Ecoforestry Management Plan

Wildwood Forest

Cedar, BC

Ecoforesty Institute Society

First Update, May 2016

Contact The Original Author:
Chris Walther, B.Sc, RPF
P.O. Box 256
Union Bay, BC
V0R 3B0
Tel.: (250) 650-0547

Or The Lead for The First Update:
Peter Jungwirth, RPF, Courtenay, BC, 250-334-4559, peter.ju@telus.net

Table of Contents

Table of Figures

Table of Tables

1. SUMMARY

The goal of this ecoforestry management plan is to manage for fully functioning ecosystems in Wildwood. The approach is to re-create the kind of forest stands that would be expected to be present if only natural disturbance had taken place. If this is achieved, then other forest services & benefits, such as educational values, recreational, habitat, biodiversity values, continued productivity, and others, will result by default.

Forest Management Plans typically aim to maintain the sustainability of timber supply. Ecoforestry aims to maintain the sustainability of both timber and non-timber values, including biodiversity, habitat diversity, soils, water, etc. Only then is there a realistic possibility that ecosystem function can be restored and maintained indefinitely.

The plan is based on a 2009 inventory cruise and field map for Wildwood. Unproductive areas are netted out, and standard forest cover attributes are applied to the remaining forested polygons. The program 'Woodlot for Windows' was used to simulate various cut levels, particularly the level designed to achieve the profile of natural stands expected for this area and natural disturbance type (NDT). Annual harvest is recommended to be no more than $35m^3$ for the entire parcel, with a theoretical maximum of $46m^3$. The figures for the East and West side of Quennel Lake are $20m^3$ and $27m^3$, respectively. The result: approximation of the undisturbed stand profile with respect to age and size class distribution, standing timber volumes, stand structural elements like veterans, snags and coarse woody debris, and also with respect to log size, quality, and market value.

It is believed that such a forest would far exceed provincial standards for protection of non-timber values including carbon sequestration and, it is hoped, would provide for both ecosystem integrity and human use of forests.

2. PREMISE

In the context of forests, sustainability is often understood as fibre sustainability, as the maximum possible undiminished harvest rate. However, the resulting plantation forests often do not provide sustainability for non-fibre values such as habitat, species diversity, biomass, humidity, soils, hydrology, and other ecological parameters, as did the natural stands before them (Maser, 1976).

Ecoforestry attempts to maintain all ecosystem function (Drengson & Taylor, 2009), and striving for forests similar to previous natural stands can be seen as one way for achieving ecosystem functional sustainability: the more that managed forests resemble the forests that were established from natural disturbances, the greater the probability that all native species and ecological processes will be maintained (Biodiversity Guidebook, BC MoF, 1995). This approach is taken in this management plan for Wildwood forest.

The vision for Wildwood in the future is to resemble the distribution of stands in all age classes expected from natural disturbance alone. Figure 1 is a conceptual graph showing how reduced selective harvests allow a forest to increase in biomass to ecological culmination. Small harvests of 35m^3 annually are expected to allow Wildwood to reach an ecological culmination volume of 85% of the undisturbed old growth forest scenario, while successive clearcuts would steadily erode biomass and arguably biodiversity, carbon storage, hydrology, and other values. This plan aims to increase biomass on Wildwood.

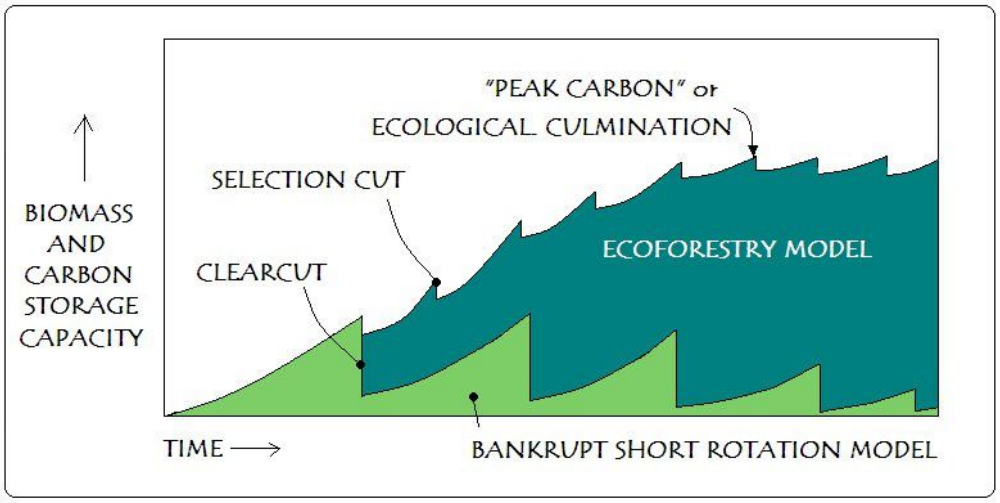

Figure 1. Ecoforestry vs. clearcuts on short rotations.
Conceptual graph showing a forest taken to a state of high or low biomass, depending on forest management and harvest pressure applied. (Used with permission of David Shipway).

Wildwood had been stewarded by Merv Wilkinson for many decades and he had been sharing his methods, philosophy and wisdom generously with thousands of visitors. For that he received much recognition and was honoured with many awards including the Order of Canada and BC. Managing Wildwood after Merv's passing must therefore respect his legacy and vision. The question has been asked, how this Ecoforestry

Management Plan (EFMP) achieves that.

Merv has had a history of challenging the status quo of forestry and he was revolutionary and daring. He was a life-long learner and continuously developed his forest practices when he learned about the need to do so. He was clearly open to other forms of income from a forest than just timber. His love for Wildwood was obvious and inspiring and he was on a quest to keep his forest as beautiful and as intact as possible while having to create an income from it.

Continuous cover forestry at an AAC slightly below the timber growth rate used to be revolutionary in BC, but it is not so much anymore. The next logical step in ecoforestry development is to reduce the AAC to a level where it is possible to grow bigger trees and an older forest with more and bigger snags and CWD and thus richer biodiversity. The other logical step necessitated by reducing the AAC is to become more creative in developing additional and alternative income opportunities from the forest.

Making both these next steps a reality will keep Wildwood to be the revolutionary and inspiring example of ecoforestry and will continue to attract worldwide interest. Summing up, the Ecoforestry Institute Society (EIS) strongly believes that this Management Plan is in keeping with Merv Wilkinson's legacy and vision for Wildwood.

3. PROPERTY DETAILS

3.1. ADMINISTRATIVE:

3.1.1. Legal Description:

The legal description is Section 3 Range 5 Cedar District. The PID is 009-712-593. Parcel size is listed as 77acre / 31.5 ha, which excludes Quennel Lake. Boundary dimensions are approximately 400m North-South, and just under 1km East-West.

Mapsheet No. for Wildwood is 92G001.4.2.

Two dwellings are located on the parcel, with the following addresses:

1. 2929 Crane Road (Log house at Lake),
2. 2933 Crane Road (Mobile Home in Forest).

3.1.2. Overview Map:

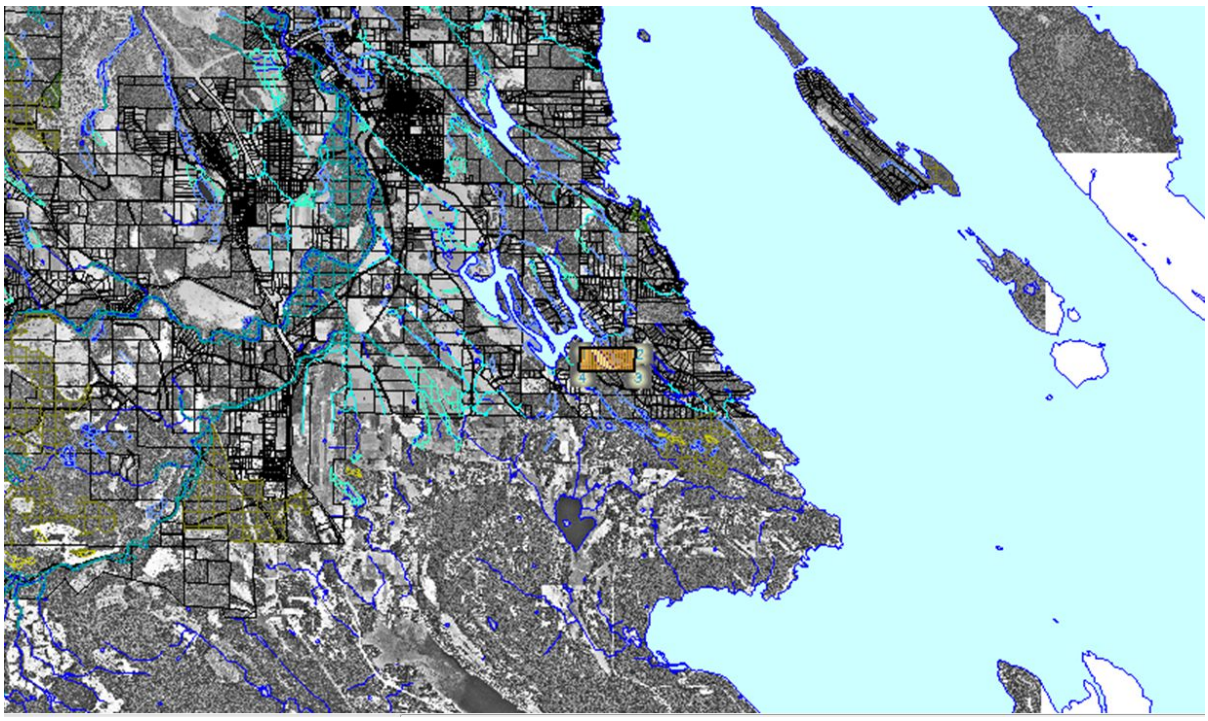

Figure 2. The South-East of the Nanaimo Regional District (Area A).
Wildwood parcel is highlighted in orange. Quennel Lake is to the North-West, Cassidy Airport 5km West. See Appendix 1 for a detailed Management Plan Map.

