3.24).

Figure 3.24: Northern older woodland-bluff panorama.

Woodland-bluff physiognomy varies between areas of enclosed canopy and more open spaces. *Arbutus menziesii* is the most abundant species. Here the woodland presents a more diverse understorey and stratification is more evident. Completing canopy species are shore pines (*Pinus contorta* var. *contorta*) and Douglas-fir (*Pseudotsuga menziesii*), and Garry oaks (*Quercus garryana*) in more exposed areas. Willow (*Salix* sp.), Pacific crabapple (*Malus fusca*) and oceanspray (*Holodiscus discolor*) are the dominant species in the understorey. Saskatoon (*Amelanchier alnifolia*) and snowberry (*Symphoricarpos*

alnus (L.) S.F. Blake) are important shrubs in this site. Bracken fern (*Pteridium aquilinum*), rattlesnake plantain (*Goodyera oblongifolia* Raf.), trailing blackberry (*Rubus ursinus* subsp. *macropetalus*), among others, are the main native species in herb layer. Only a few shore pines on the eastern side had apparent fire scars. The eastern boundary of woodland-bluff was more open than other areas and showed signs of human disturbance such as trampling and littering – beer cans and garbage. A Pacific yew tree (*Taxus brevifolia*) was identified in wetter conditions, surrounding the vernal pond area (Figure 3.25).

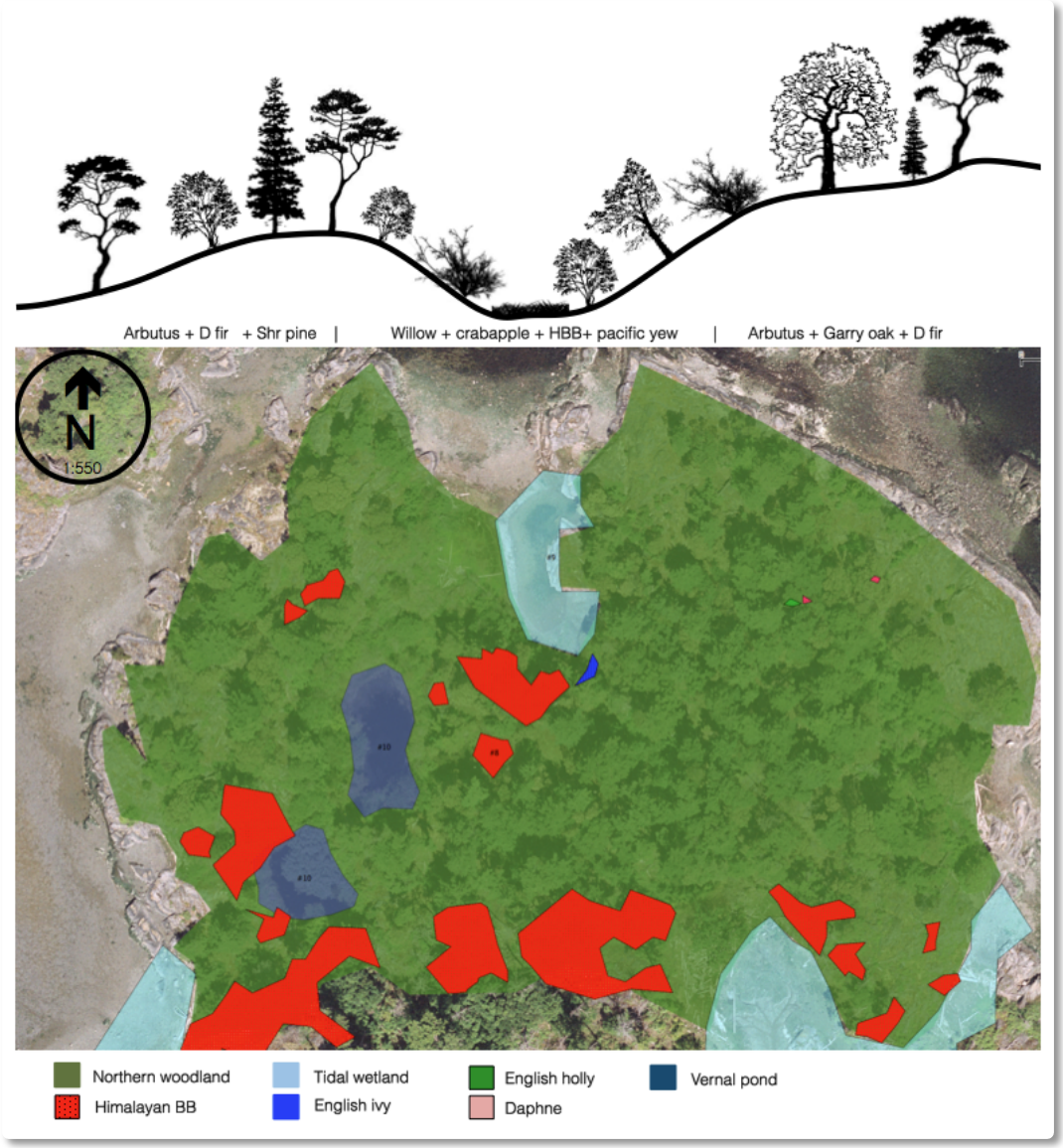

Figure 3.25: Northern older woodland-bluff horizontal and aerial diagram.

Although non-native species are less abundant in this site, they appear more diverse. Himalayan blackberry (*Rubus armeniacus*), agronomic grasses (*Bromus tectorum* and *Holcus lanatus*) and English ivy (*Hedera helix*) are the most profuse invasive species. Non-native species, in initial stage of establishment, thus, potentially invasive in the island are common hawthorn (*Crataegus monogyna*), Himalayan cotoneaster (*Cotoneaster simonsii*), English holly (*Ilex aquifolium* L.), daphne laurel (*Daphne laureola*) and cut-leaf evergreen blackberry (*Rubus laciniatus* Willd.) – last three highly invasive in the Vancouver Island region.

A young bald eagle (*Haliaeetus leucocephalus*) and a great blue heron (*Ardea heorodias*) were seen flying over this site, probably arriving or leaving nests in taller trees.

3.4.9 Tidal wetlands

These ecosystems are spread along low elevation coastal areas in West Chatham Island. Tidal wetland sites are classified under one category for similarly in environmental conditions, plant composition and association, and disturbance regimes. Altogether tidal wetlands total 2.8 ha and elevation averages at 1.8 m.

Sites are maintained by seasonal and/or tidal flood-drought periods. The erosion of bluffs and banks are also a concern in the boundaries of these sites.

Non-native invasive sweet vernal grass is present and dominant in all sites. Important silverweed (*Potentilla egedii*) populations are also found in all sites in high abundance.

A well-balanced herb composition of sea asparagus (*Salicornia pacifica* (Standley) A.J. Scott), gumweed (*Grindelia squarrosa* Pursh. Dunal), bracken fern (*Ptedirium aquilinum*), small-flowered birds-foot trefoil (*Lotus micranthus* Benth.), silver burweed (*Ambrosia chamissonis* (Less.) Greene), beach pea (*Lathyrus japonicus* var. *maritime* (L.) Kartesz & Gandhi) and invasive English ivy (*Hedera helix*) are surrounded by equally diverse and well-balanced shrub and tree composition of willow (*Salix* sp.), oceanspray (*Holodiscus discolour*), Pacific crabapple (*Malus fusca*), red osier dogwood (*Cornus stolonifera* Michx.), trembling aspen (*Populus tremuloides*), black twinberry (*Lonicera involucrata* (Richardson) Banks ex Spreng.), invasive Himalayan blackberry (*Rubus armeniacus*), and arbutus (*Arbutus menziesii*) (Figure 3.26).

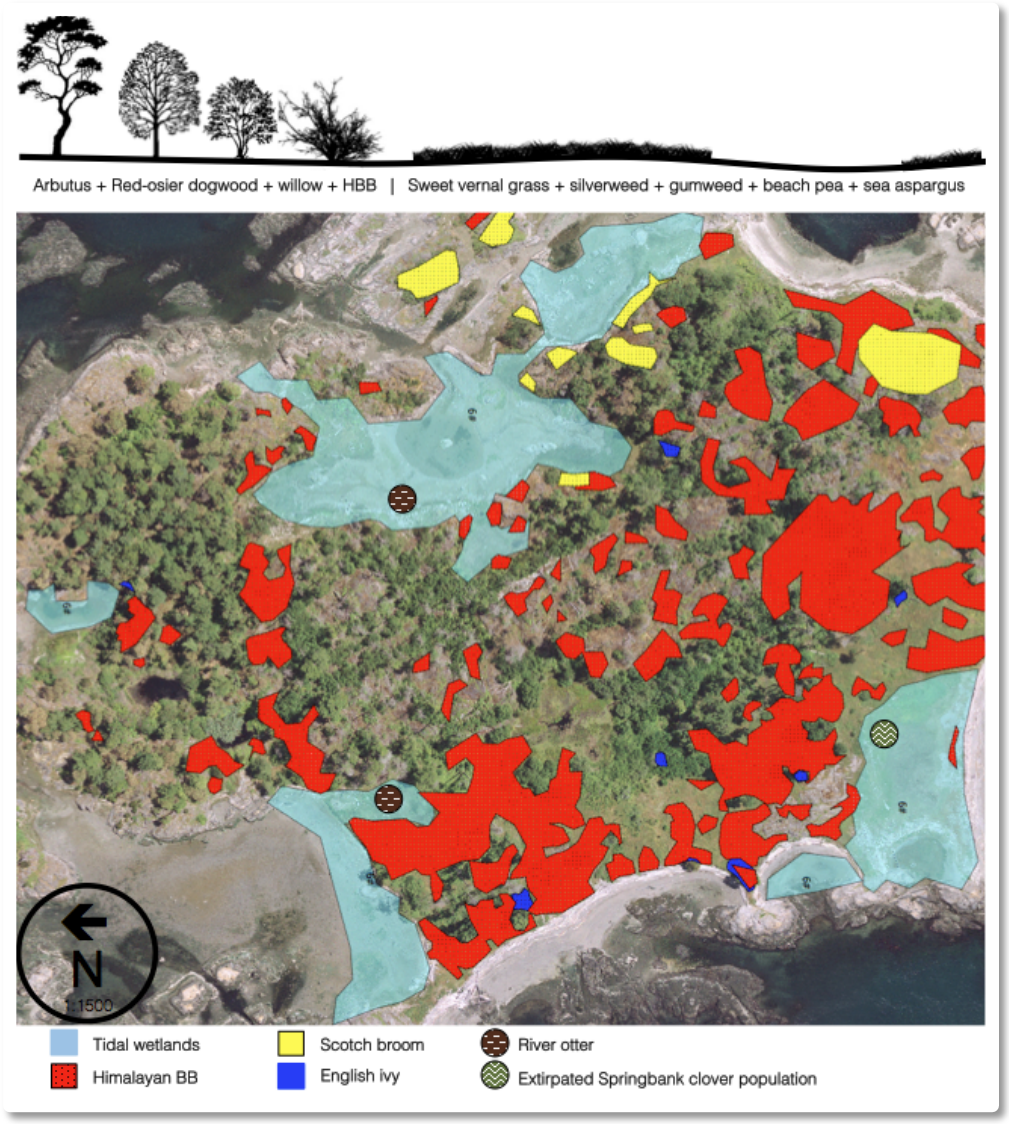

Figure 3.26: Tidal wetlands in West Chatham Island horizontal and aerial diagram.

Previous formal and informal inventories have indicated the presence of springbank clover (*Trifolium wormskioldii* Lehm.) in northeast portion of southern marsh; however, in this present study there were none to be found.

Garter snakes *(Thamnophis elegans*) were found in all sites. River otter (*Lontra canadensis*) tracks and feces were also observed in eastern and northwestern marshes.

Northwestern marsh is historical dock area. Pieces of wood and remnants of fence poles are still found in the site (Figure 3.27). Southwestern marsh served as gathering place and for celebrations during the length of this study.

Figure 3.27: Tidal wetlands in West Chatham Island. Top left: southwestern marsh. Top right: northwestern marsh. Bottom left: Western tidal pool and marsh. Bottom right: Northern tidal pool.

Wetlands and beaches were likely used for food production and harvesting in the past. Marshes would supply silverweed rhizomes and other edible herbs, while clam and oyster beds would be designed and harvested at beaches or tidal pools. Local informants noted patterns and structures that resembled traditional cultivation of bivalves.

3.4.10 Vernal ponds

Vernal ponds are the smallest ecosystem category identified in the island. The three sites investigated comprise of total 0.3 ha in area. These ponds are under similar environmental conditions, ecological processes and function. Fall and winter rains provide water to maintain these areas flooded during most part of the year, gradually drying in summer. The central pond, adjacent to old homestead area, is the largest one and most altered due to historical land use. Presently, this site is well protected, not easily accessible (Figure 3.28). Two other ponds are located within older woodland-bluff, somehow sheltered, and, therefore, do not represent heavily disturbed sites.

Figure 3.28: Vernal pond adjacent to heritage orchard and house site.

Species composition is relatively similar between sites. Possibly due to the difficult access, wet and shaded conditions in all ponds, these sites contain lowest invasion rates in the island. Himalayan blackberry (*Rubus armeniacus*) thrives on the boundary of all of the ponds. In this case, the introduced blackberry has served as buffer against major disturbances for vernal ponds. Canopy species are composed of willow (*Salix* sp.), red osier dogwood (*Cornus stolonifera*), and Pacific crabapple (*Malus fusca*). Dominant species in all sites is Pacific silverweed (*Potentilla egedii*). Silverweed occurs in association with clubmoss (*Lycopodium annotinum* L.) and water smartweed (*Polygonum amphibium* L.) in the central pond (Figure 3.29).

Garter snakes *(Thamnophis elegans*) were found in the central pond. The pond serves Pacific tree frog *(Pseudacris regilla*) as breeding site – very prolific in early June. River otter (*Lontra canadensis*) tracks and/or feces are present on tree sites.

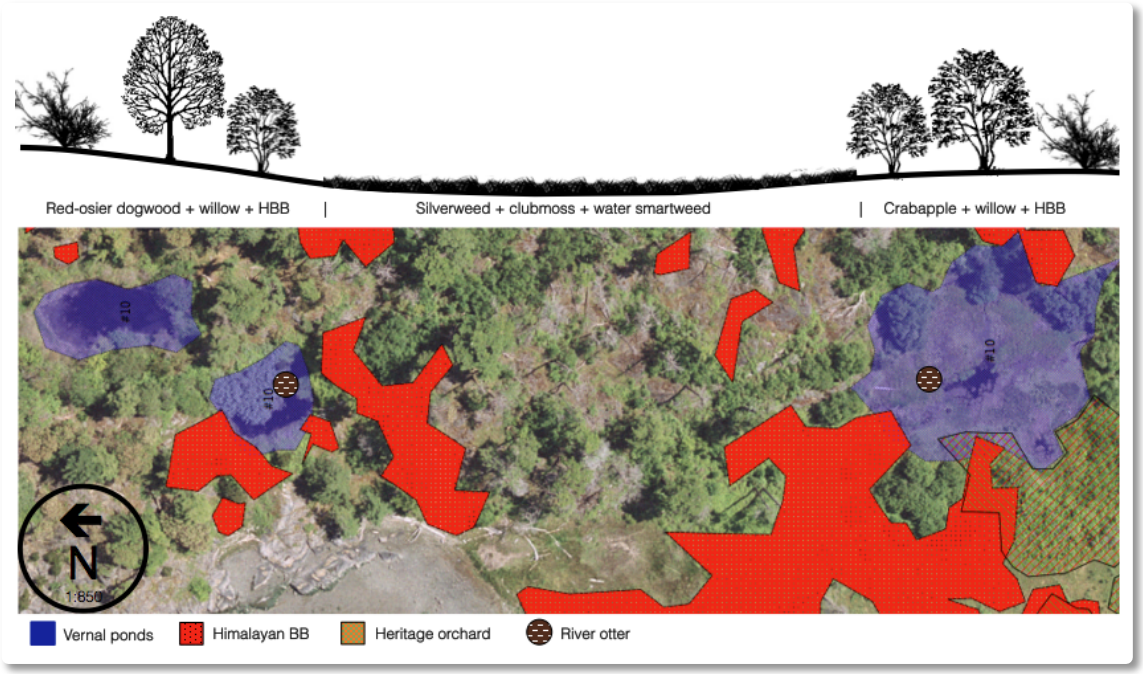

Figure 3.29: Vernal ponds in West Chatham Island horizontal and aerial diagram.

3.4.11 Invasive species

Invasive species are by far the most serious threat to biodiversity in West Chatham Island. Most prolific species are Himalayan blackberry (*Rubus armeniacus*), agronomic grasses: cheat grass, velvet grass and sweet vernal grass (*Bromus tectorum, Holcus lanatus* and *Anthoxanthum odoratum*), Scotch-broom (*Cytisus scoparius*) and English ivy (*Hedera helix*) (Table 3).

Invasive species are present is practically all regions of the island, and distribution is predominantly even with the exception of Scotch-broom, concentrated in eastern bluff, Canada thistle, in southern bluffs, and other species with minor impact. Figure 3.30 illustrates spatial distribution.

Himalayan blackberry (*Rubus armeniacus*) is the most abundant species in West Chatham Island. Although well established in most regions of the island, the species is still spreading in some sites. Comparing 2011 GPS tracks generated during fieldwork visits to the island with the CRD orthophotograph from 2005 – which serves as a base map for this study –Himalayan blackberry distribution boundaries are slightly altered and advancing in a few sites, especially on the western bluffs. A rapid dispersal mechanism

for this species is vegetative reproduction, in which a cane grows upwards and then arches over and trail on the ground, layering and rooting at the nodes within a short period of time (GOERT 2002). In less than two years, a single cane cutting can grow into a thicket 5 metres across (GOERT 2002). Within and underneath these thickets virtually no herbs or other shrubs can thrive. Seeds are produced abundantly in these aggregate fruits, at least 700 seeds per square meter, but the germination rate is only about 10% (GOERT 2002). Birds are responsible for spreading seeds to different locations, and were observed nesting in Himalayan blackberry as well as feeding on the fruits during this study.

Table 3: Area cover of invasive species in West Chatham Island.

Invasive Species		Family	Area (ha)*	% cover	Distribution
Himalayan blackberry	*Rubus armeniacus* Focke	Rosaceae	14.3	85.2	Throughout
Agronomic grasses: cheat grass, velvet grass, sweet vernal grass	*Bromus tectorum* L. *Holcus lanatus* L. *Anthoxanthum odoratum* L.	Poaceae	1.9	11.4	Throughout
Scotch-broom	*Cytisus scoparius* (L.) Link	Fabaceae	0.36	2.2	Eastern bluffs
English ivy	*Hedera helix* L.	Araliaceae	0.14	0.8	Throughout
Canada thistle	*Cirsium arvense* (L.) Scop.	Asteraceae	0.06	0.4	Southern bluffs
Daphne	*Daphne laureola* L.	Thymelaeaceae	n/a	-	Centre and north
English holly	*Ilex aquifolium* L.	Aquifoliaceae	n/a	-	Northern woodland
Himalayan cotoneaster	*Cotoneaster simonsii* Bak.	Rosaceae	n/a	-	Northern woodland
Common hawthorn	*Craetegus monogyna* Jacq.	Aquifoliaceae	n/a	-	Centre and north
Hairy cat's ear	*Hypochaeris radicata* L.	Asteraceae	n/a	-	Southern bluff
Evergreen blackberry	*Rubus laciniatus* Willd.	Rosaceae	n/a	-	Northern bluff
Total Invasive Species			16.8	100	West Chatham Is.

