

# Valens Brook Nature Reserve Management Plan

## Denman Island, British Columbia



**PREPARED FOR:**



ISLANDS TRUST CONSERVANCY

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**APPROVED BY: Islands Trust Conservancy, May 26, 2020 by Resolution Number: ITC-2020-015  
Denman Conservancy Association, July 20, 2020**

## **Executive Summary**

The Islands Trust Conservancy acknowledges and respects that Sla-dai-aich/Ihaytayich (Denman Island) is within the traditional territory of multiple Coast Salish Peoples and the Kwakwaka'wakw, whose historical relationship to the land, culture, and spirit of this place continues to this day. Islands Trust Conservancy is committed to honouring the rich history of Indigenous stewardship in the lands and waters of the Islands Trust Area and to building mutually respectful relationships between Indigenous and non-Indigenous partners in conservation. Therefore, this Management Plan for Valens Brook Nature Reserve is a living document that will evolve as opportunities for knowledge sharing arise and understanding grows<sup>1</sup>.

Valens Brook Nature Reserve consists of two donated land parcels along Denman Island's second-largest salmon spawning stream, Valens Brook, for which it is named. The Reserve protects 170 metres of this salmon-bearing creek, as well as two small wetlands and mature Douglas-fir forests with huge veteran old-growth trees over two metres in diameter. Two rare species and four rare ecological communities were identified in the Reserve during the recent inventory and an additional 14 rare species may use the Reserve based on previous information. The conservation of these lands provides a model for creating a continuous Valens Brook Greenway to protect both the creek and surrounding forests and to provide a refugia and travel corridor for native species on Denman Island.

The Reserve is held by the Islands Trust Conservancy (ITC). The 6.2-hectare (15.3-acre) property comprises two long, narrow parcels and is located approximately 4.8 km from the south end of Denman Island. The 3.74-hectare (9.2 acre) northern parcel was donated to ITC in 2012 by Kal Holsti and Marilyn Wan; the 2.55-hectare (6.3 acre) southern parcel was donated to ITC in 2018 by David Innes and Luise Hermanutz. The Denman Conservancy Association (DCA) will act as the local management group and in the future may hold a conservation covenant on the land, adding another layer of protection to the Reserve.

Initial management priorities include designing and installing signage for the Reserve, managing invasive English holly (*Ilex aquifolium*) in the newest land parcel, and developing monitoring and conservation strategies for the salmon-bearing creek. Other recommended management actions include establishing a volunteer warden, developing an annual monitoring program that includes inspection of property boundaries for trespass, monitoring water quality and flows in the creek and, if possible, decreasing the threat of wildfire. Adjusting to future changing climatic conditions will be a major consideration in long term management planning.

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<sup>1</sup> First Nations/reconciliation content written by Lisa Wilcox, Islands Trust

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## Acknowledgements

Valens Brook Nature Reserve exists as a result of the generous donation of land by Denman community members who wished to see protection for Denman’s second-largest salmon bearing creek. Many thanks to these thoughtful individuals: K. Holsti, M. Wan, L. Hermanutz and D. Innes. The author thanks all those who contributed data and assistance for this initial management plan (Table 1). Special thanks to Erika Bland (DCA Land Manager), the DCA Lands Committee, the DCA Board, and Jemma Green (ITC) for their contributions and review of the document. Thanks also to Louise Bell for her patient, dedicated editing and preparation of the background property information. As always, my sincere appreciation and apologies to the varied plant and animal occupants of the Reserve for my trampling and voyeurism.

**Table 1. Management Plan Contributors**

| <b>Name</b>                  | <b>Position/Affiliation</b>                               | <b>Professional Accreditation or Subject Expertise</b>       | <b>Contribution</b>   |
|------------------------------|---|--|---|
| Jennifer Balke               | Principal, Ecofocus Environmental Consultants             | Registered Professional Biologist                            | Ecological inventory, Trimble and Garmin data collection, GPS mapping, historic data, document additions and review |
| Don Chamberlain              | Biologist, Puntledge River Hatchery                       | Certified GPS Data Processor/Project Manager                 | Trimble GPS set up, Trimble data-handling, and post-processing  |
| Louise Bell                  | Self employed   | Editor   | Document assembly and editing   |
| Jemma Green and Nuala Murphy | Property Management Specialist, Islands Trust Conservancy | M.Sc. Environmental Studies (Restoration Ecology) (J. Green) | Contract supervision, document review   |
| Jackie O'Neil                | Islands Trust   | GIS Technician   | Islands Trust GIS data  |
| Lisa Wilcox                  | Senior Intergovernmental Policy Advisor                   | B.A. Psychology Indigenous Knowledge Holder                  | Reconciliation/Indigenous Knowledge Holder and editing  |
| Erika Bland                  | Land Manager, Denman Conservancy Association              | M.A. Environmental Studies (Political Ecology)               | Facilitation and write-up of the community consultation, and document review  |
| Denman Island community      | Members of the Denman Conservancy                         | Varied   | Contribution to information gathering,  |

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|  |  |  |   |
|--|--|--|---|
|  | Association, in particular the Lands Committee, the DCA Board and others |  | and document review (DCA Lands Committee) |
|--|--|--|---|

## 1 Introduction

Sla-dai-aich/Ihaytayich (Denman Island) is situated within the traditional territory of the Coast Salish Peoples, who share a rich history of stewardship in the lands and waters of the Islands Trust Area that inspires the work of Islands Trust Conservancy and its partners. Valens Brook Nature Reserve is the first protected area along Valens Brook, a salmon spawning stream that flows through at least 35 properties on southwest Denman Island. Rare species, mature Douglas-fir forests, and wetlands are conserved in the Reserve, which is made up of two donated land parcels. The 3.74-hectare northern parcel of the Reserve, hereafter referred to as the north parcel, was donated to the Islands Trust Conservancy (ITC) in 2012 by Kal Holsti and Marilyn Wan. The 2.55-hectare southern parcel, hereafter referred to as the south parcel, was donated in 2018 by David Innes and Luise Hermanutz. These individuals hope their donations will provide a model for protecting land along the creek to create a Valens Brook Greenway, which will protect the rare ecological communities and provide a travel corridor and refugia for native species and provide a buffer to protect salmon habitat from the impacts of nearby development. The major features of the Reserve are shown in Figure 1. This document is the first management plan for the property.

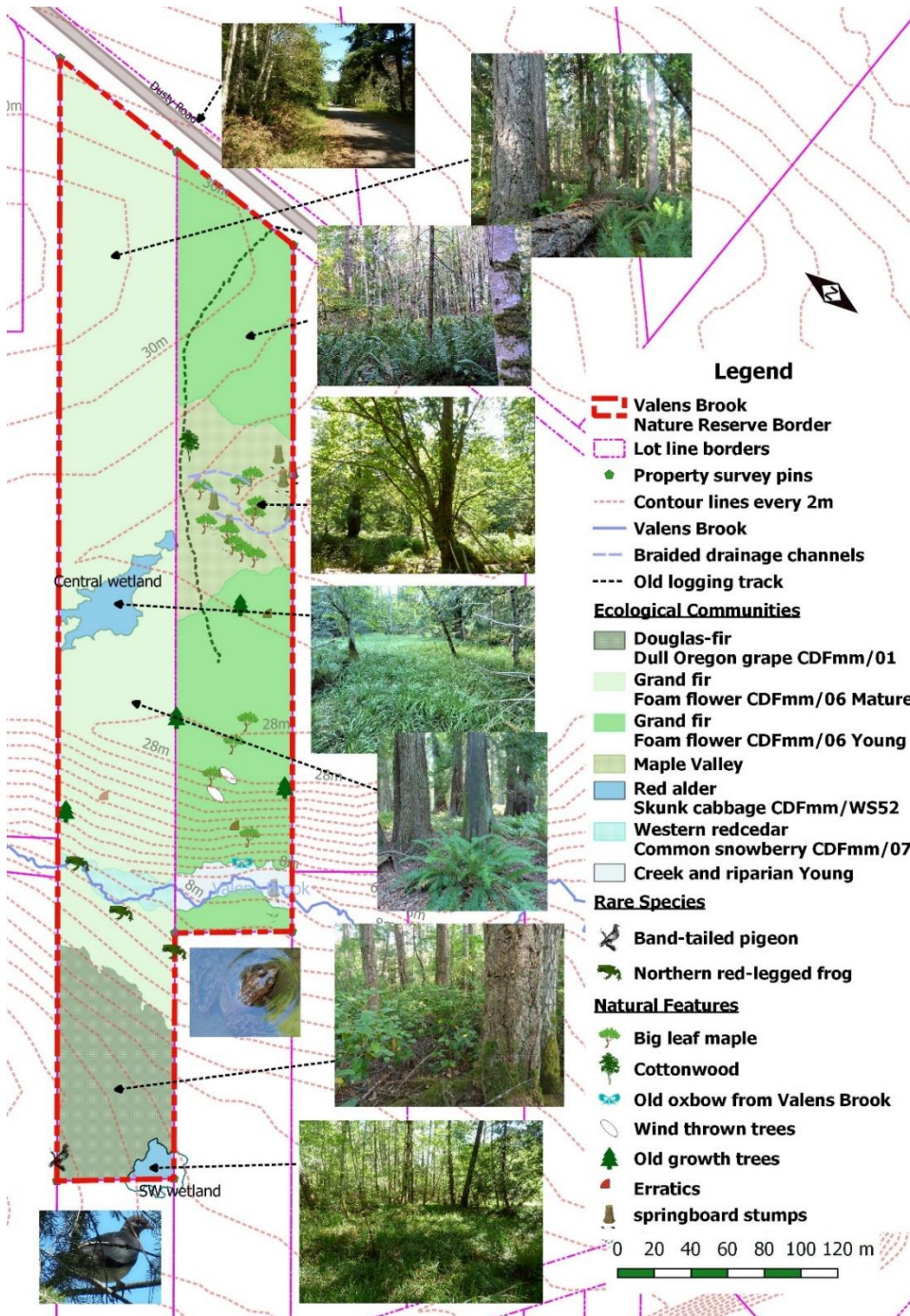
### 1.1 Islands Trust Conservancy

Since time immemorial, the lands and waters between Vancouver Island and mainland British Columbia have been home to the Coast Salish People, whose ecological, cultural, and spiritual connections to this place continue to this day. In 1974, the Province of British Columbia recognized this region as a special place within the province where the unique beauty, rural character and diverse ecosystems should be protected for future generations. Through the *Islands Trust Act*, the province established the Islands Trust, a local government, with the following mandate (known as the Object of the Islands Trust):

*To preserve and protect the Trust Area and its unique amenities and environment for the benefit of the residents of the trust area and of British Columbia generally, in cooperation with municipalities, regional districts, improvement districts, other persons and organizations and the government of British Columbia. (Islands Trust 2019a)*

In 1990, through the enactment of a section of the Islands Trust Act, the Province established the Islands Trust Conservancy (originally called the Islands Trust Fund) as a conservation land trust to assist in carrying out the “preserve and protect” mandate. Part 6 of the *Islands Trust Act* establishes the corporate status, responsibilities, and governance structure of the Islands Trust Conservancy. The Board of the ITC is one of

the corporate entities<sup>2</sup> charged to uphold the Object of the Islands Trust. Since 1990, the ITC has protected over 1,300 hectares (3,220 acres) of land as nature reserves and conservation covenants.



**Figure 1. Major features in Valens Brook Nature Reserve.**

<sup>2</sup>The corporate entities charged to uphold the Object of the Islands Trust are the Trust Council, the Executive Committee, twelve local trust committees, one island municipality and the Islands Trust Conservancy Board.

The vision of the ITC is that the islands and waters of Canada's Salish Sea will be a vibrant tapestry of culture and ecology where humans live and work in harmony with the natural world. This special place will have a network of protected areas that preserve in perpetuity the native species and natural systems of the islands. Engaged residents and conservation partners will work together to protect large natural areas and key wildlife habitat. Viable ecosystems will flourish alongside healthy island communities.

The mission of the ITC is to protect special places by encouraging, undertaking, and assisting in voluntary conservation initiatives within the Islands Trust Area. ITC nature reserves are managed to maintain, preserve and protect the natural features and values of ecosystems. This level of protection is similar to the International Union for Conservation of Nature (IUCN) protected area Category 1B: Wilderness area: "large area of unmodified or slightly modified land and/or sea; retaining its natural character and influence, without permanent or significant habitation, which is protected and managed in order to preserve its natural condition" (Lockwood 2006).

## 1.2 Purpose of Islands Trust Conservancy Management Plans

ITC management plans provide background information and set out the direction of property management as follows:

- Provide general and descriptive information on the property, including location, history, and land use.
- Identify the ecological and/or cultural values and features of the property.
- Set out the conservation goals and objectives for the property.
- Describe the management issues associated with the property.
- Provide short-, medium- and long-term management recommendations (action items or tasks) on issues such as: species at risk protection, threatened forest types, ecological restoration, public access, educational and research opportunities, invasive species management, and signage needs.
- Preserve and protect cultural, spiritual, and sacred locations.

Once the management plan process is completed, the ITC works to carry out the management actions or strategies identified in the plan, as resources allow. Following general practice and as outlined in the conservation covenant and statutory right of way, the ITC revises the Management Plan every ten years.

## 1.3 The Scope of ITC Management Plans

Consistent with the Islands Trust Reconciliation Declaration (Islands Trust 2019), the ITC recognizes that its nature reserves may be places of great cultural and spiritual significance to First Nations, as well as upholding the guiding principles of United

Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)<sup>3</sup> and the Truth and Reconciliation (TRC) Calls to Action.. Cooperative management of these protected places will provide opportunities to establish and maintain mutually respectful relationships between the Islands Trust Conservancy and First Nations. Relationship-building, knowledge-sharing, healing, and establishment of trust take time. Islands Trust Conservancy is committed to developing a parallel *Management Plan for Areas of Cultural Heritage and Sacred Significance*. This parallel Management Plan sets out guiding principles for cooperative collaboration between ITC and First Nations with traditional and treaty territories and cultural interests in the area defined by one or more nature reserves. Moreover, the Management Plan defines the common vision, objectives, policies, and best management practices for the nature reserve(s) to ensure that its natural values and cultural heritage and sacred significance are maintained for future generations.

#### 1.4 Protected Area Purpose

The purpose of Valens Brook Nature Reserve is to preserve, in perpetuity, Valens Brook (where it transverses the Reserve) and the second-growth forest, individual old-growth Douglas-fir trees, and wetland areas found in the Reserve, and to maintain the biodiversity of the site for the benefit of the flora and fauna of the Reserve, the residents of the island, First Nations, and the province generally. The land will be protected as a nature reserve in accordance with the objectives of the Islands Trust and the ITC.

#### 1.5 Protected Area Objectives

The objectives for Valens Brook Nature Reserve are to:

1. Preserve and protect the ecological communities, biological diversity, salmon-bearing creek, species at risk, and other natural values of the Reserve;
2. Restore plant and animal communities and ecological processes where necessary and feasible;
3. Support and protect continued use of areas of sacred and cultural significance by First Nations as per Section 35<sup>4</sup> of the Constitution Act and UNDRIP;
4. Support ongoing inventory, mapping and monitoring to guide management actions, provided these activities do not have a major negative impact on native species or the natural ecological functioning of the Reserve;
5. Allow the natural ecological processes and functions of the site to proceed

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<sup>3</sup> The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) is an international instrument adopted by the United Nations on September 13, 2007, to enshrine (according to Article 43) the rights that “constitute the minimum standards for the survival, dignity and well-being of the indigenous peoples of the world.” The UNDRIP protects collective rights that may not be addressed in other human rights charters that emphasize individual rights, and it also safeguards the individual rights of Indigenous people. Canada signed in 2010.

<sup>4</sup> Section 35 of the Constitution Act, 1982 recognizes and affirms the existing aboriginal and treaty rights of the aboriginal peoples of Canada and the courts have stated that aboriginal rights include aboriginal title.

- unimpeded, except in the case of wildfire or other exceptional situations where remediation is considered imperative; and
6. Remove invasive species throughout the Reserve where they compromise natural values.

## **2 Property Information**

Valens Brook Nature Reserve is located in southwest Denman Island, 4.8 km from the southern tip of Denman Island (Figure 2). The Reserve is named for Valens Brook, a salmon-bearing stream that flows over six kilometres along the southwest side of Denman, of which 170 metres flows through the Reserve.

The Reserve is 6.29 hectares (15.5 acres) in size and was formed from two immediately adjacent properties. Both properties were once segments of a 23-lot residential subdivision created in 1947. The Reserve is trapezoidal in shape, long (with its long-edge boundaries extending from 370 m to over 600 m), and narrow. At only 130 m wide, the Reserve is vulnerable to impacts from activities on adjacent parcels.

### **2.1 Location**

To access the Reserve from the BC Ferries Terminal at Denman West, travel east for 0.5 km up the 'ferry hill.' Bear right at the top of the hill, where Northwest Road joins on the left, and continue east for 0.5 km to the junction with Lacon Road on the right. Turn right on Lacon and travel south for 5.9 km to the junction with McFarlane Road on the left. Turn left onto McFarlane Road and travel east for 1.5 km east to the junction with Reginald Road on the right. Turn right on Reginald Road and travel south for 0.2 km to the junction with Dusty Road on the right. Take Dusty Road and travel 0.25 km to the eastern border of the Reserve on the right. The Reserve extends 165 m along the west side of Dusty Road, beginning just after the first driveway past Rayelyn Lane. There are currently no markers for the Reserve boundaries.

### **2.2 Legal Description**

The Reserve consists of two parcels, with the following Parcel Identification Numbers and legal descriptions:

1. North parcel: PID 028-931-734 Lot A, Section 6, Denman Island, Nanaimo District, Plan VIP89469 Except Parcel A (DD28585W)
2. South parcel: PID 030-654-505 Lot 1, Section 6, Denman Island, Nanaimo District, District Plan EPP74292

### **2.3 Legal Access**

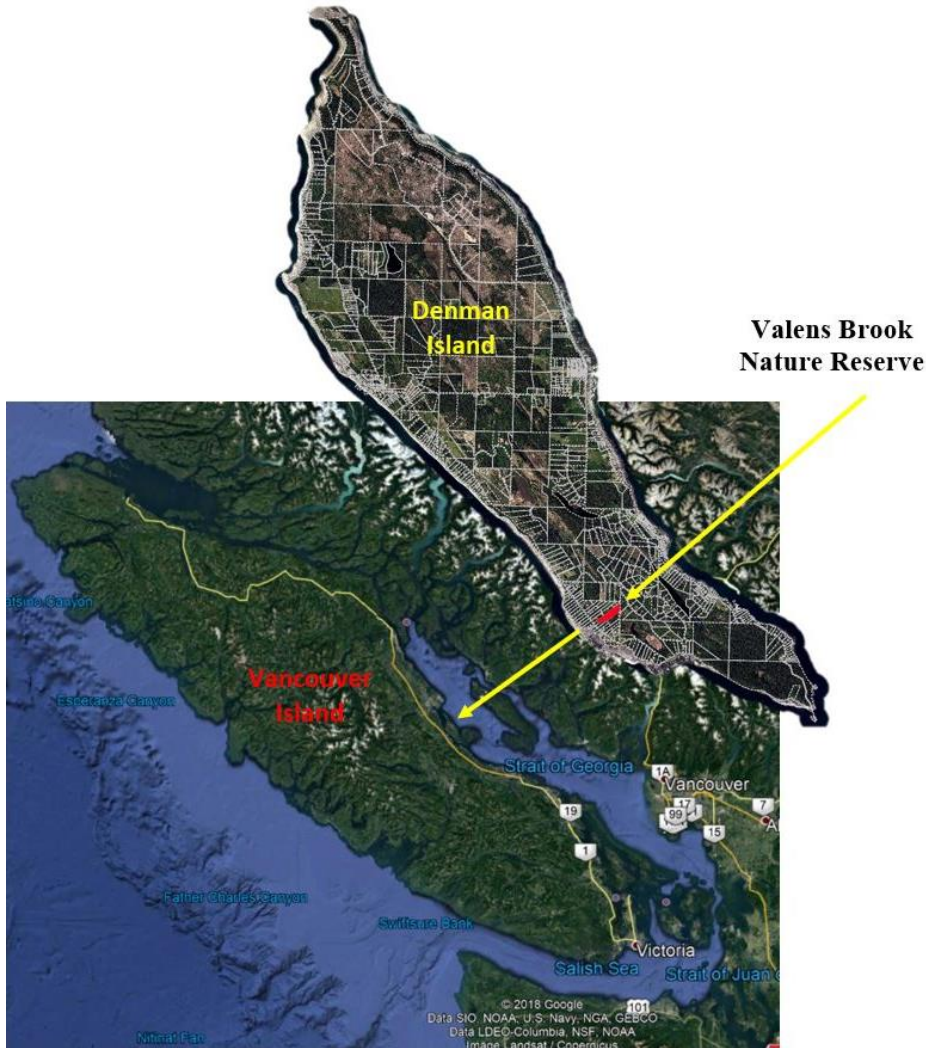
Legal access for ITC as landholders to Valens Brook Nature Reserve is off Dusty Road. Public access is not permitted.

## 2.4 Landscape Context

Denman Island is situated in the Strait of Georgia, just over one kilometre east of Vancouver Island. The northern tip of Denman is approximately eight kilometres south of the shore of the city of Comox in the Comox Valley on Vancouver Island. The Reserve is located on the west side of Denman, approximately 4.8 km north of the southern tip of the Island (Figure 2). Valens Brook, a salmon-bearing creek, spans the Reserve. As a result of previous subdivision regulations designed to protect salmon-bearing creeks, five small, provincially-tenured 'Return to Crown' parcels buffer sections of Valens Brook; two of these are just north to the Reserve and are 0.08 and 0.15 ha in size and the closest is shown on Figure 3. A sixth larger, 15-ha parcel, also along Valens Brook north of the Reserve, is held as conservation land by the BC Ministry of Forest Lands and Natural Resource Operations (Figure 3).

Denman Island is within the traditional and treaty territories of Cowichan, Halalt, Homalco, K'ómoks, Ts'uubaa-asatx (Lake Cowichan), Lyackson, Penelakut, Qualicum, Shíshálh (Sechelt), Snaw-naw-as (Nanoose), Snuneymuxw (Nanaimo), Tla'amin, We Wai Kai (Cape Mudge), Wei Wai Kum (Campbell River).

The ITC's local conservancy partner, the Denman Conservancy Association, has long promoted the protection of greenways on Denman Island, primarily along the two salmon-bearing creeks. The establishment of Valens Brook Nature Reserve is part of the long-term vision of the DCA to create a Valens Brook Greenway that protects Valens Brook and the surrounding riparian area. The intention is to buffer the creek with as large a band of contiguous forest as possible to protect stream health and reduce the risks of windthrow, root-rot incursion, the introduction of invasive species, and soil compaction. Protection of land around the creek will help to restore a contiguous riparian corridor.



**Figure 2. Location of Valens Brook Nature Reserve.**

The properties immediately adjacent to the Reserve are residential lots of one to four hectares (approx. 2.5–10 acres) (Figure 3). The eastern end of the Reserve borders a narrow, gravel road (Dusty Road) which runs south from Reginald Road to just beyond the Reserve. Although Dusty Road is gazetted<sup>5</sup> to connect Reginald Road to Lacon Road, it is not yet a 'through road' and only a pedestrian trail continues south to Lacon Rd. Thus, traffic on Dusty Road is limited. The property across Dusty Road is 4.5 ha (11.1 acres) in size and is zoned 'Rural Residential,' which has a four-hectare minimum lot size.

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<sup>5</sup> One method of creating highways in BC was to publish a notice in the British Columbia Gazette and file a copy of the notice on the title to the property in question. This process, called gazetting, ended in 1987. Today, a highway is a public road if it has significant public vehicular traffic and public money has been spent on it; however, if the road has not been gazetted, only the drivable surface is public (MacGregor 2017).

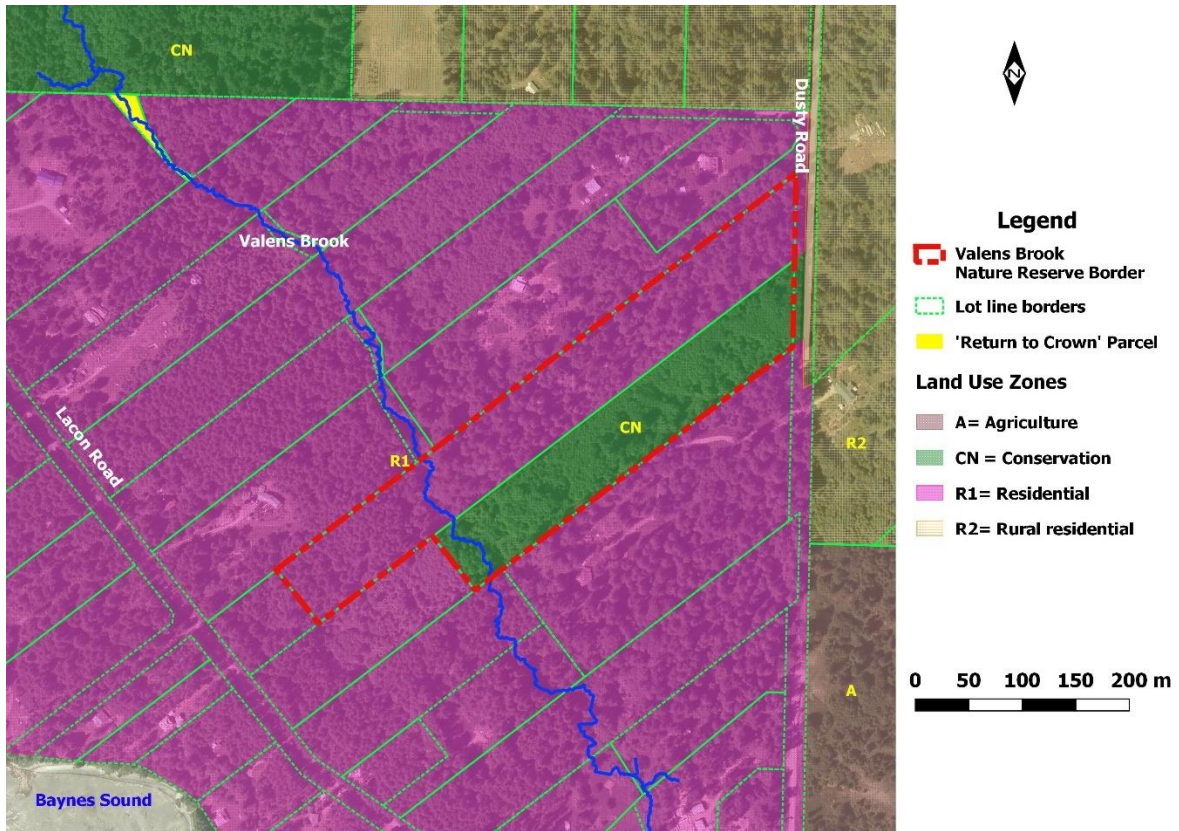


Figure 3. Lands surrounding Valens Brook Nature Reserve and along Valens Brook.