3.1.3. Zoning:

Wildwood is zoned as Rural Residential (RU4, appendix 2).

(link: http://www.rdn.bc.ca/cms/wpattachments/wpID1419atID3274.pdf)

Wildwood is located in the North Cedar Improvement District, and the North Cedar Fire Protection Service Area.

3.1.4. Higher Level Plans:

The Regional District of Nanaimo Electoral Area 'A' Official Community Plan Bylaw No. 1240, 2001, applies to Wildwood. This OCP stipulates Development Permit Areas (DPA) around lakes, wetlands, and streams, for the protection of fish and wildlife. Third level governments are obliged to apply the Fisheries Protection Act and the Riparian Areas Regulation, which is done via the Development Permit Areas 5 and 6 permitting process (appendix 3).

3.1.5. Ownership:

Ownership of Wildwood is being transferred from The Land Conservancy (TLC) to the Ecoforestry Institute Society (EIS). Bruce Hepburn has a lease agreement giving him rights to the house and duties as the on-site caretaker of Wildwood upon closing of the Wildwood purchase by EIS (appendix 4).
Responsibility for the house will be divided between the EIS and the onsite-caretaker and for the mobile home between tenants and the EIS. EIS is responsible for the remainder of the property.

3.1.5.1. The Ecoforestry Institute Society (EIS):

The purpose of EIS is to promote ecoforestry through education, training, development of demonstration forests and ecoforestry standards and through cooperation with likeminded individuals and organizations as well as First Nations.

3.1.6. Area Summary:

Table 1: Area Summary for Wildwood. Management Plan Map in Appendix 1.

Area Category	**Area (ha)**
Forested Stands	23.22
Development Permit Areas along lake, wetlands	2.57
Lake	6.44
Wetlands	2.72
Clearings, except Merv's residence	0.73
Roads and Power line RoWs	2.39
Residential Area (incl. Clearings 5, 6, with lake shore)	0.92
Total Area	**38.98**

3.2. PHYSICAL AND CLIMATIC DETAILS:

3.2.1. Geophysical summary:

Wildwood forest is located about 1.5 km from the ocean, at an elevation between 50 and 75m. Bedrock consists of Cretaceous Sandstone of the Nanaimo Group. These are mostly submarine sedimentary formations (derived from undersea fans etc) that covered the shallow ocean basin between the Wrangellia terrane (most of Vancouver Island) and the North American continent (Earle, 2002).

3.2.2. Climate:

Wildwood is located in the mildest biogeoclimatic zone of Western Canada, the Coastal Douglas-fir moist mild subzone (CDFmm), which extends from south-eastern Vancouver Island into Washington State. The following data relate to an Environment Canada Weather Station known as Nanaimo A, (#1025370), located at Cassidy, ~ 5km to the South-west of Wildwood.

Environment Canada Climate Normals for Cassidy Station :

Annual temperature :	9.5°C
Temperature Extremes:	-20°C, +36.7°C
Annual Precipitation:	1144.4 mm
Sunshine Hours:	1844h / year
Average Annual Snowfall:	92.9 cm
Growing Degree Days >5°C	1955

Compared to other sites in the CDFmm biogeoclimatic zone (Green & Klinka, 1994), the Cassidy station has average annual temperatures, but decidedly above-average precipitation, as both rain and snow.

4. MANAGEMENT GOALS, OBJECTIVES, AND STRATEGIES:

4.1. GOALS

The goal of the ecoforestry management plan for Wildwood is to organize the harvest of timber and non-timber forest products as well as of non-consumptive uses to a level that still maintains all the forest ecosystem's structure and function. This can then form the basis for educational opportunities on sustainable ecosystem management.

4.2. OBJECTIVES:

The goals stated above require Wildwood forestry activities to foster sensitive ecosystems and red listed plant communities, and species, soil, water, recreational, visual, spiritual values, carbon sequestration, etc. The objectives listed below attempt to set measurable targets:

1. To maintain a standing timber inventory of various age classes, representative of the natural disturbance regime of the area (NDT2). For example, at least 61% of Wildwood's area will be comprised of stands over 100 years old, and at least 29% will be over 250 years old (old growth). This is further detailed under Biodiversity below. Currently, the average tree age (weighted by volume) on Wildwood is estimated to be 121 years old (Cruise 2009, appendix 4).
2. To eventually achieve and maintain a stand volume equivalent to 85% of the undisturbed old growth forest scenario.
3. To maintain at least 5 full-cycle trees per hectare for seed material and non-timber purposes. This objective is to reflect the natural presence of massive old growth veterans substantially older than 250 years that survive disturbance events and provide biological continuity.
4. To regain a representative amount of Coarse Woody Debris (CWD), in which Wildwood is currently deficient, to a volume of at least $100m^3$/ha.
5. To periodically harvest some timber as the managers see fit, depending on timber availability and market conditions, to a maximum of $46m^3$ merchantable volume annually ($35m^3$ recommended). It is expected that increasingly this harvest will be in high value, mature and old growth logs, as the stands on Wildwood grow in volume to reflect the natural disturbance regime.
6. To curb the advance of exotic species by regular monitoring and manually removing broom, holly, Himalayan blackberry, morning glory, purple loose strife, and others, annually, for 5 years, at least from areas last harvested,
7. To maximize interior forest conditions by a combination of low AAC volumes, and emphasis on the single-tree-selection silviculture system as practiced by Merv Wilkinson. This mimics the naturally dominant gap-replacement disturbance dynamic for this area.
8. Any new skid trails, ecoforestry processing and community clearings or buildings (including wood and non-timber products processing area and buildings, storage and other structures which remove land from permanent ecoforestry use from the ecoforestry area) constructed shall not exceed 5% of the Ecoforestry area.

4.3. STRATEGY

1. Wildwood Forest will receive an Annual Allowable Cut (AAC) that will ensure that more than 50% of the biological productivity remains on site. Stands will live substantially beyond their culmination ages, with the resulting mature stand structure & dynamics and larger tree sizes. This is expected to result in a spread of age classes more typical of the natural disturbance type (NDT) of the area, with its habitat features and biophysical characteristics relating to soils, water, and biota, but also higher log values, and lower harvest costs.
2. Wildwood will be managed for low volume, high value forest products. Eventually, in terms of logs, for each cutting cycle few logs of high value will be harvested, and harvest costs will be low, the margin between log revenue and logging cost will be maximized. This is different from the tree farm approach, where rotations are planned to maximize fibre volumes. Here, much of the wood is in lower value, small sawlogs, and pulp wood, and logging is taken to the break-even point, where profit margins disappear.
3. Wildwood will be managed to the full potential of all its forest values, not by a timber-maximizing regime. The goal is to optimize for all values, not to maximize just one.
4. There needs to be flexibility for some adaptive management, particularly in the face of climate change. This plan attempts to be proscriptive rather than pre-scriptive, so that operators have flexibility to operate within a few clearly spelled out objectives, such as allowable cut rate.
   It is hoped that operators can manage adaptively as nature changes, eg. manage with Garry oak if that species were to expand onto Wildwood in the future, but then the cut rate, coarse woody debris targets, and other parts of the plan should be adapted to reflect the lower growth rate of that species.

4.4. DEPARTURE FROM OTHER MANAGEMENT PLANS:

This management plan departs from other management plans by optimizing for a range of values, not maximizing timber harvest.

The conventional approach to resource management plans is to inventory values that are potentially impacted by the development, design protective and mitigative measures to maintain these values at acceptable levels, and then maximize the value of the resource in question.

This manages non–primary resource values to the status-quo at best, not to their potential. For example, if a forest that no longer supports marbled murrelet habitat is managed to the status quo, that species will be unable to ever re-establish itself there.

It is hoped that the level of forestry proposed by this plan is compatible with almost all non-timber values on Wildwood, and for that reason there will be a general lack of standard protective measures for non-timber values (buffers, reserves, wildlife tree patches, special management zones etc.) unless imposed by legislation.

5. VALUES & RESOURCES:

5.1. GEOPHYSICAL

5.1.1. Terrain

The terrain in Wildwood is undulating, with slopes ranging from 0% to 80% over short distances (<10m). The portion West of Quennel Lake is gentler except for some bluffs along the lake shore. The eastern portion features a series of low ridges and swampy depressions oriented north-west / south-east. There are no 60% or steeper slopes over 15m long, nor were there any signs noted of present or historic slope instability or terrain failure.
No terrain stability assessment exists or will be required.

5.1.2. Soil

Soils in Wildwood consists largely of orthic dystric Brunisols 0.2 to 0.7m thick, with some pockets of shallow Regosols and even Folisols over sandstone bedrock outcrops. Soil texture is typically a loam to loamy sand, with a coarse fragment content that varies from 25% to over 40%. Humus is mostly a 2cm thick moder, and a Ah horizon is common.

5.1.3. Soil Management:

The soils in Wildwood are considered sufficiently robust to allow for dispersed ground equipment operation with the following exceptions:

1. There is to be no ground equipment operation of any kind when the soil is saturated at or above field capacity, and water starts to flow overland. That relates to both dispersed equipment operation, and operation on designated skid trails. Equipment operation on the surfaced roads (Crane Road) is acceptable.
   Soil damage is least likely when the soils are frozen, or too dry to compact.
2. There is to be no dispersed equipment operation within 15 meters of the mapped seasonal swamps at any time.
3. There is to be no disturbance of the moss cover on dispersed folisol pockets. Also, the managers will maintain at least 50% of the original crown closure over folisols to prevent their desiccation and degradation.
4. When trees are cut, all bucking, limbing and topping shall occur in the forest, and any parts of the cut tree not used shall remain distributed on the forest floor where the tree was cut and shall not rise more than 1m above the forest floor (except for stem pieces bigger than 1m in diameter resting on the ground).