*values are conservative and imprecise based in non-quantitative field sampling.

Introduced cheat grass (*Bromus tectorum*), velvet grass (*Holcus lanatus*) and sweet vernal grass (*Anthoxanthum odoratum*) are all grouped in a broader category here called agronomic grasses. Although completely distinct species, their frequent association in landscape cover makes it easier to use a broader group to refer to these species in the context of this study. Agronomic grasses were likely brought to the island for sheep forage and since then outcompeted native grasses.

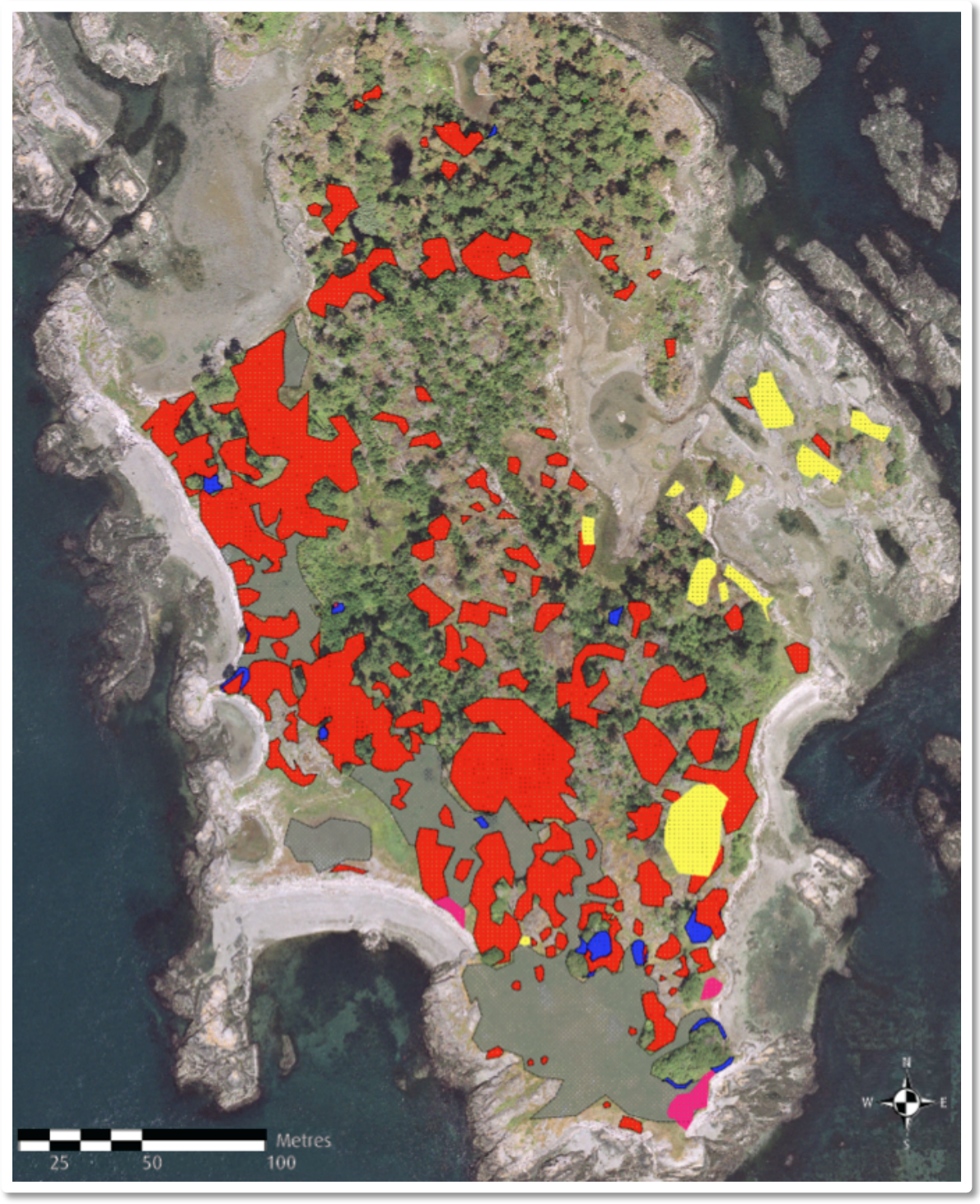

Figure 3.30: West Chatham Island: Invasive species surveyed in Ethnoecological Restoration Study. Red: *Rubus armeniacus*, Grey: Agronomic grasses (*Bromus tectorum, Holcus lanatus* and *Anthoxanthum odoratum*), Yellow: *Cystisus scoparius*, Blue: *Hedera helix*, Pink: *Cirsium arvense*.

English ivy (*Hedera helix*) presents an even distribution throughout West Chatham Island. This evergreen climbing vine is more profuse on southeastern bluff areas, spreading underneath and within willow trees, smothering and excluding mostly herbs and seedlings. The ivy is also noted climbing on willow trees and shore pines, potentially depriving these trees of photosynthetic capacity, and weakening them. Moreover, English ivy occurs in an unexpected association with Himalayan blackberry, spreading underneath blackberry thickets. In this novel assemblage, Eurasian blackberry shrub and European ivy vine form a structurally solid combination, producing a desert for plant biodiversity, not self-destructive, with the potential to spread and outcompete other species, particularly native species, more successfully. English ivy spreads vegetatively, developing roots on advancing stems and also from seeds – more viable after passing through birds' digestive tracts (GOERT 2002). During the growing season, English ivy stems can grow up to 22 cm a month, starting from either cutting or seed (GOERT 2002).

Scotch broom (*Cytisus scoparius*) is restricted to the eastern bluff. This perennial woody shrub is well established in some areas, practically forming small "broom-woods", with stems up to 3m tall and 20cm wide. Hardly any herb or shrub can grow underneath such dense aggregations of broom. Scotch broom can change ecosystem processes by fixing atmospheric nitrogen into the soil, possibly favouring other non-native plants in Garry oak associated ecosystems (GOERT 2002). Wherever present on the island, Scotch-broom occurs in great abundance and age diversity. Mature plants surrounded by seedlings were observed in most sites on the eastern bluff. This corresponds to the primary mechanism for dispersal: seeds being ejected out by sudden dehiscence of the pods when they dry to a certain point and spreading to adjacent locations to germinate. A single plant can produce up to 18,000 seeds annually. Individual plants live for 10-20 years – then they die off and open space for new broom seedlings (GOERT 2002). Animals, wind, water and humans all take part in secondary dispersal of broom, transporting seeds further away. Adjacent East Chatham Island and islets to the east are also invaded by broom. In West Chatham Island there is only one clump of a few younger plants detached from the heavily invaded rocky slopes. Seed bank germination and seedling survival are positively correlated with disturbance of the

site (Paynter *et al*. 1998).

Other non-native, potentially invasive species identified in this study include Canada thistle (*Cirsium arvense*), daphne laurel (*Daphne laureola*), English holly (*Ilex aquifolium*), hairy cat's ear (*Hypochaeris radicata* L.), Himalayan cotoneaster (*Cotoneaster simonsii* Bak.), and common hawthorn (*Craetegus monogyna*). Thistle, daphne and holly are well known in the region for their aggressive invasive behaviour. It is likely that these represent very recent invasions to the island. Hairy cat's ear is regarded as the most overlooked invasive herbaceous species in Garry oak associated ecosystems, however; it can release allelopathic substances that suppress growth of other plants (GOERT 2005). As for the last two species, not much is known about the invasive potential of these ornamental woody shrubs. Currently, the above listed species do not impose major risks in West Chatham Island, but must be watched closely and controlled as early as possible.

3.4.12 Cultural features

West Chatham Island is a cultural landscape with heightened significance to the Songhees First Nation (see Chapter 2.5). Although ecosystems have been through severe disturbances and are significantly altered from historical states, there are still many features in the island landscape that highlight cultural significance (Figure 3.31). Among different ecosystem types identified, most carry invaluable importance to the renewal of TEKW, cultural practices, memory and personal bonds.

Southern bluffs contain relatively high populations of native plants, especially *Camassia* sp., a cultural keystone species, traditionally cultivated and harvested in this area for generations (Figure 3.31). Camas bulbs were a staple food for native peoples in the region, and were regarded as a valued commodity, the "number one root" and "queen root for this climate" (Beckwith 2004, Joan Morris pers. comm. 2011). Another salient feature of the southern bluffs are stones there in an arrangement resembling a burial cairn (Figure 3.32). Burial mounds are spread inconspicuously in many different locations all throughout West Chatham Island territory.

Another often-overlooked cultural feature in the island is the presence of culturally modified trees (CMTs), living trees from which materials are harvested (Turner *et al*.

2009). In this case, Douglas-fir trees show evidence of bark removal (Figure 3.33), probably split off with the use of wedges and mauls, harvested for being considered best quality fuel (Turner 1998, Matthew and Dady 2008).

Figure 3.31: West Chatham Island historical and cultural features.

The abundance of shell middens is evident along coastal bluff areas – which makes a large share of the islands' potential archaeological sites. Coastal areas in West Chatham Island are inevitably associated with traditional reef-net fishing preparation, dugout

canoes, seal hunting and seagull eggs harvesting (Joan Morris, May Sam and Skippy Sam, pers. comm. 2011). Within the tidal wetlands, in the northern and eastern portions of the island, there are vestiges of traditional clam and oyster beds, which need to be verified carefully.

Figure 3.32: Burial cairn on *Tl'chés*.

Pacific yew (*Taxus brevifolia*) is spread within the western bluff and surrounding sparse woodlands. Its heavy, tough, durable wood was prized by coastal groups in British Columbia for carving and making a wide array of tools, and sometimes traded to the Interior (Turner 1998, 2004). In the past decades, a promising anti-cancer drug called *Taxol*, found in the bark and other parts of Pacific yew and other yew species, was being tested. This led to overharvesting of yew bark in some areas of the Province (Turner 1995, Pojar and McKinnon 2004). One of the yew trees identified in West Chatham Island near the homestead site is disproportionally large – probably millenary – thriving in an unlikely location, on a bank by a beach, as mentioned previously (Figure 3.21).

Arbutus, or Pacific madrone (*Arbutus menziesii*) is another relevant species for local culture, and is spread throughout West Chatham Island. *Sellemah* tells of their great-grandparents and grandparents, who were healers, of infusing arbutus bark into boiling water to prepare medicine for respiratory problems of all sorts, including tuberculosis

(Joan Morris pers. comm. 2011).

Figure 3.33: Culturally Modified Douglas-fir on *Tl'chés*.

The homestead area, in the western bluff, holds substantial cultural and personal significance to the Songhees and *Sellemah*'s family. Historical and cultural remnants are present in the site. House foundations, pieces of iron, roof shingles and porcelain, shell middens, fence poles and abandoned orchard tree species invoke memories about the place and cultural practices. One of the fruit tree species is an old heritage "American Mother" apple tree (*Malus domestica*) (Figure 3.34), possibly planted by *Sellemah*'s great-grandmother, together with plum and cherry trees, which are now overgrown (Joan Morris pers. comm. 2011). Camas (*Camassia* sp.) is also present in the site. Locating and

identifying these features was central to planning different stages for this study.

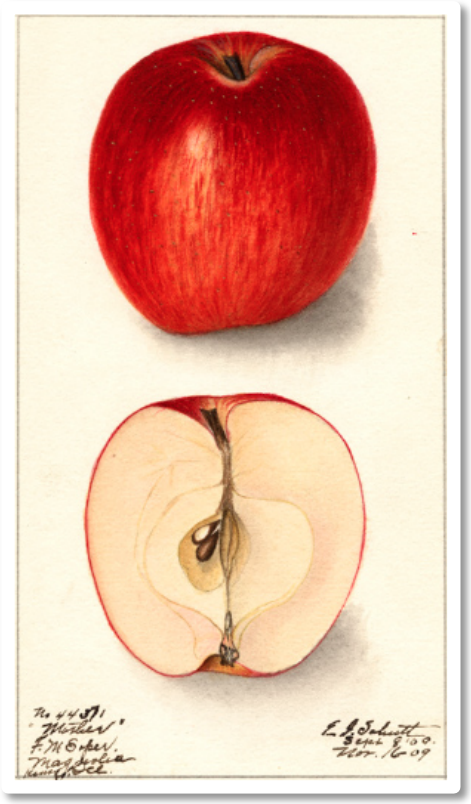

Figure 3.34: Drawing of "American Mother" apple variety (*Malus domestica*). Artist: Ellen Isham Schutt (1909). Specimen: 44371 from USDA (2011).

Sacred to many First Nations in North America, bald eagles (*Haliaeetus leucocephalus*) are present in West Chatham Island. A young eagle couple nests in the northern woodlands. During several visits to the islands, eagles were seen flying over and past our group. *Sellemah* and Songhees participants understand this as a symbol of welcoming and protection for our time in the island (Joan Morris pers. comm. 2011).

Finally, the central vernal pond is of invaluable importance to the social-ecological relationships in West Chatham Island. This site was a potable water source for Songhees resident families over generations. As a vernal pond, it is likely that a cistern-like structure was in place for gathering rainwater. Finding this pond in the initial phase of this project (June 15th 2011) was one of the best accomplishments at the time, for Pacific tree frog tadpoles (*Pseudacris regilla*) and adult frogs were abundant in the flooded areas within clubmoss (*Lycopodium annotium*). To Songhees culture, frogs or ***wəχəs***, represent life – a very accurate assertion, for amphibians are among the most vulnerable taxa to

environmental degradation or pollution. In later months, these frogs were observed in many different locations throughout the island. To *Sellemah*, finding frogs reproducing in the pond area meant that the water sources were safe and unpolluted – fostering hope for restoration of ecosystems and future dreams (Joan Morris pers. comm. 2011).

3.5 Determining priority sites for restoration and intervention

In general, the present ecological and cultural conditions for West Chatham Island are profoundly altered. With less than 2 ha of total area surveyed free from invasive species, the ecological and cultural integrity of island terrestrial ecosystems are seriously threatened. In these heavily invaded ecosystems and historically degraded sites, ecological processes and dynamics of change are guided mainly by invasive species life cycles, and by their continuing dispersal and colonization of new sites. Lack of human presence and removal of indigenous management practices that support continuous intervention contribute to the present altered state of ecosystems.

Historical major disturbance events of uncontrolled fires and a long history of sheep grazing were likely responsible for major changes in the woodland and sparse-woodland ecosystem structure – opening areas and creating opportunities for establishment of invasive species, especially Himalayan blackberry (*Rubus armeniacus*) and English ivy (*Hedera helix*) and Scotch broom (*Cytisus scoparius*). Although coniferous encroachment on (fire deprived) Garry oak prairies is a well documented process in the region (see Boyd 1999), at this stage, Himalayan blackberry, English ivy and Scotch broom seem to have invaded and encroached meadow and bluff ecosystems in West Chatham Island more aggressively and rapidly than conifers such as Douglas-fir (*Pseudotsuga menziesii*).

The Garry Oak Ecosystem Recovery Team (GOERT 2007) prepared a rank for relative rating of significance of impact for 15 of the most invasive plants on Garry oak ecosystems. Nine of the species were identified as invasive in West Chatham Island, and rank on the gradient from highest to lower impact: Scotch-broom (*Cytisus scoparius*) > English ivy (*Hedera helix*) > velvet grass *(Holcus lanatus*) > English hawthorn (*Crataegus monogyna*) > Daphne laurel (*Daphne laureola*) > sweet vernalgrass (*Anthoxanthum odoratum*) > Himalayan blackberry (*Rubus armeniacus*) > Canada thistle (*Cirsium arvense*) > English holly (*Ilex aquifollium*) (GOERT 2007).

The approach of selecting priority sites for intervention is due to a scenario of great challenges for restoration and conservation of biological and cultural attributes. Setting realistic and effective goals for restoration and intervention under the particular ecological and sociocultural conditions in West Chatham Island of highly invaded ecosystems and infrequent indigenous presence is a complicated task (Hobbs 2007, Hobbs *et al*. 2011). Priority sites will serve as focal restoration or intervention sites (see Higgs 2003) that will allow for a more meticulous implementation of specific ethnoecological restoration and intervention pilots (and prescriptions) to particular sites, as well as encouraging a more engaged connection between people and selected sites.

Criteria for determining priority sites are built on the assessment of *environmental and ecological conditions*: recent history of degradation, disturbance regimes, site location, plant composition (native species *vs*. invasive species, what invasives); *cultural features and significance*: sacredness of sites, presence of cultural keystone species (CKS), presence of cultural remnants; and *historical land use*: including deduction of historical site conditions, present relicts of past land use. All information regarding aforementioned criteria is previously described in sub-sections of this chapter.

Based on the combination of the criteria above, six sites were selected among the most vulnerable (ecologically and culturally), and most likely to benefit substantially from immediate restoration/intervention (Figure 3.35).

The degree of priority is indicated by numbers of ordinance in each site (see Figure 3.35). Here I suggest that the remnants of traditional and heritage gardens and orchards *(1)* retain social-ecological connections, as well as cultural history that can serve as an initial focal point for intervention in West Chatham Island, and are of crucial survival in this landscape. Intervention pilot projects in this site are likely to serve as a basis for approaching other degraded sites. Himalayan blackberry invasion is the most serious threat to this ecosystem, and its specific control and removal should not pose a too overwhelming goal to be attained. Thus, following activities would be encouraged by the results of this work.

Subsequently, or concomitantly, follows restoration intervention along the bank where the large Pacific yew (*Taxus brevifolia*) and Douglas-fir (*Pseudotsuga menziesii*) are located *(2)*. This is the "front door" to the island, and having such activity in place will

likely display Songhees presence (through restoration and management) to outsiders. Erosion of the bank is an important issue and needs to be addressed by careful planning for removal of invasive species Himalayan blackberry and English ivy, and protection of banks from further erosion.

1	Heritage Orchard	Keystone point for restoration project: *Rubus armeniacus*
2	Pacific yew	Surrounded by *Rubus armeniacus*, *Hedera helix*, *erosion*
3	Camas meadow	Threatened by agrograsses and *Rubus armeniacus*
4	Eastern bluff	*Cytisus scoparius* and *Hedera helix* spreading in the area
5	Woodland slope	Heavy and established invasion of *Cytisus scoparius*
6	Nrth woodland	New invasions of *Ilex aquifolium, Conoteaster simonsii, Daphne laureola*

Figure 3.35: Priority sites for intervention in West Chatham Island.

Thirdly, one of the most important historical and present sites for traditional bulb cultivation and harvesting in *Tl'chés* is addressed subsequently *(3)*. The challenges in this meadow-bluff are greater for it entails a larger area, and requires fire management prescriptions in order to control invasive agronomic grasses and shrubs, and allow for recuperation of native species, especially production of camas, chocolate lily and other geophytes.

Within the rocky-outcrop and eastern bluff ecosystems is an area displaying an aggressive invasion of English ivy underneath willow trees and Scotch broom on rocky outcrops *(4)*. Scotch broom spreads intermittently northwards until it reaches the next priority site for restoration on the woodland slope. This area *(5)* contains the denser broom aggregation on the island, forming a small woodland-like clump that needs to be removed to avoid further dispersal and invasion to adjacent sites. New invasions of English holly, cotoneaster and daphne need to be controlled and monitored in northern woodland until they are curtailed *(6)*.