In summary, the Reserve contributes to the surrounding landscape by protecting a portion of the salmon-bearing creek, providing sheltered wildlife habitat at least 300 m away from any roads, and creating an aesthetically pleasing greenspace for the enjoyment of residents of the area. In addition, the Reserve provides a model for future land conservation along the envisioned Valens Brook Greenway.

## 2.5 Site History

Denman Island is located within the treaty and traditional territories of the Coast Salish People and the Kwakwaka'wakw. The island has since time immemorial been the homeland and gathering place for First Peoples including the Cowichan, Halalt, Homalco, K'ómoks, Ts'uubaa-asatx (Lake Cowichan), Lyackson, Penelakut, Qualicum, Shíshálh (Sechelt), Snaw-naw-as (Nanoose), Snuneymuxw (Nanaimo), Tla'amin, We Wai Kai (Cape Mudge), Wei Wai Kum (Campbell River); this rich history and cultural heritage continues to this day.

tuwa ak<sup>w</sup>s xoxo<sup>t</sup> ʔa x<sup>w</sup> yixmetet (ʔa) k<sup>w</sup>ʊms hēhaw tōms giʔe  
 "Care takers of the 'land of plenty' since time immemorial"  
 (Language: ʔaʔaʔuθəm (eye-uhh-juu-eth-em) Island Comox)

For thousands of years Indigenous People occupied the shoreline of eastern Vancouver Island in a place referred to as, "the land of plenty". This Land of Plenty stretched from what is known today as Kelsey Bay south to Hornby and Denman Island and included the watershed and estuary of the Puntledge River.

The K'ómoks First Nation is located in the heart of the Comox Valley on Vancouver Island. Membership is currently 336 members within four clans: Sathloot, Sasitla, leeksun or Eiksan and Puntledge. Two cultures are identified in their community: Coast Salish (Island-Comox speaking peoples and Pentlatch-speaking peoples) and Kwakwaka'wakw (Kwak'wala speaking peoples). K'ómoks people originally occupied sites in Kelsey Bay, Quinsam, Campbell River, Quadra Island, while Pentlatch people occupied sites around Comox Harbour, Baynes Sound and Hornby and Denman islands (K'ómoks First Nation).

Oral history and archaeology describe a rich and bountiful relationship between the K'ómoks and Land of Plenty. Salmon, seal, octopus, herring, cod, deer, ducks, shellfish and a plethora of berries filled the tummies of the young and old alike. The technologies that were applied in harvest, preparation and cultivation of local resources were appropriate to the environment, resource and spiritual beliefs. Fish weirs, duck nets, berry picking techniques and clothing design met the needs of the K'ómoks and for generations provided variety, utility and sense of cultural uniqueness. Mask dances and rhythmic songs filled the winter nights and season. Property was distributed to guests in potlatches and elaborate naming ceremonies honoured the youth, leaders and elders of the communities.

Following contact with Europeans northern groups started a southerly move into K'ómoks territory. A period of conflict displaced the K'ómoks southward to their relatives the Puntledge. Followed by a period of colonial policy and practices, the K'ómoks families have endured hardship and loss of land, resources and cultural connection. Modern leaders are striving to reclaim cultural expression and relationship to the "the land of plenty". According to Island Comox cultural traditions, the origin of the people began at the meeting of the Quinsam (kwaniwsam) and Campbell Rivers. Mary Clifton, the last speaker of the Island Comox dialect, has conveyed the origin story of a man named Shalhk'em and woman named Tisitl'a that "dropped down from the sky" at kwaniwsam (Quinsam) in present-day Campbell River. With them, they brought the mask and garments of the Xwayxway and together became the first ancestors of the Island Comox people. For the descendants of the Shalhk'em and Tisitl'a, kwaniwsam remains the central location in which Island Comox territory moves outward to Salmon River in the north, Cape Lazo in the south, and the islands in the Salish Sea (formally the Strait of Georgia) (K'ómoks First Nation).

At this time no archeological impact assessment or cultural knowledge inventory has been conducted within the Reserve.

In the 1870s, immigrants came from both west and east to settle and use the island's resources. The first-growth timber was logged by these new immigrants, and although it is not known when the original trees were cut on the Reserve, a report by the island's school children noted that many of the big trees on Denman had been cut by the early 1930s (Graham pers. comm.) Springboard-notched western redcedar stumps on the Reserve provide evidence of very early logging, prior to the advent of chain saws. Trees must have been removed from the forest individually at that time, as many 150-year-old western redcedars and four veteran old-growth Douglas-firs remain.

Approximately 2 km north of the Reserve, along Madigan Marsh, Valens Brook itself was used in logging. First, the channel was straightened and deepened using dynamite and digging; then, the marsh was dammed allowing the water to accumulate into a large lake. The huge trees were felled directly into the water so the logs could be handled and moved with ease. In one version of this process, the dam was removed to allow the logs, carried by the rush of water, to reach the sea. The sea access route may have been made well north of the Reserve and the evidence of this ditching is now lost in the recent settlement and road developments. Beaver dams along the creek, as discussed in Section 3.3, have also impacted the course of the creek.'

Historic wildfires impacted forests in the south part of Denman Island, and the Reserve includes several fire-scarred trees. Jim Kirk (2002), in his history of Denman Island, mentioned that one fire on the south end burned for three days, and Winnie Isbister (1976), in an earlier history, noted that Reginald Lacon's home at the south end of Lacon Road, about 1 km south of the Reserve, burned down several times.

In 1947, the area to the northwest of Lacon's farm that includes the Reserve was subdivided, and Lacon Rd was extended south through the 23 lots. Jim Tuck, holder of a portion of former Lot 9, south of the Reserve, in the 1950s, noted that he could see Valens Brook from his waterfront home, and his photos showed a clear-cut forest (Tuck 1990). In many of the lots in the subdivision, including the Reserve, the second-growth trees on the west side of Valens Brook reflect this same logging history.

Lot 16, a portion of which is now included in the Reserve, was purchased by Charles Coull in 1956. Coull limited his house and garden, from which he and his wife obtained much of their food, to the waterfront side of Lacon Road. The Coulls' main well was also located on the waterfront side of Lacon Road. The Coulls dug a small pond in the wet area that is now in the southwest corner of the Reserve as an alternate source for water.

In 1969, brothers Kal and Ole Holsti purchased Lot 16 from Charles Coull. Kal used the waterfront house mostly during the summers and Ole visited only occasionally. At this time, Kal noted that the land of Lot 16 on the east side of Lacon Rd, particularly along the wetland course, was open and easily accessible. He recalled Coull showing him the subdivision pin at the northeast corner of the Lot 16, which is now within the Reserve.

He also remembers using an old logging road close to the northwest boundary of his property to walk to the creek. The corridor of this road is still visible where it crosses the Reserve, although young trees and windthrow obstruct the road on the properties to the northwest. The Holsti bothers also made no use of the land on the east side of the creek.

Lot 17, a portion of which is now within the south parcel of the Reserve, was given to a Denman school teacher, a member of the Millard family, in lieu of a salary. Mrs. Neville Janes, a daughter of the Millards, sold Lot 17 to Len Reily and Don Kane in about 1967. In 1988, after Len died and Don apparently lost interest, Len's wife, Betty Reily, sold the property to a logging company.

In 1988, 3.5 ha of Lot 17, which included the property that is now the south parcel, was heavily high-grade logged by Tsolem Timber Sales from Vancouver Island. The company cleared the land, removed the 150-year-old western redcedars and the merchantable firs but left three old-growth Douglas-firs, a number of large maples, and several small stands of young trees. A logging-equipment skid road, which runs through two thirds of this parcel, and a cleared log-landing at the eastern end of the Reserve are still visible today.

In the 1980s the Department of Fisheries engaged in a program to remove coarse woody debris from salmon-bearing streams, including Valens Brook. Shake-block cutters removed large downed western redcedars from around creeks. The cutters may well have accessed the north side of Valens Brook by a small track that is still visible on the southern parcel of the Reserve.

In the fall of 1988, Jenny Balke and Graham Suther purchased Lot 17 and developed the waterfront side for a home and garden. The land that is now within the Reserve remained undeveloped; the only incursions included planting trees, protecting young tree seedlings with plastic forestry tubes (Vexar®), and using a portable sawmill at the northeastern end of the Land. In 2014, Lot 17 was purchased by David Innes and Luise Hermanutz, who soon after subdivided the lot and donated land to the ITC to add to the Reserve.

## 2.6 Anthropogenic Features

Historic high-grade logging occurred over at least a part of the south parcel of the Reserve, as evidenced by a few springboard-notched stumps (Photo 1<sup>6</sup>) along the southern edge of this parcel. Short-cut stumps (Photo 2) remain from the 1988 logging of the same parcel. Also, on that parcel are some of the planted black spruce trees (Photo 3), two domestic pear trees (Photo 4), and several partially buried slabs (Photo 5) from the milling provide moist amphibian and invertebrate habitat near the eastern border.

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<sup>6</sup> Documentation for all photographs is included in Appendix 1.



***Photo 1. Springboard stumps.***



***Photo 2. Low-cut stumps.***

On the north parcel, remnants of previous human activities can be seen in three locations. The stump-free outline of an old track is barely visible on the west side of Valens Brook, where it crosses the Reserve and heads towards the creek. Nearby this road is an old well-hole, approximately 3 m by 2m in size and 1.7 m deep (Photo 6). Also near Dusty Road are five old percolation-test holes (Photo 7) from a potential subdivision initiative in 2010. The holes are approximately 1 m by 2m wide, have sloped sides to a depth of 0.5 m and do not pose a risk to wildlife. On the south parcel, the 1988 logging-equipment track (Photo 8), extends west from a log-landing (Photo 9) near Dusty Road along the northern border of this parcel. These anthropogenic features are shown in Figure 4.

An archeological survey has not been completed for Valens Brook Nature Reserve.

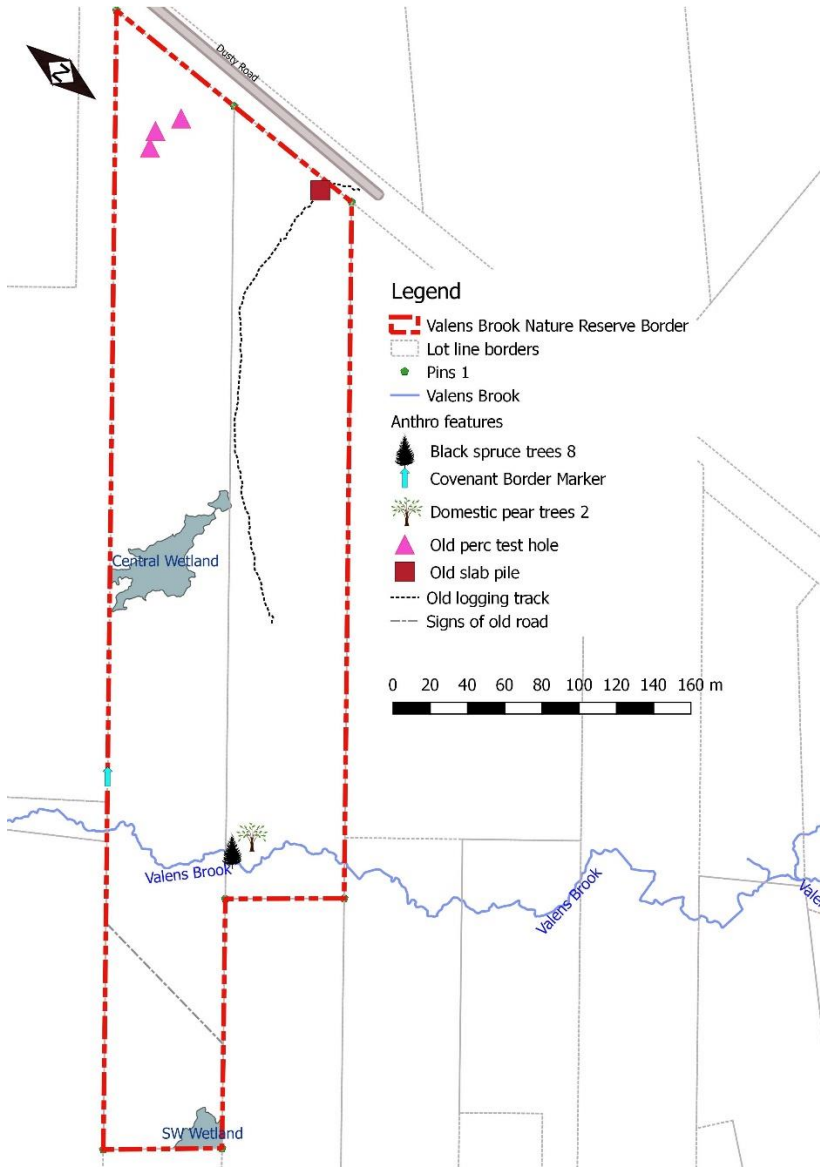


Figure 4. Anthropogenic features in Valens Brook Nature Reserve.



*Photo 3. Black spruce trees, planted.*



*Photo 4. Domestic pear trees, planted*



*Photo 5. Old milled-slabs of wood.*

*Photo 6. Old well hole.*





**Photo 7. Old perc-test holes.**

**Photo 8. Old logging-equipment track.**



**Photo 9. Log landing.**



## 2.7 Undersurface Rights

Undersurface rights for Valens Brook Nature Reserve are held by Shosuke Nakano, except for coal, for which this right was forfeited to the Province of British Columbia in 1939.

## 2.8 Notations, Charges, Liens and Interests

There are no additional charges on title at this time.

## 2.9 Local Planning Designations

At the time this plan was developed, the land use designation in the Denman Island Official Community Plan (Islands Trust 2017a) was 'Residential' for the north parcel and 'Conservation/Recreation' for the south parcel. Current zoning in the Denman Island

Land Use Bylaw (Islands Trust 2017b) is 'Residential' (R1) for the north parcel and 'Conservation' (CN) for the south parcel. Zoning and development permit areas are shown in Figure 3. Neither parcel is designated as a Sensitive Area, but a Development Permit Area for Riparian Area Regulation (RAR) Streams, Lakes and Wetlands covers the full course of Valens Brook and the 'Streamside Protection Enhancement Area' of at least 30 m on either side of the creek.

### 2.10 Existing Public and Other Use

Valens Brook Nature Reserve falls within the territory of multiple First Nations, and as such has been a site of cultural activity for thousands of years. There is knowledge and oral history relating to this site that may or may not be shared outside of the membership of a First Nation. As a first step toward strengthening cultural connections to the land that were negatively impacted by European settlement, ITC is exploring the potential of a Management Plan for *Areas of Cultural Heritage and Sacred Significance* that will support and enhance the continued use of the site by First Nations.

There are no known public or other uses of the Reserve. There are no public trails or structures on the land and no signs have been installed except for one covenant boundary marker.

## 3 Ecological Inventory

Islands Trust Conservancy acknowledges that there is a wealth of Traditional Ecological Knowledge and a long history of ecosystem stewardship among the First Nations whose territory encompasses Valens Brook Nature Reserve. ITC will strive to work with First Nations knowledge holders to deepen its understanding, improve its stewardship practices, and, ultimately, support the transfer of traditional ecological knowledge to younger generations within First Nations communities to ensure that it is not lost. At this time, the ecological information presented in the following sections was gathered using systems that are based in foundations of Western science.

### 3.1 Ecological Significance

Valens Brook Nature Reserve protects 6.29 hectares of second-growth forest along 170 metres of the salmon-bearing Valens Brook, including over three hectares of mature and two hectares of recovering rare coastal Douglas-fir forests. Within the Reserve are four massive veteran trees, each approximately two metres in diameter. The creek and two sedge-swamp wetlands provide freshwater habitat for resident and transient species, adding to the overall ecological significance and habitat diversity of the Reserve.

Two rare species and three rare ecological communities were identified in the Reserve during the ecological inventory undertaken for this plan (Tables 2 and 3). An additional 14 rare species may use the Reserve based on previous observations either in the Reserve or in similar habitats on Denman (six species previously identified in the

Reserve; another three are likely and five possible). Ecological features of the Reserve are shown in Figure 5.

**Table 2. Rare species identified in Valens Brook Nature Reserve**

| Species Name             |                         | Status      |         |           |           |             |
|--------------------------|-------------------------|-------------|---------|-----------|-----------|-------------|
| Common                   | Scientific              | Provincial  | BC List | Global    | COSEWIC   | SARA        |
| Northern Red-legged frog | <i>Rana aurora</i>      | S3 (2016)   | Blue    | G4 (2015) | SC (2015) | 1-SC (2005) |
| Band-tailed Pigeon       | <i>Columba fasciata</i> | S3S4 (2015) | Blue    | G4 (2016) | SC (2008) | 1-SC (2011) |

**Table 3. Rare ecological communities in Valens Brook Nature Reserve**

| Ecological Community Name                    |  | Status     |         |        |
|--|--|------------|---------|--------|
| Common                                       | Scientific   | Provincial | BC List | Global |
| Douglas-fir / dull Oregon-grape CDFmm/01     | <i>Pseudotsuga menziesii</i> / <i>Berberis nervosa</i> | S1 (2018)  | Red     | G2     |
| Grand fir / three-leaved foamflower CDFmm/06 | <i>Abies grandis</i> / <i>Tiarella trifoliata</i>      | S1 (2013)  | Red     | G1     |
| Red alder - skunk cabbage CDFmm/Ws52         | <i>Alnus rubra</i> - <i>Lysichiton americanus</i>      | S2 (2010)  | Red     | GNR    |
| Western redcedar / common snowberry CDFmm/07 | <i>Thuja plicata</i> / <i>Symphoricarpos albus</i>     | S1 (2013)  | Red     | GNR    |

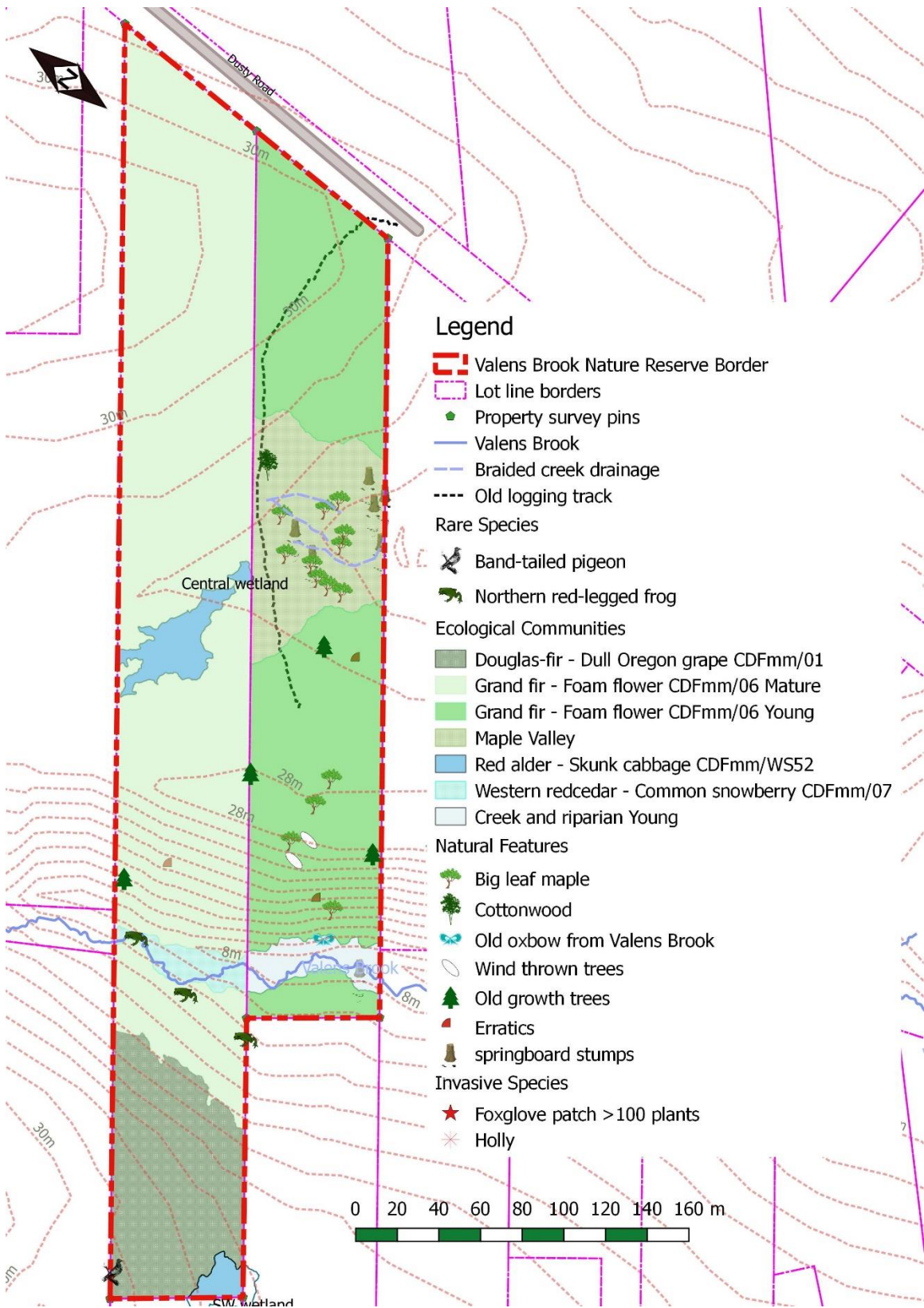
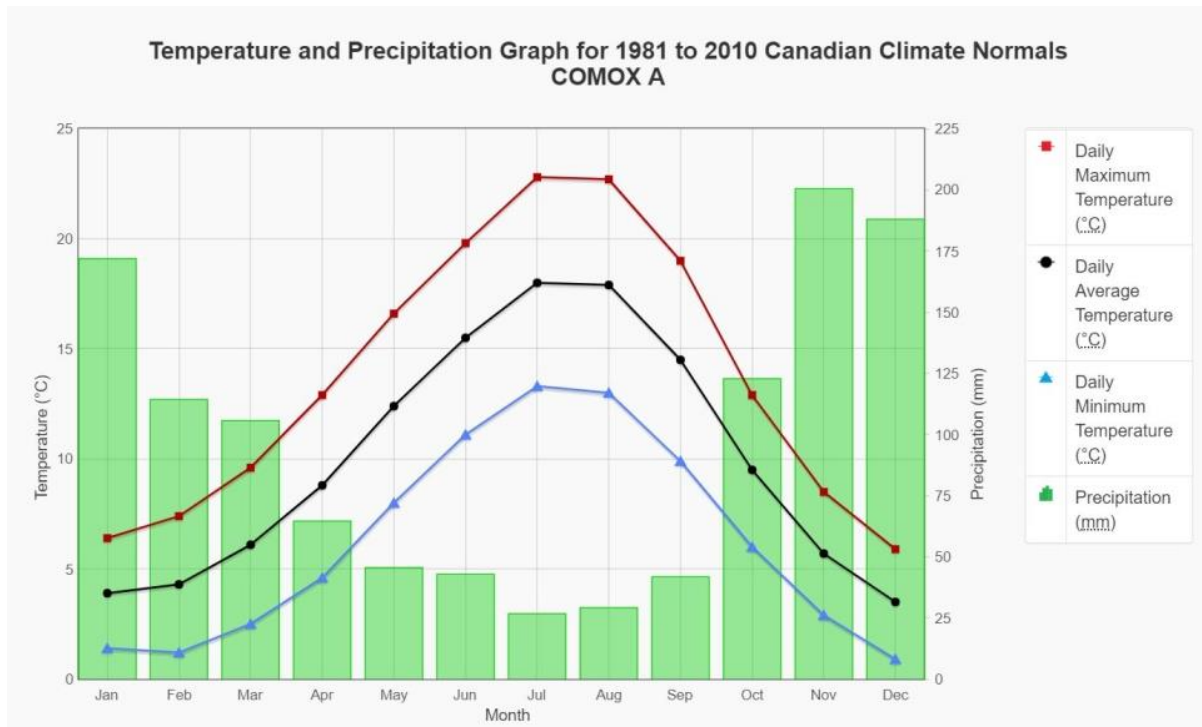


Figure 5. Ecological features in Valens Brook Nature Reserve.

### 3.2 Climate

Overall climate patterns on Denman Island feature warm, dry summers and mild, wet winters. On the southwest side of the island, where the Reserve is located, the climate is significantly influenced by weather systems from the west and southeast, with occasional northern influences. The mountains to the west on Vancouver Island create a rain-shadow effect for Denman Island, limiting the impact of moist systems from the Pacific Ocean. A gap in these Vancouver Island mountains, almost directly across from the Land, exposes this area of Denman to a violent west wind known as the Qualicum. Newly exposed trees often suffer wind-throw impacts during storms with Qualicum winds.