5.1.4. Water

Water occurs on Wildwood as

3. Quennel lake (South Arm)
4. Several wetlands
5. Seasonal streams
6. Ground water

5.1.4.1. Surface Waters:

The electoral area `A` Official Community Plan (OCP), bylaw 1240, 2001, governs stream side management near streams and in riparian areas. The OCP`s definition of stream is taken from the riparian areas regulation:

`Stream is defined as including a permanent, or non-permanent watercourse or source of water supply, whether usually containing water or not, a pond, lake, river, creek, brook, ditch and a spring or wetland that is integral to a 'stream' and may provide fish habitat.`
*(*http://www.rdn.bc.ca/cms/wpattachments/wpID402atID102.pdf*)*

The South Arm of Quennel Lake splits the property into an eastern and a western part. It occupies about 6.5 ha of Wildwood. At this time the presence of salmon in Quennel Lake is not certain, but considered possible. Various trout species and a number of other fish inhabit the lake.

There are four flowing water courses in Wildwood.

1. One seasonal stream (stream 1) in polygon 2.
2. A small non-channeling surface drainage (stream 2), also in polygon 2. Both stream 1 and 2 flow into wetland 5, which connects to wetland 6, which in turn links to fish habitat in Quennel lake.
3. Stream 3 (non-channeling) links wetlands 2 and 3, through a road culvert. There is no further surface flow draining this system, and it is seasonally dry. Therefore the system comprised of wetlands 2 and 3 is not providing fish habitat.
4. Stream 4 flows North-west through wetland 7 in polygon 6 and is considered to link to Quennel Lake (fish habitat).

Wetlands occur on both the eastern and western portions of Wildwood. Nine have been mapped. They range in size from 0.07 to over 1.2 ha in size within the property, and would be classed as shrub-swamps (see Map in Appendix 1). Wetlands 1, 2, and 3 are not linked to other water bodies, seasonally dry, and not considered fish habitat. Although the occurrence of fish in the wetlands of Wildwood has not been an issue, for the purposes of this management plan wetlands 4, 5, 6, 7, 8, and 9 are considered fish accessible, and according to the optimizing management goal above, they will be managed as potential fish habitat.

Table 2: Water Bodies on Wildwood.

Water body ID	Size (ha) in Wild-wood	Length (m) in Wild-wood	Location (Stand)	Fish Potential	Known SEI Polygon	Comments
Quennel Lake	6.44	N/A	N/A	Yes	No	Includes wet-land edges
Wetland 1	0.08	N/A	1A	No	No	NE corner
Wetland 2	0.2	N/A	1A	No	No	
Wetland 3	0.08	N/A	1A	No	No	
Wetland 4	0.11	N/A	4, 1A	Yes	No	N-Boundary
Wetland 5	0.07	N/A	2	Yes	No	Links to N0643 via Stream 1
Wetland 6	0.78	N/A	5	Yes	N0643	
Wetland 7	0.07	N/A	6	Yes	N0643B	Links to N0643A
Wetland 8	1.28	N/A	7, 8, 9	Yes	N0643A	Links to Quennel Lake
Wetland 9	0.02	N/A	9	Yes	N0643A	Links to Quennel Lake
Stream 1	N/A	~ 220 m	2, 5	Yes	No	Through Wetland 5 to Wetland 6 (N0643), and to Lake
Stream 2 (NCD)	N/A	110m	2	Yes	No	To Stream 1 and Wetland 5
Stream 3 (NCD)	N/A	15 m	1a	No	No	Links Wetlands 2 & 3
Stream 4	N/A	~ 150 m	6	Yes	No	Through Wetland 7
Totals	9.16					

5.1.4.2. Groundwater:

Wildwood is located on top of Cassidy Aquifer No. 162, which is a 76 km^2 large area stretching from the south of Nanaimo into the Cowichan Regional District. This aquifer is characterized by high vulnerability to surface contamination sources, based on the type, thickness & extent of geologic materials overlying the aquifer (Map 3, Appendix of Area 'A' OCP, http://www.rdn.bc.ca/cms/wpattachments/wpID402atID106.pdf).

5.1.5. Management of Water Resources:

Management in the vicinity of water bodies and riparian areas subject to the RDN`s OCP is addressed via Development Permit Areas (DPAs) 5 and 6 (appendix B in the OCP,

http://www.rdn.bc.ca/cms.asp?wpID=402, App. 3 in this Plan). The following directly relates to Wildwood:

5.1.5.1. Development Permit Areas 5 (DPA):

DPA 5 is a 15m wide zone that applies to certain mapped water bodies which in Wildwood include Quennel Lake, Wetland 9, and much of polygon 5 (OCP map http://www.rdn.bc.ca/cms/wpattachments/wpID402atID108.pdf).
The larger purpose of this DPA is to protect fish habitat (and also migration corridors, water storage and purification, erosion and flood control, by protecting the integrity of water bodies by limiting the alteration in the adjacent uplands. The riparian area is to remain in a largely undisturbed state. This includes alteration of land and vegetation in the DPA, and removal of trees over 5 meters high. Because the general goal of riparian protection strongly echoes ecoforestry goals, the DPA 5 is respected in this plan and considered essentially inoperable for forestry use. It is not netted out of the operable area, however, as it can help provide the old growth requirement targeted by this plan. DPA 5 is shown in red hatching on the management plan map and labeled 'Development Permit Area' in the Legend.

5.1.5.2. Riparian Assessment Areas (RAA), DPA 6:

The provincial Riparian Areas Regulation (RAR, BC Reg. 376/2004), (http://www.canlii.org/en/bc/laws/regu/bc-reg-376-2004/latest/bc-reg-376-2004.html) applies to a 30m wide zone on both sides of any water body that may be connected to fish habitat, whether it is mapped or not. Any development proposed within this zone requires a riparian assessment by a qualified professional, as laid out in the regulation. This can very likely be done by a member of the Ecoforestry Institute. These situations are addressed under development permit area (DPA) 6 in the RDN`s OCP (http://www.rdn.bc.ca/cms/wpattachments/wpID402atID102.pdf). The purpose of this environmental review is to ensure the protection of the natural environment in accordance with the Fish Protection Act by protecting the features, functions, and conditions critical to support fish processes and ensuring appropriate measures are in place for the protection of the natural environment.
For Wildwood, that means a 30m wide zone along Streams 1, 2, and 4, Quennel Lake, and wetlands 4 through 9. Ravines are also subject to the RAR, but only if commonly eroded by running water. The draws in Wildwood therefore don't qualify as ravines under the RAR.
Prior to any development in a riparian assessment area, the proponent has to undergo the riparian area assessment process, by a qualified environmental professional, registered with an appropriate association in British Columbia (forestry is appropriate).
The kind of forestry planned for Wildwood is considered sufficiently benign to not conflict with the purpose of the RAR, therefore no areas have been netted out as inoperable. However, a riparian assessment needs to be conducted prior to activity in the RAA.

5.2. BIODIVERSITY, ECOLOGICAL & BIOLOGICAL RESOURCES

Biodiversity can be defined as the diversity of living organisms on the planet, their genetic diversity, and the ecological roles they perform. In 1992, Canada ratified the United Nations Global Convention on Biodiversity. The Sensitive Ecosystem Inventory (SEI) for Vancouver Island and the Gulf Islands is a result on the federal – provincial level, and 3rd level government such as the RDN keep and use this information.

5.2.1. Sensitive Ecosystems

According to the criteria of the Sensitive Ecosystem Inventory for Vancouver Island and the Gulf Islands, at least polygons 1A, 1B, 7, 8, and likely 6 (collectively over 75% of the productive Wildwood forest area) would qualify as Older Forest sensitive ecosystems, with an average age of over 100 years (Ward et al, 1998).
Wetlands are also considered sensitive ecosystems, as is the riparian forest around lake and wetlands.
Old growth stands are among the rarest sensitive ecosystems on eastern Vancouver Island, and the old growth elements occurring in most stands make Wildwood a particularly valuable candidate for the management of sensitive ecosystems.
The purpose of the Sensitive Ecosystems Inventory project is to identify remnants of rare and fragile terrestrial ecosystems and to encourage land-use decisions that will ensure the continued integrity of these ecosystems (McPhee et al, 2000). Sensitive ecosystems can be viewed on the Environmental Atlas layer of RDNmap (https://rdnweb.com/onpointgis/onpoint).
The SEI polygons on file for Wildwood are based on air-photo interpretations. Where boundaries have been updated by GPS use, the updated area figures are used in the table below, and the updated shapes are shown on the management plan map. However, older RDN maps in the appendix will still show the air-photo based shapes and sizes.

Table 3: Sensitive Ecosystems in Wildwood from RDNmap.

SEI Polygon	Ecosystem Type	Ecosystem Code	Total Size (ha)	Size in Wild-wood (ha)	SEVI 2004 Code
N0643A	Wetland (No. 9)	WN:sw:sp:ms	2.36*	0.02	5002
N0643B	Wetland (No. 8)	WN:sp	1.32	1.28	4987
N0643D	Older Forest	OF:co	10.39*	~ 8.5 *	4979
N0643	Wetland (No.6)	WN:sp	6.4	0.78	4937

**Based on SEI airphoto interpretation.*

5.2.1.1. Management Goal:

Manage all ecosystems for full integrity and viability, whether considered sensitive or not. Demonstrate how ecoforestry is compatible with sensitive ecosystems and can take place in SEI polygons such as older forests.

5.2.1.2. Management objective:

Manage Wildwood to become an older forest with a substantial old growth component (~30%). All of DPA 5 areas, such as the Quennel lake shore, can eventually become old growth. Consider also to buffer those wetlands not shown under Development Permit Area 5 (in particular those with potential fish habitat like wetlands 4, 5, 7, 8). This would help protect both riparian and wetland sensitive ecosystems.

The annual harvest rate is designed to produce stand ages expected from natural disturbances, and would result in at least 60% of Wildwood becoming an older forest under the SEI definition (older than 100 years).

5.2.2. Red & Blue listed plant communities

These are plant communities considered endangered or threatened in the Coastal Douglas-fir moist mild biogeoclimatic subzone (CDFmm). All of Wildwood is potentially covered in red/blue listed plant communities. Because at this time the goal is to manage for the full potential of these communities, whether they are currently expressed or not, no effort is made to describe their current extent. However, as for the sensitive ecosystem above, the quality of the element occurrences of these plant communities in Wildwood is much enhanced by the old growth element here.