Finally, restoration and intervention actions on each site will require different set of strategies, in view of site particularities different levels of difficulty regarding species removal and control for achieving specific goals of re-establishing ecological and cultural soundness.

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3.7 Personal communications

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Joan Morris, interviewed by Thiago Gomes and Dr. Nancy Turner on January 15th, 2011, at Songhees Band Office, Esquimalt, BC.

Joan Morris, interviewed by Thiago Gomes on April 21st, 2011, at Songhees Band Office, Esquimalt, BC.

Joan Morris, interviewed by Thiago Gomes on July 1st, 2011, at West Chatham Island, BC.

Joan Morris, interviewed by Thiago Gomes on September 23rd, 2011, at West Chatham Island, BC.

Joan Morris, interviewed by Thiago Gomes on October 14th, 2011, at Songhees Reserve, Esquimalt, BC.

Joan Morris and Wilfred George, interviewed by Thiago Gomes on November 7th, 2011, at Lekwungen Community Garden, Songhees Reserve, Esquimalt, BC.

Skippy and May Sam, interviewed by Thiago Gomes and Joan Morris on September 8th, 2011, at Tsartlip Reserve, West Saanich, BC.

4: Healing *Tl'chés*: the people and the place

4.1 Introduction

In this chapter I outline the role of TEKW (Traditional Ecological Knowledge and Wisdom) respecting the practice of ethnoecological restoration at *Tl'chés*. Especially, exploring TEKW connections with ecological recovery, cultural revival and community engagement. Thus, I aim to answer the guiding question for this chapter: ***How can TEKW initiate and guide the recovery of ecological and cultural features and promote community engagement at Tl'chés?*** In order to better understand these connections and to arrive at desired conclusions, it is important to realize TEKW is collective and trans-generational. Therefore, I rely on interviews and observations with Songhees First Nation participants at the two ends of this knowledge system: elders and youth.

There is no way to successfully intervene in a landscape without investing some considerable time and effort into understanding the socio-ecological and cultural relationships existent in a place. Higgs (1997) argues that *good restoration* requires an expanded view that includes historical, social, cultural, political, aesthetic, and moral aspects, in order to become more inclusive and effective in the long run. Senos *et al*. (2006) propose that the incorporation of TEKW and practices of indigenous peoples into contemporary restoration projects will greatly enhance the success of restoration efforts. Here, I use the *Tl'chés* case study and vision for restoration to aver that TEKW and restoration practice can have a positive feedback, reinforcing social and cultural values as well as representing good restoration practice.

Chapter title's analogy of "Healing *Tl'chés*", instead of "Restoring *Tl'chés*", speaks to the merging of ecological and human dimensions of restoration observed in this case study. Moreover, this pays tribute to the vision of restoration endorsed by Songhees elder Joan Morris, *Sellemah* – health worker and a leader in her community, who firmly believes her people's health depends upon their connections to the land, supporting healthier and more sustainable ways of life. Moreover, I explore on the visionary idea of Chatham Islands as a place for healing people and ecosystems.

4.2 Methodology

In order to evaluate the role of TEKW in initiating and guiding ecological and cultural

recovery and promoting community engagement, I conducted a series of semi-structured interviews with specific people and made use of participatory observation methodology during fieldwork activities and celebrations.

4.2.1 Semi-structured Interviews

Interviews were focused on three main themes: significance of the islands (personal or collective), what it means to restore the island (TEKW and management practices), and future for the island (socioeconomic, cultural and ecological expectations and interventions) after this project (Appendix 2). Semi-structured, open-ended interviews were preferred for allowing an "informal conversation flow" to the interviews, which made interviewees more comfortable and at ease (Bernard 2002:5).

Interviews where carried with two groups of participants. The first group was made of elders who had lived in either Chatham Islands or Discovery Island during any period of their lives. There are only about five elders alive today who formerly lived at *Tl'chés*. I was able to interview three of them during the length of this study. Songhees elder Joan Morris, *Sellemah*, the main informant and stakeholder of this project, was one of the interviewed elders. We had several meetings regarding this project and in at least two opportunities (April 2011 and November 2011) we intently discussed the guiding topics of this chapter. The other two elders interviewed were May Sam and Skippy Sam, who had lived on Discovery Island after they got married. *Sellemah* and I visited and interviewed them early September 2011, at their home in West Saanich.

The second group encompassed project volunteers, mainly Songhees youth, who were actively involved in field survey and restoration activities at *Tl'chés*. Four volunteers were selected out of a larger group and interviewed during a fieldwork activity in West Chatham Island in October 2011. Participants were selected with the guidance of the project's main stakeholder, *Sellemah*, as agreed on University of Victoria's Human Research Ethics Protocol 11-220.

Audio-visual digital records of interviews, permission and consent from participants, data analysis, storage and handling were conducted according to ethical protocols as detailed in section *3.2.2 Semi-structured interviews* and *3.2.6 Data storage and return to the community*.

4.2.2 Participatory observation

A series of observations and personal notes, as well as audio-visual recordings, were made of informal discussions, group conversations, personal comments, reactions and impressions during selected events such as field trips, gatherings, celebrations, work parties and meetings held at *Tl'chés*.

Following each of these events, activity (field visit) reports were written based on personal notes, memories, photographs and videos. These data provided significant insights into how people interact with each other and relate to the place during activities organized and within the context of restoration.

Table 4: Sample of activity report form.

Activity Report		
Title of activity (Field Visit, Meeting, Interview)	Date:	Location:
Participants:		
Description of events:		
Future directions:		

Main events that provided this information were: a research group visit to West Chatham Island on June 15th, 2011, *Sellemah*'s birthday on July 2nd, traditional pitcook on September 17th and several fieldwork visits from July to November 2011. Participants of these events were Songhees volunteers and elders, as well as friends of *Sellemah* from different First Nations along Vancouver Island, invited to celebrations aforementioned.

Observation about impressions and reactions of elders and youth arriving in the island, their voiced opinions on the importance of the island (personal or community perspectives), opinions about future directions (some regarding restoration), as well as people's reactions after leaving the island comprised the majority of notes in this instrument. Please, refer to University of Victoria's Human Research Ethics Protocol 11-220 for more detailed information on data gathering procedures.

4.3 Vision for Restoring *Tl'chés*: "Healing the land, healing the people"

> *"Eech'aul'ih'ol", my name is Sellemah. For the first ten years of my life was raised in Chatham Island. I was raised by my great-grandparents and grandparents. We were very self-sustaining in Chatham Island. We had our*

> *own fruit trees, vegetable garden… We had fish, sea urchins, crabs, and just about every type of seafood that you can think of.*
>
> *I would very much like to see the youth involved as well as the elders, who grew up in Tl'chés, come together to do this project to promote our sustainability on the land that used to be. We have grown so accustomed to fast foods… with the worldwide shortage of food, water, everything … we need to get back to our roots. "Hych'ka"!* (Joan Morris pers. comm. 2011)

This statement by *Sellemah* reflects much of the vision behind this present restoration project. It entails personal history and narrative, connection (and reliance) to the land and resources, sense of community, nostalgia, social-ecological resilience (for future change and uncertainties), sense of belonging and tradition. Based upon these values, a set of principles emerged and were documented throughout the development of this study: Prayer, sharing and generosity, welcoming and forgiving, laughing and celebrating, reverence and respect, and compassion were considered fundamental principles to any activity regarding the islands. Traditional knowledge and wisdom are well represented in these sets of values and principles. They embody *Sellemah*'s and her family's collective knowledge about reciprocal relationships with other living beings and their environment in *Tl'chés*. During formal and informal meetings throughout the length of this study, *Sellemah* has shared some of her life story that finds tune with the values and principles here presented.

Sellemah belongs to a lineage of healers (Joan Morris pers. comm. 2011). She grew up at *Tl'chés* with her great-grandparents and grandparents, who were healers, until she was 10 years old (Joan Morris pers. comm. 2011). Inspired by her family's teachings at *Tl'chés*, the unfortunate experience of losing her grandmother (who raised her) at a young age, and having to accompany her mother through the abusive system of the Nanaimo Indian Hospital, have motivated her to become a health worker. "*And young as I was I made a vow that I would go beyond with our people with the herbs and whatever else that was handed down. I'd go to school, nursing school to learn, to help our people...*"(Joan Morris pers. comm. 2011).

Today, *Sellemah* is the Diabetes Health Coordinator for the Songhees Nation. She is a very engaged elder in the Songhees community, and an enthusiast for healthy living and

traditional foods. In her vision for restoration at *Tl'chés*, *Sellemah* talks about "getting back to our roots". This sentence can be taken figuratively, as to return to the origins, or even literally, as to returning to native plant roots (or bulbs and rhizomes) that used to be important foods for the Songhees. In any case, "getting back to our roots" may refer to social-ecological resilience strategy, in sight of loss of traditional foods and medicines, decrease in the health of forests, increased erosion, and outbreaks of pests and diseases related to changing environmental and social conditions (Turner and Turner 2008, Turner and Clifton 2009).

It was during the preparation of a shared presentation for the 3rd Vancouver Island Traditional Foods Conference that *Sellemah*, Lekwungen Community Garden Coordinator Wilfred George [*Shē'wēlth*] and I met to explore on values and principles that were guiding this restoration project, based on previous interviews, annotations and reflections. This meeting occurred in September 2011, during initial phase of intervention activities in West Chatham Island. We arrived at 10 words that were organized in six principles (Figure 4.1).

The first principle has to do with the *spiritual dimension* and significance of *Sellemah*'s experience at *Tl'chés* and Coast Salish tradition. *Sellemah* believes that her home-island is a spiritual place, and therefore, *prayer* must precede every activity carried in the islands (Joan Morris pers. comm. 2011). This was learnt from her great-grandfather, who was a shaman, and before going to do his work he chanted and was always in prayer (Joan Morris pers. comm. 2011). *Sellemah*'s grandmother would always light candles and have her granddaughter kneel with her in prayer (Joan Morris pers. comm. 2011). *Sellemah* believes that prayer grounds one for the whole day, and gives you strength to carry on no matter what the circumstances are, and that she has taught this to her own children. "*For me, I always pray to God and the Lord and the Holy Spirit. Some pray to the ancestors. Everybody has their own way of praying*" (Joan Morris, pers. comm. 2011).

As for the second principle, *Sellemah* recalls that whatever her great-grandparents and grandparents gathered, harvested or fished was shared in *generosity* to whomever was around (Joan Morris pers. comm. 2011). This principle was also put in practice during sheep shearing time or fishing season, when families would be together for weeks at time

and share wool or the salmon catch among themselves (Joan Morris pers. comm. 2011). Lekwungen culture is one of sharing: "*Our people have always been great at sharing, been great at bringing other cultures into the circle and celebrating the birth of a child, marriage. Even at a funeral we share a meal*" (Joan Morris pers. comm. 2011).

The next principle takes us back to the history of colonization in southeastern Vancouver Island, when the Lekwungen people welcomed and shared information and resources with Spanish and English explorers and settlers. *Welcoming* and *forgiving* are here connected due to the historical and chronic case of unforgiveness and hate between Indigenous Peoples and colonizers, and among Indigenous Peoples (Joan Morris pers. comm. 2011). *Sellemah* talks about her own experience of going back to Cooper Island Indian Hospital and Residential School to find and ask Sister-Superior for forgiveness after 50 years of hating her. She says it is a humbling experience and very liberating, especially after Sister-Superior asked for forgiveness from what she did to *Sellemah* and to her people (Joan Morris pers. comm. 2011).

The next principles emerge from the days of plenty at *Tl'chés*, from gatherings and traditional events. *Sellemah* as a child in *Tl'chés* experienced *celebration* and *laughter*. She recalls being the only child and sitting in the circles among the "old ones", listening to stories, cultural knowledge, and laughter (Joan Morris pers. comm. 2011). These moments were often associated with sharing of the food and gifts, and very important for life in community, building comfort and bonds (Joan Morris and Wilfred George pers. comm. 2011).

The following principles of reverence and respect relate to the principle of *prayer*, and entail the understanding of "sacredness" of place. *Reverence* and *respect* also reach beyond the spiritual realm, towards personal and community levels. Self-respect and respect to others, including animals and plant, elders, ancestors and the land, is a principle that needs to be brought back, says *Sellemah* (Joan Morris pers. comm. 2011).

The last principle comes from the way *Sellemah*'s family raised her. The "*old ones*", as she refers to great-grandparents and grandparents, were instrumental in teaching her the lessons of *compassion* and *love*, "*to always speak in love, exchange hate for love*" (Joan Morris pers. comm. 2011). *Sellemah* believes that compassion is what has brought the research team together.

Inspired by life in the islands with the "*old ones*" and her experience as a health worker, it became natural for *Sellemah* to look at restoration as an integrated practice of "healing the land, healing the people" (Figure 4.1).

Sellemah's principles find resonance with Higgs' (2003) eco-cultural restoration values, Turner's (2005) eco-cultural renewal components. Not surprisingly, these different sets of principles and values are closely related and complimentary to some extent. For instance, *respect* is mentioned in two sources and implicit in the third. *Engagement*, *compassion*, and *patience and persistence* are, in practice, complementary to each other. In addition, some principles might even find new meanings when combined, such as *responsibility*, *rooted cultures* and *reverence*.

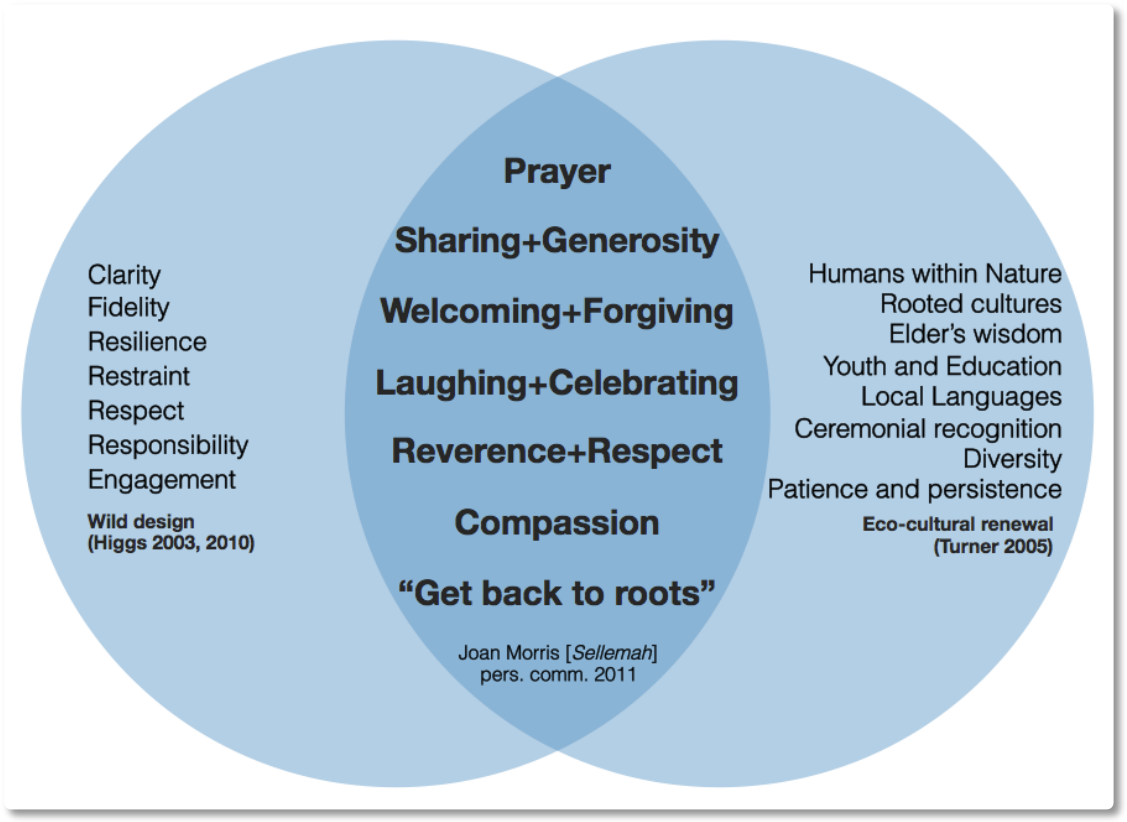

Figure 4.1 Ethnoecological restoration principles and values for restoration and intervention at *Tl'chés.*

Restorationists have already made literal and figurative analogy between restoration work and health care and were questioned over this non-scientific, value-based assessment (Davis and Slobodkin 2004). However, the analogy made here is about

intervention, as Higgs (2003:115) illustrated in the figures of a health-care provider and patient: without medical intervention the person would die. *Sellemah* understands that well. As a matter of fact, she has seen her own people and members of her family (who did not speak English) die for the lack of proper communication, attention and care, which resulted in mistaken intervention strategies (Joan Morris pers. comm. 2011).

"Healing the land, healing the people" is about people going back to the land, connecting to their roots, "*our people used to always say you have a chance to survival as long as you have the land*", working towards restoration of ecosystems and find healing from physical conditions, emotional, psychological and spiritual problems (Joan Morris pers. comm. 2011).

The world's leading independent general medical journal released a comment on the positive relationship between people's access to green spaces and human health, highlighting the importance of ecosystem services, as well as the value of natural environments for psychological restoration, such as stress reduction, and cognitive benefits resulting from activities in green spaces, such as gardening (Hartig 2008).

"Healing the land, healing the people" is a virtuous circle, working both ways. *Sellemah*'s life story and experience has allowed her to have a more holistic understanding of health. From this thinking, *Sellemah* expressed the dream that comes with these principles and vision: that *Tl'chés* would become a place of healing for her people; a "healing place" close to home (Joan Morris pers. comm. 2011).

4.4 TEKW in *Tl'chés*: restoration context

It would be pretentious and naïve to suggest this research project is responsible for revival of TEKW in *Tl'chés*. Rather it is a small brick on a continuous road to the recovery of ecological and cultural features in the landscape. Prior to this study, an important restoration effort led by historian and former Songhees Lands Manager Cheryl Bryce, assisted by Songhees elder Joan Morris, *Sellemah*, and ethnobiologists Dr. Nancy Turner and Dr. Brenda Beckwith in July 2000 culminated in traditional camas harvesting and a pitcook, followed by prescribed burn and camas seeding on Discovery Island in November 2002 (Higgs 2003, Senos *et al*. 2006). This initiative rekindled local interest, both in indigenous and academic communities, for traditional knowledge and

management of plant species and landscapes, especially in times of rapid environmental and cultural changes.

In order to revitalize TEKW at *Tl'chés*, it is important to re-establish social-ecological connections. The long-standing separation between the islands and Lekwungen people, mainly caused by the initial move of families in late 1950s from *Tl'chés* to the Songhees reservation in Esquimalt, followed by a lack of resources to visit, maintain or return to *Tl'chés*, has has the effect of disrupting this knowledge system. Presently, there are only fragments of practice and recollections within the islands landscapes and people who once lived there. Restoration is regarded as an important vehicle to reconnect people with place (Senos *et al*. 2006).