Environment Canada records for the Comox weather station, approximately 25 km north of the Reserve, indicate that most precipitation falls from October through March and climate normals for 1981 to 2010 show that there is usually a little over one metre of annual precipitation, most falling as rain (Figure 6) (Environment Canada 2014). The warmest period is July and August, with long-term normal maximum temperatures of less than 23°C. Long-term minimums from December through February are above 0.5°C.



**Figure 6. Temperature and precipitation monthly averages for Comox Weather Station, approx. 25 km north of the Valens Brook Nature Reserve.**

### 3.3 Geology and Physiography

Sediments of the Cedar district formation of the Nanaimo Group underlie the Reserve. These are considered to have been deposited as submarine fan complexes deep in the early marine environment of the Late Cretaceous period, some 55 and 87 million years

ago (Mustard et al. 1999). This formation is made up of silt-rich mudstone with thin-bedded sandstone. The beds contain narrow sandstone walls, known as clastic dykes, as well as sedimentary folding or slumping and folding of various sedimentary rock strata (Katnick and Mustard 2003).

Glaciation and erosion have altered the surface geologic features and left reminders of past glacial events, such as large erratics and boulders (Photo 10). A beaver dam across the Madigan Marsh, upstream on Valens Brook, broke in the late 1990s; the resulting erosive changes to the creek banks and lowering of the creek substrate by at least 0.5 metres in the Reserve are important reminders of the repeated and continuing changes that may occur over time. Also, the amount and nature of habitat-debris along and in the creek can be expected to change continually with altered creek flows and the aging of adjacent vegetation.

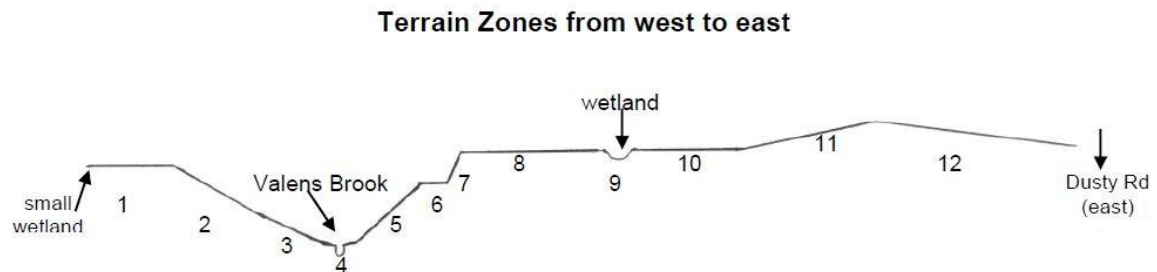


**Photo 10. Glacial erratic.**

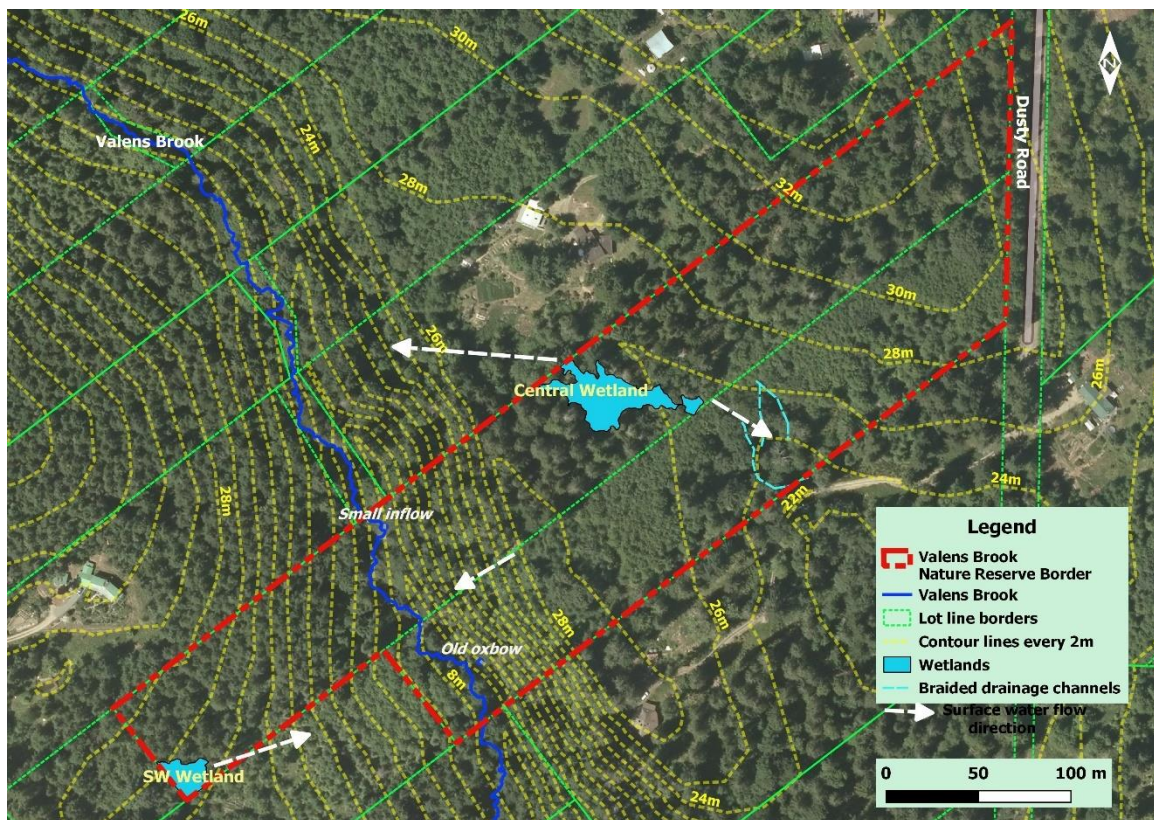
The Baseline Inventory Report completed in 2014 for the north parcel of the Reserve divided the terrain of the north parcel into 12 distinct zones (Figure 7), based on varying slope and aspect, to complete a detailed ecological inventory, as shown in Appendix 3. However, as many of these zones are absent or less developed in the south parcel, this plan includes only a general terrain description. Overall terrain and hydrology details are shown in Figure 8.

From the eastern boundary of the Reserve, the terrain of the southern parcel begins at an elevation of about 28 m above sea level, rising very slightly from Dusty Road to a high point at around 33 m near the northern boundary of the Reserve. The land then slopes down to the south and west from this high point to about 23 m on the south side of the Reserve. The broad central depression includes the wetland in the north parcel and

Maple Valley in the south parcel, with a creek draining from the wetland and passing through the southern boundary of the Reserve. Another creek drains from the wetland's northwest corner down to Valens Brook in an adjacent property.



**Figure 7. Terrain zones recorded in the Baseline Report for the north parcel (see Appendix 3 for descriptions of the terrain zones).**



**Figure 8. Terrain and hydrology details of Valens Brook Nature Reserve.**

From the wetland and Maple Valley, in the southern portion, the terrain rises very slightly to the crest immediately east of Valens Brook, where the slope drops 43–59% to the creek. In the north parcel, there is a pronounced bench nearly midway down the slope, but this bench ends just into the northern edge of the south parcel. There, the topography of the slope is only broken by two tracks downhill, possibly human-constructed. These tracks are heavily eroded, incomplete, and grown over. The track on the lower part of the slope, near the border with the north parcel, may have been an old

trail used by early shake-cutters. At the toe of the slope, a riparian area surrounds Valens Brook at an elevation of about eight metres. A flat, creek-side bench is primarily on the east side of Valens Brook and varies in width from less than 1 m to about 15 m as the creek meanders across the Reserve.

The south parcel ends just west of the creek, but the north parcel continues up hill at an 11–16% slope for almost 150 m, to the western boundary of the Reserve. The second small wetland is in the southwest corner of this northern parcel.

### 3.4 Hydrology

As already noted, two creeks cross the Reserve. One being, Maple Creek, on the eastern side of the Reserve, flows from the central wetland located in the northern part of the Reserve. This wetland drains in two directions: south through Maple Valley, continuing through several parcels before flowing into Valens Brook, and north across the corner of the neighbouring parcel and directly into Valens Brook. The second and major creek, Valens Brook, is located to the west of the central wetland and meanders across the Reserve, flowing to the south. Water levels in the creek vary from full bank in flood to very low flow with pooling in depressions in dry periods. The substrate of this creek varies from rock to gravel to finer sediments. Various erosive events have cut down the creek banks, and a number of depressions within the creek's course create pools in the Reserve at low flows.

The central wetland is the larger of the two wetlands in the Reserve, extending across the full width of the north parcel. The periphery of the sedge area (*Carex obnupta*) of this wetland reaches the northern edge of the south parcel. Construction of the logging equipment track on the south parcel in 1988 blocked the normal drainage of this wetland and caused ponding on the upstream side of the track. The second, smaller wetland, hereafter referred to as the SW wetland, is located in the southwest corner of the north parcel and receives water from beyond the Reserve on the north side. This wetland drains out across the adjacent property to the south. Additionally, several small sedge patches of a few square metres are located in both parcels. The overall hydrology can be seen in Figure 8.

### 3.5 Soils

The soils of the Reserve were rated poor to moderate/poor in the Denman Island Soils Map (Islands Trust 2011) (Figure 9). The BC Provincial Soil Mapping Tool classifies the soils of the Reserve as Royston type, described as a medium-to-strongly acid pH, imperfectly drained, cobble, gravely loam with frequent stones (British Columbia Government 2019) (Figure 10). Across the Reserve the soils have little organic matter except in the wetland and creek depressions, and sandstone and cobble fragments are frequently found near the surface (Photo 11). A cross-cut through the crest of the ridge above Valens Brook on a neighbouring property shows the larger sandstone rocks (Photo 12) and flaking mudstone layers around the sandstone.



Photo 11. Sandstone and cobble fragments near the surface.



Photo 12. Cut through ridge with sandstone blocks and flaking mudstone.

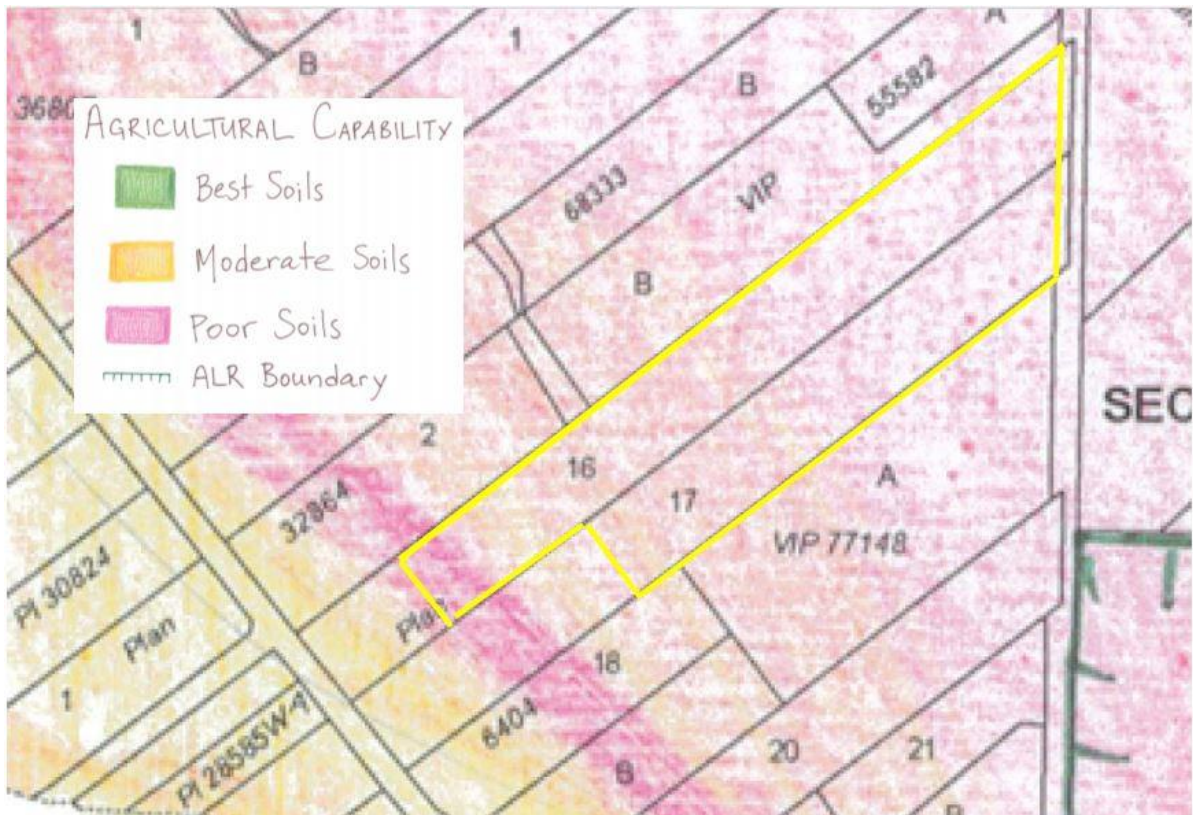


Figure 9. Soil classification from the Denman Island Soils Map.

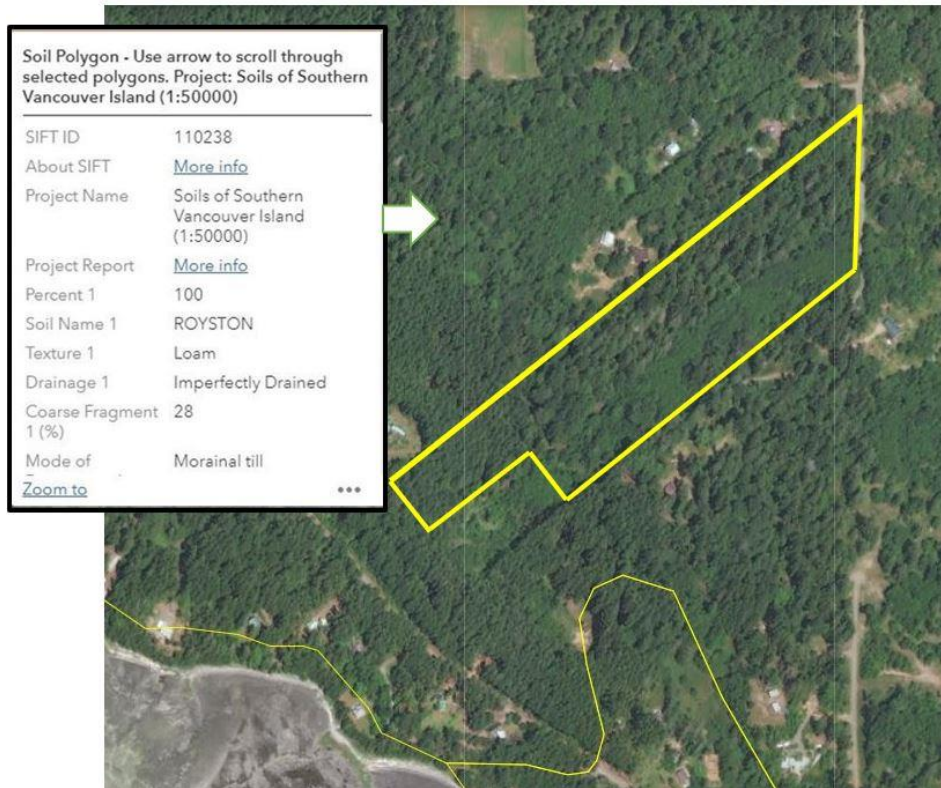


Figure 10. BC Provincial Soil Mapping Tool for the Valens Brook Nature Reserve area.

The soils west of Valens Brook tend to be poorly drained heavy clay (>40%) on the surface, particularly on the flat portions, which explains the frequent pooling of surface water. Two to three metres below the surface there is a layer of cobble, gravel, and mudstone. On the western slope, down towards Valens Brook, the soil's surface clay content is slightly reduced; on the east side of Valens Brook the soil is even sandier, but there, rocks on the surface, particularly sandstone fragments, are more abundant.

### 3.6 Ecological Classifications

The BC Ecoregion classification of the Reserve is the Strait of Georgia Ecoregion in the Georgia-Puget Basin Ecoregion of the Georgia Depression Ecoprovince. The Reserve is located in the Coastal Douglas-fir moist maritime biogeoclimatic zone (CDFmm) and within the national Pacific Maritime Zone (Faculty of Forestry, UBC 2019).

### 3.7 Ecological Communities and Site Series

The ecological inventory for this management plan was conducted by the author over seven days from April to July 2019, with an additional five days of observations and preliminary mapping in March 2019. Repeated observations of the Reserve by this biologist since 1988, as well as data from the 2014 Baseline Report inventory for the north parcel, contributed to the identification and description of the major ecological communities. Site series were identified using *A Field Guide for Site Identification and*

Interpretation for the Vancouver Forest Region (Green and Klinka 1994). Eight ecological community polygons were mapped (Figure 11); these polygons comprise three forested ecological communities at different stages of development, a swamp-wetland community, and two unclassified sites at early developmental stages (Table 4 and Appendix 2).

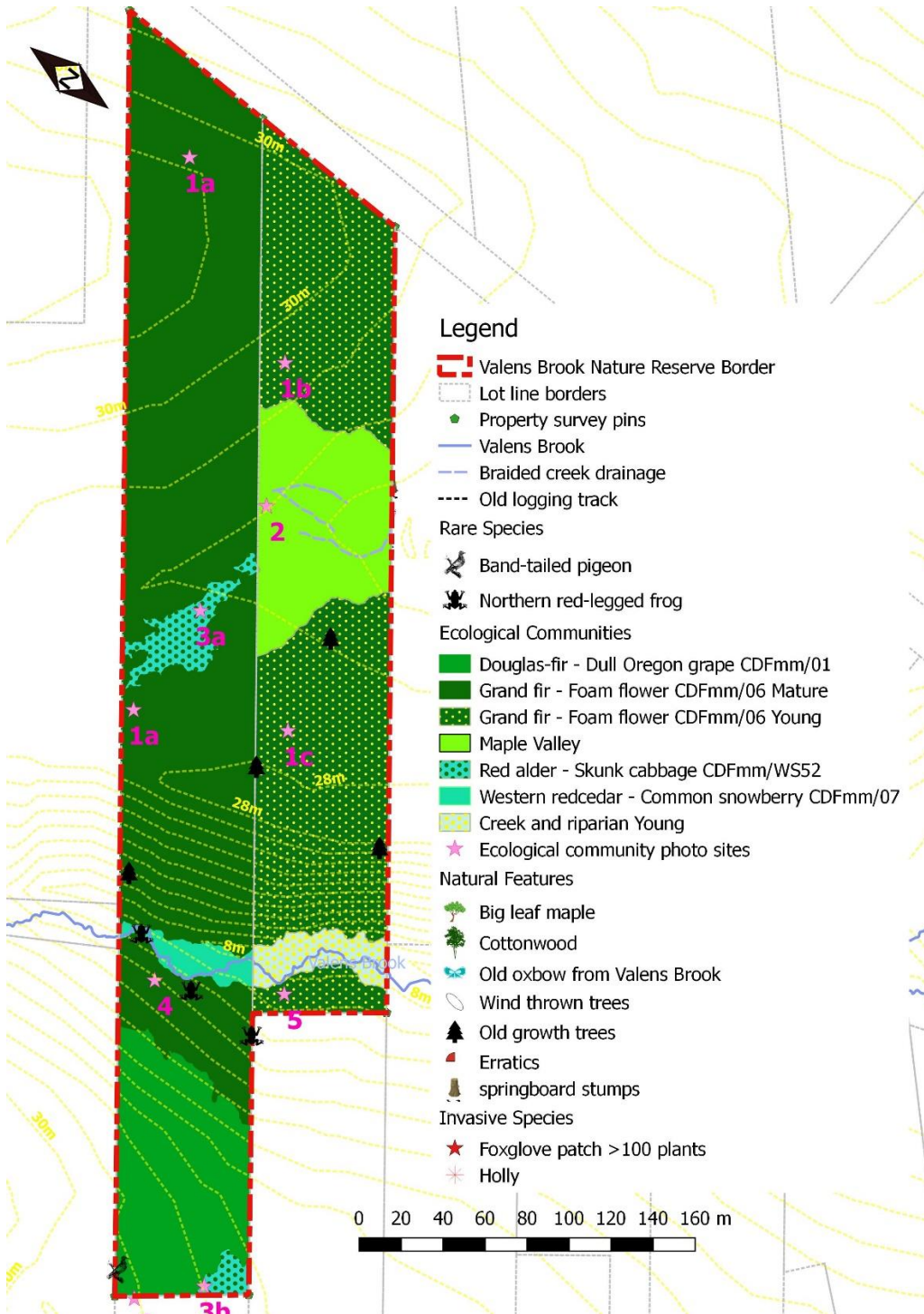


Figure 11. Ecological Communities in Valens Brook Nature Reserve.

The three upland forest communities include: (1) CDFmm/01, Douglas-fir / dull Oregon-grape (*Pseudotsuga menziesii* / *Berberis nervosa*) as a mature climax Douglas-fir-dominant forest; (2) CDFmm/06, grand fir / three-leaved foamflower (*Abies grandis* / *Tiarella trifoliata*), which is present in two different structural stages: mature climax forest and a developing seral mixed conifer-deciduous forest; and (3) a high-bench floodplain, site series CDFmm/07, western redcedar / common snowberry (*Thuja plicata* / *Symphoricarpos albus*), which is the mature riparian forest polygon on the north parcel. The creek-side bench on the south parcel is unclassified. It may be high enough to develop into a mixed coniferous forest with low-lying patches of skunk cabbage (*Lysichiton americanus*) wetland. However, the area along the creek is small, located at the toe of a pronounced slope in a narrow creek channel, and subjected to erosive forces and structural changes. Thus, species composition may vary over time and thus fit various classifications. In addition, a large forested maple grove in the south of the Reserve, hereafter referred to as the Maple Valley polygon, is unclassified, as it is distinctive and the maples are likely to remain the dominant component for some time.

The two wetlands are considered CDFmm/Ws52, red alder – skunk cabbage (*Alnus rubra* – *Lysichiton americanus*) swamp wetlands. Red alder trees remain dominant, although these areas may develop into CDF/Ws53 if a western redcedar (*Thuja plicata*) forest develops in this polygon. Alternatively, with increasing temperatures and drought, these areas may gradually silt in and dry out, becoming part of the adjacent forest.

Detailed vegetation charts for each ecological community polygon are provided in Appendix 2, as well as a preliminary plant list for the Reserve. Descriptions of the vegetation and other characteristics of the terrain zones of the north parcel identified during the Baseline Inventory Report in 2014 are included in Appendix 3.

**Table 4. Valens Brook Nature Reserve ecological communities**

| <b>Name</b>                  | <b>Polygon</b> | <b>Ecological Community</b>   | <b>Site Series</b>     | <b>Structural Stage</b>     | <b>Provincial Status</b> |
|------------------------------|----------------|---|------------------------|-----------------------------|--------------------------|
| Mature East Forest           | 1a             | grand fir / three-leaved foamflower ( <i>Abies grandis</i> / <i>Tiarella trifoliata</i> ) | CDFmm/06               | mature climax forest        | Red                      |
| Young Recovering East Forest | 1b & 1c        | grand fir / three-leaved foamflower ( <i>Abies grandis</i> / <i>Tiarella trifoliata</i> ) | CDFmm/06               | maturing seral forest       | Red                      |
| Maple Valley                 | 2              | creek and surrounding deciduous forest  | currently unclassified | residual mature maple grove | none                     |

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|                              |    |  |                        |   |      |
|------------------------------|----|--|------------------------|---|------|
| Central Wetland              | 3a | red alder - skunk cabbage ( <i>Alnus rubra</i> - <i>Lysichiton americanus</i> )            | CDFmm/Ws52             | mature wetland                          | Red  |
| Valens Brook Mature Riparian | 4  | western redcedar / common snowberry ( <i>Thuja plicata</i> / <i>Symphoricarpos albus</i> ) | CDFmm/07               | mature high bank floodplain forest      | Red  |
| Valens Brook Young Riparian  | 5  | creek and riparian area  | currently unclassified | young high bank forest /shrub/herb gaps | none |
| SW Wetland                   | 3b | red alder - skunk cabbage ( <i>Alnus rubra</i> - <i>Lysichiton americanus</i> )            | CDFmm/Ws52             | maturing wetland                        | Red  |
| Mature West Forest           | 6  | Douglas-fir / dull Oregon-grape ( <i>Pseudotsuga menziesii</i> / <i>Berberis nervosa</i> ) | CDFmm/01               | maturing climax forest                  | Red  |

**3.8 Wildlife Species**

Forty-six wildlife species were identified in the Reserve during the ecological inventory: five mammal, 31 bird, two amphibian, and eight invertebrate species. The species identified are listed in Appendix 4. The Reserve is long and narrow, so many species likely also include neighbouring habitats in their home ranges. The Reserve provides a variety of habitat types. Sunny openings in both young and older forest polygons offer basking and foraging sites for species such as reptiles and invertebrates. Coarse woody debris of varying size provides invertebrate habitat, as well as foraging sites for the birds, amphibians, and reptiles that feed on these invertebrates. Standing snags provide foraging and cavity-nesting habitat. Canopies of coniferous and deciduous forest and patches of berry-bearing shrubs create additional complex-habitat opportunities. Finally, the wetlands and creeks add to the habitat diversity and enhance travel through the Reserve, as many species take advantage of the aquatic areas for drinking, breeding, or foraging. As already noted, two rare species were identified within the Reserve, and 14 other rare species may use this protected habitat.