5.2.2.1. Management goal:

Contain the human footprint (opening of canopies, soil disturbance, extraction of stand structural elements, nutrients, and energy) to a level that allows full floristic development of the natural plant communities.
These plant communities depend on a number of structural elements typical of older forests, such as snags, downed trees, wider inter-tree spacing, presence of some sunlight to the forest floor, and development of herb, shrub, and tree understories.
The goal of this ecoforestry management plan is to develop a level of forestry activity that allows the full development of the plant communities typical for each site.

5.2.2.2. Management objective:

Implement extended rotations or cutting cycles that reduce disturbance to the natural background level (for NDT 2).
The suggested AAC of 35m^3 is designed to return Wildwood to the age class distribution expected for the CDFmm in its natural NDT2 dynamic. It is expected that the reduction in biomass extraction, combined with decreasing harvest impacts, will provide the habitat that local flora and fauna have adapted to, rather than managing for specific habitat element targets of a few known species. Therefore no specific management objectives are provided here.

5.2.3. Animals

No animal survey exists for Wildwood, but is planned to take place in the near future and at regular intervals. Rare species will be monitored more closely.
The bald eagle nesting tree on the adjacent property impacts management on Wildwood via the RDN's development permit areas (App. 2). DPA 5 stipulates buffers for eagle and heron nests:

- For Eagle Nest Trees, the Development Permit Area shall be a 60 metre radius from the nesting tree.
- For Great Blue Heron Nesting Trees, the Development Permit Area shall be a 100 metre radius from the nesting tree.

(http://www.rdn.bc.ca/cms/wpattachments/wpID402atID102.pdf)
The management plan map (appendix 1) shows a 60m wide buffer zone around the eagle nest, and this area is netted out from the operable land base. There are no known heron nests on Wildwood.

5.2.4. Plants

A plant survey for Wildwood is attached in Appendix 5. There are plans to extend the survey with a special focus on rare plant species (including tree species) in the near

future. The survey will include geo-spacial information to inform harvest planning and facilitate monitoring. Non-indigenous species will also be inventoried, mapped and removed. Anyone doing surveys, inventories or explorations of Wildwood will be tasked to record and report encounters of non-indigenous species.

5.2.5. Fungi

A survey of fungi in Wildwood is attached in Appendix 6.

5.2.6. Big Snags and Full-Cycle Trees

Due to the significant contributions of bigger snags to biodiversity, snags of dbh 30cm upwards will be inventoried and mapped and their abundance monitored. At least 5 full-cycle trees per ha will be identified, tagged and mapped. Dying trees of bigger diameter will be the preferred candidates for snag recruitment. The goal is to have at least 3 big snags or significant wildlife trees per ha of forest on average and to have them more or less dispersed throughout Wildwood. Snags of less abundant species are also prime candidates for retention, even in smaller diameters, as long as they still enable cavity nesting.

Full-cycle trees must be chosen from existing, healthy veterans first, then from other old and healthy trees and rare tree species. If they pose a significant risk to likely targets, they can be felled, but they cannot be used for lumber or firewood and need to stay on site so that they can continue to contribute to biodiversity and soil building. As soon as one has been felled, it needs to be replaced by a prime candidate in the vicinity (including GPS coordinates and marking).

5.2.7. Special Sites

Rare, special sites will be inventoried and mapped. They represent rare habitat and are of high educational and possibly aesthetic value and are valued amenities of Wildwood.

5.3. CULTURAL / SOCIAL VALUES

5.3.1. Utilities

BC Hydro operates approximately 900m of residential power line through Wildwood. This power line is associated with a 3m wide right-of way on either side of the line. That makes this area effectively inoperable for tree growth. This corridor has been netted out from the productive area.

5.3.2. Historical

Wildwood was homesteaded by J.O. Sullivan in 1889, then left to a relative (probably a niece) from Victoria who occasionally visited it. Mr. Von Platten heard from Merv's family that it was going to be let go for a tax sale, since it was virtually worthless, so he bought it. A caretaker, Fermin Sepulveda came and built the original house, lived here for a few years then went back to California. Merv (with his parents who lived on the adjacent property) acquired about 148 acres (Wildwood) from Mr. Von Platten in 1938

for $1500 which was the value of the timber on the property. At that time the timber was considered "junk wood" because of the relatively short logs and large branches. The property was in two parcels and the 70 acre parcel which he co-owned with his parents was given to his son in the 1970s at the insistence of his mother.
Wildwood forest has been stewarded by Merv Wilkinson since 1938 and has become widely recognized as a valuable example of the pursuit for sustainable forestry. Under the guidance of Dr. Paul Boving, Merv was introduced to Scandinavian forest management philosophies and practises of the time. Key among what Merv borrowed were the ideas of harvesting less than the annual growth rate, so that the stand volume is not diminished over time; and Dr. Boving's preferred tree selection method, single tree selection, or what Merv has often called "sustainable selective forestry". The underlying principle is one of sustaining timber yields over time. The standing volume was seen as being equivalent to the capital in a bank account and the annual growth rate to the interest. This analogy is helpful, however it does not present an accurate or complete picture. Thus, over time our reliance on this theory and selection methodology has changed. Never the less these principles remain important in understanding the history of this forest and its influence beyond its boundaries.
For much of his career at Wildwood, Merv had two main principles to guide his decisions.

1. Cut equal to or less than the annual growth rate (economic principle)
2. Work with Nature (ecological principle)

Harvesting less than the annual growth has been the guiding principle upon which Merv Wilkinson based the management of Wildwood. It also is the guiding principle of this plan.

5.3.3. Archaeological & Traditional Use:

An Archaeological impact assessment has not been conducted on Wildwood.
While we have an incomplete understanding of practices used by First Nations, conservation biologists and ecologists are beginning to acknowledge and view as important the role First Nations played as agents of forest maintenance and change. Deepening our understanding of this could be an important pursuit at Wildwood – as it is important in modeling and understanding how humans can live sustainably in our local habitats, and on this planet.
The world views and practices of indigenous peoples may be difficult to understand for those who have different world views, but learning from each other offers the potential to guide the creation of new ways of seeing and being – ways of being where we can acknowledge and act on the belief that all of our destinies are mingled. Western ecological sciences have great power and merging traditional ecological knowledge (values and science) with western sciences could offer an alternative to the current global consumptive economic world view. An example is the widespread use of stand maintaining fires by First Nations in this area for increasing sunlight to the forest floor, for the increase of huckleberries and other fruit bearing shrubs, and herbs like camas bulbs.
Native elders have repeatedly expressed a desire for longer rotation ages in their traditional lands. The figure of 200-300 years for a rotation period has been expressed repeatedly (Kotilla, 2002). The suggested AAC accommodates this goal.

5.3.4. Recreational

. Wildwood offers a fairly stunning forest compared to the intensely managed, fragmented, and developed landscape in the area, and light touch ecoforestry of any description is considered compatible with the increasing recreational interest in this forest. At this point this plan assumes passive recreation management (i.e. let people hike trails & roads, without adding amenities and destination points). Going forward, the impact from visitors on ecological integrity will have to be assessed from time to time and a strategy may have to be developed and implemented to keep the impact tolerable as non-consumptive use opportunities (i.e. Shinrin-Yoku) will be explored to create income from Wildwood.

5.3.4.1. Management Goal:

The goal for recreation management in this plan is twofold: to make recreation safe on Wildwood (thus avoiding potential liability issues for the owner) and to keep the impact of visitor traffic compatible with the overall goal of ecological integrity.

5.3.4.2. Management Objective:

The objective is to achieve compliance with the Occupier's Liability Act (1996), and to use the wildlife-danger tree strategy used for BC parks and recreation sites (Wildlife Tree Committee, 2006) or similar compatible tree risk assessment strategies (i.e. International Society of Arboriculture's (ISA) Tree Risk Assessment Qualification (TRAQ)), as a standard of care for the management of potentially hazardous trees.

5.3.5. Visual

The low intensity forestry planned for Wildwood will easily exceed any Visual Quality Objectives set for the area, including Quennel Lake. No special management provisions are made.

5.3.6. Educational

Wildwood is a place which can act as an inspiration in the development of an ecologically sustainable land use ethic. It is frequently looked at as the most important ecoforestry site on the west coast of North America and the perceptions of what has gone on here are varied and frequently based on little or no information. The potential exists to use this place as a research and education site so those who seek to practise ecoforestry have factual information and a model to look to for information and inspiration.

5.3.6.1. Management Goals:

- Show the significant influence Merv has played in influencing development of ecoforestry concepts and methods;
- Honour Merv's work in ecoforestry through demonstrating practices on the leading edge of forest practice where new insights and techniques are taught to students of all ages.
- Improve scientific and professional knowledge of forestry management practices
- Record all forest-related activities on Wildwood. This will update any records in existence, and also record changes over time.

5.3.6.2. Management Objectives:

Regular commercial activities in Wildwood can be adapted for an educational component, and education can also become the main focus of activities like tours,

surveys, inventories and more.
Current management in Wildwood has already made education a priority. The possibilities to use activities in Wildwood for educational purposes are almost endless and are left to the manager's imagination.

5.3.7. Spiritual

Currently, Wildwood has substantial spiritual appeal to a varied public, mostly due to its old growth component.

5.3.7.1. Goal:

Maintain or enhance the spiritual appeal of Wildwood.

5.3.7.2. Objective:

Increase the Old Growth characteristics of Wildwood. Set AAC to a level where volume, tree size, and tree age increase from the current condition, and natural processes play the major role in shaping forest structure. This plan is expected to meet this objective without any additional action.