The nature of TEKW is collective, handed down through generations within a certain community by cultural transmission (IPRN 2010, Berkes 2012). In a restoration context, it means that this type of knowledge and practice necessarily involves a group of people, a community that partakes in and maintains this cultural and environmental knowledge system. Cultural survival depends largely in its successful transmission. Loss of indigenous languages, and gaps between older and younger generations are important factors for disrupting transmission of traditional knowledge systems (Turner and Turner 2008). It is desired that youth should be involved with elders, working together in order to support each other for successful restoration efforts (Senos *et al*. 2006). Turner (2005: 230) recommends complementary principles of "elder's wisdom and experience" followed by "youth and education" for eco-cultural restoration.

For this project, *Sellemah* desired to bring together people who would understand and esteem the values and principles of her vision for restoration in *Tl'chés*. Volunteers were carefully selected. One of the conditions for Songhees participants to join the activities was an ancestry connection with *Tl'chés*. We were able to build a partnership with the Lekwungen Community Garden at the Songhees Reserve. Community garden volunteers – mainly youth – would also volunteer their time and effort to work and participate in activities in Chatham Islands. Songhees Youth workers also provided invaluable help with video documentation and fieldwork activities. Elders Skippy and May Sam from Tsartlip First Nation, who lived in Discovery Island when younger, were interviewed in

September 8th 2011, and participated in a pitcook celebration held on West Chatham Island , in September 17th 2011.

Celebration gatherings were also organized and brought a wider range of people together to experience connection or reconnection with these cultural landscapes. Stories, songs, prayers and traditional foods were shared on these occasions.

The significance of the islands to the recovery of cultural memory and practices was witnessed when young and old visitors, once on the island, started to recall stories and memories, and demonstrated unexpected emotions, then returning to their homes and family members filled with stories and experiences to share.

Traditional knowledge and wisdom (TEKW) are well represented in *Sellemah*'s sets of values and principles guiding this project (see Chapter 4.3): prayer, sharing and generosity, welcoming and forgiving, laughter and celebrating, reverence and respect, and compassion. They embody her family's collective knowledge about reciprocal relationship with other living beings and their relationship with their environment at *Tl'chés*.

4.4.1 TEKW in restoration practice at Tl'chés

Since the first time we went as a group to West Chatham Island, June 15th 2011, there was specific protocol to follow. Songhees individuals would get off the boat first, make a prayer in preparation, respecting the land and ancestors, and then welcome non-Songhees visitors. Normally an eagle or gull feather, or ***temelh*** [***tə´məlh***] – red ochre, a dark red to black powder used for ceremonial purposes – would be used in these rites for blessing and protection of participants. Observation of traditional principles was a requisite for fieldwork activities and visits to the islands. Therefore, our fieldwork activities were designed and conducted in a way to embrace and prioritize incorporation and respect for *Sellemah's* TEKW emerging principles. TEKW was central in initiating and guiding activities regarding the recovery of cultural and ecological features in *Tl'chés*. Senos *et al*. (2006) suggest that TEKW provides a model for how community members may interact with their local environments in ways that support or enhance social and ecological functioning.

During the initial phase of planning fieldwork activities and preliminary conversations, it became evident that the chance of visiting Chatham Islands and learn about native species and traditional ways of life would become one of the greatest rewards for younger Songhees volunteers. At this time, Lekwungen Community Garden Wilfred George [*Shē'wēlth*] stated, "*I am interested in working with Joan [Sellemah] in this project, to work with the native plants and be part of this program with her and the youth [...] First of all, I would like to work with plants, sustaining the island for the future youth. This is very interesting. I have never been to Discovery and Chatham Islands… to go there and see what native plants are there*" (Wilfred George pers. comm. 2011).

In this statement, *Shē'wēlth* reveals his interest in working with a knowledgeable elder and youth regarding native plants and TEK, and demonstrates a heightened sense of caring/tending for the land, managing or intervening to maintain ecological and cultural functioning, services and features in the island for future generations.

As volunteers learned from their own experience with TEK, whether in the community garden context or during activities held in West Chatham Island, restoration awareness increased. In fact, one of the youth volunteers was eager to also work on invasive species removal at the Songhees Reserve in Esquimalt, especially nearby his mother's house, applying what he learnt at Chatham Islands.

During TCEM (Terrestrial Cultural Ecosystem Mapping) fieldwork endeavours in West Chatham Island, youth had the chance to hear from *Sellemah* about her knowledge and experience, and to survey the island for mapping different ecosystem types, culturally significant sites and native species, and invasive species – under the model of "motivated learners and knowledgeable elders" (Turner 2005:228).

At one point, I accompanied the Songhees team in surveying a historical camas bluff-meadow ecosystem and identification of culturally significant species. For some of the youth in the small group, it was the first time to see the cultural keystone species camas (*Camassia* sp.) stalks and bulbs, as well as other native edible plants such as chocolate lily (*Fritillaria affins*) in a natural environment. The bulbs were rather small, but it gave *Sellemah* the opportunity to speak about how important these bulbs – especially camas – were as a staple food and a valued commodity among their ancestors.

A young Songhees volunteer mentioned she has been going back to her mother after field trips to ask about the stories she was told when younger, stories that she had recalled during these visits of observing and studying native species in the islands.

Language revival was experienced whenever the Songhees team, led by *Sellemah* and *Shē'wēlth*, would see a plant or animal whose Lekwungen name was known to them. *Sellemah* would often say a Lekwungen word and ask younger volunteers to point or say the word in English in order to test and instruct. Finding Pacific tree frogs (*Pseudarcris regilla*) in vernal pond, which was readily identified as ***wəχəs***, was a significant episode for inspiring restoration work, since these frogs symbolize life and the beginning of new cycles in Coast Salish culture, and indicated environmental heath on this culturally and ecologically important system (Joan Morris pers. comm. 2011).

TEKW experiences ignited and guided the following fieldwork activities in West Chatham Island, which consisted of election of priority sites for restoration intervention, and planning and establishment of restoration intervention pilots (see Chapter 3.5). This was a cooperative process mainly amongst *Sellemah*, *Shē'wēlth* and me, informed by TCEM data and TEKW guidance. TEKW and memory offered historical benchmarks for restoration, which, combined with ecological surveys and mapping, assisted us in arriving at strategies for adaptive management. Establishment of intervention pilots followed *Sellemah*'s TEKW principles and wild design framework (see Chapter 2 and section 4.3).

Adaptive strategies emerged during removal of invasive species in West Chatham Island. Songhees team deliberately decided to cut, prepare and plant stems of willow (*Salix* sp.) as an experiment to repopulate an area where Scotch broom was removed (Figure 4.2). On a different site, where Himalayan blackberry (*Rubus armeniacus*) and English ivy were being removed, the intention was to recompose shrub layer with native Saskatoon (*Amelanchier alnifolia*) or Nootka rose (*Rosa nootkana*), and trailing blackberry (*Rubus ursinus* subsp. *macropetalus*). Higgs (2005) recommends that successful restoration efforts depend on ecological insights as well as cultural knowledge and support, as observed in the examples above.

With this, it is possible to suggest that TEKW had a fundamental role in rekindling discussions involving restoration and that people's reconnection with TEKW can trigger restoration awareness, especially when target environments are degraded to some extent.

TEKW is a powerful instrument to guide interventions for the recovery of ecological and cultural features through hands-on practice towards culturally relevant and ecologically sustainable goals, under a set of values and principles.

Figure 4.2: Restoration intervention in West Chatham Island. Top right - *Salix* sp. stems for protecting sites. Top left - Slope with Scotch broom (*Cytisus scoparius*). Bottom - Eastern bluff and manual removal of Scotch broom young plants

4.4.2 TEKW for community engagement

Celebration is an integral and essential part of TEKW systems, and also a principle for *Tl'chés* restoration. *Sellemah* defines it even more specifically: *laughter* and *sharing*. On two occasions, celebration gatherings were held in West Chatham Island.

The first gathering was to commemorate *Sellemah's* birthday on July 2nd, 2011. Guests were mainly family and close friends of *Sellemah*, including her son and 8-year-old

grandson. This was *Sellemah's* grandson's first time on the island. His father was happy to be back in *Tl'chés* after 9 years, and took his son around to show him familiar places.

Sellemah's cousin was very moved by the opportunity of being at *Tl'chés* for the first time in his life saying, "*this is the place I used to hear my mom crying about*". He shared that his mother grew up in the islands and always mentioned how much she missed it, after she moved to the Songhees reserve. He was eager to know when would be the next trip over and said he would like to come along. At the end of the day, he mentioned that that had been one of the best days of his life – which were many days – and that he was honoured to be walking in his family's ancestral grounds.

At the end of the day, participants' comments revolved around the amazement of being able to be at a place with such deep and compelling history, how "at home" some people felt, and how they wanted to return for more visits, and how "strong and fragile" the island appeared to be. *Sellemah* also noted that three eagles flying over the island were a meaningful welcoming sign.

Community interaction for building connections to place is an important part for TEKW continuity, self-identification and engagement. To my surprise, at least three of the youth volunteers had never heard about the existence of *Tl'chés* as Lekwungen traditional territory growing up in the Songhees community, until they became part of this research project. Later, one of them found he had a distant ancestor who had lived on the islands. One of the younger volunteers, Sandy George [*Xiquelum*], assumed he is gradually learning about his culture, especially in recent times with a growing interest in native foods and plants and restoration (Sandy George pers. comm. 2011). Realization of cultural identity encourages active participation in taking care of ancestral lands (Turner 2005: 229). His older brother Wilfred George [*Shē'wēlth*] spoke of the acquired responsibility to "*maintain the lands and the waters protected*" and noted that this is something that needs to be done together, in community (Wilfred George pers. comm. 2011). Therefore, cultural identification as "social-ecological citizens" or "stewards of cultural landscapes" might be the best pathway for genuine community engagement around TEKW and practices.

Community participation culminated in a traditional pitcook gathering in mid-September, 2011, which aimed to celebrate and present the project to a broader audience.

This time, *Sellemah's* family, close friends and volunteers were accompanied by other Songhees community members, guests of honour from different First Nations, and other collaborators. This was first time at *Tl'chés* for many guests. It was also a first pitcook experience for a few visitors and younger volunteers.

Traditional pitcooking techniques are important components of TEKW in Coast Salish culture. Anthropologist Wayne Suttles (2005) describes processes and techniques for Coast Salish pitcooks that were done in pits used year after year, especially for steaming camas (*Camassia* sp.) bulbs. Stones were put at the bottom of the pit and a fire was built over them. When the stones were red-hot, unburned wood and ashes were removed and immense quantities of camas bulbs were placed inside the pit surrounded by kelp, salal (*Gaultheria shallon* Pursh.), grand fir (*Abies grandis*) boughs and sword fern (*Polystichum munitum* (Kaulf) C. Presl.), leaving a stick, which was removed at the end, leaving a channel through which to pour water (Suttles 2005:181). In traditional pitcooks other native bulbs and rhizomes, as well as clams, oysters, crabs, salmon and game, were also cooked (Joan Morris pers. comm. 2011).

The *Tl'chés* pitcook of September 2011 did not count with all ingredients of Suttles' (2005) accounts, but was rather creative and adaptive to local conditions. Since there were no camas or chocolate lilies bulbs available to feed 30-40 people, more readily acquired vegetables – different kinds of potatoes, carrots, plantain, onions and garlic – were bought in a farmer's market and brought to the island. For the lack or low availability of salal, grand fir boughs and sword fern, Nootka rose (*Rosa nutkana*) branches and oceanspray (*Holodiscus discolor*), also brought from outside, were used to envelop the food. Sea asparagus *(Salicornia pacifica*) from the surrounding upper tidal area was used to add extra flavour in this local adaptation.

Pitcook preparation is a participatory work. There are lengthier parts involving long waits, and a very busy series of steps to it as well, which Dr. Nancy Turner and *Sellemah* explained to all present that day. Early in the morning a couple of volunteers gathered stones and firewood, re-dug pits and lit the fires. Once stones were red-hot and all food and materials were ready, one group removed ashes, one person placed and held the pole in the centre of pit, another group placed layers of oceanspray and wild rose over the stones, another one placed sea asparagus and root vegetables into the pit, while others

covered the food with the other branches and leaves, the one holding the pole withdrew it, to allow the next group to pour water through the channel it left, another group covered the pit with a burlap tarp after the water had been added, avoiding any losses of heat, and finally young men with shovels quickly covered the burlap with sand to hold the heat and steam in the ground (Figure 4.3). It took about a couple of hours until the opening of the pit. In the meanwhile, guests would share songs, stories and laughter, and enjoy other traditional foods, such as barbecued salmon, bannock and tea all heated over the fire. Afterwards, more songs and stories, prayers and ceremonies were carried on until the end of the day.

Figure 4.3 Traditional pitcook in West Chatham Island. Top left - removing ashes. Top right- sharing pitcook vegetables. Bottom left - Sellemah preparing bannock. Bottom centre and bottom left - open pit with vegetables.

Partaking in such important cultural event was especially significant to the Songhees volunteers, who could see their own community and families sharing knowledge,

laughter, respect and that moment together. Presence of a broader community of indigenous leaders and elders from neighbouring and distant nations as witnesses was also significant. This event was an important milestone for gradual re-establishment of Songhees community presence, of story, song, prayer and TEKW at *Tl'chés* for the years to come.

4.5 Healing Place

Sellemah's vision for restoring *Tl'chés* comprises ecological and human dimensions. She longs to see at least examples of the traditional garden and heritage orchard restored, as well as her people's relationship with their environment (Joan Morris pers. comm. 2011). She strongly believes that returning to traditional teachings and ways of life ("*going back to our roots*") supports a healthier and more sustainable future for her community and the restoration of *Tl'chés* is symbolically and in reality is to her an important step in this direction.

As a health worker, she cares about people's health, especially with regards to the "nutrition transition" indigenous peoples are experiencing worldwide (Kuhnlein 2006, 2009). Sellemah strongly believes that a reconnection between indigenous peoples and their environments, traditional foods, values and principles are part of a healing process to start to address all the historical abuse of colonization, Residential Schools and Indian Hospitals, which she experienced firsthand (Joan Morris pers. comm. 2011).

Sellemah comes from a lineage of healers. Her great-grandfather was a shaman and her immediate family observed principles of prayer and reverence before every activity at *Tl'chés* (Joan Morris pers. comm. 2011). They all knew about plants and medicines, and spiritual healing practices. Her great-grandparents and grandparents were also "seers", that could see into the spiritual realm (Joan Morris pers. comm. 2011). Surrounded by lively spirituality, life in *Tl'chés* was based on compassion, and everything was done in love (Joan Morris pers. comm. 2011). *Sellemah* recalled that she had never heard a harsh word in her life while she was at *Tl'chés*.

Nowadays, there are at least two distinctive opinions regarding future land use at *Tl'chés*, as interest in the islands has increased because of restoration initiatives in the last decade. One approach is suggested in the current model of economical development for

the Songhees Nation, with hopes for adding *Tl'chés* into the region's cultural tourism route, fomenting a new business for the band as its Wellness Centre facility is under construction in their Esquimalt reservation. Presently, there are a couple of radio and cell phone towers on small Vantereight Island that bring some revenue to the band. A different vision comes from *Sellemah* and some other community members. It is more aligned with understanding of the deeper historical, ecological and cultural values of the islands to the Lekwungen people.

Elders Skippy and May Sam believe that something could be done in the islands to assist families in need of resources and support. They considered themselves rich people when they lived on Discovery Island, for they had everything they needed. Skippy and May even suggested building cabins on the islands, so people could go back there to stay or live for periods of time. They also worried about the erosion of the graveyard sites and beaches (Skippy and May Sam pers. comm. 2011).

Songhees volunteers have also voiced their visions and hopes for the future of the islands, mainly expressing a longing for preserving the landscape in a near-natural state. *Shē'wēlth* shares, "*In my time I know I have seen Victoria been developed quite a bit. And I'd like to see this [Tl'chés] not being developed, to maintain the nature, maintain the beds [camas, oyster and clam], I guess, mainly maintain the lands and the waters and protect that from being developed. And that's something we all have to do together in protecting our lands here*" (Wilfred George pers. comm. 2011). Youth volunteer, Johnny Horne [*Skweekmelten*] says, "*Every time I come here I feel so good. There's no development or nothing. It's so cool. It is so nice and quiet… I kind of imagine this place being like this: no development, all the wildlife… I can imagine my kids would like it here 10 years from now. Both of them would have lots of fun, as much fun as I am having here*" (Johnny Horne pers. comm. 2011). Over the length of this study, other visitors to the island have expressed sentiments of peace and tranquility and spiritual rest when at *Tl'chés*.

Sellemah understands the spiritual significance of *Tl'chés*, and growing up among healers, she considers the most appropriate use for *Tl'chés* is as a healing place, especially in view of the great need for physical and emotional healing among indigenous people. *Sellemah* envisions healing as a holistic process that comes with reconnection to tradition

and land. During an interview in late 2011 *Sellemah* stated, "*Somewhere down the line, I don't know if it's going to be in my lifetime… somewhere down the line that the island it would be known as the healing place*". Inspired by visitors' sentiments that the island is a spiritual place, *Sellemah* responded, "*It was an answer to prayer. Because before we all started going I spent a month in prayer saying 'ok, God, show me this is what you want. Show me if this is blessed by you'. This was an answer to prayer, 'cause our people have to go to Round Lake [Treatment Centre in Armstrong, BC] or somewhere far away. They are away from family, away from friends [...] such a foreign place, disjointed, right? I really want the island to be a healing place. It's isolated, but still reachable if anything happens to family and they need to go back. So I want to see the whole island as a healing place. I would like to see our people set in place, even if it's just to listen*" (Joan Morris pers. comm. 2011). *Sellemah* points to the importance of respect for elders, recalling an elder, who had gone through the Nanaimo Indian Hospital and passed away earlier that year, and who had told her, "Nobody wants to listen to us. All I want is somebody to sit down with me, maybe not believe, but just listen to me", and *Sellemah* completes, "*my mom used to ask herself 'why our people don't believe us?' So, that's what I want for Tl'chés: to be known as the healing island*". During an informal conversation in West Chatham Island, a weekend after traditional pitcook, *Sellemah* was confident about the potential of healing the islands carry, "*When people come here talking about, whether it is sexual abuse victims, alcoholics, drug addicts, whatever... when they come here, they feel so safe and peaceful that they [want to] stay and be healed. And because [of] this, as I said, this is a very sacred spot. That it will happen, it will happen*" (Joan Morris pers. comm. 2011).

In fact, the process for becoming a healing place has already begun, as this study could observe. The fact that *Sellemah* had the opportunity to return to her home-island in early 2000s, after a 50-years' absence, along with the recent restorative activities, has greatly influenced her to seek and share this healing experience with others.

During the pitcook celebration of September 17th, 2011, ceremonies denoted the process of reconnection between people and ancestral lands, and among themselves. Clan Chief Adam Dick (*Kwaxistalla*) and his wife Kim Recalma-Clutesi (*Oqwilowgwa*) of the Kwakwak'wakw were guests of honour, as was Bill White (*Xelimuxw / Kasalid*),

Hul'qumi'num. In the welcoming protocols *Kwaxistalla* mentioned that the noticed ancestors in the land were content: "*they are happy that the people have come back*". Later in the day, *Sellemah* led an act of peace, reconciliation and forgiveness between the Lekwungen and Kwakwak'wakw, regarding the warring history between both peoples. Lekwungen representatives, elders and youth offered forgiveness and asked for forgiveness to the Kwakwak'wakw for raids and violent acts in the past, on behalf of ancestors. *Kwaxistalla* was very moved and spoke words of peace and forgiveness. Following this, hosts and guests shared prayers and blessings for each other. Traditional foods, songs and stories were also shared throughout the day (see section 4.4.1). Salmon and food offering was performed to honour *Tl'chés* ancestors. In the end, guests of honour were gifted heritage plum (*Prunus domestica*) saplings from the West Chatham Island heritage orchard, to be transplanted in their own communities.