**3.9 Expected Change Over Time**

Over time, the forests in polygons 1 and 3 will continue to mature. In the southern part of the Reserve, seral forests of red alder (*Alnus rubra*) and western hemlock (*Tsuga heterophylla*) will be replaced by climax species: Douglas-fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), and western redcedar (*Thuja plicata*). The maturation and future of the unusual monoculture of bigleaf maple (*Acer macrophyllum*) in polygon 2 is unpredictable. With the conifers removed by logging, the dominance of these large

mature maples has changed little in 30 years of observation. Overall, the maple canopies have increased without other tree competition. Although a large number of maple seedlings sprout on the forest floor (Photo 13), few young maple trees are developing, likely due to browsing, especially by deer. Thus, as these long-lived (100–300 years) maple trees age, their dominance may wane, with coniferous forests replacing them.



**Photo 13. Maple seedlings.**

Beavers have profound effects on forest communities, wetlands, and watercourses. Although beavers have built dams in the Reserve on at least two previous occasions, beaver populations seem unable to survive in this area of Valens Brook. There likely is insufficient space in the narrow Valens Brook valley for beaver to keep a safe distance from disturbance by dogs or people while they build a sufficiently large protective pool and there is a lack of young trees preferred by beavers. Nevertheless, when present, dams markedly changed the water flows and vegetation, and may again in future years.

Climate changes may also have significant effects on the forests, wetlands, and creek water flows in the Reserve. Increasing temperatures and decreasing rainfall may alter forest species composition. With the survival of the more drought-tolerant species, Denman’s forests may increasingly resemble the forests of the southern Gulf Islands<sup>7</sup>.

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<sup>7</sup>Denman Island is near the northern limit of the coastal Douglas-fir moist maritime zone and has fairly flat terrain, with numerous depressed, water-receiving wetlands that are, or were previously, dammed by beavers. Thus, Denman forests tend to be somewhat transitional to the neighboring coastal western hemlock very dry maritime zone (CWHxm1), although there are marked differences between them and the CWHxm1-ecological communities on islands to the north.

Also, the drier, warmer conditions may enhance the drying of wetland areas and decrease overall creek flows, while unusual storms may cause additional erosion and windthrow and further change the course of Valens Brook or the wetland borders.

#### **4 Threats**

Threats to the Reserve are summarized in Table 5. There are currently no public trails within the Reserve and thus threats from human recreational use are minimal. Neighbours, and likely their pets, use the Reserve, as evidenced by the placement of prayer flags around the veteran Douglas-fir (*Pseudotsuga menziesii*) in the north parcel (Photo 14), but the only trails observed during the inventory were deer trails (Photo 15). Nevertheless, the Reserve's long, unmarked borders along private lands present the threat of local disturbance by neighbours, even unknowingly.



**Photo 14. Old-growth fir with prayer flags on north parcel.**



**Photo 15. Deer trails, possibly occasionally also used by humans on north parcel.**

If a trail was established at this time, human use could be a considerable threat to wildlife in the Reserve. The Reserve is long and narrow, and one of the benefits of this configuration is that significant portions of the land are far from regular human disturbance and thus provide secure habitat for resident wildlife. Trails through these narrow habitats would diminish this value.

Another key threat is that of aquatic pollutants entering the Reserve’s portion of Valens Brook from upstream, a threat that is faced by the entire Valens Brook system. Possible pollutants include fertilizers, other agricultural chemicals and septic runoff. Central and southwest wetlands are vulnerable from adjacent properties to the north, and Valens Brook from the west, as well as from the entire creek drainage to the north.

The threat of wildfire is ubiquitous on small Gulf Islands, particularly where forests are adjacent to homes using wood for heating. Usually, fires are only used for heating when the weather is wet and cold, but changing climate conditions may lead to drier cold periods resulting in an increase in the threat of sparks triggering fires.

High winds, especially from unusual directions, are another threat. Most vulnerable are the exposed treetops of the very tall, veteran Douglas-firs and the trees along the road and neighbouring driveways. Often, tops from tall trees are lost and edge trees are blown down in major storms. Cutting of trees in the private lands next to the long borders of the Reserve would increase the threat of windthrow in the Reserve.

**Table 5. Threats to Valens Brook Nature Reserve.**

| Threats   | Polygons       |               |                    |                     |
|---|----------------|---------------|--------------------|---------------------|
|   | Mature Forests | Young Forests | Creek and Wetlands | Overall Threat Rank |
| <b>Recreational Activities on Trails:</b> There are no public trails in the Reserve.  | N/A*           | N/A           | N/A                | N/A                 |
| <b>Recreation Off-trail:</b> There is little public use of the Reserve. Off-trail use of the Reserve by people or pets entering from neighbouring properties is a potential threat.   | Low            | Low           | Low                | Low                 |
| <b>Free-Ranging Dogs:</b> Off-leash dogs entering from neighboring properties could disrupt wildlife in the Reserve.  | Med            | Med           | Med                | Med                 |
| <b>Freshwater Drainage:</b> Pollutants could flow downstream along Valens Brook into the Reserve. Also, surface water drainage from neighbouring yards and gardens enters both the creek and the wetlands and may carry pollutants. | Low            | Low           | Med                | Med                 |
| <b>Fire:</b> Wildfire may be caused by sparks on neighboring properties that burn wood for heat in dry cold conditions, or by lightning strikes. The accumulation of dead wood increases the risk.                                  | Med            | Med           | Low                | Med                 |

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|   |     |     |     |     |
|---|-----|-----|-----|-----|
| <b>Invasive Non-native Species:</b> Invasive species may spread into the Reserve from neighbouring private land, either by encroachment or through dispersal by wind, water and/or wildlife.  | Med | Med | Med | Med |
| <b>Problematic Native Species:</b> Abundant Black-tailed Deer ( <i>Odocoileus hemionus</i> ) can be problematic, limiting natural regeneration, dramatically altering understory vegetation structure and composition, and adversely affecting songbird populations (Martin et al. 2011).           | Med | Med | Low | Med |
| <b>Climate Change:</b> Drying conditions, higher temperatures, and more intense storms in the future could increase the threat of wildfire. Also increased is the threat of biodiversity loss due to the death of moisture-loving plants or alterations in the phenology of interdependent species. | Med | Med | Med | Med |
| <b>Overall Threat Status for Protected Area</b>   | Med | Med | Med | Med |

**\*Current Threat Rating:**

N/A: Not applicable

High: The threat is likely to seriously degrade the biodiversity target.

Med (Medium): The threat is likely to moderately degrade the biodiversity target.

Low: The threat is likely to only slightly impair the biodiversity target.

**4.1 Expected Changes to Threats Over Time**

Increasing development pressures may lead to further subdivision in the neighbourhood, which would put additional pressure on limited water resources and could diminish flows in Valens Brook and in the local ground water in general. In addition, increased human development and/or activity along the long boundaries of the Reserve would increase the threat of wildlife disturbance, illegal tree-cutting, invasive non-native species introductions, pets’ use of the Reserve (causing further disturbance of wildlife), and other intentional or unintentional trespass into the Reserve.

Climate change is likely to increase the threat of wildfires and damage by major storms, including windthrow of trees and flooding and erosion, especially along Valens Brook. In addition, it is likely that species composition will change, as some species may not thrive in the changing conditions. Thus, some species may disappear from the Reserve leading to a loss of biodiversity, at least in the short term. As the transition appears to be happening quickly, climate change may impact entire ecological communities within the Reserve and produce unknown effects.

**5 Community Engagement**

**5.1 Adjacent Land holders**

In preparation for the development of the Management Plan, letters were sent to all landholders and neighbours within a 100 m radius of the reserve. A total of 39 letters

were mailed on August 21, 2019 (Appendix 5). The letters contained information about Valens Brook Nature Reserve and an invitation to the open house.

## 5.2 First Nations

Letters were mailed to the following First Nations on October 24, 2019 (Appendix 6):

- Homalco First Nation
- Stz'uminus (Chemainus) First Nation
- Ts'uubaa-asatx (Lake Cowichan) First Nation
- Halalt First Nation
- Lyackson First Nation
- Penelakut Tribe
- Tla'amin (Sliammon) First Nation
- Snaw-naw-as (Nanoose) First Nation
- K'ómoks (Comox) First Nation
- We Wai Kai (Cape Mudge) First Nation
- Qualicum First Nation
- Wei Wai Kum (Campbell River) First Nation
- Cowichan Tribes

This letter provided information about the Nature Reserve and outlined the proposed management plan.

## 5.3 Conservation Partners and Community Members

DCA has a keen interest in the ongoing management of Valens Brook Nature Reserve, and will continue to work with ITC to assist in its management. The management planning process and stakeholder consultation revealed that many community members view the Valens Brook watershed as a highly significant natural amenity on Denman Island. Some landholders have expressed interest in conservation covenants that would protect additional sections of the Valens Book corridor, aligning with DCA's vision for a Valens Brook Greenway extending from its Madigan Marsh headwaters to its estuary near Hinton Road.

## 5.4 Engagement Results

A Public Open House presenting the Draft Valens Brook Management Plan was held at the Marcus Isbister Old School Centre, 5901 Denman Road, on Saturday, September 7th from 11-1pm. 49 people attended this Open House and many participants provided verbal feedback to DCA and ITC personnel about the management plan draft there presented. Refreshments were provided to attendees.

In addition to the Open House, DCA solicited further input from neighbours and others interested in the Reserve through an article in the DCA Newsletter and at our Annual General Meeting in February 2019. Interested parties were invited to contact DCA in

order to obtain a copy of the draft plan for review. The draft management plan was made available online for review to five interested neighbours and community members whose written comments were submitted via email to the DCA Land Manager, and then compiled and sent to ITC staff for incorporation into the plan. Neighbours were also invited to participate in a site visit led by Jenny Balke to learn about the Reserve and discuss management issues on the ground. Eight neighbours participated in the walk on November 24th 2019.

Comments on the draft plan relayed both in-person and via email to the DCA Land Manager revealed the overall consensus that public access to the Reserve should be minimal. Neighbours expressed various concerns about the impacts of encroachment on the natural values of the land from too much—or unauthorized—access of various types. In particular, concerns were raised about the impact of free-ranging dogs on wildlife in the Reserve, particularly deer. Trail development was seen as a threat to the biodiversity values in the Reserve, as was the potential for pollution of Valens Brook from a horticulture operation on a neighbouring property upstream. Browsing of vegetation by deer, and its impact on overall ecological structure and function, was also a concern raised by neighbours.

Overall, stakeholder engagement about VBNR and this management plan revealed that most neighbours, and some members of the public, are aware of the important ecological values of the Nature Reserve. Those who know the land are pleased that its intrinsic natural diversity and amenities are now protected. Based on the findings of stakeholder engagement and the ecological inventory completed for the land, ongoing access to the Reserve should be minimal, with activities limited to monitoring and necessary management such as the installation of boundary markers and signage.

## **6 Management Plan Recommendations**

The Reserve comprises two parcels, which were donated to ITC in 2012 and 2018. This document is the Reserve's first management plan. The north parcel boasts maturing forest and wetland ecosystems that are in good condition, whereas the south parcel encompasses ecosystems recovering from logging in 1988 and undergoing considerable growth and species composition changes. As Valens Brook flows through both parcels, the Reserve represents the beginning of a possible Valens Brook Greenway intended to protect the salmon-bearing creek. Valens Brook has been mapped under the BC government's Urban Salmon Habitat Program, and various fish samplings have been conducted, as well as a major culvert restoration.

Initial management issues are those common to any new reserve, such as the need for signage, as well as the general need to develop a system for monitoring the property boundaries and any changing conditions in the Reserve. Short-term and ongoing management concerns include assessing the threat of invasive species, the selective browsing by deer, mitigating wildfire risk to surrounding properties, responding to

climate change impacts and restoration needs, and identifying conservation opportunities. The following discussion of these issues incorporates ideas from existing DCA-managed reserves and other Denman Island conservation initiatives in the planning stage.

The objective for the management of ITC protected areas is to allow the natural ecological processes and functions of the site to proceed unimpeded, except in the case of wildfire or other exceptional situations where remediation is considered imperative. Applying this approach to Valens Brook Nature Reserve, management actions should involve the removal of the most problematic invasive species, English holly (*Ilex aquifolium*), from the south parcel and consideration of ways to reduce the wildfire risk such as putting small, dead, leaning trees on the ground to absorb moisture and decompose.

Establishing a volunteer reserve warden to assist with reserve management and monitoring tasks is strongly recommended. Other recommendations include deciding on initial signage, installing boundary markers, and developing a Valens Brook water quality and flow monitoring program. Public trail development is not recommended due to the narrow shape of the Reserve, as all areas would be exposed to human disturbance. Consultation with the Denman Island Volunteer Fire Department is recommended to help protect both public safety and certain natural values in the Reserve. A recommended long-term management action is to assist beavers by creating a permanent weir on the creek. Climate change preparedness could include examining ecosystem composition (species, conditions and growing sites) in protected areas in southwestern BC and the northern USA, predicting and observing the adaptations of local species to new climatic conditions; and focusing management on learning and adapting new strategies to deal with the new situations.

### 6.1 Management Roles

The Reserve is held by Islands Trust Conservancy and is monitored annually by ITC or its contractors. The Denman Conservancy Association will be the management partner for the Reserve, and will help identify major management issues and carry out management actions within the Reserve in accordance with the management plan, through annually renewed service contracts with ITC. A conservation covenant will be registered on the Reserve at a later date and the covenant holder(s) will be responsible for monitoring the covenant to ensure compliance.

**Table 6.** *Valens Brook Nature Reserve Management Partners.*

| <b>Partner</b>                 | <b>Role</b>        |
|--------------------------------|--------------------|
| Islands Trust Conservancy      | Land Holder        |
| Denman Conservancy Association | Management Partner |

## 6.2 Permitted and Prohibited Uses

The Nature Reserve is not open to the public. Any uses that could reasonably pose a threat to vegetation, wildlife or wildlife habitat are not permitted.

The following activities by the public are prohibited within the Reserve:

- Entry without authorization
- Use of motorized vehicles
- Bicycling
- Horseback riding
- Camping
- Fires
- Hunting
- Smoking
- Trail development
- Tree cutting
- Collection or harm of plants, fungi or animals

## 6.3 Proposed Monitoring Program

The ITC monitors annually looking for management concerns. DCA has agreed to be the local management partner of this Reserve and can visit regularly. When a conservation covenant is registered the covenant holder will complete annual compliance monitoring. Further possible initiatives to augment the monitoring program for the Reserve are as follows:

1. Seek out and appoint a volunteer warden to report regularly (e.g., monthly) and form a 'friends of' group, if there is interest.
2. Invite the warden and any other interested volunteers to undertake specific monitoring tasks and participate in annual monitoring visits with all partners to discuss monitoring findings and management issues.
3. Establish a water quality monitoring site and a flow height indication marker in Valens Brook, ideally in the middle of the Reserve with the help of the DCA Land Manager to coordinate data collection by the warden or another reliable volunteer.
4. Establish specific photopoint stations to document important features that may change over time or that need monitoring for protection.
5. Place covenant markers (signs) at regular intervals and hotspots along the boundaries to facilitate monitoring and prevent unintentional trespass.

Possible monitoring tasks to take place on an arranged schedule for various ecological or other features could include:

- Taking photos at all photopoint stations on an arranged schedule and assessing the changes.

- Recording the Valens Brook flow height, collecting water samples, and conducting water quality tests at the water quality monitoring site.
- Conducting plant or wildlife surveys (e.g., monthly counts of resident birds throughout the year, neotropical migrant bird surveys in summer, tracking the growth of specific plants, etc.).

#### 6.4. Public Access

There is no public access to the Reserve. An old logging track that is slightly grown-over runs from the southeast corner of the Reserve up to the northern boundary and west along the boundary, almost to the crest above Valens Brook. Beyond this point, there are no connections for trails to other protected lands or access points. The track is mostly within the Young Developing Forest polygon, but it also runs through Maple Valley and passes near the central veteran old-growth tree. In general, there are no specific views or prominent visible features along the track, and it is without a destination. The current shape of the Reserve does not lend itself to trail development. More importantly, one of the major assets of the Reserve is the fact that the forest and creek habitat, while narrow, is a safe distance from disturbance by humans or domestic animals, and thus offers quality wildlife habitat. Active public use of the old logging track would reduce this benefit.

Alternative access opportunities for First Nations may be established through a separate Management Plan for Areas of Cultural Heritage and Sacred Significance.

#### 6.5 Signage

The only signage at present is a single covenant boundary marker, put up following the recent ITC annual monitoring survey (Photo 16). The Reserve is in an area of Denman that is primarily private land and thus most visitors to the area would not know that it is there. Disturbance by the general public can be expected to be minimal if the location of the Reserve is not advertised. In accordance with the Islands Trust Conservancy Sign Policy (TFB 96011), signage should be kept to a minimum. One or two signs are recommended for along Dusty Road to identify the Reserve and its purpose to protect the salmon-bearing creek and create a wildlife corridor. As well, additional covenant boundary markers could be placed at selected monitoring points. Last, a flow-measurement marker could be placed in Valens Brook.

#### 6.6 Trail Use, Maintenance and Development

As already noted, there are no existing trails and trail development is not recommended within the Reserve due to its narrow shape and the lack of connections with a trail system.

#### 6.7 Protection Initiatives for Sensitive Ecosystems and Species and Ecosystems at Risk

The Reserve offers basic protection for rare species and ecological communities; however, human use of the surrounding land within the Valens watershed has a major influence on the quality and integrity of these ecosystems. Stewardship initiatives

encouraging islanders to develop watershed conservation commitments are recommended. Monitoring of water quality and flow rates will be key to understanding the chemistry and hydrology of this creek, which is at the centre of the Reserve and is the reason why the Reserve was created. The protection of rare species such as the northern red-legged frog (*Rana aurora*) may also require monitoring for the presence of American bullfrogs (*Lithobates catesbeianus*) and other exotic invasive predators. Other monitoring or inventory initiatives that focus on bats, birds, or salamanders may be warranted.



**Photo 16. Covenant boundary sign on northern border.**

### 6.8 Ecological Restoration Options

The forest ecosystems in the south parcel can be expected to recover naturally, though restoration may be needed if deer browsing is hindering the growth of key trees and shrubs. Recommended ecological restoration activities are focused on Valens Brook. The replacement of the McFarlane Road hanging culvert, which blocked salmon passage up the creek was completed in 2002; a second hydrological restoration initiative for the creek could be the creation of one or more fish-friendly, secure weirs to mimic less-stable beaver dams on the lower reaches. Beaver dams are an important creek enhancement. Several dams have been started by beavers within or near the Reserve and later failed, possibly because there is insufficient cover in the narrow confines of the lower channel to protect beavers from disturbance by humans and domestic animals. Dams create important salmon-spawning and fry-rearing habitat, as well as supporting the aquatic needs of numerous other species. With the cooperation of Fisheries and Oceans Canada, for example, secure fish ladder weirs could be created at several points along Valens Brook. The pools that would develop subsequently would create aquatic habitat for fish and other species, and might also provide sufficient protection for beavers to continue dam-building activities.

### 6.9 Scientific Research/Education Opportunities

A number of education opportunities are possible within the Reserve. In past years, salmon fry, raised on Denman Island in the 'Salmonids in the Classroom' program created by Fisheries and Oceans Canada, have been released into Valens Brook near the Reserve. While this program is an important natural history education tool, the release of captive-reared fry into naturally-occurring salmon fry habitat is hazardous due to possible disease or parasite introduction and competitive pressures on natural stocks in tiny summer pools. Thus, other captive-fry release sites might be sought, and the Reserve used for alternative salmonid educational programs.

Possible research and education programs include:

- water quality and flow rate measurement,
- frog and salamander monitoring (e.g., wooden coverboards could be placed in the Reserve to create artificial habitat for monitoring the presence and abundance of salamanders),
- salmonid fry and spawning surveys, and
- invertebrate surveys.

Future research could include focused species at risk surveys and monitoring during peak season for rare plants, mosses and lichens, bats, birds, gastropods, reptiles and amphibians, impacts of deer herbivory and restoration, and specific species of interest.

On July 16, 2019 the ITC Board adopted a Reconciliation Declaration<sup>8</sup> that states a commitment to creating opportunities for knowledge-sharing, understanding, and collaboration. Relationship-building with regional First Nations could lead to an improved understanding of important cultural and ecological knowledge about the forests and wetlands of Denman and possibly about historical uses and cultural values of the Reserve itself. The first steps in relationship-building may include inviting discussion and story-telling, offering support to visiting elders, and helping with any matters identified by First Nations.

### 6.10 Exotic and Invasive Species Management

In general, many factors will affect the future survival and composition of native ecosystems around Denman Island, particularly in and around small nature reserves. Climate warming and drying, as well as increased storm activity, will likely lead to alterations in native species survival, with the death of some species and the opening up of some sites. In addition, increasing road development and use may increase the abundance and variety of non-native species being introduced and dispersed around the

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<sup>8</sup> [http://www.islandstrustconservancy.ca/media/84933/itc\\_2019-09-05\\_itc-reconciliation-declaration-picture.pdf](http://www.islandstrustconservancy.ca/media/84933/itc_2019-09-05_itc-reconciliation-declaration-picture.pdf)

island. Thus, invasive species management needs to consider future ecological changes as well as current pressures both inside and around the reserves.

A variety of invasive species are present in the south parcel as a result of the 1988 logging. The most significant of these is English holly: many large (3-4 metre-high) plants are scattered along the eastern side of Valens Brook. Manual removal of these plants is possible as the area is accessible via the old logging track. Monitoring of any regrowth could be conducted by the volunteer warden. Many other invasive species such as herb-robot (*Geranium robertianum*), Canada thistle (*Cirsium arvense*), hairy cat's ear (*Hypochaeris radicata*), and grass species will likely be shaded out as the coniferous canopy increases. The north parcel is relatively free of invasive species; however, the open riparian area around Valens Brook has many of these invasive species, no doubt because it receives considerable wildlife traffic as well as in-flowing water from upstream.

Foxgloves (*Digitalis purpurea*) are numerous, especially in logged or disturbed areas on Denman, and there are many plants in the forest, wetland, and creek polygons of the Reserve. Foxgloves are native to parts of Europe, Asia, and Africa. They prefer acidic, disturbed soils and can grow in part-sun to deep shade. Thus, their presence and possible persistence in the Reserve can be expected. All parts of this plant are toxic, but poisoning is rare except in very young children. Eradication of this plant is unlikely as it will continue to recolonize disturbed edges, especially along the creek.

In general, future invasive species management (control, removal, or acceptance) should be based on four factors: 1) degree of invasion, 2) overall ecological impact, 3) availability of an acceptable removal method, and 4) potential for successful removal or control without causing other major ecological disruption.

### 6.11 Wildfire Risk Management

Wildfire risk management actions, such as removing woody debris, are limited by the overarching conservation objective of minimizing disturbance to the natural environment. A major wildfire in the reserve would require a provincial response (e.g., water bombers) due to the long, narrow shape of the Reserve and the limited road access. Wildfire mitigation and response plans should be developed in collaboration with DCA and the Denman Island Volunteer Fire Department. These should be updated annually as needed. Although the risk of wildfire is reduced while there is no advertised public access, signage indicating that fire and smoking are prohibited and fire-hazard notification signs (e.g., fire danger index) could be considered.

One acceptable wildfire risk management action would be to drop small, severely leaning dead trees to the forest floor, where would take on moisture from the ground and more readily rot, becoming less of a fire risk.

### 6.12 Climate Change Impacts and Management

The most serious consequences of rising temperatures, moisture deficits, and unusual storm events are increased risk of windthrow and wildfire and the possibility of new plant invasions or damaging new insect pests securing a foothold in already climate-stressed ecosystems. In general, for small, discrete protected land parcels on the Gulf Islands, such as Valens Brook Nature Reserve, these impacts may change the very features that contributed to their initial protection.

The Reserve has both forest and aquatic features that are likely to be sensitive to warming and drying conditions and powerful storm events. Western redcedar is a major component of the grand fir – three-leaved foam flower (*Abies grandis* / *Tiarella trifoliata*) forest. As a species that prefers moist, cool habitats, western redcedar may become stressed with future climatic changes and decline in abundance, while the more drought-tolerant Douglas-fir (*Pseudotsuga menziesii*) may increase. The trend towards drought-tolerant species is expected to be similar for shrub and herbaceous plant communities in the Reserve.

The Reserve's wetlands, which are small, shallow, surface-water-dependent aquatic systems, are likely to dry and shrink if winter water recharge and flows are reduced and temperatures increased. If the water levels/flows throughout the Valens Brook drainage can be maintained by beaver dams, the lower reaches of Valens Brook are likely to remain as moist riparian communities.

Climate changes may disrupt normal critical interactions between species, by triggering changes in some of the previous synchronous timing of seasonal events such as invertebrate emergence, plant flowering, seeding or species migration. The interactions of species in both forest and wetland communities may be affected, particularly species with life cycles linked to water levels or air and water temperatures. Because many of the cycles linking these species are not well-understood, climate change impacts are unknown.

Managing for climate change is likely to mean preparing for new ecological scenarios. Not only do managers need to plan to protect the existing ecosystems within the Reserve, but they also need to design realistic plans to adapt as ecosystems change over time. The natural values originally present may change considerably, and new values and conservation opportunities may become available. Research on, or visits to, protected areas with similar topography and ecosystems, such as forests or wetlands on islands south of our region, could be beneficial in appreciating expected ecosystem changes. In this potentially unstable future, adaptive management may be the best approach. This includes 1) observing how the natural systems seem to cope with the changes, 2) monitoring various changing features, and 3) managing 'gently,' while limiting human impacts to prevent further stress to the Reserve's ecosystems.

## 7 Action Items

The following action items are intended to contribute to the management, maintenance, or protection of natural and cultural values in the Reserve. Additional monitoring actions noted in section 6.3 can be conducted through the immediate action item #2 in section 7.1.