5.4. TIMBER RESOURCES

5.4.1. Natural Disturbance and Range of Natural Variability

All of Wildwood is located in the Coastal Douglas-fir moist mild biogeoclimatic subzone (CDFmm). This zone is characterized by Natural Disturbance Type 2 (NDT2), which experiences stand replacing fires with a 200 year return period, on average (Biodiversity Guidebook, 1995, see Appendix 10). Aside from the rare catastrophic stand replacing events, much of the NDT2 forests is dominated by more frequent, much smaller scale gap replacement, as a consequence of mortality of individual trees or small clumps, due to insects, disease, wind, snow, etc. , and a small percentage of NDT2 experiences stand maintaining fires more typical of NDT3.

5.4.2. AAC

The AAC for Wildwood is set to largely reflect the NDT2 profile of table A4.1, in appendix 4 in the Biodiversity Guidebook (Appendix 10 in this Plan). That table is the cumulative distribution (% of landscape above or below the indicated age) for an average disturbance return interval of 200 years (NDT2).

The Program 'Woodlot for Windows' (Version 3.226, 2007) was used to simulate stand entries and future harvest levels. Depending on sort order, an AAC of up to 46m^3 can theoretically satisfy the age class targets of table A4.1 in the biodiversity guidebook. At this harvest level, the end volume (14,600m^3, after a 250 year simulation run) would be 77% of the undisturbed (old growth) volume (~18,830m^3), and 115% of the current volume (12680m^3).

The suggested conservative harvest level for Wildwood is 35m^3 per year. At this level, Wildwood's stand volume would reach 15,970m^3 of standing timber volume, which is 85% of the undisturbed scenario, and 126% of the current volume.

Recognizing that AAC calculations with growth and yield models will always be approximations for complex forests like Wildwood, permanent sample plots are an indispensable tool to fine-tune AAC determinations. These plots have been established and will be remeasured at least every 10 years.

A summary of a simulation run is attached as appendix 7 of this plan, a summary of the timber types is in appendix 8, and a sample Woodlot.lot file in appendix 9.

5.4.2.1. Settings for this Simulation:

1. A 5% Area net down was applied to all polygons to anticipate any unforeseen reduction of productive area due to additional infrastructure and reserve trees.
2. Because most of polygon 5 is mapped as DPA5, and the extent of the wetland here is unclear, and water flows into this stand, it is netted out in its entirety.
3. Table A4.1 of the Biodiversity Guidebook shows 19 age classes with target percentages. These can be used for age constraints in Woodlot, but only one age constraint can be selected for any one simulation run. Hundreds of these were tried. For the display run, the 61% target area in over 100 year old stands was selected.
4. The program can not accommodate age constraints for ages older than current stand ages. Therefore, to simulate the dynamic of age classes in the 140 to 250+ year range, simulations were run that were based on Wildwood covered in old growth stands, with the same areas, species composition, and productivity as the current stands. This showed the effect of various AAC figures on older age

classes. So, while only one age constraint is visible, many others were run, and the highest yielding sort order of most restrictive age constraint was selected.

5. Partial cut was selected for all polygons, and the calculations were also set for partial cut.
6. Five Sort orders were simulated:
    - Default (stands in chronological sequence)
    - Oldest stands first
    - Stands closest to harvest age first
    - Stands sorted by MAI
    - Stands sorted by site index.

Of these sort orders, the first two were usually the lowest. The last three usually returned higher values and were very close to each other.

5.4.2.2. AAC for East side of Quennel Lake only:

Due to access conditions for the part of Wildwood West of Quennel Lake, simulations were run for the Eastern portion only, with the same constraints and conditions.
The highest harvest level that would still satisfy the age class distribution requirements of table A4.1 is 27m3, but a maximum value of $20m^3$ is recommended to satisfy the 85% of undisturbed stand volume target.

5.4.2.3. Summary Graphs for volume and age classes:

The two figures below show that at the suggested harvest level, Wildwood's inventory in older age classes grows steadily and levels out in about 2150. This allows harvest of valuable mature and older timber while increasing Wildwood's timber volume, value, and age, and concurrently providing increasingly higher quality of non-timber values. A schedule of log prices from the Vancouver log market is attached in appendix 15. At that stage, the typical harvest would consist mostly of Douglas-fir H-logs, with some I-logs and B & C peelers.

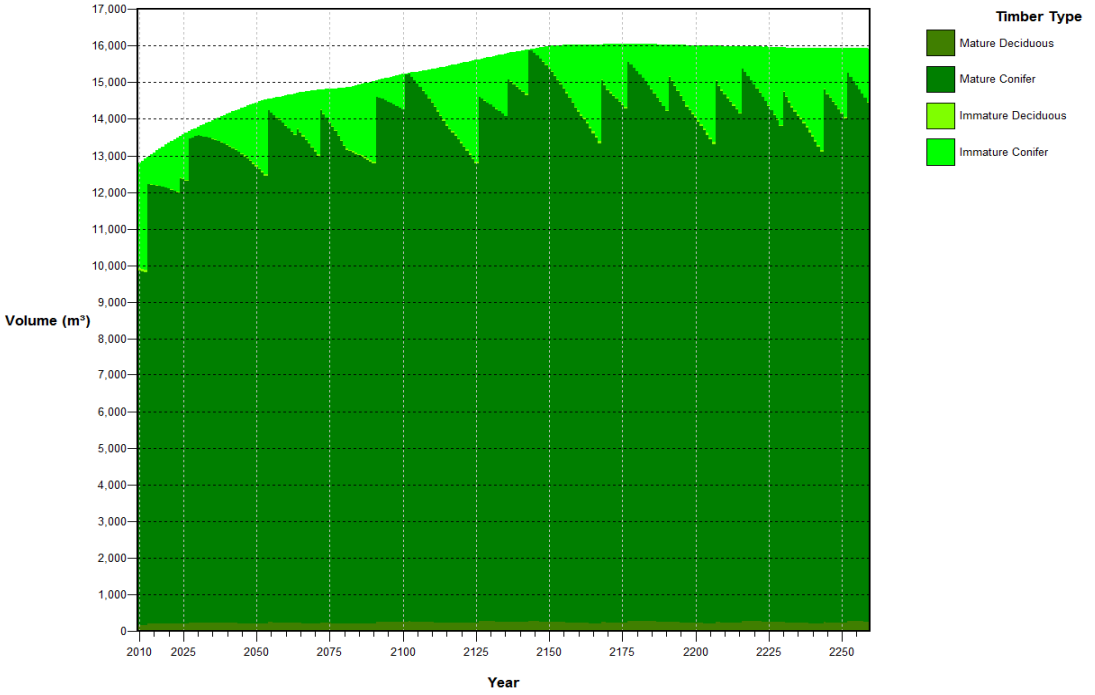

Figure 3 Time-Volume Graph for Wildwood using an AAC of 35m^3.

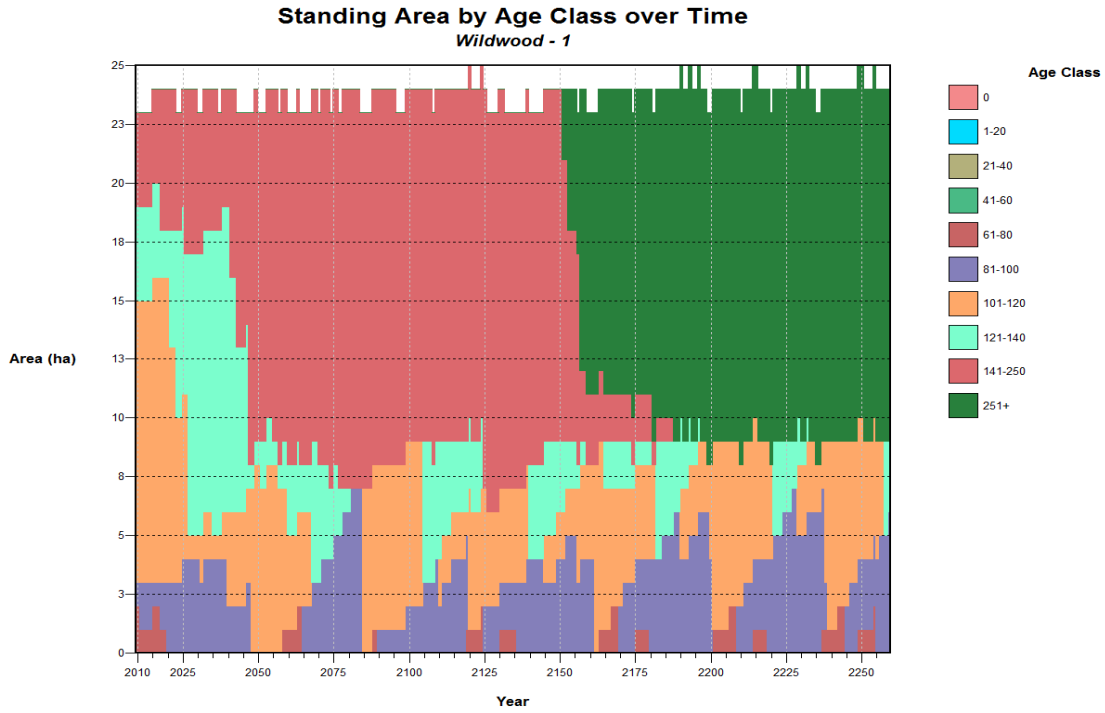

Figure 4 . Wildwood Age class development over 250 years, using an AAC of 35m^3 .

5.4.2.4. Comparison with Industrial Scenario:

Managing stands already considered an older forest to become substantially older is unusual and not in keeping with the principles of a 'well regulated forest' that maximizes wood fibre. For comparison, figures 4 and 5 below simulate Wildwood managed for industrial timber production.

Settings for the industrial management simulation:

1. Existing stands are simulated using VDYP as for the ecoforestry scenario above, but future yields are calculated using the program TIPSY.
2. Partial cut is disabled
3. no age constraints are selected
4. area Net-down is increased to 10%. Conscientious Industrial forestry sets aside riparian reserves, wildlife tree patches, Variable retention patches etc. to provide for non-timber values. Therefore, the industrial scenario could potentially have 10% of old growth, which the program does not show as this area is netted out.
5. Highest yield sort order is by site index.
6. Polygon 5 is excluded, as in the ecoforestry scenario.