To *Sellemah*, these experiences and acts are part of healing processes normally overseen by health and indigenous authorities (Joan Morris pers. comm. 2011).

Healing processes were not only noticed in ceremonial activities, but also during fieldwork surveys and restoration interventions. Songhees volunteers enjoyed the opportunity to spend time in the islands learning about native plants, local history, traditional values and principles, as well as interacting with the land. Apparently some volunteers were already in a process of healing, or on a reconnecting journey and this experience in *Tl'chés* contributed to a heightened experience, and motivated some to help others find healing. *Xiquelum* stated that, "*I never really grew up traditionally. I have seen it, but not participated when I was younger…. There's still many people out there that can help, and I met a whole bunch of people from other communities about traditional foods and stuff like that*" (Sandy George pers. comm. 2011). In past years, *Shē'wēlth* had gone through a healing program that looked more like a garden program and it was highly successful, preparing and enabling him to become an inspirational leader to the Lekwungen Community Garden and a significant participant in this restoration project (Wilfred George pers. comm. 2011).

In all, *Sellemah* understands the reasons behind the competing opinion from some of the community that longs to use *Tl'chés* as a source of economic revenue only. However, she firmly disagrees, stating that "*money is not the answer, healing is! Money can cover*

up some problems but it doesn't really deal with the issues. We need a healing place for our own" (Joan Morris pers. comm. 2011). Although motivations and justification for *Tl'chés* as a healing place were thoroughly considered, ways for practical implementation of this vision were not discussed in detail. Implementation of healing programs might include the construction of cisterns for potable rainwater collection, ecological latrines/toilets, and minimal infrastructure; or simply be centered on short-term activities and camping for least disturbance. Likewise the ecological restoration process, cultural renewal and healing processes will take patience and perseverance (Turner 2005), as well as vision and commitment: in all of these, *Sellemah* sets an inspiring example.

As a beginning, restoration of ecological and cultural features in sites such as traditional gardens and heritage orchard will serve as an important step for achieving *Sellemah's* vision for *Tl'chés* as a healing place.

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4.7 Personal communications

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Joan Morris, interviewed by Thiago Gomes and Dr. Nancy Turner on January 15th, 2011, at Songhees Band Office, Esquimalt, BC.

Joan Morris, interviewed by Thiago Gomes on April 21st, 2011, at Songhees Band Office, Esquimalt, BC.

Joan Morris, interviewed by Thiago Gomes on July 1st, 2011, at West Chatham Island, BC.

Joan Morris, interviewed by Thiago Gomes on September 23rd, 2011, at West Chatham Island, BC.

Joan Morris, interviewed by Thiago Gomes on October 14th, 2011, at Songhees Reserve, Esquimalt, BC.

Joan Morris and Wilfred George, interviewed by Thiago Gomes on November 7th, 2011, at Lekwungen Community Garden, Songhees Reserve, Esquimalt, BC.

Johnny Horne, interviewed by Thiago Gomes on October 14th, 2011 at West Chatham Island, BC.

Sandy George and Tiffany Charleson, interviewed by Thiago Gomes on October 14th, 2011 at West Chatham Island, BC.

Skippy and May Sam, interviewed by Thiago Gomes and Joan Morris on September 8th, 2011, at Tsartlip Reserve, West Saanich, BC.

Wilfred George, interviewed by Thiago Gomes on April 21st, 2011 at Songhees Band Office, Esquimalt, BC.

Wilfred George, interviewed by Thiago Gomes on October 14th, 2011 at West Chatham Island, BC.

5: Towards a healing place

The pathway to achieve the goals of renewing, restoring and protecting the cultural and ecological values of *Tl'chés*, highlighted as a result of this ethnoecological restoration study, involves a wide array of social-ecological, cultural, economic and also political implications. Many of these were addressed in previous chapters.

An ethnoecological approach to restoration, as presented in this study, provides innovative avenues for investigation and intervention that meet present needs of recovery in the cultural landscapes of *Tl'chés*. Ecological integrity and cultural fidelity are desired goals for long-term sustainability of ecosystems and people. Setting of goals in ecological restoration is normally determined by an understanding of ecosystem dynamics, diagnosing damage and degradation, awareness of a changing environment and local socioeconomic and philosophical aspects (Higgs 2004, Hobbs 2007).

At *Tl'chés*, Songhees cultural and philosophical values, especially elder Joan Morris' [*Sellemah*] principles and vision for the islands are paramount for guiding the setting of restoration and intervention goals. Therefore, it is of vital importance to take into account significance of the place, especially as home-islands to *Sellemah*, a handful of other elders alive, and many other ancestors of the Lekwungen people. Indeed, *Tl'chés* is a keystone place for these people, providing social-ecological resilience and safeguarding cultural identity in times of rapid and drastic change.

Fieldwork activities and celebration gatherings held in West Chatham Island not only generated important ecological and cultural information pertinent to planning of restoration intervention approaches, but also were surprisingly effective in initiating the process of reconnecting people to the ancestral territory of *Tl'chés*, strengthening cultural identity and renewing TEKW transmission, ultimately building expectation within the community for the future and restoration of *Tl'chés*, as described in Chapter 4. Oral history, traditional knowledge and historical records do provide a valid reference, or a "historical target" for restoration to a point in early 1900s. However, a combination of cultural guidelines, socioeconomic needs and political interest will also play an important part in defining restoration or intervention targets. The framework of wild design for

Tl'chés, presented in Chapter 2 (see Figure 2.6), therefore, will certainly provide an adaptive approach to achieve desired objectives.

Ecological assessments of terrestrial ecosystems at *Tl'chés* based on qualitative descriptions of distinct ecosystems types, attentive to cultural insights, native species of importance, and invasion of exotic species, as presented in Chapter 3, were important to generate a baseline for understanding ecological dynamics and diagnosing ecological damage (*i.e.*: plant invasion, ecological succession). Plant invasions are known to be positioned among the main drivers for ecosystem change and biodiversity loss worldwide (Millennium Ecosystem Assessment 2005). In fact, Vitousek *et al*. (1996) regarded biological invasions literally as global environmental change *per se*, founded on the ubiquity and velocity in which invasions are spreading and influencing ecosystems around the world (see also Crosby 1986, Dirzo and Raven 2003, Davis 2009). Vitousek *et al*. (1996) listed a series of detrimental consequences of biological invasions in local and global ecosystems, including the potential for altering ecosystem processes and reducing overall biological diversity.

In Garry oak ecosystems of southeastern Vancouver Island, invasive species are not necessarily just the drivers of change, but also passengers of anthropogenic and climatic influences (MacDougall and Turkington 2005, Lilley and Vellend 2009). Climate change projections for the Coastal Douglas-fir (CDF) zone, where *Tl'chés* archipelago is located, point to warmer temperatures, drier summers and wetter winters for the coming decades (IPCC 2007), however with little shift in the ecosystem climate niche compared to others zones in British Columbia (Hamann 2006, Wang *et al*. 2012). It is likely that in southeastern Vancouver Island, CDF zone will gradually change as new species advance, especially western redcedar (*Thuja plicata* Donn ex D. Don) and possibly exotic species, due to wetter climatic conditions and suppression of indigenous prescribed fires (MacDougall and Turkington 2005, Hamann 2006, Wang *et al*. 2012). Therefore, the influence of human disturbance – including the facilitation of invasive species introduction and fire suppression – cannot be taken for granted in the scheme of environmental change.

In this context, profoundly altered ecosystems arise as result of human action, environmental change and introduction of non-native species – novel ecosystems –

posing important implications for conservation and restoration in local and global communities (see Milton 2003, Hobbs *et al*. 2006, Hobbs *et al*. 2009, Hobbs *et al*. forthcoming). Consequences to social-ecological systems, particularly within cultural landscapes, are difficult to assess and may include negative and undesirable changes such as disease epidemics, reduced access to traditional lands and resources, management and harvesting, erosion of traditional languages, reduced intergenerational learning, increased loss of food security and declining of health, which are mainly associated to the loss of biocultural diversity (Turner and Turner 2008, Maffi and Woodley 2010).

The new paradigm of ethnoecological restoration approach considered here employs the framework of wild design (Higgs 2003, Higgs and Hobbs 2010) applied to a specific cultural context. The combination of ecological assessments and TEKW-based values and principles for restoration and intervention works as an adaptive model that allows for social-ecological processes to flow and achieve desired goals, gradually establishing "healing processes" to people and ecosystems.

5.1 *Tl'chés*: a cultural keystone place

Tl'chés is a place that carries great significance in many spheres. Previous chapters review the social-ecological history, processes of change and present state of *Tl'chés* through the lenses of ethnoecological restoration. Not only the islands are home to important remnants of sensitive Garry oak associated ecosystems and rare species, they also stand as a cultural landmark for Indigenous People in the region.

The archipelago is cited in the narrative "Origin of Salmon" (Jenness n.d.), which tells the story of how the most important species for culture and subsistence of Lekwungen – and all Coastal Peoples of the Pacific Northwest, often referred to as Salmon Nation (Nabhan 2006) – helped humankind in times of necessity. Moreover, *Tl'chés* was fundamental to the survival of many Songhees families during the smallpox epidemic of 1862-3, serving as "refuge camp", subsequently permanent villages. This allowed Songhees population and culture to rebound from a low point of just 100 individuals in early 1900s after epidemics to over 500 in recent years (Higgs 2005, Lutz 2009). The islands have then become *homeland* to forthcoming Songhees generations with the establishment of permanent villages. Although *Tl'chés* families left the islands to join the

main Songhees Band in early 1960s (Keddie 2003), and have not returned to live in the islands, the sense of *homeland* is still alive for descendants of these families (Joan Morris, pers. comm. 2011).

Tl'chés went through drastic environmental change over the last century. Nevertheless, it still remains a keystone place for the renewal of Songhees culture – perhaps even to neighbouring indigenous groups. There are numerous culturally significant areas, shell middens, culturally modified trees and sacred sites throughout the islands. The last generation of *Tl'chés*-born-and-raised Songhees, now elders, still carry rich memories and local knowledge about the islands. Another important cultural aspect is that Lekwungen geography is inseparable from spiritual power and stories (Lutz 2009:14).

On the one hand, Songhees presence in the islands was fundamental for maintaining diverse, functional and highly productive ecosystems for thousands of years. On the other hand, *Tl'chés* has been a keystone place to the maintenance and promotion of Lekwungen culture throughout history. The islands have also supported local livelihoods and economy with fishing, husbandry and cultivation for many generations, as described in Chapter 3.

Here, I propose that *Tl'chés* is a cultural keystone place (CKP) in the region, based on the following elements, *(1)* long-standing oral history; *(2)* archaeological importance; *(3) a* crucial historical event for population survival; *(4)* central for safeguarding and renewal of cultural identity; *(5)* support socioeconomic and ecological resilience.

The abovementioned elements are universal, and therefore, can be tested as a framework for cultural keystone places (CKP) in different geographical locations. Ultimately, the CKP concept can assist selection of salient places within cultural landscapes with high conservation and restoration values for maintenance of biological and cultural diversities.

5.2 State of social-ecological systems at *Tl'chés*.

Social-ecological systems at *Tl'chés* are largely altered from historical conditions. Non-native species invasion (*i.e.*: *Rubus armeniacus*, *Cytisus scoparius*, *Hedera helix,* and agronomic grasses), change in environmental conditions (*i.e.*: drier summers, fluctuation of rainwater and fresh water availability, accidental fires, grazing), land

abandonment and cessation of harvesting and tending of the cultivated systems (*i.e.*: prescribed fire recession) have all contributed to the altered state of present biotic and abiotic conditions of ecosystems (see Figure 2.2), and broken social-ecological relations.

Human influence is evident in processes of change abovementioned. Sudden and long-lasting recession of indigenous TEKW management and practices – corresponding to the last resident families moving out in late 1950s – was likely the main factor for local ecosystems to enter in a path towards ecological novelty. Devoid of indigenous presence in the landscape, *Tl'chés* social dimensions had become remnants of a time and disconnected memories of people who once lived there.

It is still unclear, however, how climate change has been affecting local ecosystems at *Tl'chés*. Nonetheless, it is important to take into account predictions for the larger CDF zone with regards to species migration, temperature change and precipitation, especially the rise of ocean levels and increased force of winter storms. The last impose great risk to nearshore ecosystems, erosion of banks and archaeological sites along *Tl'chés* coastline.

West Chatham Island ecosystems today are mostly dominated by non-native invasive species. There are sites completely covered by invasive Himalayan blackberry (*Rubus armeniacus*), in association with English ivy (*Hedera helix*) or Scotch-broom (*Cystisus scoparius*), dominating and competing with native species. In these cases, structural and functional conditions of ecosystems are severely modified from expected historical states, and fit into the novel ecosystem definition. On the other hand, ecosystem services such as habitat and food provision for avifauna are still maintained to some extent.

A different situation is observed, especially in the orchard site, with heritage plum (*Prunus domestica*), cherry (*Prunus avium*), heritage apple (*Malus domestica*) and cultivar crabapple (*Malus*) trees. These are non-native, mostly non-invasive species. However, lack of pruning and thinning has allowed these species to overgrow and "naturalize", sending hundreds of new root suckers that have grown into dense patches of saplings. Today, this heritage orchard has theoretically achieved a hybrid state, and might move towards a novel ecosystem state. Ecological history of land use, disturbances, and invasions contribute to distinct states of disruption in the island, from severely modified sites to moderately altered ones, which allows for assessment of different stages of ecosystems state throughout *Tl'chés*.

With this it is possible to suggest that present ecosystems in West Chatham Island correspond to hybrid ecosystems – modified in its biotic and abiotic characteristics from historical states, in which restoration to historical qualities is still attainable (Hobbs *et al*. 2009). The great extent of non-native species invasion in the island is an obvious sign of alteration from historical (pre-contact) conditions. Moreover, episodes potentially associated with change in climatic conditions topped with recession of management practices confirm these ecosystems as hybrid ecosystems and possible candidates to become novel ecosystems as they experience more drastic changes. Therefore, efforts to restore *Tl'chés* ecosystems back to historical attributes are pertinent, especially involving these highly cultural systems. Human intervention in restoration is central to place social-ecological systems of *Tl'chés* into a trajectory for recovery, whether towards a historical trajectory or a hybrid path.

Trends of environmental change not only impact ecosystems, but might also have a foreseen effect on cultural practices and memory, especially with regards to native species, which can be outcompeted by non-native species in hybrid and novel ecosystems. Sometimes, non-native species are incorporated into local peoples' ecological and cultural relationships, as seen in the orchard at *Tl'chés,* due to extirpation of useful native species caused by non-native species invasions, or preference of exotic over native species. An ecological analogy to Lutz's (2009) "*moditional economy*" practiced by Indigenous Peoples, the "*moditional ecology*" might also have been in place at *Tl'chés* and throughout Indigenous Peoples' communities in order to support traditional ways of life. A "*moditional ecology*" trend might even be selected in the processes of continuous restoration and intervention strategies at *Tl'chés* in the long run.

5.3 Restoration & Intervention recommendations for West Chatham Island.

Best restoration and intervention recommendations for *Tl'chés* come from the adequate incorporation of wild design framework into the ethnoecological restoration approach. Specific wild design for *Tl'chés* is based on TEKW practices, values and principles, ecological, historical and cultural understanding, as well as socioeconomic and political aspects in order to generate an adaptive intervention plan (see Figure 2.6). Adaptive restoration or intervention will, therefore, allow for the accomplishment of

specific goals, such as removal and control of invasive species, revegetation of sites and maintenance of native species, and also generate clearer ecological understanding of cause-and-effect relationships through thoughtful experimentation of intervention approaches (Zedler and Callaway 2003, Zedler 2005, Hobbs *et al*. 2011).

There are numerous opportunities for establishment of restoration and intervention experiments at *Tl'chés*. However, fieldwork activities in this study were limited to West Chatham Island for reasons previously described in section *3.2.5 Methodology scope and limitations*. Hence, priority sites for restoration intervention were selected, and pilots established throughout West Chatham Island (see Figure 3.35). Intervention actions have been initiated in pilot sites (Appendix 9). However, continuous monitoring, assessment and engagement in intervention activities are essential to the success of these actions.

Although intervention activities and actions were already contemplated in chapters 3 and 4 to some extent, it is important to argue for the adaptive character of local interventions. Here, I present opportune strategies for dealing with invasive species, other than manual removal, exploring their potential uses to local livelihoods – either as a strategy for species control, or when control is not an attainable goal (novel ecosystems). Himalayan blackberry (*Rubus armeniacus*) fruit productivity is reasonably high. Blackberries could be harvested for fresh fruit consumption, jelly making, and as healthy food (rich in nutrients and antioxidants). Alongside berry harvest, manual control and removal of blackberry stalks can be done as an effective control strategy. Stalks can potentially be broken off and used as mulching material, similarly to what some indigenous people have done in their gardens elsewhere (Nancy Turner pers. comm. 2011, describing practices of Dr. Margaret Siwallace of Bella Coola, as observed in 1972). Scotch broom (*Cystisus scoparius*) becomes a tall shrub when mature and disposing of these bushes is challenging. The hard wood of mature broom can possibly be employed for tool making or related uses. In Europe, farmers use broom as green manure and as a preferred fuel for bread ovens. Common dandelion (*Taraxacum officinale*), hairy cat's ear (*Hypochaeris radicata*), and sheep sorrel (*Rumex acetosella*) can also be harvested for their medicinal and nutritional values, and as a strategy for gradual removal.

There are potential risks to the implementation of such alternative management strategies. For example, Himalayan blackberry, if not completely removed, might remain as an invasive threat in West Chatham Island, maintained by its successful mechanisms of seed dispersal via avifauna and spontaneous vegetative propagation of stalks. In the case of Scotch broom, soil seed bank lasts for decades, and if aboveground seed source populations outside West Chatham Island are not controlled, invasion and dispersal of broom will not be stopped. Soil disturbance is still a risk when controlling and manually removing invasive species, especially for opening new opportunities for invasion in disturbed sites. Sensitive sites susceptible to erosion also pose risks to intervention and removal of non-native species, for these are often buffering against major disturbances, especially in coastal bluff and beach banks in West Chatham Island.

Another interesting non-chemical, alternative, intervention option is a novel approach for restorationists. Livestock grazing, particularly of goats and sheep to control blackberry has been successfully tested in Australia and New Zealand (Cox 2003). Recently studies have been carried in Gulf Islands and Vancouver Island, BC, concluding that herbivory can reduce perennial biomass and open bare soil sites for native annuals species establishment (GOERT 2011). This strategy can become problematic in West Chatham Island, due to the long history of sheep grazing and natural selection of annuals over perennials. If chosen, sites for grazing intervention should be carefully studied prior to selection for achieving proposed goals and not causing negative effects.