### 7.1 Immediate Actions (1-2 years)

1. Support all partners, contractors and volunteers to complete cultural competency training in regard to reconciliation, knowledge and history of Coast Salish and Indigenous Peoples.
2. Seek out and appoint a volunteer warden and invite other volunteers to join a 'friends of' group if there is interest. Decide on the monitoring tasks for the warden and other volunteers.
3. Engage with First Nations to ensure that the management plan is reflective of treaty, inherent rights, and the traditional territories of each Nation.
4. Work in collaboration towards a Management Plan for Areas of Cultural Heritage, gathering and harvesting, and Sacred Significance with First Nations.
5. Decide on signage needs. Design and install signs, as necessary.
6. Plan removal of any debris from past uses such as the plastic forestry tubes (Vexar®) used to protect tree seedlings.
7. Plan an overall strategy for the removal of invasive species, particularly the removal of English holly.
8. Install covenant boundary markers along the boundary and/or property pins.
9. Conduct a fire risk analysis for the Nature Reserve. Meet with the Denman Island Volunteer Fire Department to discuss approaches for mitigating the threat of wildfire in the Reserve, particularly human-source fires.

### 7.2 Short term Actions (3-5 years)

1. As resources allow, continue with invasive species management by implementing a comprehensive invasive species strategy (inventory, removal, reassessment), particularly for English holly.
2. As resources allow, conduct species at risk surveys at appropriate times of year to document species of concern, collect baseline data, guide future management and restoration efforts, and to provide a better understanding of the natural values of the reserve.
3. Choose a water quality monitoring site and install a flow marker.
4. Decide on whether the installation of a permanent weir is desired.
5. Begin the discussion of anticipated climate change. As resources allow, design effective monitoring tasks to collect basic data on possible ecosystem changes (e.g., through brainstorming with other reserve managers). Work and liaise with First Nations associations on climate strategies and knowledge.

### 7.3 Long term Actions (5+ years)

1. Review the effectiveness of invasive species management strategies and adapt as needed.
2. Review the effectiveness of climate change monitoring programs and adapt as necessary.
3. If a permanent weir is considered, seek funding and develop a design and proposal. Then, install and monitor weir.
4. Evaluate the value of active restoration techniques to ensure forest regeneration; for example: planting of red cedar seedling if there is minimal recruitment; planting of berry producing shrubs and culturally important plants with caging or protection from browsing etc.

#### 7.4 Ongoing or Annual Action Items

1. Annual monitoring walk and discussion between ITC, management and possible covenant partners, volunteer warden and First Nations.
2. Annual review of issues identified by the volunteer warden and DCA (e.g., invasive species management, trail and incursion impacts, etc.).
3. Annual review of the wildfire risk, ideally every April to prepare for wildfire season.
4. Annual review of possible climate-related changes and adaptations occurring within the Reserve, as required.

## 8 Conclusions

Valens Brook Nature Reserve protects 6.2 hectares of forest and freshwater ecosystems, including both mature, climax ecosystems and areas still recovering from logging. Four rare ecological communities and two of 16 possible species at risk were identified in the ecological inventory conducted in the preparation of this plan. The Reserve represents the initial steps toward the creation of Denman's first greenway for the protection of a salmon-spawning stream.

The Reserve's ecological communities will continue to mature and be left to recover largely without influence. At this time, there are no trails for public access and none are recommended, as this would counteract the wildlife habitat benefits of the Reserve due to the Reserve's narrow shape. Limited signage is recommended; these could explain the Reserve's important conservation role. Climate change impacts and the danger of wildfires are important management concerns. Characteristics that increase the vulnerability of the Reserve to ecosystem damage are the long, unmarked borders and the Reserve's position in the lower reaches of a large watershed.

A key management recommendation is to appoint a volunteer warden who would oversee routine monitoring and maintenance within the Reserve. Monitoring of water quality and flow volume in Valens Brook, as well as monitoring of property boundaries for trespass, will provide information about the integrity of the Reserve and contribute to an awareness of the benefits of reserves as a protective buffer in watersheds. Other

recommended actions include the removal of English holly, the development of an overall invasive species management strategy, and to develop a wildfire risk analysis.

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## 10 Appendices

### Appendix 1 Photograph documentation

**Table A1- 1. Documentation of photographs taken by J. Balke and used in this management plan**

| Text Section | Photo   | Location UTM Zone 10 Coordinates | Direction (°) | Date YYYY-MM-DD | Description                                  |
|--------------|---------|----------------------------------|---------------|-----------------|--|
| 2.6          | 1       | 373601<br>5483578                | 90            | 2019-05-06      | Spring-board stumps                          |
| 2.6          | 2       | 373477<br>5483528                | 170           | 2019-07-15      | Chain-saw stumps                             |
| 2.6          | 3       | 373399<br>5483489                | 360           | 2019-07-24      | Black spruce (planted 1989-90)               |
| 2.6          | 4       | 373392<br>5483492                | 120           | 2019-07-24      | Pear trees (planted 1990-91)                 |
| 2.6          | 5       | 373693<br>5483682                | 250           | 2019-04-30      | Old mill slabs (cut late-1990's)             |
| 2.6          | 6       | 373263<br>5483398                | 210           | 2019-07-24      | Well hole                                    |
| 2.6          | 7       | 373617<br>5483760                | 100           | 2019-07-24      | Perc test hole                               |
| 2.6          | 8       | 373652<br>5483668                | 270           | 2019-04-30      | 1988 logging track                           |
| 2.6          | 9       | 373694<br>5483670                | 310           | 2019-04-30      | 1988 log-landing                             |
| 3.3          | 10      | 373451<br>5483571                | NA            | 2019-04-20      | Erratic                                      |
| 3.5          | 11      | 373705<br>5483298                | 115           | 2019-07-24      | Soil profile at Dusty Road                   |
| 3.5          | 12      | 373479<br>5483509                | NA            | 2019-07-15      | Stones in soil                               |
| 3.9          | 13      | widespread                       |               | 2019-04-20      | Maple seedlings                              |
| 4            | 14      | 373388<br>5483558                | 210           | 2019-07-15      | Human activities and veteran old growth tree |
| 4            | 15      | 373419<br>5483552                | 150           | 2019-07-15      | Deer trail                                   |
| 6.5          | 16      | 373377<br>5483578                | 235           | 2019-07-15      | Covenant border sign                         |
| App* 2       | A2-1a 1 | 373672<br>5483750                | 20            | 2019-07-15      | Polygon 1a Mature Forest East                |
| App* 2       | A2-1a 2 | 373448<br>5483610                | 220           | 2019-07-15      | Polygon 1a Mature Forest East                |
| App 2        | A2-1b   | 373623<br>5483654                | 220           | 2019-07-15      | Polygon 1b Young Deciduous Forest East       |
| App 2        | A2-1c   | 373485<br>5483545                | 220           | 2019-07-15      | Polygon 1c Young Coniferous Forest East      |
| App 2        | A2-2    | 373563<br>5483619                | 150           | 2019-07-15      | Polygon 2 Maple Valley                       |

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|       |       |                      |     |            |  |
|-------|-------|----------------------|-----|------------|--|
| App 2 | A2-3a | 373505<br>5483614    | 290 | 2019-07-15 | Polygon 3a Central Wetland                         |
| App 2 | A2-3b | 373252<br>5483414    | 70  | 2019-05-08 | Polygon 3b SW Wetland                              |
| App 2 | A2-4  | 373353<br>5483522    | 160 | 2019-05-08 | Polygon 4 Mature Riparian                          |
| App 2 | A2-5  | 373385<br>5483470    | 150 | 2019-04-30 | Polygon 5 Young Riparian                           |
| App 2 | A2-6  | 373227<br>5483437    | 150 | 2019-07-24 | Polygon 6 Mature Forest West                       |
| App 3 | A3-1  | multiple along creek |     | 2019-05-08 | Northern red-legged frog ( <i>Rana aurora</i> )    |
| App 3 | A3-2  | northwest corner     |     | 2019-05-08 | Band-tailed pigeon ( <i>Patagioenas fasciata</i> ) |

\* App = Appendix

Appendix 2. Ecological community polygon descriptions

Six ecological communities are described in the following charts. For two of the communities, the grand fir / three-leaved foamflower (*Abies grandis* / *Tiarella trifoliata*) forest and the red alder – skunk cabbage (*Alnus rubra* – *Lysichiton americanus*) wetlands, there are three and two polygons respectively (Figure 11).

- 1. East forest Polygons**
- 1a: Mature east forest
  - 1b: Recovering deciduous east forest patches
  - 1c: Recovering coniferous east forest patches

**Table A2-1- 1. Ecological community 1a, b and c: Mature and recovering east forest. Description.**

|   |  |
|---|--|
| <b>Polygons</b>                         | Community 1 comprises: 1a maturing climax, 1b young seral deciduous, 1c young seral coniferous   |
| <b>Ecological Community</b>             | grand fir / three-leaved foamflower ( <i>Abies grandis</i> / <i>Tiarella trifoliata</i> )  |
| <b>Classification</b>                   | CDFmm/06   |
| <b>Structural Stage</b>                 | Mixture maturing climax and young seral forests  |
| <b>Status (BC List)</b>                 | Red-listed   |
| <b>Slope (%)</b>                        | Slope and aspect vary, rising slightly from Dusty Road, then sloping down to the central wetland (north parcel) and Maple Valley (south parcel). Continuing on the west side of these features, rising slightly to the crest above Valens Brook and descending steeply with a bench in the north and without in the south, 40-53% to the toe of the slope at the Riparian polygon. The north parcel rises on the west side of the creek at 10-15%.   |
| <b>Aspect (°)</b>                       | Aspect ~ where flat and 215-250° from crest to Valens Brook bench, then rising west of Valens 85°  |
| <b>Photograph</b>                       | A2-1a, 1b and 1c   |
| <b>Ecological Community Description</b> | The maturing climax forest canopy at 40+ m (north parcel) is fairly open with gaps from wind-throw and is dominated by Douglas-fir ( <i>Pseudotsuga menziesii</i> ) and western redcedar ( <i>Thuja plicata</i> ). Grand fir ( <i>Abies grandis</i> ), western hemlock ( <i>Tsuga heterophylla</i> ), bigleaf maples ( <i>Acer macrophyllum</i> ) and red alder ( <i>Alnus rubra</i> ) are also present. The forest is about 100 years old, but on both parcels four veteran Douglas-firs tower above. The shrub community is varied and sparse, and sword fern ( <i>Polystichum munitum</i> ) dominates the understory.<br>The 31 year old transitional seral forests of the south parcel are dominated by either red alder or Douglas-fir and western hemlock. The understory has few shrubs and varies from sword fern and stinging nettle ( <i>Urtica dioica</i> ) under the alder to very little under the coniferous patches, except where the patches are small with more light at the edges and a variety of herbs are growing. Mosses are prominent in the older forest polygons. |

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|                                       |   |
|---------------------------------------|---|
| <b>Disturbance Notes</b>              | A few springboard stumps occur in both forest ages, but most of the chain-sawn stumps are on the south parcel, where mature maples are nearly all that was left after the 1988 logging. A logging track on that parcel was created at that time and is still evident. Also in the 1990s a portable sawmill was used near the eastern border and a rotting pile of old slabs are still present. Fire-scarring is present on the oldest trees in both parcels. The portion of the north parcel on the west side of the creek was logged, probably in the 1950s. This may have been a second logging or the first after an earlier fire. Shake blocks were likely cut from fallen western redcedars especially along the creek.                              |
| <b>Anticipated Change/ Succession</b> | As the maturing forest ages and the canopy increases, the root rot disease thought to be present, killing western hemlocks and grand firs in the north parcel, will continue to spread. Many trees have fallen, often from wind-throw, opening up gaps with young forest regeneration in the spaces. The standing snags and coarse woody debris (CWD) will benefit cavity nesters, invertbrates, amphibians, and foragers. The young forest will be replaced by the climax coniferous species, likely retaining the existing bigleaf maples. Additional small CWD will result from the dying suppressed trees. Where the coniferous canopy closes, the understory will decline, but will increase where the conifers are older and the canopy is opening. |
| <b>Wildlife Observations</b>          | The mixed ages and species of trees, including snags and CWD, provide a wide diversity of habitat niches for birds, mammals, amphibians, reptiles, and invertebrates. Birds from small cavity-nesting chestnut-backed chickadees to large turkey vultures ( <i>Cathartes aura</i> ) and bald eagles ( <i>Haliaeetus leucocephalus</i> ) have been seen in these forests. Black tailed deer ( <i>Odocoileus hemionus</i> ) have made trails across through the forests and squirrels, raccoons, and rodents have been seen. Flying insects and resident spiders were also abundant. See Table A 4-1.   |

**Table A2-1- 2. Ecological community 1 a, b, and c: Mature and recovering west forest.**

**Vegetation cover by layer.**

| Polygon 1<br>Vegetation<br>Cover by Layer | Percent Cover (%)         |                |                  |                          |                |               |                 |                           |                |  |
|---|---------------------------|----------------|------------------|--------------------------|----------------|---------------|-----------------|---------------------------|----------------|--|
|   | Veteran<br>Tree<br>Canopy | Main<br>Canopy | 2ndary<br>Canopy | Total<br>Canopy<br>Cover | Shrub<br>Layer | Herb<br>Layer | Moss,<br>Lichen | Coarse<br>Woody<br>Debris | Non-<br>native |  |
| <b>1a Mature Forest</b>                   | T*                        | 35-40          | 20               | 35-50                    | 10-15          | ~80%          | 5-10            | 15-20                     | T              |  |
| <b>1b Deciduous Patches</b>               | 0                         | 0              | 45               | 1-5                      | to 80%         | 1-5           | 65              | 1-5                       | 10+            |  |
| <b>1c Coniferous Patches</b>              | 2                         | 2-5            | 30-100%          | 5-10                     | to 100%        | <5            | <5              | <5                        | 10             |  |

\* T=trace (less than 1%)

Table A2-1- 3. Ecological community 1a: Mature west forest. Tree and shrub species.

| Polygon 1a Mature Forest<br>Tree and Shrub species | Percent Cover (%) |             |               |       |            | Notes<br>DBH = diameter at breast height<br>All heights estimated |
|--|-------------------|-------------|---------------|-------|------------|---|
|  | Veteran Trees     | Main Canopy | 2ndary Canopy | Shrub | Non-native |   |
| <b>Trees</b>                                       |                   |             |               |       |            |   |
| alder, red ( <i>Alnus rubra</i> )                  |                   | 5           | 5             | 1     |            | In gaps ~20-30m, DBH 285-450mm                                    |
| Douglas-fir ( <i>Pseudotsuga menziesii</i> )       | T*                | 5           | 1-2           | 1     |            | Main: 40+m, DBH 760-900mm<br>2°: to 20m, DBH 390-405mm            |
| fir, grand ( <i>Abies grandis</i> )                |                   | 5           | 5             | < 5   |            | Main: 20-30m, DBH 450-770mm<br>2°: 12m, DBH 250-270mm             |
| hemlock, western ( <i>Tsuga heterophylla</i> )     |                   | 10          | 10            | 2-5   |            | Main: 35m, +565-1145mm<br>2°: 20m, DBH 340mm many dying           |
| maple, bigleaf ( <i>Acer macrophyllum</i> )        |                   | <3          |               | < 1   |            | Main: 25-30m DBH 730mm, seedlings                                 |
| redcedar, western ( <i>Thuja plicata</i> )         |                   | 15-20       | <3            | < 1   |            | Main: 40+m, DBH to 1445-1530<br>2°: 30m, DBH 570-630mm PIWO holes |
| <b>Shrubs</b>                                      |                   |             |               |       |            |   |
| blackberry, trailing ( <i>Rubus ursinus</i> )      |                   |             |               | T     |            |   |
| holly, English ( <i>Ilex aquifolium</i> )          |                   |             |               |       | T          | Isolated individuals  |
| huckleberry, red ( <i>Vaccinium parvifolium</i> )  |                   |             |               | 1-2   |            | Some 3+m  |
| oceanspray ( <i>Holodiscus discolor</i> )          |                   |             |               | T     |            |   |
| Oregon-grape, tall ( <i>Berberis aquifolium</i> )  |                   |             |               | 1-2   |            |   |
| Oregon-grape, dull ( <i>Berberis nervosa</i> )     |                   |             |               | 2     |            |   |
| rose, dwarf ( <i>Rosa gymnocarpa</i> )             |                   |             |               | T     |            |   |
| salal ( <i>Gaultheria shallon</i> )                |                   |             |               | T     |            |   |
| twin flower ( <i>Linnaea borealis</i> )            |                   |             |               | T     |            |   |

\* T=trace (less than 1%)

Table A2-1- 4. Ecological community 1b and 1c: Recovering west forest. Tree and shrub species.

| Polygon 1b & 1c Young forest Tree and Shrub species | Percent Cover (%)<br>Deciduous/Coniferous Patches |              |                          |                        |       |            | Notes:<br>Deciduous/Coniferous Patches<br>All heights are estimates<br>DBH=diameter at breast height |
|---|---|--------------|--------------------------|------------------------|-------|------------|--|
|   | Veteran Tree Canopy                               | Above Canopy | Young Forest Main Canopy | Young Forest 2° Canopy | Shrub | Non-native |  |
| <b>Trees</b>  |   |              |                          |                        |       |            |  |
| alder, red ( <i>Alnus rubra</i> )                   |   |              | 40/2                     | 2/10                   | 1/0   |            | 20-25m, DBH 125-225mm / 15-20m, DBH 105mm  |
| Douglas-fir ( <i>Pseudotsuga menziesii</i> )        | 0/2   |              | 0/30-100                 | 0/5-10                 | 1-2/5 |            | Some dead, others 3-7m / Veteran: 50+m, DBH to 2136mm Main: 25 m, DBH 140-330mm 2°: 10-12m, DBH=90mm |
| fir, grand ( <i>Abies grandis</i> )                 |   |              | 0/1                      |                        | 1/1   |            | 3-4m, some dead / 2-30m, DBH 305mm,, many dead   |
| hemlock, western ( <i>Tsuga heterophylla</i> )      |   |              | 0/5-15                   |                        |       |            | 25m, DBH 320-485mm   |
| maple, bigleaf ( <i>Acer macrophyllum</i> )         |   | 5+/20        |                          |                        | T*/T  |            | 25-30m, DBH 145-520mm / 35m DBH up to 1320mm (many multiple trunks)                                  |
| redcedar, western ( <i>Thuja plicata</i> )          |   | 0/2-5        |                          |                        | 0/T   |            | / Residual mature trees, DBH 720-1050mm  |
| <b>Shrubs</b>                                       |   |              |                          |                        |       |            |  |
| cherry, bitter ( <i>Prunus emarginata</i> )         |   |              |                          |                        | T/T   |            | One tree 20m, DBH 250mm / shrub leaning horizontal   |
| casara ( <i>Rhamnus purshiana</i> )                 |   |              |                          |                        | T/T   |            |  |
| elderberry, red ( <i>Sambucus racemosa</i> )        |   |              |                          |                        | T/    |            |  |
| holly, English ( <i>Ilex aquifolium</i> )           |   |              |                          |                        |       | <1/1+      | Plants up to 6m+   |
| huckleberry, red ( <i>Vaccinium parvifolium</i> )   |   |              |                          |                        | 1/1-2 |            | Occasional   |
| oceanspray ( <i>Holodiscus discolor</i> )           |   |              |                          |                        | T/T   |            | Few, in patches  |

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|   |  |  |  |  |      |  |                 |
|---|--|--|--|--|------|--|-----------------|
| Oregon-grape, tall ( <i>Berberis aquifolium</i> ) |  |  |  |  | T/T  |  | Few, in patches |
| Oregon-grape, dull ( <i>Berberis nervosa</i> )    |  |  |  |  | <5/0 |  | Patches         |
| rose, dwarf ( <i>Rosa gymnocarpa</i> )            |  |  |  |  | T/0  |  |                 |

\*T = trace (less than 1%)

**Table A2-1- 5. Ecological community 1: Mature west forest. Herb and moss species.**

| Polygon 1a Mature Forest<br>Herb and Moss Species            | Percent Cover (%) |              |                    | Notes |
|--|-------------------|--------------|--------------------|-------|
|  | Herb Layer        | Moss, Lichen | Non-native species |       |
| <b>Herb Species</b>  |                   |              |                    |       |
| avens, large-leaved ( <i>Geum macrophyllum</i> )             | T*                |              |                    |       |
| bedstraw species ( <i>Galium spp</i> )                       | T                 |              |                    |       |
| bedstraw, Cleavers ( <i>Galium aparine</i> )                 | T                 |              |                    |       |
| bittercress, little western ( <i>Cardamine oligosperma</i> ) | T                 |              |                    |       |
| buttercup,western <i>Ranunculus occidentalis</i>             | T                 |              |                    |       |
| chickweed, common ( <i>Stellaria media</i> )                 | T                 |              |                    |       |
| fern, bracken ( <i>Pteridium aquilinum</i> )                 | T                 |              |                    |       |
| fern, spiny wood ( <i>Dryopteris expansa</i> )               | T                 |              |                    |       |
| fern, sword ( <i>Polystichum munitum</i> )                   | 60-70             |              |                    |       |
| foxglove ( <i>Digitalis purpurea</i> )                       |                   |              | T                  |       |
| grass species  | T                 |              | T                  |       |
| hairy cat's ear ( <i>Hypochaeris radicata</i> )              |                   |              | T                  |       |
| miner's lettuce, Siberian ( <i>Claytonia sibirica</i> )      | T                 |              |                    |       |
| pathfinder plant ( <i>Adenocaulon bicolor</i> )              | T                 |              |                    |       |
| sandwort, big-leaved <i>Moehringia macrophylla</i>           | T                 |              |                    |       |
| sedge, Dewey's ( <i>Carex deweyana</i> )                     | 1                 |              |                    |       |
| sedge, slough ( <i>Carex obnupta</i> )                       | 1                 |              |                    | patch |
| sedge species ( <i>Carex sp.</i> )                           | 1-2               |              |                    |       |
| speedwell species <i>Veronica sp</i>                         | T                 |              |                    |       |

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|   |     |    |  |               |
|---|-----|----|--|---------------|
| stinging nettle ( <i>Urtica dioica</i> )  | 3-5 |    |  |               |
| sweet-cicely ( <i>Osmorhiza chilensis</i> )   | T   |    |  |               |
| tarweed, Chilean ( <i>Madia sativa</i> )  | T   |    |  |               |
| vanilla leaf ( <i>Achlys triphylla</i> )  | 1-2 |    |  |               |
| wall lettuce ( <i>Lactuca muralis</i> )   | T   |    |  |               |
| <b>Moss Species</b>   |     |    |  |               |
| <i>Dicranum sp</i>  |     | p* |  | Mostly on CWD |
| <i>Hylocomium splendens</i> (step moss)   |     | P  |  |               |
| <i>Isoetes macrospora</i> (cattail moss)  |     | P  |  |               |
| <i>Kindbergia oregona</i> (Oregon beaked moss)  |     | P  |  |               |
| <i>Kindbergia praelonga</i> (slender beaked moss)                                     |     | P  |  |               |
| <i>Leucolepis acanthoneuron</i> (Menzie's tree moss)                                  |     | P  |  |               |
| <i>Rhytidiadelphus loreus</i> (lanky moss)  |     | P  |  |               |
| <i>Rhytidiadelphus triquetrus</i> (electrified cat's-tail moss)                       |     | P  |  |               |
| Other moss species present, esp. on CWD and bases of trees.                           |     |    |  |               |
| * P = present, T = trace (less than 1%). Species' percent coverage was not attempted. |     |    |  |               |
| ^ CWD = coarse woody debris on ground   |     |    |  |               |

**Table A2-1- 6. Ecological community 1: Young recovering west forest. Herb and moss species.**

| Polygon 1b & 1c Young Forest<br>Herb and Moss Species | Percent Cover<br>(Deciduous/Coniferous<br>%) |                 |                | Notes |
|---|--|-----------------|----------------|-------|
|   | Herb<br>Layer                                | Moss,<br>Lichen | Non-<br>native |       |
| <b>Herb Species</b>                                   |  |                 |                |       |
| avens, large-leaved ( <i>Geum macrophyllum</i> )      | T*/-   |                 |                |       |
| bedstraw species ( <i>Galium spp</i> )                | 1+/-   |                 |                |       |
| bedstraw, Cleavers ( <i>Galium aparine</i> )          | T/-  |                 |                |       |
| bittercress, little western Cardamine oligosperma     | 1+/T   |                 |                |       |
| bracken fern ( <i>Pteridium aquilinum</i> )           | -/T  |                 |                |       |
| buttercup species, ( <i>Ranunculus sp.</i> )          | T/-  |                 |                |       |
| chickweed, common ( <i>Stellaria media</i> )          | 1-2/-  |                 |                |       |
| daisy, oxeye ( <i>Leucanthemum vulgare</i> )          |  |                 | -/T            |       |
| fern, spiny wood ( <i>Dryopteris expansa</i> )        | -/T  |                 |                |       |
| fern, sword ( <i>Polystichum munitum</i> )            | to<br>30/2-<br>3                             |                 |                |       |
| foxglove ( <i>Digitalis purpurea</i> )                |  |                 | T/1            |       |