Results:

1. The industrial AAC is 133m^3. While this may be a theoretical maximum, it would likely be achieved at least in the first rotation. The recommended ecoforestry yield (35m^3 would only be 26% of this, and the maximum yield under this plan (46m^3) would still only be 35% of the industrial target.
2. The volume decreases from the present (11960m^3) to 7900$m^{3.}$ after 250 years, which is 66% of the starting volume, or 42% of the unlogged scenario.
3. All age classes older than 140 years disappear entirely from the operable land base by within about 100 years (however, the 10% netted out area could produce old growth if left undisturbed).

4. After 100 years, average volume in Wildwood is < 310m3/ha, about 50% of that in the ecoforestry scenario, trees are young, small, and limby, and harvesting profitability is marginal and market-dependent. Typical log grades would consist of Douglas-fir J-logs (gang), possibly with some C-peelers, and with a substantial amount of small chip-and-saw (lower value than J sawlogs, and not traded on the Vancouver log market) (Appendix 15).

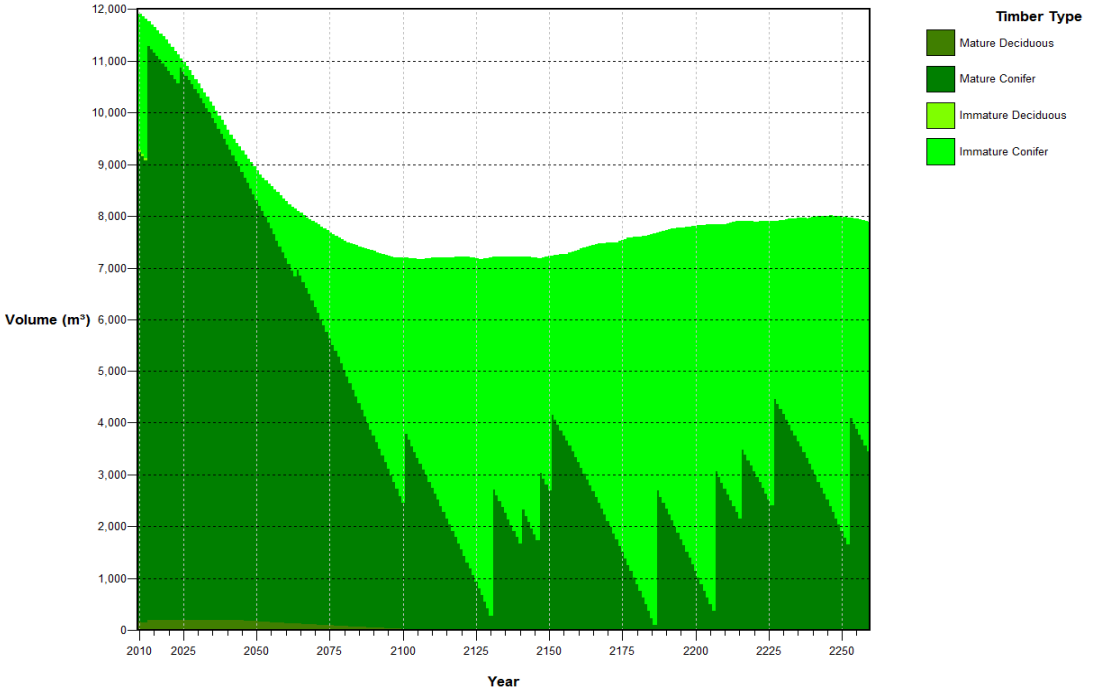

Figure 5 Time-Volume graph for Wildwood in a hypothetical industrial scenario.

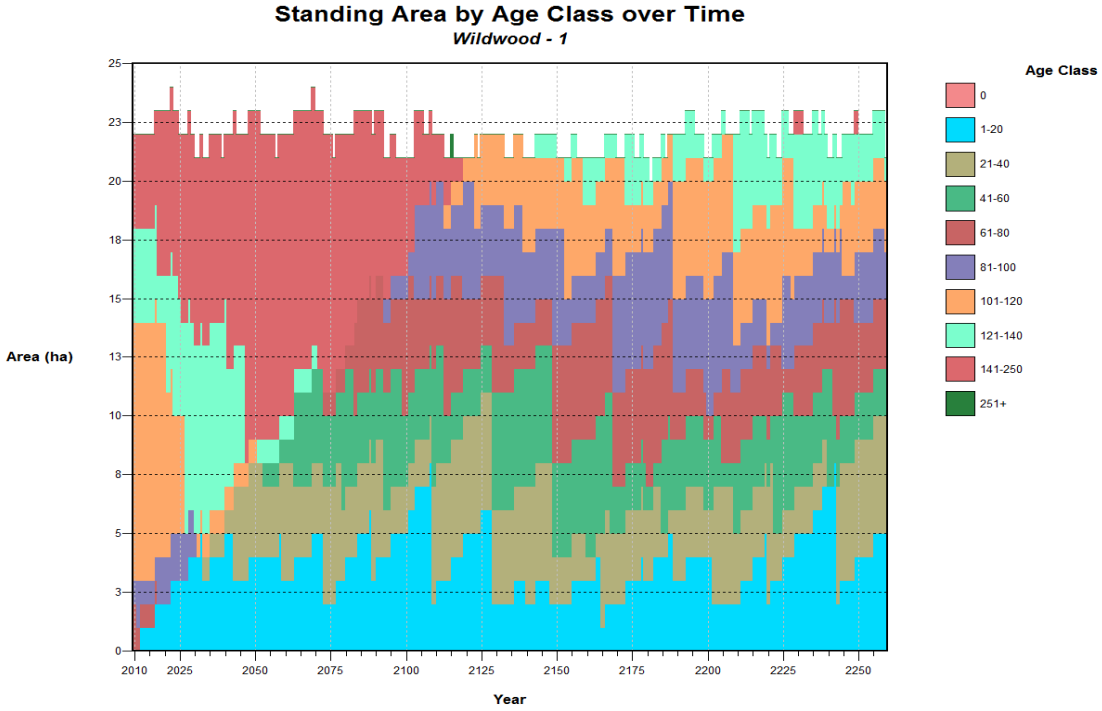

Figure 6 Age class distribution for Wildwood in a hypothetical industrial scenario.

5.4.3. Harvesting Goals:

According to McPhee et al (2000), uneven-aged forestry can be compatible with conservation of sensitive ecosystems in coastal BC. Mimicking natural disturbance in scale, intensity and frequency will be key.

5.4.3.1. Maintain Natural Disturbance Regimes:

According to FSC Canada (2005), the natural disturbance regime for NDT2 forests are:
35-60% Gap replacement (mostly due to individual tree death, resulting in small openings and complex, multi-layered stands)
20-55% Stand replacement (crown fires, major storms etc., resulting in large openings and even-aged stands or stands with 2 age classes.
5-20% Stand maintaining disturbances (frequent, low intensity ground fires, resulting in open stands of fire resistant species)
Silviculture systems like single tree selection and group selection mimic gap replacement, the dominant disturbance regime for NDT2. These were previously practised by Merv Wilkinson and are also recommended in this plan. Stand replacement disturbances are somewhat (albeit poorly) mimicked by conventional forestry and are dominant in the forested landscape. Thus, there is no need to focus on this disturbance pattern at Wildwood. Stand maintaining disturbances though could be mimicked on the driest sites of Wildwood by removing smaller diameter trees and those tree species usually succumbing to low-intensity fires.

5.4.3.2. Operational Goals:

1. Focus on what needs to be left in place before selecting trees for harvest.
2. For any harvest entry, maximize the value of the harvested fraction, and minimize the volume extracted.
3. Minimize fragmentation, prioritize for interior forest habitat.
4. Retain special habitat features wherever found (pileated woodpecker's ant wells, bear dens, valuable habitat trees, etc).
5. Sustain structure & composition of older forest ecosystems.
6. Maintain the productivity of Wildwood's soils.

5.4.3.3. Harvest Objectives

1. Avoid use of equipment on wet soils, or moist soils with fine texture (loam and finer), or any soils that have reached field capacity no matter how robust (water sedimentation concerns).
2. Avoid falling during the nesting season, March through August (Campbell et al. 1990a, b; 1997).
3. Be aware of the market for each tree before harvest. Know the market for each log and the value-added opportunities at Wildwood before bucking it. Don't rely on a professional logger to do this, as it changes with different log buyers.
4. Many logs don't pay their way to the mill. Any piece of wood remotely unprofitable stays in Wildwood for ecological functions. Priority for retaining un-marketed wood in a harvest setting is first as standing live tree, then snag, then CWD on site, lastly CWD yarded.

5.4.3.4. Harvest Priority

1. Trees deemed a hazard by the wildlife / danger tree or TRAQ assessment process.
2. Groups of diseased trees, especially root disease. This likely indicates a flaring up of the fungus, which is vigorous and has a massive inoculum. Single diseased trees are not a priority.
3. Groups of trees that have reached their pathological rotation age. This is particularly relevant to deciduous trees on rich sites. This does not imply a harvest imperative, as the manager may prefer to harvest spalted wood, or use the trees as substrate for fungi or for snag recruitment, but it should be considered an action item.
4. Dominant & codominant trees or groups of trees in a 2-layered or multi layered stand, which suppress a well-established understorey of trees, and understorey release is desired.
5. Trees that are closely spaced.