Most importantly, whenever re-assessing intervention strategies and developing new ones, a wild design framework considers community participation and deliberation, as well as consultation with elders, necessary for successful implementation of intervention strategies.

5.3.1 Ethnoecological restoration intervention pilots

Elaboration of intervention activities and methods was done in a participatory process with Songhees elder Joan Morris [*Sellemah*], Lekwungen Community Garden Coordinator Wilfred George [*Shē'wēlth*] and myself. From six priority sites defined, Songhees team and I arrived at recommendations described in Table 5. Together, we planned preliminary intervention actions for each site, following appropriate TEKW

principles and ecological protocols from GOERT Best Practice guidelines for removal of Himalayan blackberry, Scotch broom, and English ivy (GOERT 2002). Moreover, intervention activities were determined to follow principles of respect and reverence, which reflect on low impact actions, respectfully aware of all life forms.

Fieldwork activities on October 14th, October 24th and November 10th, 2011, focused on establishing intervention pilots. All priority sites were accessed and had initial activities established. It is important to highlight that all intervention actions are to be done via an approach of minimal disturbance because of the sensitivity of ecosystems, environmental vulnerability and sacredness of certain sites, and a generally positive response of invasive species to disturbances. Therefore, invasive species removal and control should be done manually or follow alternative, non-chemical, non-aggressive strategies – highly recommended by *Sellemah*'s TEKW principles.

In terms of control and removal of invasive species, there are different levels of difficulty imposed by particular species. Invasive species' impact rates, life cycles and extent of invasion are taken into consideration for providing prescriptions for most appropriate intervention and restoration actions within focal sites of priority.

On site 1, thinning and transplanting of plum saplings were initiated, as well as manual removal and control of Himalayan blackberry (*Rubus armeniacus*) and English ivy (*Hedera helix*) from specific areas of encroachment. Site 2 also had a pilot program established with manual and careful removal of invasive species in the surroundings of the Pacific yew tree (*Taxus brevifolia*) and Douglas-fir (*Pseudotsuga menziesii*). Scotch broom (*Cytisus scoparius*), English ivy (*Hedera helix*) and Himalayan blackberry (*Rubus armeniacus*) patches were manually removed from areas of the surrounding meadow on site 3. Sites 4 and 5 were approached simultaneously, with the removal of most young broom (*Cystisus scoparius*) plants. On site 6, the only intervention was manual removal of invasive species (newer invasions) during site surveying for TCEM, and require a more thorough intervention in the near future.

Immediate removal of Himalayan blackberry (*Rubus armeniacus*) is not recommended for all sites. Himalayan blackberry is a well-established species in the island, covering about 85% of surveyed area. Although invasive, this shrub provides habitat and food for a wide array of native bird species. Himalayan blackberry should be controlled or removed

Table 5: Restoration intervention recommendations for priority sites in West Chatham Islands.

Site #	Site Description	Invasive species	Site Disturbances	Recommended actions	When
1	Heritage orchard	*Rubus armeniacus*	SW winds and saltspray + trampling + greese grazing + spread of invasive species	Control and remove (manually) Himalayan blakberry and English ivy in sites encroaching other species and newest invasions; thin down plum orchard and transplant saplings to desired sites; collect heritage apple stems for grafting and propagation.	Ideal: Feb-Apr and Fall Possible: all year round
2	Pacific yew tree bank	*Rubus armeniacus, Hedera helix*	SW winds and saltspray + littering + erosion + spread of invasive species	Manual removal of Himalayan blackberry and English ivy surrounding yew tree and replant native shrubs (Nootka rose, Saskatoon,trailing blackberry) for protection of banks against erosion. Monitor tree base situation – consider supporting trunk in future. Consider building a dyke to protect banks and tree against erosion.	Ideal: Fall Possible: all year round
3	Camas meadow	Agronomic grasses (*Bromus tectorum, Holcus lanatus, Anthoxanthum odoratum*), *R. armeniacus*	SE winds and saltspray + geese grazing and trampling + invasive agronomic grasses competition	Manual removal of Himalayan blackberry and Scotch broom from site surroundings. Harvest of *Camassia* spp. and *Fritillaria* sp. bulbs, select over death camas. Collect camas seeds in spring to use in future. Harvest invasive plantain, hairy cat's ear, and sheep sorrel for eating; plan prescribed fire experiment in order to control invasive agronomic grasses and promote native species.	Ideal: Feb-May Possible: Jan
4	Eastern bluff	*Cytisus scoparius, Hedera helix*	SE winds and saltspray + English ivy rapid spread + dispersal of Scotch broom	Manual removal of all young Scotch broom plants – minimal disturbance. After that, remove adult plants. Keep monitoring - seed bank lasts for decades.	Ideal: Mar-Apr Possible: all year round
5	Woodland slope	*Cystisus scoparius*	SE winds and saltspray + invasion and dispersal of Scotch broom	Same as above.	Ideal: Mar-Apr Possible: all year round
6	Northern woodland	*Ilex aquifolium, Cotoneaster simonsii, Daphne laureola*	Trampling and littering + new arrival of invasive species	Specific survey and manual removal of small invasions of daphne, holly, English ivy, cotoneaster. Continuous monitoring.	Ideal: all year round

preferably mainly in critical locations, where its existence harm or risk other species survival or depletes ecological and/or cultural features. Himalayan blackberry removal should be planned according to future land use objectives, site-specific, on a gradual campaign to control, remove and replace this invasive species for native ones whenever possible, employing alternative minimal disturbance techniques.

It is expected that simple manual removal of invasive Himalayan blackberry, Scotch broom and English ivy in different sites will be effective in reducing these species' cover and invasion rate considerably for at least one season, opening opportunities for deliberate native plant revegetation and propagation actions on cleared sites in West Chatham Island. Wherever Scotch broom plants were removed manually and willow stems were immediately planted to reduce soil disturbance and avoid invasive species' establishment, it is estimated that invasive species cover will be reduced in the subsequent years, and if intentional control of broom is kept, it is likely that invasion trends will diminish. Prescribed fire experimentation interventions will also be an important part of the adaptive process, since it has already been used in the past for controlling invasive species and promoting native ones on site 3.

Finally, monitoring of established intervention pilots (geo-referenced and photographed) is key for the success of ethnoecological restoration and intervention pilots in West Chatham Island. Moreover, completion of additional actions suggested is needed in order to protect priority sites, and ultimately shift ecosystems into states that support higher ecological integrity and cultural fidelity values.

5.4 Future directions

This research is defined as an ethnoecological restoration study and, therefore, possesses a character of "continuity", natural to restoration processes. Here, I leave questions and directions for planners, practitioners and community members with respect to ethnoecological restoration and future of *Tl'chés*.

First of all, continuous work is needed on the established restoration and intervention pilots, so that other sites can be selected for intervention in the future. For this, re-assessment of principles and values is an important part of TEKW adaptive restoration –

open to emerging conditions and needs of restoration and intervention work, as depicted in the wild design framework for *Tl'chés* (see Figure 2.6).

Secondly, I suggest further studies on environmental conditions and issues not comprehended on this study scope. Proper archaeological surveys of terrestrial ecosystems and nearshore environment will likely reveal more details of land use and change at *Tl'chés*, as well as social-ecological connections between Lekwungen ancestors and their environment. Likewise, in order to guarantee long-term sustainability to people in *Tl'chés*, a better understanding of surrounding marine conditions must be achieved.

Consequently, it would be beneficial to expand the scope of this work to all the islands of the *Tl'chés* archipelago and surrounding areas in order to generate a more in-depth understanding of social-ecological processes and patterns governing ethnoecological restoration dynamics in this region. Long-term plots for ecological study are also part of an adaptive approach to ethnoecological restoration and should be promptly established in any of the pre-selected priority sites for restoration in West Chatham Island, and in other sites selected throughout *Tl'chés* islands in the near future. Restoration targets should not necessarily aim to take *Tl'chés* ecosystems back to a pre-contact era or early 1900s, especially for presently comprising highly altered social-ecological systems. Ethnoecological restoration goals should be determined according to an adaptive approach in view of changing environmental conditions. Although it might be difficult to interpret large-scale climate change projections onto a small scale of specific ecosystems, it is important to take into account broader scale implications of change for planning immediate and long-term restoration actions.

Furthermore, Songhees presence must also be restored at *Tl'chés*. This would guarantee the continuation of restoration activities and also impede the misuse of the islands grounds by unauthorized visitors, which risks both ecological and cultural components in these landscapes. Strategies for bringing back Songhees presence to *Tl'chés* are still being discussed, however, fieldwork activities and celebration gatherings part of this present study provided a legitimate experience for people reconnecting to *Tl'chés* in a wide array of ways. Moreover, the vision for *Tl'chés* as a "healing place" calls for the encounter between people and place - a special encounter. "*Healing the land, healing the people*" consists of social, cultural and ecological elements that can be put

into practice in activities such as restoration and intervention in local ecosystems. Thus, promoting ecological and cultural well-being, and providing opportunities for knowledge and experiences to be shared amongst different generations in the grounds of the "healing islands" is recommended for *Tl'chés*. An inspirational example of Indigenous Peoples reconnecting and protecting their traditional territories is the Coastal Guardian Watchmen Program initiated in Haida Gwaii and adopted in BC's Central and Northern Coasts (see www.coastalguardianwatchmen.ca). Implementation of a similar project at *Tl'chés*, paired with restoration work and healing programs would become the proper response to decades of Songhees absence in the islands. Likewise, classification of *Tl'chés* as a cultural keystone place (CKP) will likely provide Songhees community with a systematic argumentation for the protection and restoration of significant cultural and ecological features currently at risk on this landscape.

Other than community engagement, political will and articulation are necessary to move forward with the objectives and vision of "*Healing the land, healing the people*" at *Tl'chés*, proposed in this study. Songhees First Nation has a timely opportunity to invest in programs that promote cultural renewal and social-ecological resilience in their territory, such as the extension of this present study to all islands of *Tl'chés*, as the new Wellness Centre facility that aims for promotion of Songhees cultural presence in the region is currently under construction. Although conflicting interests revolve around the future land use of *Tl'chés*, local elders' knowledge and wisdom, and community engagement cannot be taken for granted in the process of decision making for Chatham Islands and Discovery Island, as highlighted in this study. The partnership model adopted between this research project and the Lekwungen Community Garden mirror possible pathways to the continuation of restoration and healing processes initiated during fieldwork activities and cultural gatherings.

In all, the home islands of *Sellemah*, where her Lekwungen ancestors lived for thousands of years, have been a landmark for cultural and ecological resilience in the southern waters of the Salish Sea. This study highlights the importance of restoring and maintaining ecological and cultural values in the landscape, so that *Tl'chés* will hopefully continue to be a place of cultural identity and healing for future generations.

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5.6 Personal communications

Nancy Turner, personal communication with Thiago Gomes in June 15th, 2011, in West Chatham Island, BC.

Appendix 1a

Participant Consent Form (Group 1: Elders and Leaders)

Restoring *Tl'chés*: an ethnoecological restoration study in Chatham Islands, British Columbia

You are invited to participate in a study entitled "Restoring Tl'chés: an Ethnoecological Restoration Study in Chatham Islands, British Columbia, Canada" that is being conducted by BSc. Thiago Gomes.

I, Thiago Gomes, am a MSc. Candidate in the School of Environmental Studies at the University of Victoria, under the supervision of Dr. Nancy Turner and Dr. Eric Higgs. As a graduate student, I am required to conduct research as part of the requirements for a Master of Science degree in the School of Environmental Studies.

You may contact my supervisors at (250) 7217354, or respectively at nturner@uvic.ca and ehiggs@uvic.ca. I can be contacted for further questions via email at gothiago@uvic.ca, telephone at (250) 884-9761, or in person at the Social Sciences and Mathematics Building room B264.

Purpose and Objectives
This project is committed to providing assistance in the restoration of cultural and ecological features in Chatham Islands and within the Songhees First Nation, revitalizing traditional ecological knowledge on the landscape and reversing trends of biodiversity and cultural loss. Counting with community active participation and an integrative research approach, this study will likely initiate innovative processes for restoration in Chatham Islands. The objectives of this study are to generate a better understanding of environmental change, the role of traditional knowledge for restoration and develop restoration strategies for the gardens and orchards in Chatham Islands.

Importance of this Research
This research will be carried in partnership with the Songhees community in order to satisfy the needs and interests of this First Nation regarding restoration in their traditional territory in Chatham Islands. This research will likely initiate a process of restoration in elder Joan Morris' [Sellemah] birthplace. She longs to provide opportunities for community engagement in more sustainable and healthier ways of life.
This research is also important as a study between the correlation of traditional knowledge and the practice of restoration, as an innovative approach.

Participants Selection
You are being asked to participate in this study because of your importance to the community as a respected and knowledgeable person in providing important information about Chatham Islands and/or traditional plant use, or as a leader/influential person in shaping the future of the Songhees First Nation.

What is involved
If you agree to voluntarily participate in this research, your participation will include a 1-2 hour interview with main investigator, Thiago Gomes, and possibly Joan Morris, at your best convenience and an invitation to a Gathering to be hold in Chatham Islands, where another session of interviews will be made in a focus group. The interviews will be semi-structured and open-ended, like a conversation, and will be recorded in audio and video. A transcription will be made for each interview. Photos will also be taken of you.

Inconvenience
Participation in this study may cause some inconvenience to you, including the time required for the interviews and for reviewing responses and outcomes of the research.

Risks
There are some potential risks to you by participating in this research and they include fatigue in answering questions and field outing, or emotional distress in remembering past memories. The short travel by boat to

Chatham Islands on the occasion of the Gathering may also pose risks to your physical integrity. To prevent or to deal with these risks I will be extremely careful to monitor people's state and energy during interviews and field outing. As for travelling by boat, life jackets will always be provided to participants and, trained and experienced personnel with appropriate navigation equipment will handle boats.

Benefits
The potential benefits of your participation in this research include recognition for your knowledge within the community and beyond, as well as receiving compensation for your time. This research is important to society in providing a clearer understanding of how traditional knowledge systems could support healthier and more sustainable ways of life, and promote restoration of areas that could be managed for the benefit of future generations. Research on traditional food systems of production and management and the connections with environmental sustainability are relatively new; therefore, this research will contribute to the state of knowledge about the social and ecological roles of key food plant species, their habitats and applications to restoration.

Compensation
As a way to compensate you for any inconvenience related to your participation, you will be given an honorarium ($25/hour), or a gift of equal value. If you would not participate if the compensation was not offered, then you should decline.

Voluntary Participation
Your participation in this research must be completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study your data will be included with or without your name or removed in the study, following the your wishes. A verbal agreement might be obtained, followed by a written note describing the agreement to ensure understanding.

Dissemination of Results
It is anticipated that the results of this study will be shared with others through a thesis submitted as part of my degree, presentations at scholarly meetings, class presentation, internet, published article, chapter or book, newspaper, radio or TV, and directly to participants involved.

Disposal of Data
If participants give their permission data from this study will be retained until the project is completed, on password secured computers and in Thiago's office. Data may be deposited in archives at UVic and at the Songhees Lands Office. If participants wish their data to be destroyed, this will be done through shredding of interview notes and deleting files from all computers before stored in archives.

In addition, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researchers.

Visually Recorded Images/Data
Photos and videos may be taken of me for: Analysis (__) Dissemination (__) _____ (Participant initials)

I agree to have my responses attributed to me by name in the results: _____ (Participant initials)

_____	_____	_____
Name of Participant	*Signature*	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher

Appendix 1b

Participant Consent Form (Group 2: youth)

Restoring *Tl'chés*: an ethnoecological restoration study in Chatham Islands, British Columbia

You are invited to participate in a study entitled "Restoring Tl'chés: an Ethnoecological Restoration Study in Chatham Islands, British Columbia, Canada" that is being conducted by BSc. Thiago Gomes.

I, Thiago Gomes, am a MSc. Candidate in the School of Environmental Studies at the University of Victoria, under the supervision of Dr. Nancy Turner and Dr. Eric Higgs. As a graduate student, I am required to conduct research as part of the requirements for a Master of Science degree in the School of Environmental Studies.

You may contact my supervisors at (250) 7217354, or respectively at nturner@uvic.ca and ehiggs@uvic.ca. I can be contacted for further questions via email at gothiago@uvic.ca, telephone at (250) 884-9761, or in person at the Social Sciences and Mathematics Building room B264.

Purpose and Objectives
This project is committed to providing assistance in the restoration of cultural and ecological features in Chatham Islands and within the Songhees First Nation, revitalizing traditional ecological knowledge on the landscape and reversing trends of biodiversity and cultural loss. Counting with community active participation and an integrative research approach, this study will likely initiate innovative processes for restoration in Chatham Islands. The objectives of this study are to generate a better understanding of environmental change, the role of traditional knowledge for restoration and develop restoration strategies for the gardens and orchards in Chatham Islands.

Importance of this Research
This research will be carried in partnership with the Songhees community in order to satisfy the needs and interests of this First Nation regarding restoration in their traditional territory in Chatham Islands. This research will likely initiate a process of restoration in elder Joan Morris' [Sellemah] birthplace. She longs to provide opportunities for community engagement in more sustainable and healthier ways of life.
This research is also important as a study between the correlation of traditional knowledge and the practice of restoration, as an innovative approach.

Participants Selection
You are being asked to participate in this study because of your importance to the community as an inspiring youth in shaping the future of the Songhees First Nation with regards to ecological and cultural restoration.

What is involved
If you agree to voluntarily participate in this research, your participation will include a 1-2 hour interview with main investigator, Thiago Gomes, and possibly Joan Morris, at your best convenience and an invitation to a Gathering to be hold in Chatham Islands, where another session of interviews will be made in a focus group. The interviews will be semi-structured and open-ended, like a conversation, and will be recorded in audio and video. A transcription will be made for each interview. Photos will also be taken of you.

Inconvenience
Participation in this study may cause some inconvenience to you, including the time required for the interviews and for reviewing responses and outcomes of the research.

Risks
There are some potential risks to you by participating in this research and they include fatigue in answering questions and field outing, or emotional distress in remembering past memories. The short travel by boat to

Chatham Islands on the occasion of the Gathering may also pose risks to your physical integrity. To prevent or to deal with these risks I will be extremely careful to monitor people's state and energy during interviews and field outing. As for travelling by boat, life jackets will always be provided to participants and, trained and experienced personnel with appropriate navigation equipment will handle boats.

Benefits
The potential benefits of your participation in this research include recognition for your knowledge within the community and beyond, as well as receiving compensation for your time. This research is important to society in providing a clearer understanding of how traditional knowledge systems could support healthier and more sustainable ways of life, and promote restoration of areas that could be managed for the benefit of future generations. Research on traditional food systems of production and management and the connections with environmental sustainability are relatively new; therefore, this research will contribute to the state of knowledge about the social and ecological roles of key food plant species, their habitats and applications to restoration.

Compensation
As a way to compensate you for any inconvenience related to your participation, you will be given an opportunity to visit Chatham Islands with no expenses and will receive a gift for your collaboration. If you would not participate if the compensation was not offered, then you should decline.

Voluntary Participation
Your participation in this research must be completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study your data will be included with or without your name or removed in the study, following the your wishes. A verbal agreement might be obtained, followed by a written note describing the agreement to ensure understanding.