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|  |            |        |       |                    |
|--|------------|--------|-------|--------------------|
| grass species  |            |        | 3-5/- |                    |
| grovelover ( <i>Nemophila parviflora</i> )   | 1+/-       |        |       |                    |
| herb-robert ( <i>Geranium robertianum</i> )  |            |        | T/T   |                    |
| pathfinder plant ( <i>Adenocaulon bicolour</i> )   | -/T        |        |       |                    |
| sedge, Dewey's ( <i>Carex deweyana</i> )   | -/T        |        |       |                    |
| sedge species ( <i>Carex sp</i> )  | 2/T        |        |       |                    |
| Siberian miner's lettuce ( <i>Claytonia sibirica</i> )   | 1+/-       |        |       |                    |
| speedwell, thyme-leaved ( <i>Veronica serpyllifolia</i> )  | T/T        |        |       |                    |
| starflower ( <i>Trientalis latifolia</i> )   | -/T        |        |       |                    |
| stinging nettle ( <i>Urtica dioica</i> )   | to<br>60/T |        |       |                    |
| thistle, Canada ( <i>Cirsium arvense</i> )   |            |        | -/1+  | -/occasional patch |
| thistle species ( <i>Cirsium species</i> )   | T/T        |        |       |                    |
| vanilla leaf ( <i>Achlys triphylla</i> )   | 1/1        |        |       |                    |
| wall lettuce ( <i>Lactuca muralis</i> )  | -/T        |        |       |                    |
| <b>Moss Species</b>  |            |        |       |                    |
| <i>Dicranum sp</i>   |            | P*     |       | On CWD^            |
| <i>Isoetecium myosuroides</i> (cattail moss)   |            | P      |       | On CWD             |
| <i>Kindbergia oregana</i> (Oregon beaked moss)   |            | P/P    |       | On CWD & ground    |
| <i>Kindbergia praelonga</i> (slender beaked moss)  |            | -/P    |       | On CWD & ground    |
| <i>Leucolepis acanthoneuron</i> (Menzie's tree moss)   |            | -/PD   |       | On ground          |
| <i>Plagiomnium insigne</i> (coastal leafy moss)  |            | PD*/PD |       | On ground          |
| <i>Rhytidiadelphus triquetrus</i> (electrified cat's-tail moss)  |            | P/P    |       | On CWD             |
| Other moss species present especially on CWD and bases of trees.   |            |        |       |                    |
| * PD = present and dominant, P = present, T = trace (less than 1%). Species' percent was coverage not attempted. |            |        |       |                    |
| ^ CWD = coarse woody debris on ground  |            |        |       |                    |



***Photo A2- 1a1. Polygon 1 Mature east forest.***



***Photo A2- 1a2. Polygon 1 Mature east forest.***



***Photo A2-1b. Polygon 1 Young deciduous east forest.***



***Photo A2-1c. Polygon 1 Young coniferous forest.***

2. Maple Valley unclassified community

Table A2-2- 1. Ecological community 2. Maple valley. Description.

|   |   |
|---|---|
| <b>Polygon Site</b>                     | 2 Maple valley  |
| <b>Ecological Community</b>             | Recovering forest   |
| <b>Classification</b>                   | Transition  |
| <b>Structural Stage</b>                 | Mature trees, part young seral  |
| <b>Status (BC List)</b>                 | None  |
| <b>Slope (%)</b>                        | V. gently sloping basin, each side <3 deg   |
| <b>Aspect (°)</b>                       | 50°deg & 230°, either side of basin   |
| <b>Photograph</b>                       | A2-2  |
| <b>Ecological Community Description</b> | Mature and a few younger bigleaf maples ( <i>Acer macrophyllum</i> ) are dominant in the 30 m high canopy in a broad valley bottom surrounding a creek. One black cottonwood ( <i>Populus balsamifera ssp. trichocarpa</i> ) is present, also small stands of red alder ( <i>Alnus rubra</i> ). Conifer stumps include western redcedars ( <i>Thuja plicata</i> ) logged in 1988 and springboards from the historic logging. The central creek has many braided channels and standing water segments. Coarse woody debris covers about 10%.         |
| <b>Disturbance Notes</b>                | Was selectively logged in 1988, taking the western redcedar and firs and leaving the maples. A few small-diameter springboard stumps suggest only limited logging historically.   |
| <b>Anticipated Change/ Succession</b>   | The bigleaf maples have considerable influence over the rest of the flora and are likely to remain dominant into the foreseeable future. Currently, maples take the majority of the light and probably most of the soil moisture in the summer. Adjacent conifers will have to grow taller than the maples to shade them out and take over the space, which may take over 100 years. As the understory dries, the community may change from stinging nettle and sword fern to an increasing component of the bracken fern just beginning to appear. |
| <b>Wildlife Observations</b>            | Birds, frogs, dragonflies, damselflies, and other invertebrates were seen taking advantage of the moisture and open sunny areas early in the season. The huge maple canopies offer good foraging and nesting opportunities for birds and ample seeds for small mammals. Beds and trails used by black-tailed deer ( <i>Odocoileus hemionus</i> ) were present. Wildlife is listed in Appendix 1.  |

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**Table A2-2- 2. Ecological community 2. Maple valley. Vegetation cover by layer.**

| Polygon 2 Maple Valley Vegetation Cover | Percent Cover (%) |               |              |             |            |              |                     |            |
|---|-------------------|---------------|--------------|-------------|------------|--------------|---------------------|------------|
|   | Main Canopy       | 2ndary Canopy | Total Canopy | Shrub Layer | Herb Layer | Moss, Lichen | Coarse Woody Debris | Non-native |
| <b>Overall Cover by Layer</b>           | 50                | 5             | 50+          | 1-2         | 50-60      | 5            | 10-15               | 5+         |

**Table A2-2- 3. Ecological community 2. Maple valley. Tree and shrub species.**

| Polygon 2 Maple Valley Tree & Shrub Species                      | Percent Cover (%) |             |               |             |                  | Notes:<br>All heights are estimates. DBH (cm)   |
|--|-------------------|-------------|---------------|-------------|------------------|---|
|  | Veteran Trees     | Main Canopy | 2ndary Canopy | Shrub Layer | Invasive Species |   |
| bigleaf maple ( <i>Acer macrophyllum</i> )                       |                   | 50          | 5             |             |                  | Distributed throughout, mature trees 30+m, DBH 705-1440m, young trees 10-25m, DBH 150-390mm, many seedling maples on ground |
| black cottonwood ( <i>Populus balsamifera ssp. Trichocarpa</i> ) |                   | 2           |               |             |                  | 1 tree 30m, DBH 405mm, a patch of cottonwoods is located on other lands nearby  |
| Douglas-fir ( <i>Pseudotsuga menziesii</i> )                     |                   |             | 1             |             |                  | 2 trees 11-12 m   |
| red alder ( <i>Alnus rubra</i> )                                 |                   | 5           | T*            |             |                  | Isolated patch & occasional tree 20-30m, DBH 110-210mm  |
| western hemlock ( <i>Tsuga heterophylla</i> )                    |                   | 3-5         |               |             |                  | 1 residual tree 30m, DBH 435mm  |
| western redcedar ( <i>Thuja plicata</i> )                        |                   |             |               |             |                  | 2 dead trees  |
| elderberry, red ( <i>Sambucus racemosa</i> )                     |                   |             |               | 1           |                  |   |
| holly, English ( <i>Ilex aquifolium</i> )                        |                   |             |               |             | 1                | Western edge  |
| huckleberry, red ( <i>Vaccinium parvifolium</i> )                |                   |             |               | 1           |                  | Occasional plants   |
| raspberry, black ( <i>Rubus leucodermis</i> )                    |                   |             |               | T           |                  | Occasional  |
| salal ( <i>Gaultheria shallon</i> )                              |                   |             |               | T           |                  | 1 young plant on edge   |

\*T = trace (less than 1%)

Table A2-2- 4. Ecological Ecological community 2. Maple valley. Herb and moss species.

| Polygon 2  | Percent Cover (%) |              |                    | Notes                      |
|--|-------------------|--------------|--------------------|----------------------------|
|  | Herb Layer        | Moss, Lichen | Non-native species |                            |
| <b>Herb Species</b>  |                   |              |                    |                            |
| American brooklime <i>Veronica becca bunga</i>               | T*                |              |                    | Wet areas                  |
| bedstraw species ( <i>Galium spp</i> )                       | 1-2               |              |                    | Widespread distribution    |
| bittercress, beautiful ( <i>Cardamine pulcherrima</i> )      | T                 |              |                    |                            |
| bittercress, little western ( <i>Cardamine oligosperma</i> ) | 1                 |              |                    |                            |
| bracken fern ( <i>Pteridium aquilinum</i> )                  | T                 |              |                    |                            |
| chickweed, common ( <i>Stellaria media</i> )                 | T                 |              |                    | Wet area near neighbour    |
| fern, lady ( <i>Athyrium filix-femina</i> )                  | T                 |              |                    | In wet spots               |
| fern, licorace ( <i>Polypodium glycyrrhiza</i> )             | T                 |              |                    | By woody debris            |
| fern, spiny wood ( <i>Dryopteris expansa</i> )               | T                 |              |                    | By woody debris            |
| fern, sword ( <i>Polystichum munitum</i> )                   | 5-10              |              |                    |                            |
| foxglove ( <i>Digitalis purpurea</i> )                       |                   |              | T                  | Occasional                 |
| fringecup ( <i>Tellima grandiflora</i> )                     | T                 |              |                    | Occasional in wet channels |
| grass, reed canary ( <i>Phalaris arundinacea</i> )           |                   |              | T                  | In wet area                |
| grass species  | T                 |              |                    | Occasional                 |
| grovelover <i>Nemophila parviflora</i>                       | 1                 |              |                    |                            |
| hedge nettle ( <i>Stachys cooleyae</i> )                     | T                 |              |                    |                            |
| herb-robert ( <i>Geranium robertianum</i> )                  |                   |              | T                  | Occasional                 |
| horsetail, common <i>Equisetum arvense</i>                   | T                 |              |                    |                            |
| monkey-flower ( <i>Mimulus moschatus</i> )                   | T                 |              |                    | In wet areas               |
| rush, common <i>Juncus effusus</i>                           | T                 |              |                    |                            |
| sedge, Dewey's ( <i>Carex deweyana</i> )                     | T                 |              |                    |                            |
| sedge, slough ( <i>Carex obnupta</i> )                       | T                 |              |                    | Patch 2x2 m                |
| sedge species ( <i>Carex sp.</i> )                           | 1                 |              |                    | Small patches              |
| Siberian miner's lettuce ( <i>Claytonia sibirica</i> )       | T                 |              |                    |                            |
| speedwell, thyme-leaved ( <i>Veronica serpyllifolia</i> )    | T                 |              |                    |                            |
| stinging nettle ( <i>Urtica dioica</i> )                     | 30                |              |                    | Patches and solid areas    |
| thistle, Canada ( <i>Cirsium arvense</i> )                   |                   |              | 2                  | Occasional                 |
| thistle, species ( <i>Cirsium sp.</i> )                      | T                 |              |                    |                            |
| vanilla leaf ( <i>Achlys triphylla</i> )                     | 1                 |              |                    | small patches              |

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|   |   |    |  |                  |
|---|---|----|--|------------------|
| wall lettuce ( <i>Lactuca muralis</i> )   | T |    |  |                  |
| <b>Moss Species</b>   |   |    |  |                  |
| <i>Dicranum sp</i>  |   | P* |  | On CWD^          |
| <i>Isoetecium myosuroides</i> (cattail moss)  |   | P  |  | On CWD           |
| <i>Kindbergia oregana</i> (Oregon beaked moss)  |   | P  |  | On CWD & ground  |
| <i>Kindbergia praelonga</i> (slender beaked moss)                                     |   | P  |  | on CWD & ground  |
| <i>Plagiomnium insigne</i> (coastal leafy moss)                                       |   | P  |  | patches on soil  |
| <i>Rhytidiadelphus loreus</i> (lanky moss)  |   | P  |  |                  |
| <i>Rhytidiadelphus triquetrus</i> (electrified cat's-tail moss)                       |   | P  |  |                  |
| Other moss species  |   | P  |  | On CWD and rocks |
| *P = present, *T = trace (less than 1%). Species' percent coverage was not attempted. |   |    |  |                  |
| ^ CWD = coarse woody debris on ground   |   |    |  |                  |



**Photo A2- 2. Polygon 2  
Maple Valley.**

**3. Red alder – skunk cabbage (*Alnus rubra – Lysichiton americanus*) wetlands**

Polygons: 3a: Central wetland  
3b: SW wetland

**Table A2-3- 1. Ecological community 3. Wetlands. Description.**

|                             |  |
|-----------------------------|--|
| <b>Polygon ID</b>           | Includes: 3a Central wetland and 3b SW wetland                           |
| <b>Ecological Community</b> | Red alder - skunk-cabbage ( <i>Alnus rubra - Lysichiton americanus</i> ) |
| <b>Classification</b>       | CDFmm/Ws52   |
| <b>Structural Stage</b>     | Maturing wetland   |

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|   |  |
|---|--|
| <b>Status (BC List)</b>                 | Red-listed   |
| <b>Slope and Aspect</b>                 | Flat   |
| <b>Photograph</b>                       | A2-3a, A2-3b   |
| <b>Ecological Community Description</b> | Shallow slough sedge ( <i>Carex obnupta</i> ) wetlands with red alder ( <i>Alnus rubra</i> ) dominant in the canopy and a few Douglas-fir ( <i>Pseudotsuga menziesii</i> ) and western redcedar ( <i>Thuja plicata</i> ) growing on raised hummocks. A mix of shrubs are also on hummocks or coarse woody debris (CWD).  |
| <b>Disturbance Notes</b>                | The central wetland's drainage to north and south was affected when both of those properties were clear-cut logged. Ponding above the south parcel in 1988 likely increased the size of the central wetland. A well hole was dug in SW wetland in the 1940s-50s around the time of the logging of this portion of the north parcel.  |
| <b>Anticipated Change/ Succession</b>   | These wetlands may mature into western redcedar / skunk cabbage ( <i>Thuja plicata</i> / <i>Lysichiton americanus</i> ) wetlands or with increasing temperatures and water deficits they may gradually dry and shrink in size.   |
| <b>Wildlife Observations</b>            | Birds have nested in the central wetland in the past, and many species likely drink the fresh water when available. Species with aquatic life cycles that previously used the wetlands for breeding may not be able to adjust, as the standing water seems to diminish much earlier in the season. The forest-opening-and-edge habitat provides many birds and invertebrates with foraging, nesting, and travelling habitat. Dead and dying alders are valuable for cavity nesters, invertebrates, and foraging species such as woodpeckers. |

**Table A2-3- 2. Ecological community 3. Wetlands. Vegetation cover by layer.**

| Polygon 3<br>Vegetation Cover<br>by Layer | Percent Cover (%) |                |                  |                          |                |            |                 |                           |            |
|---|-------------------|----------------|------------------|--------------------------|----------------|------------|-----------------|---------------------------|------------|
|   | Above<br>Canopy   | Main<br>Canopy | 2ndary<br>Canopy | Total<br>Canopy<br>Cover | Shrub<br>Layer | Herb Layer | Moss,<br>Lichen | Coarse<br>Woody<br>Debris | Non-native |
| <b>3a Central wetland</b>                 | 5-10*             |                | 15-<br>20        | 20-30                    | T**            | 90+        | –               | 5-10                      | –          |
| <b>3b SW wetland</b>                      |                   | 50             | 10               | 60                       | 5+             | 70         |                 | 5-10                      |            |

\* Trees from surrounding mature forest overhanging the wetland edges.

\*\* T = trace (less than 1%)

Table A2-3- 3. Ecological community 3a. Central wetland. Vegetation species.

| Polygon 3a Central Wetland<br>Vegetation species | Percent Cover (%) |                |       |       | Notes<br>All heights are estimates<br>DBH=diameter at breast<br>height |
|--|-------------------|----------------|-------|-------|--|
|  | Above<br>Canopy   | Main<br>Canopy | Shrub | Herb  |  |
| <b>Trees*</b>                                    |                   |                |       |       |  |
| alder, red ( <i>Alnus rubra</i> )                | 5-10              | 15-20          | T**   |       | 10-20m, DBH 235mm & snags  |
| <b>Shrubs</b>                                    |                   |                |       |       |  |
| blackberry, trailing ( <i>Rubus ursinus</i> )    |                   |                | T     |       |  |
| raspberry, black ( <i>Rubus leucodermis</i> )    |                   |                | T     |       |  |
| <b>Herbs</b>                                     |                   |                |       |       |  |
| fern, lady ( <i>Athyrium filix-femina</i> )      |                   |                |       | 1-2   |  |
| fern, sword ( <i>Polystichum munitum</i> )       |                   |                |       | 1-2   |  |
| sedge, slough ( <i>Carex obnupta</i> )           |                   |                |       | 85-90 |  |
| vanilla leaf ( <i>Achlys triphylla</i> )         |                   |                |       | T     | At the edge  |

\* Trees from surrounding mature forest overhanging the wetland edges.

\*\* T = trace (less than 1%)

Table A2-3- 4. Ecological community 3b. SW wetland. Tree and shrub species.

| Polygon 3 SW wetland<br>Tree and Shrub species    | Percent Cover (%) |                |                  |       |            | Notes<br>All heights are estimates<br>DBH=diameter at breast height |
|---|-------------------|----------------|------------------|-------|------------|---|
|   | Veteran<br>Tree   | Main<br>Canopy | 2ndary<br>Canopy | Shrub | Non-native |   |
| <b>Trees</b>                                      |                   |                |                  |       |            |   |
| alder, red ( <i>Alnus rubra</i> )                 |                   | 35             |                  |       |            | 20-25m, DBH=115-255mm   |
| Douglas-fir ( <i>Pseudotsuga menziesii</i> )      |                   | 5              |                  |       |            | 30-40+m, DBH=460-590mm  |
| fir, grand ( <i>Abies grandis</i> )               |                   |                |                  | 1     |            |   |
| redcedar, western ( <i>Thuja plicata</i> )        |                   | 5              | 3                |       |            | 25-30m, DBH=730mm   |
| <b>Shrubs</b>                                     |                   |                |                  |       |            |   |
| blackberry, trailing ( <i>Rubus ursinus</i> )     |                   |                |                  | T*    |            |   |
| huckleberry, red ( <i>Vaccinium parvifolium</i> ) |                   |                |                  | T     |            |   |
| oceanspray ( <i>Holodiscus discolor</i> )         |                   |                |                  | 1     |            |   |
| rose, dwarf ( <i>Rosa gymnocarpa</i> )            |                   |                |                  | 1     |            |   |

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|   |  |  |  |   |  |  |
|---|--|--|--|---|--|--|
| salal ( <i>Gaultheria shallon</i> )             |  |  |  | 5 |  |  |
| saskatoon berry ( <i>Amelancier alnifolia</i> ) |  |  |  | 1 |  |  |

\*T = trace (less than 1%)

**Table A2-3- 5. Ecological community 3b. SW wetland. Herb and moss species.**

| Polygon 3b SW wetland<br>Herb and moss species  | Percent Cover (%) |              |                    | Notes   |
|---|-------------------|--------------|--------------------|---------|
|   | Herb Layer        | Moss, Lichen | Non-native species |         |
| <b>Herb Species</b>   |                   |              |                    |         |
| fern, sword ( <i>Polystichum munitum</i> )  | 5+                |              |                    |         |
| sedge, slough ( <i>Carex obnupta</i> )  | 70                |              |                    |         |
| Note: The following species were seen on a deer path running through the wetland.   |                   |              |                    |         |
| bedstraw species ( <i>Galium spp</i> )  | T*                |              |                    |         |
| buttercup, western ( <i>Ranunculus occidentalis</i> )   | T                 |              |                    |         |
| chickweed, common ( <i>Stellaria media</i> )  | T                 |              |                    |         |
| fern, bracken ( <i>Pteridium aquilinum</i> )  | T                 |              |                    |         |
| grass species   | T                 |              |                    |         |
| herb-robert ( <i>Geranium robertianum</i> )   | T                 |              |                    |         |
| sweet-cicely ( <i>Osmorhiza chilensis</i> )   | T                 |              |                    |         |
| pathfinder plant ( <i>Adenocaulon bicolour</i> )  | T                 |              |                    |         |
| <b>Moss Species</b>   |                   |              |                    |         |
| <i>Hylocomium splendens</i> step moss   |                   | P*           |                    | on CWD^ |
| <i>Isoetecium myosuroides</i> (cattail moss)  |                   |              |                    | on CWD^ |
| <i>Kindbergia oregana</i> (Oregon beaked moss)  |                   |              |                    | on CWD^ |
| <i>Kindbergia praelonga</i> (slender beaked moss)   |                   |              |                    | on CWD^ |
| <i>Plagiomnium insigne</i> (coastal leafy moss)   |                   |              |                    | on CWD^ |
| Other moss species on tree trunks and coarse woody debris   |                   |              |                    |         |
| *P = present, T = trace (less than 1%). Species' percent coverage was not attempted.<br>^ CWD = coarse woody debris on ground |                   |              |                    |         |



Photo A2- 3a. Polygon 3 Central wetland.

Photo A2-3b. Polygon 3 SW wetland.



**4. Western redcedar / common snowberry (*Thuja plicata* / *symphoricarpos albus*) maturing riparian community**

**Table A2-4- 1. Ecological community 4. Valens Brook mature riparian. Description.**

|   |  |
|---|--|
| <b>Polygon ID</b>                       | 4 Valens Brook Mature Riparian   |
| <b>Ecological Community</b>             | Western redcedar / common snowberry ( <i>Thuja plicata</i> / <i>Symphoricarpos albus</i> )   |
| <b>Classification</b>                   | CDFmm/07   |
| <b>Structural Stage</b>                 | Maturing climax high bank floodplain forest  |
| <b>Status (BC List)</b>                 | Red-listed   |
| <b>Slope and Aspect</b>                 | Bench mostly flat with hummocks and slopes along creek edges to water  |
| <b>Photograph</b>                       | A2-4   |
| <b>Ecological Community Description</b> | Riparian bench, up to 15 m wide, along Valens Brook. Lies mostly on the east side, from the toe of the eastern slope to the creek. A maturing 80-100+ yr mixed bigleaf maple ( <i>Acer macrophyllum</i> ), red alder ( <i>Alnus rubra</i> ), Douglas-fir ( <i>Pseudotsuga menziesii</i> ), and grand fir ( <i>Abies grandis</i> ) forest canopy, with few shrubs and a diverse sword-fern-dominated herb layer. Moss is mainly on the coarse woody debris (CWD). |

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|                                       |   |
|---------------------------------------|---|
| <b>Disturbance Notes</b>              | The trees in the narrow steep-sided valley were, and continue to be, affected by wind-throw effects, which resulted from the 1988 logging of the forest, including the riparian area, of the north parcel. The breakage of an upstream beaver dam and subsequent flooding in the creek also changed the terrain and species of this polygon. In addition, species are brought into the area via the creek, both animals and plants.   |
| <b>Anticipated Change/ Succession</b> | This valley will continue to be affected by wind-throw until neighbouring forests reach mature height. Effects to the creek systems will alter the riparian area, so that other unknown changes in terrain or species composition could occur. The amount, size, and positioning of the large CWD changes during high-water periods, gradually moving downstream. Overall, the forests will mature, and a mix of species is likely to be maintained.  |
| <b>Wildlife Observations</b>          | At least three rare northern red-legged frogs ( <i>Rana aurora</i> ) were seen in or along the creek on several visits. Many species use the creek as a travel corridor: signs of mink ( <i>Neovison vison</i> ), raccoon ( <i>Procyon lotor</i> ), black-tailed deer ( <i>Odocoileus hemionus</i> ), and red squirrel ( <i>Tamiasciurus hudsonicus</i> ) were evident, birds were plentiful in the canopies, foraging on CWD or soaring above, and invertebrates were seen, including water striders ( <i>Gerridae</i> family) on the water. |

**Table A2-4- 2. Ecological community 4. Valens Brook mature riparian. Vegetation cover by layer.**

| Polygon 4 Valens Brook mature riparian | Percent Cover (%) |             |               |                    |             |            |              |                     |            |  |
|--|-------------------|-------------|---------------|--------------------|-------------|------------|--------------|---------------------|------------|--|
|  | Veteran Tree      | Main Canopy | 2ndary Canopy | Total Canopy Cover | Shrub Layer | Herb Layer | Moss, Lichen | Coarse Woody Debris | Non-native |  |
| <b>Overall Cover by Layer</b>          | 3-5               | 10-15       | 5-10          | 25-30              | 3-5         | 85         | 5-10         | 5-10                | T*         |  |

**Table A2-4- 3. Ecological community 4. Valens Brook mature riparian. Tree and shrub species.**

| Polygon 4 Valens Brook mature riparian<br>Tree and Shrub species | Percent Cover (%) |             |               |       |            | Notes   |
|--|-------------------|-------------|---------------|-------|------------|---|
|  | Veteran Tree      | Main Canopy | 2ndary Canopy | Shrub | Non-native |   |
| <b>Trees</b>   |                   |             |               |       |            | All heights are estimates<br>DBH=diameter at breast height                  |
| alder, red ( <i>Alnus rubra</i> )                                |                   | 5           | 5             |       |            | Main: 25-30m, DBH=470-620mm, snags 3m                                       |
| Douglas-fir ( <i>Pseudotsuga menziesii</i> )                     | 3-5               | 5-10        | 5             |       |            | Vet: 40+m, DBH=1050mm<br>Main: 30m, DBH=600-750mm<br>2°: 15m, DBH=220-360mm |
| fir, grand ( <i>Abies grandis</i> )                              |                   | 2           | 3-5           |       |            | Main: 30m, DBH=430mm<br>2°: 20m, DBH=200-245mm                              |

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|   |  |    |     |     |  |  |
|---|--|----|-----|-----|--|--|
| hemlock, western ( <i>Tsuga heterophylla</i> )    |  |    | 2-3 | 3-5 |  | 12-18m, DBH=180-200mm  |
| redcedar, western ( <i>Thuja plicata</i> )        |  | 10 |     | T*  |  | 30m, DBH=835mm, several multi-trunks and broken, many baby seedlings |
| <b>Shrubs</b>                                     |  |    |     |     |  |  |
| blackberry, trailing ( <i>Rubus ursinus</i> )     |  |    |     | T   |  |  |
| huckleberry, red ( <i>Vaccinium parvifolium</i> ) |  |    |     | 1   |  |  |
| Oregon-grape, dull ( <i>Berberis nervosa</i> )    |  |    |     | T   |  |  |
| salal ( <i>Gaultheria shallon</i> )               |  |    |     | T   |  |  |