5.4.4. Harvest Monitoring

For covenant purposes, a monitoring system must be practical enough to readily identify transgressions. This is particularly important when high value trees are involved, such as the larger old growth individuals in Wildwood, or any extended rotation ecoforestry stands. The financial incentive is always to over harvest.
While no completely reliable system comes to mind, the following elements may be helpful in devising one:

1. In the case of Wildwood, where only a few trees would be involved in the annual harvest, each tree can be documented before the harvest.
2. An accurate log book of any timber removal including the date, location, rationale, species and dimensions (height, dbh and scaled volume if applicable) will be kept and backed-up offline and online.
3. For larger harvests, 100% cruises can be conducted before and after periodic harvests, perhaps once a decade, and only in the areas identified for harvest.
4. The on-site caretaker of Wildwood needs to be at Wildwood when any harvesting takes place and will be informed about the harvest plan in detail. If s/he is not available, another trusted person needs to be instructed and assigned.
5. A neighbourhood watch system should be established which would be informed about when harvests are taking place. The system would be that when harvesting noise is audible and neighbours were not informed about harvesting, that they immediately inform a number of given contacts.
6. .The manager is responsible for the cut control and timber protection. Damaged and poached volumes are part of the harvest.
7. Establishment of a photographic record, particularly of more valuable stands and trees.
8. Stump surveys are a valuable fall-back option.
9. Harvest will require a Ministry of Forests timber mark, and the wood will be scaled. The scale sheets would be part of the harvest volume document base.
10. The Ministry of Forests compliance and enforcement staff have experience with monitoring harvest activities and could be consulted.

5.4.5. Harvest – Administrative Considerations

Timber mark, log scaling, and logging tax are legal requirements for tree harvest in British Columbia:

1. A timber mark certificate is required to transport logs in BC. These are available free of charge from the Ministry of Forest & Range District offices. The registered owner should apply, and certificate of title and recent property tax notice may be required.
   The hammer mark is used to stamp the timber mark code on the log ends for shipping. Hammer mark exemptions are available for small volumes, logs can be marked with crayons in such cases. Hammer marks are not required if logs are processed on Wildwood.
2. There is a provincial requirement to scale all logs prior to milling. Usually mills automatically scale all logs they receive, but if this is not done, the owner is responsible for the scaling. This applies also to logs milled on site. Exemptions for this requirement may also be available for small volumes for wood used on site.
   Scaling must be done by certified scalers, usually on designated scale sites. An alternative for small log volumes are roving scalers, who can scale logs on suitable areas such as landings, where logs can be spread out. This work is also subject to random check scaling by the Ministry of Forests and Range. A list of roving scalers is available at the South Island district office.
3. Logging tax: logging tax returns must be filed on all income derived from logging operations, even on losses. They are separate from income tax returns; logging operations show up on both returns, but logging taxes are usually fully deductible as a credit against income taxes paid. Logging tax returns are not filed with the Canada Revenue Agency, but with the provincial government, located at:
   Ministry of Finance, Income Taxation Branch
   1st Floor 1802 Douglas Street, Victoria BC V8T 4K6
4. Aside from the logging-related requirements, operators must ensure that regional zoning laws are not violated, particularly DPA 5 and 6.

5.4.6. Harvest Activities in the next 10 years (2016 – 2026):

Selecting trees for harvest is a complex task with significant consequences. While Merve Wilkinson went about selecting trees with great intuition and based on an intimate knowledge of Wildwood, it may not be prudent for EIS to entrust one person with this responsibility if for no other reason than public perception and public trust. It is also more likely to arrive at good selection decisions when the perspectives of several ecoforesters are being taken into account. Furthermore, documenting rationales will help to evaluate the quality of selection decisions over time and will also serve to teach the interested public. The EIS Forestry Committee will therefore devise a written 10-year Forest Development Plan (within the next months and before any harvesting will take place) which will guide the timber harvest for the next decade. Merve Wilkinson's selection criteria will certainly greatly influence this process. Access issues for the portion of Wildwood West of Quesnel Lake will also need to be addressed.

5.4.7. Access:

Access within Wildwood was largely established by Merv Wilkinson, and was planned for a combination of logging truck and ground skidder (Loomis 2001). This infrastructure is in place and basically all of Wildwood has been selectively accessed in the past. Very little new development will be required.
Perhaps the best roads for low intensity harvest operations have been designed and built by Orville Camp of Oregon. The following principles may be helpful if some access roads are to be maintained, re-routed, or constructed new (Camp, 1984).

5.4.7.1. Access Planning:

- Build narrow roads for slow vehicles, not wide roads for speed and visibility. This reduces required access area and openings. A 3.5m width is sufficient.
- Keep grade between 3% and 10%. Steeper roads are much harder to maintain.
- Consider "contour access", which avoids roads running parallel to water drainage.
- Design for the largest expected vehicle only.
- Drain road side ditches into forest well away from streams, to avoid contamination.
- Connect roads in loops. This provides alternative access and avoids turn-arounds.
- Most trucks can negotiate a 15m turning radius.

5.4.7.2. Access Maintenance:

- Rock the surface of the more frequently used roads, for stability, especially if used in all seasons.
- Encourage leaf litter and moss to colonize the roads. This will help prevent erosion.
- Annually inspect all culverts and ditches.

5.4.8. Silviculture:

5.4.8.1. Regeneration:

Merv Wilkinson's approach was to use natural regeneration only. The advantages are:

1. locally adapted provenances,
2. Regeneration establishment prior to harvest, ie. advance regeneration instead of regeneration delay,
3. No planting cost or efforts.
4. In Merv Wilkinson's experience, better root development (Loomis, 2001).

This approach is preferred and is suggested in this management plan. It is contingent on the retention of sufficient tall, healthy and productive seed trees. Merv recommends at least 10 good dominant seed trees dispersed over Wildwood. This is considered a minimum; however, if mostly single tree selection is practiced, the annual seed rain from the existing canopy will easily provide sufficient regeneration.
If any seedlings are to be planted for whatever reason, seed stock (and perhaps seedlings) from Wildwood or immediately adjacent properties is to be used.

5.4.8.2. Spacing:

Merv Wilkinson did space occasionally, but more frequently relied on natural factors for thinning. Growing season droughts particularly ensured successful recruitment of preferred species (Douglas-fir) on mesic and drier sites. Depending on the size of the

trees, density is not considered a problem below 5000 saplings/ha, and should remain at over 1500 stems/ha to maintain form and dispense with the need to prune after spacing.

5.4.8.3. Fertilization:

Merv Wilkinson ranged both cattle and sheep in Wildwood forest, both for brush control and building humus. This appeared effective, and improvement in tree health was observed. However, there are no plans to graze large animals in Wildwood.
The only fertilizer options remotely considered for Wildwood in this plan are certified organic compost and fertilizers, and bio-dynamic products (Demeter).

5.4.8.4. Brushing:

Brush hazard appears low in most polygons, but may be moderate in the moister stands like 2, 5, and 7, if larger openings are allowed. Merv Wilkinson's approach to keep opening size small and protect advance regeneration during harvest ensured brush competition was not a problem. Any brush control in Wildwood will be done manually, there will be no herbicide use.

5.4.9. Coarse Woody Debris (CWD):

CWD and carbon effect, and are affected by, soils, biodiversity, and cultural habits and values. They are included here because of the direct accounting link between timber, wood production, and CWD / carbon.
A CWD survey was conducted in the summer of 2009. The average CWD amount was 37.8m3/ha (Appendix 11). The range indicated by the plots extended from a low of 0.9m3/ha to a high of 212.7m3/ha. This is substantially lower than expected. Stevens (1997) has compiled figures on CWD in natural stands in BC, organized by NDT and biogeoclimatic zones. And according to her list, Wildwood barely exceeds 50% of the CWD in the dry interior zones (App. 13).

5.4.9.1. Management Goal:

A substantially higher mass of CWD is desired. However, no special requirements are made as the conservative AAC set for Wildwood was set with CWD restoration in mind.

5.4.9.2. Objective:

Target is 100m3/ha. Monitor by revisiting the permanent sample plots every 10 years.

5.4.10. Carbon Budget:

The carbon sequestration capabilities of forests is getting increasing attention as greenhouse gas emissions increase and global warming becomes an accepted reality. Wildwood is no exception. Maintaining a closed canopy, extending rotation ages, managing for decay-resistant species like western redcedar and Douglas-fir, managing for more CWD, marketing a higher percentage of large, valuable logs, maintaining soil hydrocarbons etc., all work toward increasing the effectiveness of Wildwood forest as a carbon sink (see figure 1, page 6, for a conceptual graphic).

5.4.10.1. Management Goal:

The goal with respect to carbon is to increase our understanding about the carbon cycling in forests under various management regimes, and to increase the effectiveness of carbon sequestration for Wildwood. A secondary goal is to survey the market for carbon credits that Wildwood may be eligible for.

5.4.10.2. Objective:

Apply a model as a tool. Whether Wildwood is carbon neutral, a sink, or a source, is not clear at this time. However, this plan includes a commitment to investigate Wildwood's carbon budget over the next 5 years, specifically using the recent Operational-Scale Carbon Budget Model of the Canadian Forest Service (CBM-CFS3), or to conduct a greenhouse gas inventory.

5.4.11. Protection:

Forest protection refers to preventing catastrophic losses due to insects, disease, and fire. Industrially managed forests are committed to maximizing fibre, and an uncompromising commitment to combat any agents that reduce fibre can be expected.
However, these agents are also natural forces, essential ecosystem components that help define ecosystems via the natural disturbance regimes discussed under Biodiversity above. The timber-destroying nature of forces that are integral ecosystem components put the ecoforester into a dilemma. The scale of disturbances caused by insects and fire typically is at the landscape level, and far exceeds the size of Wildwood. The essential context to Wildwood is also that it is a small parcel of second growth forest, older forest, and old growth forest, in a land scape until recently dominated by older & old growth forests, and now dominated by urbanization, fragmentation, and permanent early seral communities (lawns, fields, young forests). It may be anthropogenic, but the recent and ongoing disturbance due to logging, agriculture & urbanization has been a devastating stand-replacing disturbance at a huge scale, and disturbance-adapted species and communities far exceed the late seral / climax stands found in Wildwood.
Another consideration are the legal obligations to the safety and property of neighbours and public utilities.
It is not expected that insect infestations and diseases will become a significant issue at Wildwood due to natural regeneration, multi-storey stands and a high level of biodiversity. Even, if they should occur, the application of insecticides and fungicides will not be permitted. Disturbances by insects and diseases would instead be considered natural agents of diversification and change.