Dissemination of Results
It is anticipated that the results of this study will be shared with others through a thesis submitted as part of my degree, presentations at scholarly meetings, class presentation, internet, published article, chapter or book, newspaper, radio or TV, and directly to participants involved.

Disposal of Data
If participants give their permission data from this study will be retained until the project is completed, on password secured computers and in Thiago's office. Data may be deposited in archives at Uvic and at the Songhees Lands Office. If participants wish their data to be destroyed, this will be done through shredding of interview notes and deleting files from all computers before stored in archives.

In addition, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researchers.

Visually Recorded Images/Data
Photos and videos may be taken of me for: Analysis (__) Dissemination (__) _____ (Participant initials)

I agree to have my responses attributed to me by name in the results: _____ (Participant initials)

Name of Participant	*Signature*	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Appendix 2a

Semi-structured Interview Questions (Guide)

Set A:

1 What is the Lekwungen name and meaning for Chatham Islands?
2 Were there specific places for harvesting/planting food? Fishing? Hunting? Where?
3 Where were the orchards and gardens and homestead?
4 Who was responsible for tending the gardens/orchards?
5 How did they take care of the gardens/orchards?
6 Were there protocols or ceremonies for harvesting, fishing or hunting?
7 Did you have to bring any resources from other areas - animals or plants?
8 What did you and your family eat back during your days on the Chatham Islands?
9 What are the species that used to be part of the orchards/gardens?"
… as well as more specific questions for each plant species, regarding use, cultural significance, distribution, production, phenology (seasonality), and general inquiries about social-ecological interactions.

Set B:

1 What is left from the old gardens, orchards and homestead?
2 What are the new species in the area?
3 What species cannot be found nowadays?
4 Were the woodlands more open or closed than today?
5 Are there any memorable episodes of uncommon/unexpected change in the landscape/seascape?
6 Any records of fires, storms or unnatural events?
7 Why did your family and other families leave the islands?
… and other questions about socioeconomic and environmental change in the place.

Set C:

1 Have you ever been to *Tl'chés*? When? What for (occasion)?
2 How do you see the islands in 5-10 years?
3 How Chatham Islands can encourage a more sustainable and healthier way of life in the Songhees Nation?
4 What does it mean to restore Chatham Islands? What is the best strategy?
5 What is your expectation regarding this project and the future of the islands?
6 Are there any negative effects for "bringing back" traditional orchards and gardens?
7 What are positive effects of restoring cultural and ecological features in Chatham Islands?

Appendix 2b

Focus Groups Questions (Sample)

Set A

1 What is the significance of Chatham and Discovery Islands to the Songhees Nation?

2 Do Chatham Islands play a role in encouraging a more sustainable and healthier way of life among the Songhees? And a broader community?

Set B

1 How do you see the islands in 5-10 years?

2 What does it mean to restore Chatham Islands?

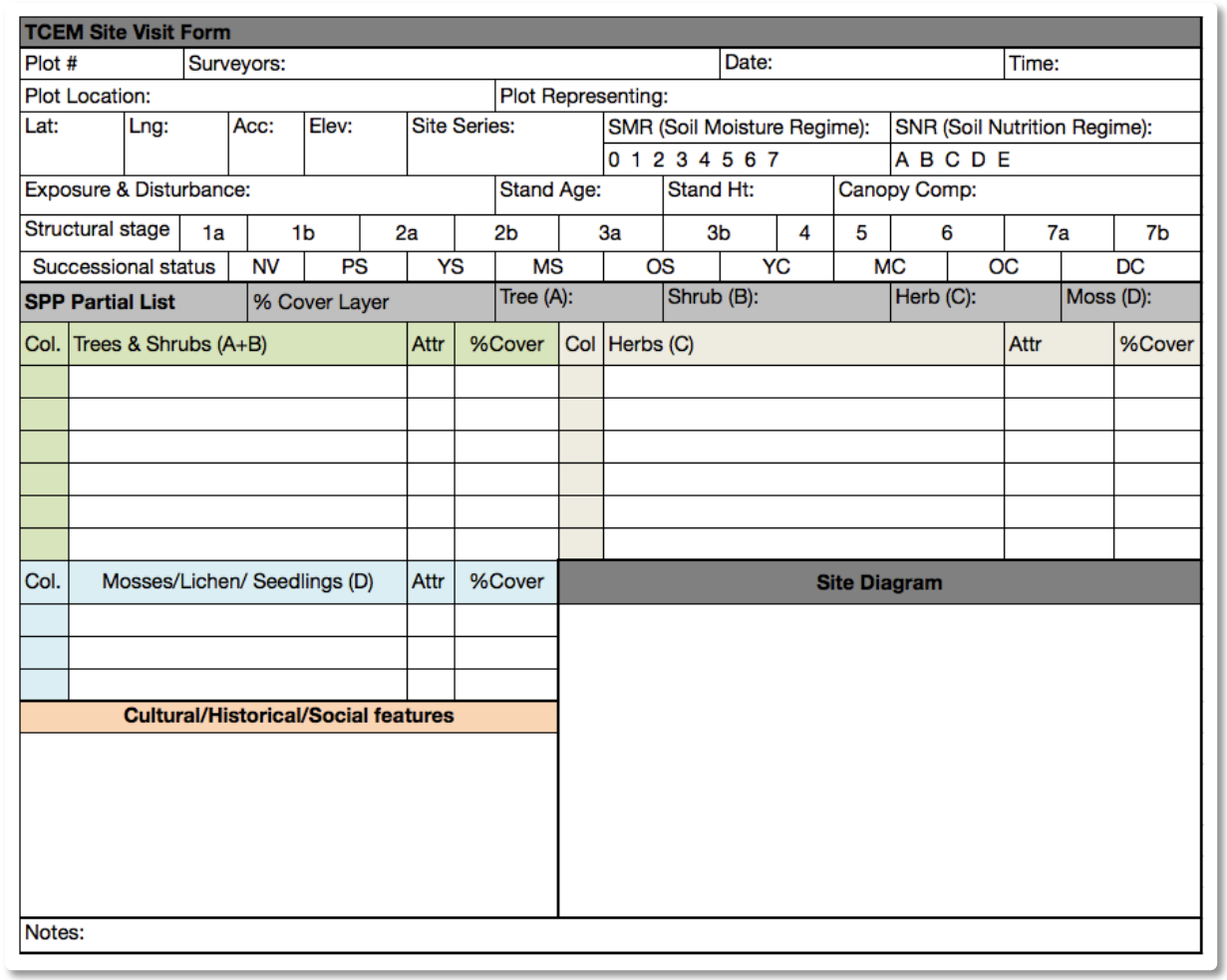
3 Are there negative side effects from "bringing back" the gardens and orchards? Which?

4 What are positive effects of restoring cultural and ecological features in *Tl'chés*?

5 What is the most sustainable land use for *Tl'chés*?

Appendix 3

Terrestrial Cultural Ecosystem Mapping (TCEM) Form



TCEM Site Visit Form

Plot #	Surveyors:						Date:			Time:	
Plot Location:				Plot Representing:							
Lat:	Lng:	Acc:	Elev:	Site Series:	SMR (Soil Moisture Regime):			SNR (Soil Nutrition Regime):			
					0 1 2 3 4 5 6 7			A B C D E			
Exposure & Disturbance:				Stand Age:	Stand Ht:		Canopy Comp:				
Structural stage	1a	1b	2a	2b	3a	3b	4	5	6	7a	7b
Successional status	NV	PS	YS	MS	OS	YC	MC	OC	DC		
SPP Partial List	% Cover Layer			Tree (A):	Shrub (B):		Herb (C):		Moss (D):		

Col.	Trees & Shrubs (A+B)	Attr	%Cover	Col	Herbs (C)	Attr	%Cover

Col.	Mosses/Lichen/ Seedlings (D)	Attr	%Cover

Site Diagram

Cultural/Historical/Social features

Notes:

TCEM form. Modified from Terrestrial Ecosystem Mapping (TEM) site visit form FS1333 (see Province of British Columbia 2010)

TCEM Codes:

SMR: 0-7 scale of moisture; 0 being driest, 7 being the wettest condition. **SNR**: A-E scale of nutrient regime: A very poor, B poor, C medium, D rich, E very rich. **Structural age**: 1a sparse, less than 10% vegetation cover; 1b bryophyte dominated; 1c lichen dominated; 2a forb dominated; 2b graminoid dominated; 2c aquatic; 2d dwarf shrub dominated; 3a low shrub; 3b tall shrub; 4 pole/sapling tree>10m tall; 5 young forest self-thinning; 6 mature forest trees established after stand replacing disturbance; 7a old forest stands; 7b very old forest stands complex structure abundant age sizes. **Successional status**: NV non-vegetated; PS pioneer seral; YS young seral; MS maturing seral; OS overmature seral; YC young climax; MC maturing climax; OC old climax; DS disclimax.

Appendix 4

Restoring *Tl'chés*: Data

Prepared by Thiago Gomes, School of Environmental Studies (University of Victoria)

Information contained in these two (02) DVD-Rs and in this one (01) Duracell® 8GB data stick correspond to the dataset obtained during the research project "Restoring *Tl'chés*: an ethnoecological restoration study in Chatham Islands, British Columbia", part of Thiago Gomes' masters degree completion, from September 2010 to July 2012. Information is purposely duplicated in different medias for guaranteeing backups of this project data.

This data package will be handed to Songhees elder Joan E. Morris, *Sellemah*, and shared with others if she wishes to do so.

There are two (02) main folders in this package:

1. */TlchesDATA/Dataset/*
Here the dataset for this study can be found, and is organized in sub-files, e.g.: Archival and Historical, Field Herbarium, Interviews and TCEM Field Data. Within these files, there are worksheets (*.xls*), text documents (*.docx, .pdf*) and images (*.jpg*, *.tiff*).

2. /TlchesDATA/QGIS West Chatham Island Project
Here is the GIS (Geographical Information System) data that was obtained during TCEM (Terrestrial Cultural Mapping) fieldwork and then processed with the use of QGIS – an open source software (www.qgis.org). Files are organized in folders corresponding to their categories. Files are also saved in formats compatible with different GIS software available and used more broadly, like ArcGIS®.

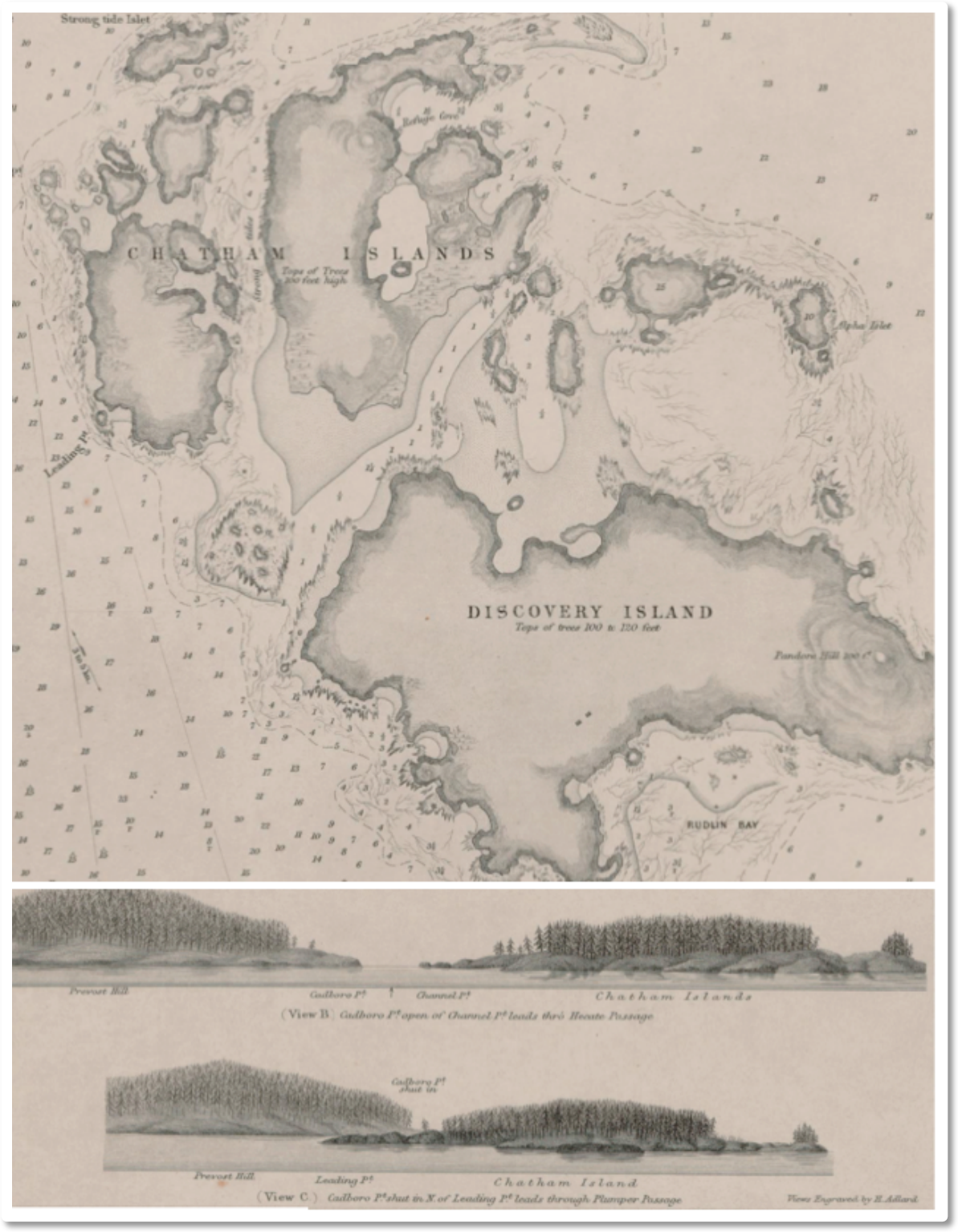
In order to access this information you will need a GIS software installed in your device. I recommend QGIS for it is free, of relatively simple use and available for Windows, Mac, and Android. Once you have installed the program (go to the website and follow instructions), you can access the map project by opening the file ***/TlchesDATA/QGIS West Chatham Island Project/West Chatham Island Project.qgs***. Then, you will be able to see the map and activate/deactivate different layers of information created during this study. You will also be able to add more information if desired. You will be able to run this map using a GIS software without the need to copy this information to your hard drive. Either with USB data sticks or DVDs.

There is a special plug-in that allows the user to "travel" through different waypoints with images that were captured during fieldwork. Look for a green arrow on top right of the menu. That is the EVis® plug-in. You have to select a layer with a date, e.g. *10-Sep-11*, and when you click on a waypoint from that layer, a window will open with information, comments and images about that site.

If you have any doubt about the organization or use of this information, please contact Thiago Gomes: gothiago@uvic.ca or go.thiago@yahoo.com

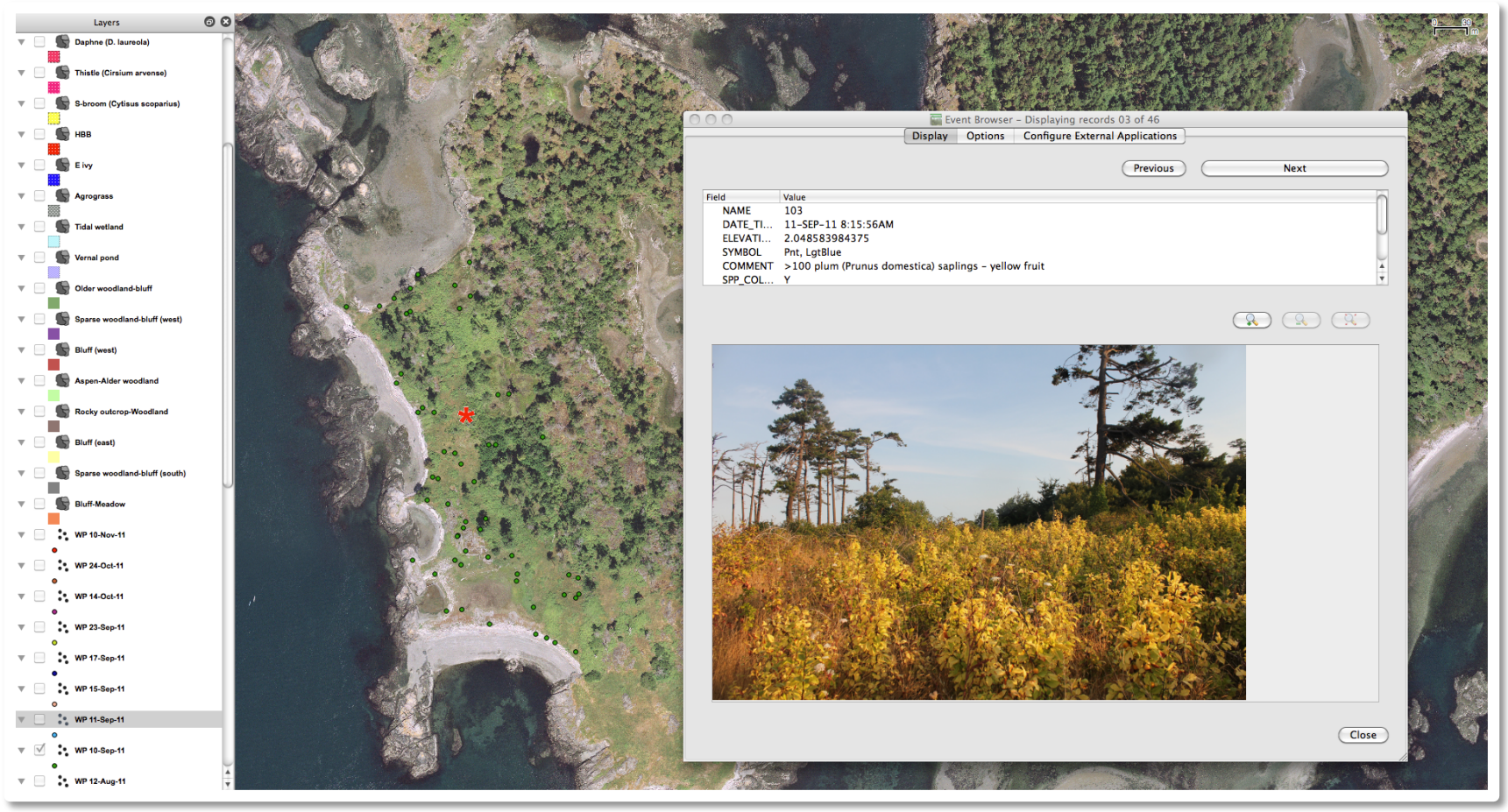
Appendix 5

Map: Inner Channels leading from Juan de Fuca Strait to Haro Strait Surveyed by Captain G.H. Richards (1864).



Appendix 6

Quantum GIS - Evis© platform



Evis© allows for creation of an Event Browser (complete with waypoint and site informations), which enables QGIS user to "navigate" in different surveyed ecosystems and waypoints.