\*T = trace (less than 1%)

**Table A2-4- 4. Ecological community 4. Valens Brook mature riparian. Herb and moss species.**

| Polygon 4 Valens Brook mature riparian<br>Herb species       | Percent Cover (%) |            |   | Percent Cover (%) |            |
|--|-------------------|------------|---|-------------------|------------|
|  | Herb Layer        | Non-native |   | Herb Layer        | Non-native |
| Herb Species   |                   |            | sedge, Dewey's ( <i>Carex deweyana</i> )                  | 1                 |            |
| avens, large-leaved ( <i>Geum macrophyllum</i> )             | T*                |            | sedge, slough ( <i>Carex obnupta</i> )                    | 5-10              |            |
| bedstraw species ( <i>Galium spp</i> )                       | 1                 |            | sedge species ( <i>Carex sp.</i> )                        | 3-5               |            |
| bedstraw, Cleavers ( <i>Galium aparine</i> )                 | 2                 |            | skunk cabbage ( <i>Lysichiton americanus</i> )            | 1                 |            |
| bittercress, beautiful ( <i>Cardamine pulcherrima</i> )      | T                 |            | speedwell, thyme-leaved ( <i>Veronica serpyllifolia</i> ) | T                 |            |
| bittercress, little western ( <i>Cardamine oligosperma</i> ) | T                 |            | speedwell species <i>Veronica sp</i>                      | T                 |            |
| brooklime, American ( <i>Veronica becca bunga</i> )          | T                 |            | sweet-cicely ( <i>Osmorhiza chilensis</i> )               | T                 |            |
| bulrush, small-flowered ( <i>Scirpus microcarpus</i> )       | T                 |            | thistle, Canada ( <i>Cirsium arvense</i> )                |                   | T          |
| buttercup, western ( <i>Ranunculus occidentalis</i> )        | T                 |            | vanilla leaf ( <i>Achlys triphylla</i> )                  | 2                 |            |
| chickweed, common ( <i>Stellaria media</i> )                 | T                 |            | wall lettuce ( <i>Lactuca muralis</i> )                   | T                 |            |
| fern, lady ( <i>Athyrium filix-femina</i> )                  | 1-2               |            | water parsley ( <i>Oenanthe sarmentosa</i> )              | T                 |            |
| fern, licorace ( <i>Polypodium glycyrrhiza</i> )             | T                 |            | Moss species  | Moss Layer        | Notes      |
| fern, spiny wood ( <i>Dryopteris expansa</i> )               | T                 |            |   |                   |            |

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|   |    |    |   |    |                            |  |  |
|---|----|----|---|----|----------------------------|--|--|
| fern, sword ( <i>Polystichum munitum</i> )              | 40 |    | <i>Kindbergia praelonga</i><br>(slender beaked moss)                                  | p* | Mostly on CWD <sup>^</sup> |  |  |
| foam flower ( <i>Tiarella trifoliata</i> )              | T  |    | <i>Leucolepis acanthoneuron</i><br>(Menzies' tree moss)                               | P  |                            |  |  |
| foxglove ( <i>Digitalis purpurea</i> )                  |    | T  | <i>Plagiomnium insigne</i><br>(coastal leafy moss)                                    | P  |                            |  |  |
| fringecup ( <i>Tellima grandiflora</i> )                | T  |    | <i>Rhytidiadelphus loreus</i><br>(lanky moss)   | P  |                            |  |  |
| grass species   | 2  | *  | Others on tree trunks and coarse woody debris   |    |                            |  |  |
| grass, reed canary ( <i>Phalaris arundinacea</i> )      |    | 10 | * P = present, T = trace (less than 1%). Species' percent coverage was not attempted. |    |                            |  |  |
| grove-lover ( <i>Nemophila parviflora</i> )             | 1  |    | <sup>^</sup> CWD = coarse woody debris on ground                                      |    |                            |  |  |
| harebell, Scouler's ( <i>Campanula scouleri</i> )       | T  |    |   |    |                            |  |  |
| herb-robert ( <i>Geranium robertianum</i> )             |    | T  |   |    |                            |  |  |
| horsetail, common <i>Equisetum arvense</i>              | T  |    |   |    |                            |  |  |
| miner's lettuce, Siberian ( <i>Claytonia sibirica</i> ) | T  |    |   |    |                            |  |  |
| mint, Canada ( <i>Mentha arvensis</i> )                 | T  |    |   |    |                            |  |  |
| monkey-flower ( <i>Mimulus moschatus</i> )              | T  |    |   |    |                            |  |  |
| nettle, hedge ( <i>Stachys cooleyae</i> )               | 1  |    |   |    |                            |  |  |
| nettle, stinging ( <i>Urtica dioica</i> )               | 5  |    |   |    |                            |  |  |
| pathfinder plant ( <i>Adenocaulon bicolor</i> )         | 1  |    |   |    |                            |  |  |
| rush, common ( <i>Juncus effusus</i> )                  | T  |    |   |    |                            |  |  |



**Photo A2- 4. Polygon 4  
Mature riparian.**

5. Valens Brook young riparian unclassified community

Table A2-5- 1. Ecological community 5. Valens Brook young riparian community. Description.

|   |  |
|---|--|
| <b>Polygon ID</b>                       | 5 Valens Brook Young Riparian  |
| <b>Ecological Community</b>             | Creek and riparian area, with small pockets adjacent to creek of western redcedar / swordfern - skunk cabbage ( <i>Thuja plicata</i> / <i>Polystichum munitum</i> - <i>Lysichiton americanus</i> )   |
| <b>Classification</b>                   | None   |
| <b>Structural Stage</b>                 | Young seral recovering forest  |
| <b>Status (BC List)</b>                 | None   |
| <b>Slope and Aspect</b>                 | Slope: east side is flat, west side varies from flat to a slope of 29%. Aspect on the west varies with the meanders of the creek.  |
| <b>Photographs</b>                      | A2-5a, A2-5b   |
| <b>Ecological Community Description</b> | Riparian forest community surrounding salmon-spawning creek with a low-lying patch of skunk-cabbage ( <i>Lysichiton americanus</i> ) wetland habitat in an old oxbow. Recovering 31 year old coniferous forest canopy at 20-30 m with seral western hemlock ( <i>Tsuga heterophylla</i> ) dominant, but climax conifer species developing. Minor components of red alder ( <i>Alnus rubra</i> ) and bigleaf maple ( <i>Acer macrophyllum</i> ) also present. Understory a mixed shrub and herb community.  |
| <b>Disturbance Notes</b>                | Springboard stumps present from historical logging. Also low-cut stumps from the 1998 logging. Shake cutters also may have accessed the creek to cut up old redcedar logs in the 1980s. In the mid 1990s, a beaver dam washed out upstream on Valens Brook and resulted in flood water that caused considerable erosion of both creek banks and substrate.   |
| <b>Anticipated Change/ Succession</b>   | The riparian area will develop, as in the adjacent properties, with the forest maturing and contributing to the downed coarse woody debris as the trees age. If the creek is maintained, the moisture will sustain the forest, but increasing temperatures may alter the species composition. The integrity of creek flows depends upon the amount and quality of water from upstream and is affected by the actions of beaver and humans throughout the approximately-seven-kilometre system.   |
| <b>Wildlife Observations</b>            | Spawning salmon attract various predators in the fall; bald eagles ( <i>Haliaeetus leucocephalus</i> ) and river otter ( <i>Lontra canadensis</i> ) have been seen. Initial construction of a beaver dam began on the creek in April or May, but was not completed. A large dam was present on the adjacent property to the north about 10 years ago. Red-legged frogs ( <i>Rana aurora</i> ) are common, as are Pacific chorus frogs ( <i>Pseudacaris regilla</i> ). The creek provides fresh water, and the edge habitat supports many aerial bird, bat, and invertebrate species as well as land-based wildlife. The area is well-used by black-tailed deer ( <i>Odocoileus hemionus</i> ). Wildlife is listed in Appendix 1. |

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**Table A2-5- 2. Ecological community 5. Valens Brook young riparian community. Vegetation cover by layer.**

| Polygon 5 Young Riparian Vegetation Cover | Percent Cover (%) |               |              |             |            |              |                     |            |
|---|-------------------|---------------|--------------|-------------|------------|--------------|---------------------|------------|
|   | Main Canopy       | 2ndary Canopy | Total Canopy | Shrub Layer | Herb Layer | Moss, Lichen | Coarse Woody Debris | Non-native |
| <b>Overall Cover by Layer</b>             | 30-40             | 20            | 60           | 10          | 50         | 5            | 5+                  | 5-10       |

**Table A2-5- 3. Ecological community 5. Valens Brook young riparian community. Tree and shrub species.**

| Polygon 5 Young Riparian Tree and Shrub species   | Percent Cover (%) |               |       |            | Notes<br>All heights are estimates<br>DBH=diameter at breast height  |
|---|-------------------|---------------|-------|------------|--|
|   | Main Canopy       | 2ndary Canopy | Shrub | Non-native |  |
| bigleaf maple ( <i>Acer macrophyllum</i> )        |                   | 5             |       |            | 2 trees:15+ m, DBH 130 mm, + minor overhang from slope   |
| black spruce ( <i>Picea mariana</i> )             |                   |               |       | 5          | Many getting grown over by other species   |
| Douglas-fir ( <i>Pseudotsuga menziesii</i> )      | 5                 |               | T*    |            | Two residual trees 40+ m, DBH 490 & 760mm, one young in main canopy at 30m                                       |
| grand fir ( <i>Abies grandis</i> )                | 5                 | 5             | 5     |            | Main: 20-30 m, DBH 210-445 mm<br>2°:12+ m, DBH 137-170 mm  |
| red alder ( <i>Alnus rubra</i> )                  | 15-20             | 5-10          |       |            | Main: 20-25 m, DBH to 660 mm, tops broken.<br>2°: 15-20 m, DBH 210-250 mm, another recently fallen across creek. |
| western hemlock ( <i>Tsuga heterophylla</i> )     | 10-15             | 10            | T     |            | Main: 20-30m, DBH 370-415 mm.<br>2°: 15-20m, DBH 160-220 mm.   |
| western redcedar ( <i>Thuja plicata</i> )         | 5-10              |               | 2     |            | One residual tree 25-30m, DBH 745mm growing out of old stump.  |
| elderberry, red ( <i>Sambucus racemosa</i> )      |                   |               | 2     |            | Two large bushes > 30yr old  |
| holly, English ( <i>Ilex aquifolium</i> )         |                   |               |       | T          | In the centre on the east side   |
| huckleberry, red ( <i>Vaccinium parvifolium</i> ) |                   |               | 2     |            |  |
| pear, domestic ( <i>Pyrus sp.</i> )               |                   |               |       | 2          | 3m   |
| salal ( <i>Gaultheria shallon</i> )               |                   |               | T     |            | One small patch  |

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|  |  |  |   |  |
|--|--|--|---|--|
| salmonberry ( <i>Rubus spectabilis</i> ) |  |  | 2 |  |
|--|--|--|---|--|

\*T = trace (less than 1%)

**Table A2-5- 4. Ecological community 5. Valens Brook young riparian community. Herb and moss species.**

| Polygon 5 Young Riparian Herb and Moss species               | Percent Cover (%) |            | Notes |   | Percent Cover (%) |              |            | Notes |
|--|-------------------|------------|-------|---|-------------------|--------------|------------|-------|
|  | Herb Layer        | Non-native |       |   | Herb Layer        | Moss, Lichen | Non-native |       |
| <b>Herb Species</b>  |                   |            |       | pathfinder plant ( <i>Adenocaulon bicolor</i> )           | T                 |              |            |       |
| bedstraw species ( <i>Galium spp</i> )                       | 1                 |            |       | sedge, Dewey's ( <i>Carex deweyana</i> )                  | T                 |              |            |       |
| bedstraw, Cleavers ( <i>Galium aparine</i> )                 | 2                 |            |       | sedge, slough ( <i>Carex obnupta</i> )                    | 5-10              |              |            |       |
| bittercress, beautiful ( <i>Cardamine pulcherrima</i> )      | T*                |            |       | sedge species ( <i>Carex sp.</i> )                        | 5                 |              |            |       |
| bittercress, little western ( <i>Cardamine oligosperma</i> ) | T                 |            |       | skunk cabbage ( <i>Lysichiton americanus</i> )            | 1-2               |              |            |       |
| bulrush, small-flowered ( <i>Scirpus microcarpus</i> )       | T                 |            |       | speedwell, thyme-leaved ( <i>Veronica serpyllifolia</i> ) | T                 |              |            |       |
| buttercup species ( <i>Ranunculus sp.</i> )                  | T                 |            |       | stinging nettle ( <i>Urtica dioica</i> )                  | T                 |              |            |       |
| chickweed, common ( <i>Stellaria media</i> )                 | T                 |            |       | sweet-cicely ( <i>Osmorhiza chilensis</i> )               | T                 |              |            |       |
| fern, deer ( <i>Blechnum spicant</i> )                       | T                 |            |       | thistle, bull <i>Cirsium vulgare</i>                      |                   |              | T          |       |
| fern, lady ( <i>Athyrium filix-femina</i> )                  | 1                 |            |       | thistle, Canada ( <i>Cirsium arvense</i> )                |                   |              | 1          |       |
| fern, spiny wood ( <i>Dryopteris expansa</i> )               | 1                 |            |       | thistle, species ( <i>Cirsium sp.</i> )                   | T                 |              |            |       |
| fern, sword ( <i>Polystichum munitum</i> )                   | 5-10              |            |       | trillium, western ( <i>Trillium ovatum</i> )              | T                 |              |            |       |
| foam flower ( <i>Tiarella trifoliata</i> )                   | T                 |            |       | vanilla leaf ( <i>Achlys triphylla</i> )                  | 1-2               |              |            |       |
| forget-me-not ( <i>Myosotis discolor</i> )                   | T                 |            |       | violet, stream ( <i>Viola glabella</i> )                  | T                 |              |            |       |
| foxglove ( <i>Digitalis purpurea</i> )                       |                   | T          |       | wall lettuce ( <i>Lactuca muralis</i> )                   | T                 |              |            |       |

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|   |     |     |                          |   |  |    |                     |
|---|-----|-----|--------------------------|---|--|----|---------------------|
| grass, reed canary<br>( <i>Phalaris arundinacea</i> )   |     | 10  | NW<br>corner<br>& E side | <b>Moss Species</b>                                     |  |    |                     |
| grove-lover<br>( <i>Nemophila parviflora</i> )          | T   |     |                          | <i>Leucolepis acanthoneuron</i><br>(Menzies' tree moss) |  | P* | on ground           |
| hairy cat's ear<br>( <i>Hypochaeris radicata</i> )      |     | T   |                          | <i>Plagiomnium insigne</i> (coastal leafy moss)         |  | P  | on ground           |
| hedge nettle ( <i>Stachys cooleyae</i> )                | 1-2 |     |                          | <i>Kindbergia praelonga</i> (slender beaked moss)       |  | P  | on CWD <sup>^</sup> |
| herb-robert<br>( <i>Geranium robertianum</i> )          |     | 1-2 |                          | Other mosses present on CWD and tree bases.             |  |    |                     |
| Lyall's anemone<br>( <i>Anemone lyallii</i> )           | T   |     |                          |   |  |    |                     |
| miner's lettuce, Siberian ( <i>Claytonia sibirica</i> ) | T   |     |                          |   |  |    |                     |
| mitrewort, Brewer's<br>( <i>Mitella breweri</i> )       | T   |     | SW side                  |   |  |    |                     |

\* P = present, T = trace (less than 1%). Species' percent coverage was not attempted.

<sup>^</sup> CWD = coarse woody debris on ground



**Photo A2- 5. Polygon 5  
Young riparian.**

6. Douglas-fir / dull Oregon-grape (*Pseudotsuga menziesii* / *Berberis nervosa*)  
maturing east forest

Table A2-6- 1. Ecological community 6: Mature West Forest. Description.

|   |  |
|---|--|
| <b>Polygon ID</b>                       | 2 Mature West Forest   |
| <b>Ecological Community</b>             | Douglas-fir / dull Oregon-grape ( <i>Pseudotsuga menziesii</i> / <i>Berberis nervosa</i> )   |
| <b>Classification</b>                   | CDFmm/01   |
| <b>Structural Stage</b>                 | Maturing climax  |
| <b>Status (BC List)</b>                 | Red-listed   |
| <b>Slope and Aspect</b>                 | Slope ~flat Aspect NA  |
| <b>Photograph</b>                       | A2-6   |
| <b>Ecological Community Description</b> | Maturing climax forest, primarily Douglas-fir ( <i>Pseudotsuga menziesii</i> ), 80-90 years old, with a fairly open canopy, a rich dense shrub layer, and few herbaceous species. Salal ( <i>Gaultheria shallon</i> ) is the dominant shrub, but there are gaps with patches of primarily ocean spray ( <i>Holodiscus discolor</i> ) and other species. A variety of mosses are present on coarse woody debris (CWD), tree trunks, and in shrub-gaps.  |
| <b>Disturbance Notes</b>                | Logged in the late 1940s to early 1950s and perhaps before. Only a few old stumps remain, suggesting the area was likely burned or the old springboard stumps were used for firewood.  |
| <b>Anticipated Change/ Succession</b>   | The forest is expected to mature, with a gradual thinning of trees and an increase in canopy complexity. As the forest to the south matures, less light will be available for shrub-growth, and the ocean spray may decrease unless gaps develop in the overhead canopy. Several trees nearer the creek have fallen, likely due to wind-throw. Disease or drought-related stress farther up-slope may weaken trees, leading to increased wind-throw. Spreading root-rot may also weaken trees. |
| <b>Wildlife Observations</b>            | More than 10 rare band-tailed pigeons ( <i>Patagioenas fasciata</i> ) were seen in the forest, likely due to bird-feeders at the neighbours' home to the north. The shrubs, tree canopies, and trunks provide foraging and shelter habitat for red squirrels ( <i>Tamiasciurus hudsonicus</i> ), raccoons ( <i>Procyon lotor</i> ), black-tailed deer ( <i>Odocoileus hemionus</i> ), a variety of birds, and other species. See Table A3-1.   |

Table A2-6- 2. Ecological community 6: Mature West Forest. Vegetation cover by layer.

| Polygon 6 Mature West Forest Vegetation Cover | Percent Cover (%)   |             |               |                    |             |            |              |                     |            |
|---|---------------------|-------------|---------------|--------------------|-------------|------------|--------------|---------------------|------------|
|   | Veteran Tree Canopy | Main Canopy | 2ndary Canopy | Total Canopy Cover | Shrub Layer | Herb Layer | Moss, Lichen | Coarse Woody Debris | Non-native |
| Overall Cover by Layer                        |                     | 50-60       | 5-10          | 60-70              | 75-80       | <5         | 50           | 5                   | T*         |

\*T = trace (less than 1%)

Table A2-6- 3. Ecological community 6: Mature West Forest. Tree and shrub species.

| Polygon 6 Mature Forest West Tree and Shrub species |             |               |       |            | Notes<br>All heights are estimates<br>DBH=diameter at breast height |
|---|-------------|---------------|-------|------------|---|
|   | Main Canopy | 2ndary Canopy | Shrub | Non-native |   |
| <b>Trees</b>  |             |               |       |            |   |
| alder, red ( <i>Alnus rubra</i> )                   |             | 1             | 2     |            | 2°: 12m, DBH=180mm  |
| Douglas-fir ( <i>Pseudotsuga menziesii</i> )        | 50-60       | 8             | 1-2   |            | Main: 35-40m, DBH=500mm<br>2°: 25m, DBH=205mm                       |
| fir, grand ( <i>Abies grandis</i> )                 |             | 5             | 1-2   |            | 16m, DBH=180mm  |
| maple, bigleaf ( <i>Acer macrophyllum</i> )         |             |               | T*    |            |   |
| <b>Shrubs</b>                                       |             |               |       |            |   |
| apple, Pacific crab ( <i>Malus fusca</i> )          |             |               | T     |            |   |
| blackberry, trailing ( <i>Rubus ursinus</i> )       |             |               | T     |            |   |
| holly, English ( <i>Ilex aquifolium</i> )           |             |               |       | T          |   |
| huckleberry, red ( <i>Vaccinium parvifolium</i> )   |             |               | 1-2   |            |   |
| oceanspray ( <i>Holodiscus discolor</i> )           |             |               | 20    |            | Avg. 5-6m, up to 10m, impressive                                    |
| Oregon grape, tall ( <i>Berberis aquifolium</i> )   |             |               | T     |            |   |
| Oregon-grape, dull ( <i>Berberis nervosa</i> )      |             |               | 2     |            |   |
| rose, dwarf ( <i>Rosa gymnocarpa</i> )              |             |               | 1-2   |            |   |
| salal ( <i>Gaultheria shallon</i> )                 |             |               | 50    |            | Up to 2m  |
| saskatoon berry ( <i>Amelancier alniflora</i> )     |             |               | 1-2   |            |   |
| twin flower ( <i>Linnaea borealis</i> )             |             |               | T     |            |   |

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\*T = trace (less than 1%)

**Table A2-6- 4. Ecological community 6: Mature West Forest. Herb and moss species.**

| Polygon 6 Mature West Forest<br>Herb and Moss species  | Percent Cover (%) |              |            | Notes                      |
|--|-------------------|--------------|------------|----------------------------|
|  | Herb Layer        | Moss, Lichen | Non-native |                            |
| <b>Herb Species</b>  |                   |              |            |                            |
| anemone, Lyall's ( <i>Anemone lyallii</i> )  | T*                |              |            |                            |
| avens, large-leaved ( <i>Geum macrophyllum</i> )   | T                 |              |            |                            |
| bedstraw species ( <i>Galium spp</i> )   | T                 |              |            |                            |
| bittercress, little western ( <i>Cardamine oligosperma</i> )   | T                 |              |            |                            |
| buttercup, western ( <i>Ranunculus occidentalis</i> )  | T                 |              |            |                            |
| daisy, oxeye ( <i>Leucanthemum vulgare</i> )   |                   |              | T          |                            |
| fern, bracken ( <i>Pteridium aquilinum</i> )   | T                 |              |            |                            |
| fern, sword ( <i>Polystichum munitum</i> )   | 1                 |              |            |                            |
| foam flower ( <i>Tiarella trifoliata</i> )   | T                 |              |            |                            |
| grass species  | T                 |              | *          |                            |
| grove-lover ( <i>Nemophila parviflora</i> )  | T                 |              |            |                            |
| herb-robert ( <i>Geranium robertianum</i> )  |                   |              | T          |                            |
| sedge, Dewey's ( <i>Carex deweyana</i> )   | T                 |              |            |                            |
| speedwell, thyme-leaved ( <i>Veronica serpyllifolia</i> )  | T                 |              |            |                            |
| starflower ( <i>Trientalis latifolia</i> )   | T                 |              |            |                            |
| tarweed, Chilean ( <i>Madia sativa</i> )   | T                 |              |            |                            |
| vanilla leaf ( <i>Achlys triphylla</i> )   | T                 |              |            |                            |
| <b>Moss Species</b>  |                   |              |            |                            |
| <i>Hylocomium splendens</i> step moss  |                   | PD*          |            | Mostly on CWD <sup>^</sup> |
| <i>Isoetes myosuroides</i> (cattail moss)  |                   | P*           |            |                            |
| <i>Kindbergia oregana</i> (Oregon beaked moss)   |                   | P            |            |                            |
| <i>Kindbergia praelonga</i> (slender beaked moss)  |                   | P            |            |                            |
| <i>Leucolepis acanthoneuron</i> (Menzies' tree moss)   |                   | P            |            |                            |
| <i>Rhytidiadelphus triquetrus</i> (electrified cat's-tail moss)  |                   |              |            |                            |
| Others on tree trunks and coarse woody debris  |                   |              |            |                            |
| * PD = present and dominant, P = present, T = trace (less than 1%). Species' percent coverage was not attempted. |                   |              |            |                            |
| <sup>^</sup> CWD = coarse woody debris on ground   |                   |              |            |                            |



***Photo A2- 6. Polygon  
6 Mature west forest.***

Appendix 3. Terrain Zone Descriptions from North parcel Baseline Inventory Report

| Terrain Zone | Slope | Aspect | Canopy Main<br>(DBH in mm,<br>Heights & Cover<br>approx.)  | Canopy<br>Secondary (DBH<br>in mm, Heights<br>& Cover<br>approx.)   | Shrub   | Herb  | Moss   |
|--------------|-------|--------|--|---|---|---|--|
| 1            | ~flat |        | Douglas-fir (Fd)<br>35m, DBH 450-<br>610, Cover<br>~35%<br>Western<br>redcedar (Cw)<br>30m, Cover <2%                | red alder (Dr)<br>20+m, DBH 110-<br>220, Cover 25%,<br>Douglas-fir 25+<br>DBH 215-259,<br>Cover <10%,<br>Cw Cover <2% | salal avg. 1m,<br>high Cover 85%,<br>ocean spray 4-<br>5m, Cover 20%,<br>wild<br>apple,Saskatoon<br>berry,<br>honeysuckle,<br>rose, Cw,<br>western hemlock<br>(Hw),<br>Overall cover<br>100%  | occasional sword<br>fern, bedstraw,<br>trailing<br>blackberry,<br>Lyll's anemone,<br>sweet cicely, wall<br>lettuce, Dewey's<br>sedge.<br>Overall cover<br><5%   | step,<br>Oregon<br>beaked,<br>Menzie's<br>tree and flat<br>mosses.<br>Overall<br>cover ~ 10%             |
| 2            | 16%   | 84°    | Fd 35+m,<br>DBH~465 (one<br>575 ) Cover 45%<br>few Grand fir<br>(Bg) 35+m, DBH<br>370                                | Fd 20-25m, DBH<br>170-240 Cover<br>20%<br>Bg DBH 200<br>Cover <2%   | ocean spray large<br>area of 100%<br>cover overall<br>15%, salal overall<br>cover 70%<br>Oregon grape<br><5%, Saskatoon<br>berry <5% also<br>red huckleberry,<br>Fd, Bg, Hw, rosa,<br>trailing<br>blackberry, a<br>western<br>dogwood | foam flower,<br>large-leaved<br>avens, wall<br>lettuce,<br>bedstraw, vanilla<br>leaf, star flower,<br>speedwell sp.,<br>Lyll's anemone,<br>coral root, slough<br>sedge,<br>rattlesnake<br>plantain, stinging<br>nettle patch, occ.<br>Herb robert,<br>grass sp. and<br>sword and<br>bracken fern.<br>Overall cover<br><5% | Oregon<br>beaked,<br>slender<br>beaked,<br>step and<br>electrified<br>cat's-tail<br>mosses.<br>Cover 50% |
| 3            | 11%   | 84°    | Fd 40+m, DBH<br>500-630<br>Cover 35-40%<br>Bg 40M DBH<br>665 Cover <5%<br>8+ trees wind<br>throw create<br>large gap | Fd 30m, DBH up<br>to 280 Cover<br>15-20%<br>Occasional Bg   | red huckelberry,<br>trailing<br>blackberry, Bg<br>Overall cover 5%  | Mainly sword<br>fern. Cover 80%.<br>Rest cover 5-10%<br>stinging nettle,<br>Dewey's sedge,<br>vanilla leaf,<br>Siberian miner's<br>lettuce, star  | step, tree<br>and slender<br>beaked<br>mosses.<br>Cover 20%  |

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|   |     |      |  |  |  |  |  |
|---|-----|------|--|--|--|--|--|
|   |     |      |  |  |  | flower, bed straw, foxglove, bracken fern  |  |
| 4 |     |      | Dr 25-30m, DBH 390-685. Cover 20%.<br>Bigleaf maple 30+m, multiple trunks joined DBH 1275. Cover 20%.<br>Fd 25m DBH 360 & Bg DBH 420. Cover 5%.<br>Note above deciduous canopy a Fd DBH 560 & Bg DBH 414-810. Covering <5% |  | Bg Cover <2%<br>Cw, Hw Cover 2%  | sword fern up to 2m high. Cover 60%.<br>Many others - additions:<br>Canada mint, hedge nettle, skunk cabbage, slough sedge, deer fern, alumroot, water parsley, small-flowered bullrush, reed canarygrass<br>Cover 10% and stinging nettle<br>Cover 5% | Most moss on coarse woody debris (CWD) and trees.<br>Occ. Menzie's tree moss & others.<br>Overall cover 5% |
| 5 | 50% | 245° | Fd ~40m, DBH 550-920 Cover 20%.<br>Cw 40m, DBH 750-1030 Cover 20%.<br>Bigleaf maple 30-40m, DBH 543-820, Cover 40% .<br>Note: very large old-growth Fd above the main canopy DBH >2m                                       | Fd ~30m, DBH 250, Cover 10-20%.<br>Hw ~20m, DBH 360-435, Cover 5-10%<br>Bg <5% | Hw, Cw, red huckleberry. Cover <5%<br>patches of Oregon grape. Cover <5% | sword fern Cover 60%<br>duff leaves and debris. Cover 30%.<br>Many other occasional incl. Wall lettuce, vanilla leaf, bedstraw, grass sp.  | Most moss on CWD and trees.<br>Oregon beaked moss.<br>Overall cover <5%                                    |

| Terrain Zone | Slope | Aspect | Canopy Main (DBH in mm, Heights & Cover approx.) | Canopy Secondary (DBH in mm, Heights & Cover approx.) | Shrub | Herb | Moss |
|--------------|-------|--------|--|---|-------|------|------|
|--------------|-------|--------|--|---|-------|------|------|

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|    |                      |      |   |  |  |   |   |
|----|----------------------|------|---|--|--|---|---|
| 6  | flat<br>~20m<br>wide |      | Cw fire-scarred<br>40+m DBH 880-<br>1460 Cover 40%<br>Fd 40+m DBH<br>580-1220 Cover<br>20%<br>Bigleaf maple<br>40m DBH 670<br>Cover 20%<br>Few Bg DBH 465<br>& Hw DBH 565<br>Overall cover<br>60+%  | Hw up to 30m<br>DBH 230 <5%<br>Fd DBH 240                | dull Oregon<br>grape patch<br>Cover 10%<br>ocassional red<br>huckleberry                       | sword fern Cover<br>60%<br>duff Cover ~30%<br>Others: vanilla<br>leaf, star flower,<br>bed straw,<br>Dewey's sedge,<br>wall lettuce, grass<br>sp. Cover <2% | Most moss<br>on CWD<br>and trees.<br>slender<br>beaked<br>moss<br>Overall<br>cover 5% |
| 7  | 43%                  | 250° | Fd 40m similar<br>DBH (5) Cover<br>30%<br>Cw 40m similar<br>DBH (5) Cover<br>30%  | Bg & Hw 25-<br>30m Cover ~<br>5%                         | Hw, Cw, red<br>huckleberry<br>Cover 15%  | sword fern Cover<br>65%,<br>duff  | mosses on<br>coarse<br>woody<br>debris <5%  |
| 8  | 7%                   | 50°  | Cw 40+m DBH<br>1215 Cover 40%<br>Fd 40+m DBH<br>850 Cover 10%<br>Hw 40m DBH<br>440-640 Cover<br>15% has root<br>rot<br>Bigleaf maple<br>(1) Cover 5%<br>Bg (2) near S<br>border DBH 705<br>Note: canopy<br>gaps, trees<br>broken incl. Dr,<br>Cw & Hw | Hw DBH 190<br>& Cw<br>Cover <5%                          | Hw, Cw, Bg,<br>small patch<br>dull Oregon<br>grape, red<br>huckleberry<br>Overall cover<br><5% | sword fern Cover<br>80%<br>few vanilla leaf,<br>bed straw, grass<br>sp., star flower  | Most moss<br>on CWD<br>and trees.<br>slender<br>beaked<br>moss<br>Overall<br>cover 5% |
| 9  | flat                 |      | Centre open<br>Cw around edge<br>40m Cover<br>~10%  | Dr 10-15m (2<br>are ~30m)<br>Cover 40%                   |  | slough sedge 1m<br>high Cover 80%<br>occ. skunk<br>cabbage, lady fern<br>& on debris-sword<br>fern  |   |
| 10 | 1%                   | 200° | BG 40+m DBH<br>560 Fd 40+m<br>DBH 660 CW<br>40+m DBH up<br>tp 1290<br>Overall cover   | Height 25-<br>30m<br>Dr DBH 425,<br>bigleaf maple,<br>Cw | Cw red<br>huckleberry<br>salmonberry<br>snags<br>Cover <2%                                     | sword fern Cover<br>70%<br>Stinging nettle<br>patch Cover 15%<br>Slough sedge<br>patches  | Most on<br>trees and<br>CWD:<br>electrified<br>cat's tail,<br>lanky &                 |

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|    |               |      |  |  |   |   |   |
|----|---------------|------|--|--|---|---|---|
|    |               |      | 10-15%<br>Wind throw 3+<br>trees &<br>openings in<br>canopy  | Overall cover<br>20%   |   | Few Dewey's<br>sedge, vanilla leaf,<br>bed straw, wall<br>lettuce, Canada<br>thistle  | slender<br>beaked<br>mosses<br>Overall<br>cover <5%   |
| 11 | stepped<br>6% | 200° | Cw 35m DBH<br>970-1070<br>Fd 40+m DBH<br>495-1070<br>Bg 40m DBH<br>840<br>Occasional Hw<br>40+m<br>Overall cover<br>10-15%                               | Height 10-<br>30m<br>Dr DBH 550<br>Hw DBH 410<br>Fd DBH 440<br>Bg DBH 410<br>Overall cover<br>30%  | Bg Dr Hw Cw,<br>snags, red<br>huckleberry,<br>holly, dull<br>Oregon grape,<br>ocean spray,<br>black<br>gooseberry<br>Overall cover<br>10%                                 | sword fern 70%<br>others: vanilla leaf,<br>bedstraw, Dewey's<br>sedge, veronica sp.   | step moss<br>on coarse<br>wood<br>debris<br>slender<br>beaked<br>moss on<br>ground<br>Overall<br>cover 5% |
| 12 | 10%           | 90°  | Cw 40+m DBH<br>1325-1840<br>Cover 30%<br>Fd 40+m DBH<br>810-1100 Cover<br>25% occ Bg<br>DBH 670<br>Hw DBH up to<br>835 Cover 10%<br>Overall Cover<br>50% | Dr 30+m DBH<br>275-445<br>Cover 20%<br>Others cover<br><5%:<br>Hw 30M DBH<br>480 & snag<br>30m DBH 520<br>Fd 30+m DBH<br>605<br>Bg DBH 315 | snags, Hw Cw<br>red<br>huckleberry,<br>twin flower,<br>trailing<br>blackberry,<br>holly, black<br>gooseberry<br>Overall cover<br>10%<br>dull Oregon<br>grape cover<br><5% | sword fern Cover<br>65%<br>Others Cover 30%:<br>spiny wood fern,<br>grass sp., star<br>flower, Dewey's<br>sedge, Siberian<br>miner's lettuce,<br>veronica sp., big-<br>leafed sandwort,<br>foxglove,<br>pathfinder, wall<br>lettuce, occ.<br>bracken fern | slender<br>beaked,<br>step and<br>lanky<br>mosses,<br><i>Dicranum</i><br>sp.<br>Overall<br>cover 10%      |

Appendix 4. Wildlife Species



**Photo A4- 1.**  
**Northern red-legged  
frog.**



**Photo A4- 2. Band-  
tailed pigeon.**

*ITC Management Plan for Valens Brook Nature Reserve 2020*

**Table A4- 1: Wildlife Species Identified in Valens Brook Nature Reserve during the Ecological Review of 2019**

| <b>Common Name</b>          | <b>Scientific Name</b><br><i>Genus species</i><br><i>subspecies</i> | <b>SAR*</b>                  | <b>Type of Record**</b> | <b>Expected Habitat Type</b> |
|-----------------------------|---|------------------------------|-------------------------|------------------------------|
| <b>Mammals</b>              |   |                              |                         |                              |
| Black-tailed deer           | <i>Odocoileus hemionus columbianus</i>                              |                              | Seen, scat, track       | All                          |
| Beaver                      | <i>Castor canadensis</i>  |                              | Dam, cuttings           | Creek                        |
| Mink                        | <i>Neovison vison</i>   |                              | Scat                    | Primarily creek area         |
| Raccoon                     | <i>Procyon lotor</i>  |                              | <b>Track, scat</b>      | All                          |
| Red squirrel                | <i>Tamiasciurus hudsonicus</i>                                      |                              | <b>Midden</b>           | All                          |
| Shrew species               | <i>Sorex sp.</i>  |                              | <b>Seen</b>             | All                          |
| <b>Birds</b>                |   |                              |                         |                              |
| American robin              | <i>Turdus migratorius</i>   |                              | <b>Seen</b>             | All                          |
| Bald Eagle                  | <i>Haliaeetus leucocephalus</i>                                     |                              | Seen                    | Forage, perch trees          |
| band-tailed pigeon          | <i>Patagioenas fasciata</i>   | *                            | Seen                    | Forest (See Photo A3-1)      |
| Barred owl                  | <i>Strix varia</i>  |                              | <b>Heard</b>            | Young calling                |
| Bewick's Wren               | <i>Thryomanes bewickii</i>  |                              | <b>Heard</b>            |                              |
| Black-throated gray warbler | <i>Dendroica nigrescens</i>   |                              | <b>Seen</b>             | All                          |
| Brown creeper               | <i>Certhia americana</i>  |                              | <b>Seen</b>             | All                          |
| Chestnut-backed chickadee   | <i>Parus rufescens</i>  |                              | <b>Seen</b>             | All                          |
| Common raven                | <i>Corvus corax</i>   |                              | Seen                    | All                          |
| Dark-eyed junco             | <i>Junco hyemalis</i>   |                              | <b>Seen</b>             | Edges                        |
| Golden-crowned kinglet      | <i>Regulus satrapa</i>  |                              | <b>Heard</b>            | All                          |
| Hammond's flycatcher        | <i>Empidonax hammondii</i>  |                              | <b>Heard</b>            | All                          |
| Hutton's vireo              | <i>Vireo huttoni</i>  |                              | <b>Heard</b>            | All                          |
| Northern flicker            | <i>Colaptes auratus</i>   |                              | <b>Seen</b>             | Forest                       |
| Orange-crowned warbler      | <i>Oreothlypis celata</i>   |                              | <b>Heard</b>            | All                          |
| Pacific wren                |   | <i>Troglodytes pacificus</i> |                         | <b>Heard</b>                 |
| Pacific-slope flycatcher    | <i>Empidonax difficilis</i>   |                              | <b>Heard</b>            | All                          |
| Pine siskin                 | <i>Carduelis pinus</i>  |                              | <b>Heard</b>            | All                          |

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|                            |                                 |   |              |  |
|----------------------------|---------------------------------|---|--------------|--|
| Red-breasted nuthatch      | <i>Sitta canadensis</i>         |   | <b>Heard</b> | All  |
| Red-breasted sapsucker     | <i>Sphyrapicus ruber</i>        |   | <b>Seen</b>  | All, attracted by sap from the cottonwoods |
| Ruby-crowned kinglet       | <i>Regulus calendula</i>        |   | <b>Heard</b> | All  |
| Rufous hummingbird         | <i>Selasphorus rufus</i>        |   | <b>Seen</b>  | All  |
| Song sparrow               | <i>Melospiza melodia</i>        |   | <b>Seen</b>  | All  |
| Spotted towhee             | <i>Pipilo erythrophthalmus</i>  |   | <b>Seen</b>  | All  |
| Swainson's thrush          | <i>Catharus ustulatus</i>       |   | <b>Heard</b> | All  |
| Townsend's warbler         | <i>Dendroica townsendi</i>      |   | <b>Heard</b> | All  |
| Turkey vulture             | <i>Cathartes aura</i>           |   | Seen         | Forage, perch trees                        |
| Varied thrush              | <i>Ixoreus naevius</i>          |   | Heard        | All  |
| Western tanager            | <i>Piranga ludoviciana</i>      |   | <b>Heard</b> | All  |
| Warbling vireo             | <i>Vireo gilvus</i>             |   | <b>heard</b> | All  |
| Yellow-rumped warbler      | <i>Dendroica coronata</i>       |   | <b>Heard</b> | All  |
| <b>Amphibians</b>          |                                 |   |              |  |
| Pacific chorus frog        | <i>Pseudacris regilla</i>       |   | <b>Seen</b>  | All  |
| Northern Red-legged frog   | <i>Rana aurora</i>              | * | <b>Seen</b>  | All (see Photo A3-1)                       |
| <b>Invertebrates</b>       |                                 |   |              |  |
| Banana slug                | <i>Ariolimax columbianus</i>    |   | <b>Seen</b>  | All  |
| Bark centipede             | Scolopendromorpha order         |   | <b>Seen</b>  | Moist CWD^ habitat                         |
| Bluet species damselfly    | <i>Enallagma sp.</i>            |   | <b>Seen</b>  | All  |
| Pacific forktail damselfly | <i>Ischnura cervula</i>         |   | <b>Seen</b>  | Wetland, creeks                            |
| Pacific sideband snail     | <i>Monadenia fidelis</i>        |   | <b>Seen</b>  | All  |
| Robust lancetooth snail    | <i>Haplotrema vancouverense</i> |   | <b>Seen</b>  | All  |
| Water strider              | Gerridae family                 |   | <b>Seen</b>  | Creek                                      |
| Yellow-spotted millipede   | <i>Harpaghe haydeniana</i>      |   | <b>Seen</b>  | CWD  |

\* SAR=Species at Risk

\*\* Bold type indicates species expected to breed or reside within the Reserve, as shown by territorial song or other behaviour. (Birds seen were usually also heard)

^ CWD=coarse woody debris (e.g., fallen trees or branches)

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**Table A4- 2. Additional rare species that may be found in Valens Brook Nature Reserve**

| Common   | Scientific                               | Provincial*       | BC List** | Global^       | COSEWIC^  | SARA~       | VBNR~~ |
|--|--|-------------------|-----------|---------------|-----------|-------------|--------|
| Autumn Meadowhawk Dragonfly                          | <i>Sympetrum vicinum</i>                 | S3S4 (2015)       | Blue      | G5 (2015)     |           |             | I      |
| Barn Swallow   | <i>Hirundo rustica</i>                   | S3S4B (2015)      | Blue      | G5 (2016)     | T (2011)  | 1-T (2017)  | P      |
| Common Woodnymph Butterfly, <i>incana</i> subspecies | <i>Cercyonis pegala incana</i>           | S2 (2013)         | Red       | G5T4T5 (2003) |           |             | I      |
| Cutthroat Trout, <i>clarkii</i> subspecies           | <i>Oncorhynchus clarkii calrkii</i>      | S3S4 (2004)       | Blue      | G5T4 (1997)   |           |             | I      |
| Dun Skipper Butterfly                                | <i>Euphyes vestris</i>                   | S2 (2013)         | Red       | G5 (2016)     | T (2013)  | 1-T (2003)  | P      |
| Great Blue Heron, <i>fannini</i> subspecies          | <i>Ardea herodias fannini</i>            | S2S3B, S4N (2018) | Blue      | G5T4 (2016)   | SC (2008) | 1-SC (2010) | I      |
| Little Brown Myotis (Bat)                            | <i>Myotis lucifugus</i>                  | S4 (2015)         | Y         | G3 (2016)     | E (2013)  | 1-E (2014)  | L      |
| Northern Goshawk, <i>laingi</i> subspecies           | <i>Accipter gentilis laingi</i>          | S2 (2010)         | Red       | G5T2 (2016)   | T (2013)  | 1-T (2003)  | P      |
| Oregon Forest snail                                  | <i>Allogona townsendii</i>               | S2 (2015)         | Red       | G3G4 (2010)   | E (2013)  | 1-E (2005)  | P      |
| Peregrine Falcon, <i>pealei</i> subspecies           | <i>Falco peregrinus pealei</i>           | S3 (2010)         | Blue      | G4T3 (2016)   | SC (2017) | 1-SC (2003) | L      |
| Townsend's Big-eared Bat                             | <i>Corhyorhinus townsendii</i>           | S3S4 (2015)       | Blue      | G4 (2016)     |           |             | L      |
| Wandering Salamander                                 | <i>Aneides vagrans</i>                   | S3 (2016)         | Blue      | G4 (2005)     | SC (2014) | 1-SC (2010) | I      |
| Western Pondhawk Dragonfly                           | <i>Erthemus collocata</i>                | S3S4 (2015)       | Blue      | G5 (2016)     |           |             | P      |
| Western Screech-Owl, <i>kennicottii</i> subspecies   | <i>Megascops kennicottii kennicottii</i> | S2S3 (2017)       | Blue      | G4G5T4 (2016) | T (2012)  | 1-T         | I      |

~~ I= identified previously, L=likely, P=possible.

\* **Provincial Status** applies to a species' or ecological community's conservation status in British Columbia. The number in parenthesis is the year the status rank was last reviewed. 1 = critically imperiled 2 = imperiled 3 = special concern, vulnerable to extirpation or extinction. 4 = apparently secure.

\*\* **B.C. List Status:** Species are assigned to provincial lists depending on their Provincial Conservation Status. **Red:** Includes any native species or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation. **Blue:** Includes any native species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

^ **Global Rank** applies to a species/ecological community across its entire range. The number in parenthesis is the year the rank was last reviewed. 3 = vulnerable to extirpation or extinction 4 = apparently secure. 5 = demonstrably widespread, abundant, and secure.

^^ **COSEWIC** (Committee On the Status of Endangered Species In Canada) rank is followed by the date that the rank was last reviewed: E = ENDANGERED: A species facing imminent extirpation or extinction. T = THREATENED: A species that is likely to become endangered if limiting factors are not reversed. SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.

~ **SARA** (Species At Risk Act) status consists of the SARA Schedule followed by the SARA Status code and may be followed by the date that the rank was last reviewed: E = ENDANGERED: A species facing imminent extirpation or extinction. T = THREATENED: A species that is likely to become endangered if limiting factors are not reversed. SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.

Appendix 5. Letter to Neighbours



August 21, 2019

Dear Neighbour,

The Islands Trust Conservancy is creating a management plan for the new Valens Brook Nature Reserve and as a neighbour of the Reserve, we invite you to share your ideas, questions, and concerns regarding the long-term management of this special place.

Valens Brook Nature Reserve (PID 028-931-734; Lot A, Section 6, Denman Island, Nanaimo District; Plan VIP89469 Except Parcel A (DD28585W) and PID 030-654-505; Lot 1, Section 6, Denman Island, Nanaimo District; Plan EPP74292) protects 6.2 hectares (15.3 acres) of forest and 170 metres of stream on southwest Denman Island. The Reserve's primary purposes are to provide a forest buffer for Valens Brook, Denman Island's second-largest salmon-bearing stream, and to act as a travel corridor for wildlife. Four rare ecological communities and two species at risk have been identified in the reserve during our recent inventory, and an additional 14 rare species are expected to use the Reserve based on other accounts.

The information and actions required to manage the Valens Brook Nature Reserve will be set out in a management plan, which will be updated every 10 years. Development of any kind, as well as disturbance of native wildlife, vegetation, soils, and water flow/quality, is prohibited.

An open house will be held on Saturday September 7th from 11-1 pm at the Marcus Isbister Old School Centre at 5901 Denman Road to gather feedback on management planning for Valens Brook Nature Reserve as well as for two other Islands Trust Conservancy nature reserves on Denman Island. I hope to see you there.

If you are unable to attend the open house but have questions, comments, or concerns about Valens Brook Nature Reserve, please don't hesitate to contact me.

Sincerely,

Jemma Green  
A/Property Management Specialist  
250-405-5193  
jgreen@islandstrust.bc.ca



Appendix 6. Letter to First Nations

Dear Chief and Council,

**Re: Islands Trust Conservancy Nature Reserves on Sla-dai-aich/Ihaytayich (Denman Island)**

The Islands Trust Conservancy, through its work as a land trust, is drafting management plans for the new Valens Brook Nature Reserve as well as for Inner Island Nature Reserve and Lindsay Dickson Nature Reserve on Denman Island.

The Islands Trust and the Islands Trust Conservancy wish to acknowledge First Nations treaty and rights within the Islands Trust Area and ensure that the direction of the management plans is reflective of both reconciliation and conservation goals; as well as, the cultural significance and traditional use of the area so that these values can also be preserved and protected—now and into the future. We understand that the cultural significance of this land may be confidential and we would work with you to ensure that the management plan reflects this significance appropriately.

Valens Brook Nature Reserve (PID 028-931-734; Lot A, Section 6, Denman Island, Nanaimo District; Plan VIP89469 Except Parcel A (DD28585W) and PID 030-654-505; Lot 1, Section 6, Denman Island, Nanaimo District, District Plan EPP74292), Inner Island Nature Reserve (PID 018-012-256; Lot A, Section 21, Denman Island, Nanaimo; District Plan VIP55499) and Lindsay Dickson Nature Reserve (PID 009-706-071; The SE 1/4 of Sec. 14, Denman Island, Nanaimo District, Except part in plan VIP70081 and PID 009-705-911; The SW 1/4 of Sec. 14, Denman Island, Nanaimo District Except the Northerly 40 acres and part in Plan VIP70081) together make up over 68 hectares of protected forests, wetlands, and streams on Denman Island (map attached). These nature reserves are home to many sensitive and provincially red- or blue-listed ecological communities and several species at risk, and they are a protective buffer for portions of Denman’s two major salmon-bearing stream systems. ITC works in partnership with the Denman Conservancy Association to conserve the unique natural and ecological values of these lands.

The Conservancy is aware that there are sites of cultural and spiritual significance in these areas, and that there are registered archeological sites on Lindsay Dickson Nature Reserve and near Valens Brook Nature Reserve. In keeping with the Islands Trust Conservancy Reconciliation Declaration (attached), we would like to work with your Nation to protect and manage cultural heritage sites in these nature reserves in a way that is reflective of treaty, inherent rights, and the traditional territories of your Nation.

You may also be interested to know that the ITC has developed a draft management plan template that includes cultural heritage. I would be pleased to provide it to you, if you would like to comment on it.

Thank you for considering our request to work together. Please contact me at the number or email listed below. Thank you for your kind consideration.

Sincerely,



Nuala Murphy  
Property Management Specialist  
Islands Trust Conservancy  
250-405-5193 | nmurphy@islandstrust.bc.ca

Islands Trust Conservancy's Victoria office is located in Coast Salish territory and we acknowledge with respect the BOKÉĆEN, Cowichan, Halalt, Homalco, K'ómok, Klahoose, Lake Cowichan, Lekwungen, Lyackson, MÁLEXET, Penelakut, Qualicum, Scia'new, selílwitulh, SEMYOME, Shíshálh, Snaw-naw-as, Snuneymuxw, Skw̓xwú7mesh, SḶÁUTW, Stz'uminus, SXIMELEĒ, T'Sou-ke, Tla'amin, Tsawwassen, We Wai Kai, Wei Wai Kum, W̱JOĒĒP, W̱SIKEM, and x<sup>w</sup>məθk<sup>w</sup>əyəm territories in which we live and work.