Appendix 7

Plant species collected in West Chatham Island (Ethnobotanical Collection at the University of Victoria's Herbarium)

#	Col*	Date	Location	GPS Coordinates (X/Y)		Family	Species	Vernacular	Obs	Origin	BC Status
1	NT	15-Jun	Vernal pond	481,047.25	5,364,541.35	Rosaceae	*Malus fusca* (Raf.) C.K. Schneid	Pacific crabapple	unripe fruits	Native	Yellow
2	TG	15-Jun	Vernal pond	481,047.25	5,364,541.35	Scrophulariaceae	*Veronica anagallis-aquatica* L.	water speedwell	alternate leaves and raceme inflorescense	Exotic/introduced/naturalized	Exotic
3	TG	15-Jun	Orchard	480,999.36	5,364,527.24	Liliaceae	*Allium vineale* L subsp. *vineale*	field garlic	bulb and young inflorescence	Exotic/introduced/naturalized	Exotic
4	TG	15-Jun	Southeast bluff	480,958.70	5,364,398.12	Asteraceae	*Senecio* sp.	dusty miller	young flower disc, white-hairy stalk and leaves	?	-
5	TG	15-Jun	Southwest shore	481,028.90	5,364,555.46	Rubiaceae	*Galium trifidum* (subsp.?)	Three-petalled bedstraw	whole plant w/ flowers	Native	Yellow
6	TG	15-Jun	Vernal pond	481,047.25	5,364,541.35	Ranunculaceae	*Ranunculus repens L.*	creeping buttercup	bog area in patches	Exotic/introduced/naturalized	Exotic
7	TG	15-Jun	Southern meadow-bluff	481,192.20	5,364,235.10	Liliaceae	*Triteleia hyacinthina (Lindl.) Greene*	white brodiaea; triteleia	inflorescence, no leaves	Native	Yellow
8	TG	15-Jun	Vernal pond	481,028.90	5,364,555.46	Polygonaceae	*Polygonum amphibium* L	water smartweed	pink inflorescence	Native	n/a
9	NT	15-Jun	Orchard/ Vernal pond	481,028.90	5,364,555.46	Rosaceae	*Malus domestica*	heritage American "Mother" apple	branch w/ leaves	Exotic/introduced/naturalized	n/a

10	NT	15-Jun	Orchard/ Vernal pond under apple tree	481,028.90	5,364,555.46	Rosaceae	*Rubus ursinus* subsp. *macropetalus* (Douglas ex Hook.) Roy L. Taylor & MacBryde	Trailing blackberry	branch w/ leaves	Native	Yellow
11	NT	15-Jun	Orchard	480,958.70	5,364,398.12	Rosaceae	*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roem.	saskatoon	branch w/ leaves	Native	Yellow
12	NT	15-Jun	Orchard	480,958.70	5,364,398.12	Rosaceae	*Prunus domestica*	heritage plum	branch w/ leaves + unripe fruit	Introduced	-
13	TG	28-Jul	Southern bluff	481,138.80	5,364,199.00	Rosaceae	*Malus fusca (Raf.) C.K. Schneid*	Pacific crabapple	branch w/ leaves	Native	Yellow
14	TG	28-Jul	Southern bluff	481,108.76	5,364,281.03	Apiaceae	*Sanicula crassicaulis* Poepp. ex DC.	Pacific sanicle	Leaf, old stalk	Native	n/a
15	TG	28-Jul	Southern bluff	481,108.76	5,364,281.03	Polygonaceae	*Rumex acetosella* L.	sheep sorrel	inflorescence w/ leaves	Exotic/introduced/naturalized	Exotic
16	TG	28-Jul	Southern meadow-bluff	481,146.56	5,364,244.01	Liliaceae	*Fritillaria affinis* (Schult.) Sealy var. *affinis*	Chocolate lily	stalk w/ seeds	native	Yellow
17	TG	28-Jul	Southeast bluff	481,226.58	5,364,224.22	Asteraceae	*Cirsium arvense (L.) Scop.*	Canada thistle	flower and fruit	Exotic/introduced/naturalized	Exotic
18	TG	28-Jul	Southeast bluff	481,252.78	5,364,254.27	Rubiaceae	*Galium aparine* L.	cleavers, or common bedstraw	fruit and leaves	Native	Yellow
19	TG	28-Jul	Southeast bluff	481,192.20	5,364,235.10	Fabaceae	*Vicia sativa* L.	common vetch	fruit and leaves	Exotic/introduced/naturalized	Exotic
20	TG	28-Jul	Southeast bluff	481,028.90	5,364,555.46	Rosaceae	Malus fusca (Raf.) C.K. Schneid	Pacific crabapple	semi-ripe fruits 2 samples	Native	Yellow

21	TG	28-Jul	Southeast bluff	481,224.01	5,364,276.37	Caprifoliaceae	*Symphoricarpos albus* (L.) S.F. Blake	Common snowberry	flowers, fruits and leaves	Native	Yellow
22	TG	28-Jul	Southeast bluff	481,224.01	5,364,276.37	Rosaceae	*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roem.	saskatoon	fruit and leaves	Native	Yellow
23	TG	28-Jul	Southeast bluff	481,094.31	5,364,333.86	Fabaceae	*Lathyrus japonicus* var. *maritimus* (L.) Kartesz & Gandhi	beach pea	flowers, fruits and leaves	Native	Yellow
24	TG	28-Jul	Orchard	480,958.70	5,364,398.12	Liliaceae	*Allium vineale L subsp. vineale*	field garlic	mature flower and bulb	Exotic/naturalized	Exotic
25	TG	28-Jul	Orchard	480,958.70	5,364,398.12	Orchidaceae	*Epipactis helleborine (L.) Crantz*	Helleborine orchid	whole plant w/ flowers	Exotic/introduced/naturalized	Exotic
26	TG	28-Jul	Orchard/ Vernal pond	481,021.23	5,364,564.00	Rosaceae	*Malus domestica*	heritage "American Mother" apple	leaves and fruit	Exotic/introduced/naturalized	n/a
27	TG	28-Jul	Vernal pond	481,041.20	5,364,559.91	Salicaceae	*Salix glauca* L.	grayeaf willow	leaves	unknown	n/a
28	TG	28-Jul	Rocky north shore	480,917.53	5,364,608.90	Rubiaceae	*Galium trifidum* L.	three-petalled bedstraw	flowers and leaves	Native	n/a
29	TG	28-Jul	Northwest bluff/beach	480,917.53	5,364,608.90	Brassicaceae	*Cakile maritima* Scop.	European/American searocket	3 samples w/ flowers	Exotic/introduced/naturalized	Exotic
30	TG	28-Jul	Northwest bluff/beach	480,917.53	5,364,608.90	Brassicaceae	*?Cardamine nuttallii* Greene	beautiful bitter-cress		Native	Yellow
31	TG	12-Aug	Southern bluff	481,128.83	5,364,315.27	Rosaceae	*Rubus armeniacus* Focke	Himalayan blackberry	leaves and late flowers	Exotic/introduced/naturalized	Exotic

32	TG	12-Aug	Southern bluff	481,126.75	5,364,332.04	Fabaceae	*Cytisus scoparius* (L.) Link	Scotch-broom	leaves and fruit	Exotic/introduced/naturalized	Exotic
33	TG	12-Aug	Southern meadow-bluff	481,108.76	5,364,281.03	Denstaedtiaceae	*Pteridium aquilinum* (L.) Kuhn	Bracken fern	leaves	Native	Yellow
34	TG	12-Aug	Southern meadow-bluff	481,126.75	5,364,332.04	Poaceae	*Holcus lanatus* L.	Grass #1: velvetgrass	stalk, roots and seeds	Exotic/introduced/naturalized	Exotic
35	TG	12-Aug	Southern bluff	481,126.75	5,364,332.04	Poaceae	*Anthoxanthum odoratum* L.	Grass #2: sweet vernal grass	stalk, leaves and inflorescence	Exotic/introduced/naturalized	Exotic
36	TG	12-Aug	Southern bluff	481,201.24	5,364,315.59	Rosaceae	*Rubus armeniacus* Focke	Himalayan blackberry	leaves and flowers	Exotic/naturalized	Exotic
37	TG	12-Aug	Southeast bluff	481,201.24	5,364,315.59	Araliaceae	*Hedera helix* L.	English ivy	stem + leaves	Exotic/introduced/naturalized	Exotic
38	TG	12-Aug	Southeast bluff	481,202.77	5,364,246.40	Rosaceae	*Rubus ursinus* subsp. *macropetalus (Douglas ex Hook.) Roy L. Taylor & MacBryde*	trailing blackberry	leaves	Native	Yellow
39	TG	12-Aug	Southeast bluff	481,198.18	5,364,215.15	Poaceae	*Bromus tectorum* L.	Grass #3 Cheatgrass	stalk, roots, leaves and inflorescence	Exotic/introduced/naturalized	Exotic
40	TG	12-Aug	Southern meadow-bluff	481,224.01	5,364,276.37	Lamiaceae	*Clinopodium douglasii* (Benth.) Kuntze	yerba buena	branch w/ leaves + flower + fruit	Native	Yellow
41	TG	12-Aug	Southern bluff	481,121.80	5,364,261.24	Plantaginaceae	*Plantago lanceolata* L.	narrowleaf plantain	dried stalk and bulbs	Exotic/introduced/naturalized	Exotic
42	TG	12-Aug	Southern meadow-bluff	481,130.97	5,364,264.16	Liliaceae	*Camassia quamash* (Pursh) Greene or *leichtin*i?	Blue camas	dried stalk and bulbs	Native	Yellow

43	TG	12-Aug	Southern meadow-bluff	481,130.97	5,364,264.16	Asteraceae	*Achillea millefolium* L.	yarrow	dried plant	Native	n/a
44	TG	10-Sep	SW sparse woods	481,083.34	5,364,380.37	Rosaceae	*Malus fusca (Raf.) C.K. Schneid*	Pacific crabapple	branch w/ leaves + fruit	Native	Yellow
45	TG	10-Sep	Southern bluff/beach	481,057.40	5,364,344.29	Asteraceae	*Ambrosia chamissonis* (Less.) Greene	silver burweed	plant + inflorescence	Exotic/introduced/naturalized	Yellow
46	TG	10-Sep	Vernal pool	481,039.77	5,364,392.91	Rosaceae	*Potentilla egedii* Wormsk. L.	coast silverweed	branch	Native	Yellow
47	TG	10-Sep	Vernal pool	481,039.77	5,364,392.91	Fabaceae	*Lotus micranthus* Benth.	small-flowered birds-foot trefoil (small pea)	plant + seedpods + flowers	Native	Yellow
48	TG	10-Sep	SW sparse woods	481,040.42	5,364,399.37	Rosaceae	*Holodiscus discolor* (Pursh) Maxim.	oceanspray	branch w/ leaves + dried flowers	Native	Yellow
49	TG	10-Sep	Vernal pool	480,989.35	5,364,407.59	Asteraceae	*Grindelia squarrosa* (Pursh) Dunal	gumweed	plant + flowers	Native	Yellow
50	TG	10-Sep	SW beach	480,944.25	5,364,412.27	Asteraceae	*Antennaria* sp.	pussy toes	plant + inflorescence	Native	n/a
51	TG	10-Sep	Vernal pool	480,989.41	5,364,366.83	Chenopodiaceae	*Atriplex patula* L.	seasonally flooded area herb	plant + inflorescence	Exotic/introduced/naturalized	Exotic
52	TG	10-Sep	Western bluff	480,949.48	5,364,547.79	Rosaceae	*Malus fusca (Raf.) C.K. Schneid*	Pacific crabapple	branch w/ leaves	Native	Yellow
53	TG	10-Sep	NW bluff	480,949.19	5,364,673.61	Rosaceae	*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roem.	saskatoon	branch w/ leaves + buds	Native	Yellow

54	TG	10-Sep	NW bluff	481,121.80	5,364,261.24	Chenopodiaceae	*Chenopodium album* L.	lambsquarters	plant + inflorescence = seasonally flooded area herb	Introduced/ naturalized	n/a
55	TG	10-Sep	NW bluff	480,987.46	5,364,643.11	Caprifoliaceae	*Lonicera involucrata* (Richardson) Banks ex Spreng.	black twinberry	branch w/ leaves + dried flowers	Native	Yellow
56	TG	10-Sep	NW bluff	480,997.23	5,364,653.83	Cornaceae	*Cornus stolonifera Michx.*	red-osier dogwood	branch w/ leaves + fruit	Native	Yellow
57	TG	10-Sep	NW bluff	480,997.10	5,364,685.34	Asteraceae	*Anaphalis margaritacea* (L.) Benth.	pearly everlasting	plant + inflorescence	Native	Yellow
58	TG	11-Sep	Orchard	480,994.10	5,364,544.36	Rosaceae	*Prunus domestica* L.	yellow plum	leaves and fruit	Exotic/introduced/naturalized	Exotic
59	TG	11-Sep	Orchard	480,994.10	5,364,544.36	Rosaceae	*Prunus domestica* L.	red/ purple plum	leaves and fruit	Exotic/introduced/naturalized	Exotic
60	TG	11-Sep	Western bluff	480,966.59	5,364,537.79	Thymelaeaceae	*Daphne laureola* L.	Daphne laurel	branch w/ leaves	Exotic/introduced	Exotic
61	TG	11-Sep	Western bluff	480,966.59	5,364,537.79	Rosaceae	*Crataegus monogyna* Jacq.	English hawthorn	branch w/ leaves + fruit	Exotic/naturalized	Exotic
62	TG	11-Sep	Orchard	480,972.97	5,364,518.19	Rosaceae	*Prunus avium* L.	sweet cherry	branch w/ leaves	Exotic/naturalized	Exotic
63	TG	11-Sep	Western bluff	480,972.97	5,364,518.19	Aceraceae	*Acer sp*	ornamental maple, probably Norway maple	branch w/ leaves	Exotic/introduced/naturalized	n/a
64	TG	11-Sep	Western bluff	480,972.97	5,364,518.19	Pinaceae	*Pseudotsuga menziesii* (Mirb.) Franco	Douglas-fir	branch w/ needles and cones	Native	Yellow
65	TG	11-Sep	Eastern bluff	481,266.45	5,364,378.65	Fabaceae	*Vicia nigricans* subsp. *gigantea* (Hook.) Lassetter & C.R. Gunn.	giant vetch	branch w/ leaves + dried flowers	Native	Yellow

66	TG	11-Sep	Central woods	481,170.89	5,364,451.83	Rosaceae	*Cotoneaster simonsii* Bak.	Himalayan cotoneaster	branch w/ leaves + fruit	Exotic/introduced/naturalized	Exotic
67	TG	11-Sep	Central woods	481,165.98	5,364,446.47	Saxifragaceae	*Heuchera micrantha* Douglas ex Lindl.	alumroot	stalk w/ leaves	Native	Yellow
68	TG	11-Sep	Central woods	481,160.06	5,364,434.86	Denstaedtiaceae	*Pteridium aquilinum (L.) Kuhn*	Bracken fern	leaf	Native	Yellow
69	TG	23-Sep	Northern wood-bluff	481,215.09	5,364,822.24	Liliaceae	*Triteleia hyacinthina* (Lindl.) Greene	white brodiaea; triteleia	stalk w/ flower-fruit	Native	Yellow
70	TG	23-Sep	Northern wood-bluff	481,215.09	5,364,822.24	Pinaceae	*Pseudotsuga menziesii* (Mirb.) Franco	Douglas-fir	branch w/ leaves and cone	Native	Yellow
71	TG	23-Sep	Northern wood-bluff	481,192.27	5,364,831.52	Rosaceae	*Crataegus monogyna* Jacq.	common hawthorn	branch w/ leaves + fruit	Exotic/introduced/naturalized	Exotic
72	TG	23-Sep	Northern wood-bluff	481,165.43	5,364,822.70	Orchidaceae	*Goodyera oblongifolia* Raf.	rattlesnake-plantain	plant + flowers	Native	Yellow
73	TG	23-Sep	Northern wood-bluff	481,141.18	5,364,806.50	Caprifoliaceae	*Lonicera ciliosa* (Pursh) Poir. ex DC	orange honeysuckle	2X collections = leaves	Native	Yellow
74	TG	23-Sep	Northern wood-bluff	481,141.18	5,364,806.50	Rosaceae	*Cotoneaster simonsii* Bak.	Himalayan cotoneaster	branch w/ leaves + buds	Exotic/introduced/naturalized	Exotic
75	TG	23-Sep	Northern wood-bluff	481,141.18	5,364,806.50	Rosaceae	*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roem.	saskatoon	branch w/ leaves	Native	Yellow
76	TG	23-Sep	Northern wood-bluff	481,098.52	5,364,781.83	Caprifoliaceae	*Lonicera ciliosa* (Pursh) Poir. ex DC.	western trumpet/orange honeysuckle	leaves and fruit	Native	Yellow
77	TG	23-Sep	Northern wood-bluff	481,098.52	5,364,781.83	Polypodiaceae	*Polypodium glycyrrhiza D.C. Eaton*	licorice fern	branch w/ leaves	Native	Yellow

78	TG	23-Sep	Central woods	481,038.71	5,364,739.04	Apiaceae	*Oenanthe sarmentosa* C. Presl ex DC.	water parsley	herb beneath crabapple	Native	Yellow
79	TG	23-Sep	Northern wood-bluff	481,025.34	5,364,825.93	Rosaceae	*Rubus laciniatus Willd.*	cutleaf evergreen blackberry	branch w/ leaves	Exotic/introduced/naturalized	Exotic
80	TG	10-Nov	Orchard	480,998.04	5,364,548.79	Rosaceae	*Malus* sp.	crabapple sultivar	fruit	Exotic/introduced	Exotic

BC List Status: Extinct – Red: endangered/threatened – Blue: special concern – Yellow: secure/no risk of extinction. Status information from e-flora BC.

*Col = Specimen Collector (TG: Thiago Gomes; NT: Nancy Turner).

Appendix 8

West Chatham Island, July 1, 2011
Bird list – Marilyn Lambert (naturalist, bird specialist)

Name	**Species**	**BC List Status**
Double-crested Cormorant	*Phalacrocorax auritus*	Blue
Pelagic Cormorant	*Phalacrocorax pelagicus*	Red (subtaxa)
Great Blue Heron	*Ardea herodias*	Blue (subtaxa)
Canada Goose	*Branta canadensis*	Red (subtaxa)
Bald Eagle	*Haliaeetus leucocephalus*	Yellow
Killdeer	*Charadrius vociferus*	Yellow
Black Oystercatcher	*Haematopus bachmani*	Yellow
Glaucous-winged Gull	*Larus glaucescens*	Yellow
Pigeon Guillemot	*Cepphus columba*	Yellow
Rhinoceros Auklet	*Cerorhinca monocerata*	Yellow
Anna's Hummingbird	*Calypte anna*	Yellow
Northwestern Crow	*Corvus caurinus*	Yellow
Violet-green Swallow	*Tachycineta thalassina*	Yellow
Tree Swallow	*Tachycineta bicolor*	Yellow
Barn Swallow	*Hirundo rustica*	Blue
Cedar Waxwing	*Bombycilla cedrorum*	Yellow
White-crowned Sparrow	*Zonotrichia leucophyrs*	Yellow
Song Sparrow	*Melospiza melodia*	Yellow
Purple Finch	*Carpodaucus purpureus*	Yellow
House Finch	*Carpodaucus mexicanus*	Yellow

BC List Status: Extinct – Red: endangered/threatened – Blue: special concern – Yellow: secure/no risk of extinction. Distribution information (e-fauna BC) was only available for Glaucous-winged gull (year-round resident), and Anna's hummingbird (resident).

Appendix 9

Intervention pilots in West Chatham Island