5.4.11.1. Protection Goal:

For the reasons set out above, this management plan proposes to disrupt large-scale stand replacing events, natural or anthropogenic, and support the continued expression of late seral and climax communities. Large scale disturbance agents like fire may still be admitted, but only on a small scale, and more for educational rather than forest management reasons. This would not be the same for an ecoforestry management plan at the landscape level.

5.4.11.2. Protection Objectives:

Fight all unplanned fires.

Timber consumed by fire or stand-replacing insect disturbance is counted as part of the AAC.

Before any harvest activity between April 1st and October 31st, and any burns any time, contact the local fire department:

North Cedar Fire Department (Volunteer)
Postal Address: PO Box 74 Cedar BC 9X 1W1
Street Address: 2100 Yellowpoint Road
Business Phone #: 250-722-3122

Burning Permits are required between April 1st and October 31st, and notification outside this window is preferred. For further information, see appendix 12.

North Cedar is a volunteer, on-call department that answers to the local improvement district and has mutual aid agreements with neighbouring departments like North Oyster in the South, and Wellington & Cassidy to the West. 9-1-1 will access emergency services.

If no volunteers are available for a non-emergency call, contact the North Cedar Improvement District, located in the same building, at 250- 722-3711. Three staff members are on duty during regular business hours.

The North Cedar department and the Ministry of Forests (South Island District) are currently drafting an urban-wildfire interface protocol which will relate to forested residential parcels, like Wildwood. Fire preparedness and coordinating activities and equipment readiness with the fire department during the fire season will help avoid potentially catastrophic consequences to Wildwood and help meet legal and insurance requirements.

5.5. RECOMMENDATIONS:

5.5.1. Further Studies:

5.5.1.1. Animal Study:

The fauna in Wildwood has not been studied. Such a study would be of interest for at least two reasons:

- It would provide a baseline to which future studies can be compared.
- It would point out the location of any rare animal habitat at this time, and would make fine filter biodiversity management possible. The current approach is a coarse filter only, designed to provide all types of habitat in the long term, without special inventory or treatment for existing special habitat.

5.5.1.2. Higher Number of Sample Plots or 100% Cruise:

Since it is intended to provide a record of forest activities at Wildwood, increasing the number of permanent sample plots (currently a total of 30) especially in the smaller and more variable polygons is desirable. A 100% cruise should be considered, too, as it is obviously a very reliable way to track changes in the stands. This is a tally of all trees rather than a sampling exercise, and can be conducted using several less experienced field crew.

5.5.1.3. Stump Cruise:

This cruise would help recreate the original stand on Wildwood present before Merv Wilkinson started here. It would provide information on species, size, spatial distribution, volume etc., and would help approximate an original base line.

5.5.1.4. SEI Ground Survey:

The sensitive ecosystems in Wildwood have been inventoried using air photo interpretation as a coarse filter approach targeting larger polygons. Consequently the smaller sensitive ecosystems in Wildwood are not mapped. At this point it appears very likely that all the small wetlands and most of the forested stands in Wildwood are sensitive ecosystems. A ground survey is a much finer filter and would update the SEI.

5.5.1.5. Riparian Assessment Areas:

If Wildwood remains in the current zoning category, the 30m wide riparian area along any potentially fish-bearing water body will need an assessment prior to harvesting in those zones. This can likely be done by members of the EIS.

5.5.2. Wetland 6

This wetland is mapped as both a sensitive ecosystem and a wetland subject to the 15m reserve buffer for Development Permit Area 5 items. During the cruise, the presence of the wetland was not obvious, and a cruise plot with 50 alder trees (plot D5, trees over 15m high) is located in the middle of it. Seasonal water courses (Stream 1 and NCD 2) flow into it, and seasonally wet pockets certainly exist here. Currently, the entire polygon is netted out as inoperable.

It is clear that the air photo interpretation of polygon 5 as a wetland is problematic and it will need a ground survey to establish the true boundaries of this wetland, if it actually exists at all. This survey should be conducted during the growing season to allow

assessment of the annual vegetation and of the nature of the soils. Any wetland found here will then require the 15m DPA buffer.

5.5.3. Revisit current zoning:

The current zoning for Wildwood is Rural Residential RU4, which allows subdivision to 2ha parcels, agriculture, silviculture, aquaculture, and a number of other uses (RDN Bylaw 500, 1987, see appendix 2). The following are three reasons to reconsider the current designation:

1. Because Wildwood is not zoned as managed forest land (resource land), tighter restrictions apply to forestry, recreational development, and other resource management. This is particularly true for development permit areas 5 and 6.
2. Another consideration for revisiting the current zoning of Wildwood is the possible difference in annual property taxes.
3. If the current zoning is desired, a Riparian assessment will have to be completed by a qualified professional to satisfy Ministry of Environment regulations (Fish Protection Act, Riparian Assessment Area Regulation) before interventions can take place in the 30m wide Riparian Assessment Area. It is possible that this can be done by members of the Ecoforestry Institute.

5.5.4. Variation in Long Term Management:

5.5.4.1. Eastern vs. Western Portion:

The South arm of Quennel Lake bisects Wildwood and interferes with road access to the western portion of Wildwood. This situation could be used for different management scenarios.

One possibility that could be entertained on the western side is to simulate a burn as practiced by local natives pre-contact. This would likely be a low intensity ground fire when wildfire hazard is low, with the objective of thinning saplings and brush, and boost the herb layer in the understory. Fire control can be provided by pumped water from both the lake and wetland 8. This could be done in conjunction with, or subsequent to a harvest entry there. It should also involve an ethnobotanical expert, agreement from neighbours, and could be a joint project with elders of a local First Nation. The objective here would be to simulate a planned fire as conducted by First Nations into the late 19thth century, to favour certain forage plants for human and wildlife use.

Another option may be to concentrate harvest activities on the easily accessed eastern portion, and emphasize conservation on the isolated western portion. For the purposes of this plan, an annual cut of 20m^3 is recommended for the eastern portion.

5.5.4.2. Climate change:

Even if the milder predictions on climate change are only partially true, Wildwood will experience a shift to warmer and drier weather during the vegetation period and this will be the most critical test of adaptive management in Wildwood and elsewhere. Western redcedar, grand fir, red alder, broadleaf maple, and hemlock can be expected to decrease, while arbutus and Garry oak will likely increase. At this time, arbutus is not frequent, and Garry oak only occurs on nearby lands but not on Wildwood. However, Douglas-fir can be expected to remain the dominant tree species.

At present, the fairly intact ecosystems in Wildwood are probably more resilient than adjacent forests, but monitoring for signs of stress, unexpected mortality, and species shifts will likely be part of the future management here. Providing habitat for small mammals and birds should be sufficient to maintain a population of seed dispersers on site, and the low impact harvest entries promoted in this plan should minimize additional stress on this forest.

As stated under 'carbon budget' above, Wildwood's greenhouse gas and carbon budgets need to be investigated within the next 5 years.

5.5.5. Wildwood as Nucleus of a Protected Area Network:

Wildwood, but also some of its adjacent properties, constitute an accumulation of old growth, older forests, wetlands, and riparian areas, all sensitive ecosystems, now rare on eastern Vancouver Island. Together, they could provide corridors linking foreshore to forested uplands at the landscape level and provide a regional biodiversity and habitat centre. However, many of these lands are also valuable for residential development.

Part of the objective of this management plan is to make it more palatable for owners of local sensitive ecosystems to join a regional conservation project. Lands could be dedicated as parks, or owners could adopt a covenant that would allow small footprint land use, and potentially significant periodic revenue at much reduced economy-of-scale cost. Periodic harvest entries could be coordinated across several properties, as described by T. Banighen in Drengson & Taylor (1997). This could constitute a unique example of ecosystem sustainability at the landscape level in the long term.

At present, an unprotected corridor exists between Wildwood and Yellow Point Lodge. Yellow Point Lodge has a covenant on some of their forested land and have indicated a willingness to place a covenant on another part of their forest. An ecological reserve and two parks exist between Wildwood and Yellow Point Park. With the protection of 3 other properties this corridor could have some longer term protection.

The properties on Wildwood's southern boundary are forested with impressive old growth stands in good condition. One of these (a five acre parcel) is the best example of old growth Douglas-fir forest in Yellow Point. The other parcels have homes on them and are currently not for sale. Should they come up for sale a purchase should be considered. Depending on financial considerations a covenant could be placed on them and they could be resold.

The properties on Wildwood's western and northern boundaries are either for sale as building lots or have already been developed. One of these is Merv's childhood home.

5.5.6. Wildlife/Danger Tree Assessment:

Successful conservation management on naturally forested land will produce desired structural stages, including old trees with defects, and snags. These usually provide the best habitat, but are deemed a potential hazard to workers and the visiting public. Wildwood sees very regular visits by the public, and there are also periodic harvest entries. The Wildlife Tree Committee offers two assessment programs, one for recreational and park settings, the other for forestry work. Qualification in one does not qualify the assessor for the other. Particularly the qualification for assessment in BC parks is recommended as it considers the hazard rating of the tree, the disturbance rating by the expected use, and the nature of the threatened target, which makes it very useful for conservation purposes. It is recommended that the Ecoforestry Institute has a suitable candidate qualified to do both assessments. This will become more important if more conservation lands are acquired, and liability becomes an increasing concern.
Contact the Wildlife Tree Committee via its partners, Ministry of Environment, Ministry of Forests, or WCB. (http://www.for.gov.bc.ca/hfp/values/wildlife/wlt/contacts.htm).

5.5.7. Fire Preparedness:

Periodically contact the North Cedar fire department for updates on the wildfire interface plan for the area, and update fire preparedness for Wildwood specifically.

5.5.8. Ecoforestry Research

Wildwood offers a rare opportunity to do research to further develop ecoforestry concepts and practices. Examples of how this opportunity could be taken advantage of include:

- Identify potential and willing research partners and their roles and contributions
- Try and compare different tree selection approaches for harvest, document them and their consequences
- Research, try and compare different timber harvesting methods and machinery
- Research, try and monitor consequences of non-timber forest products harvesting and develop guidelines for ecologically sustainable harvesting
- Research and compare different forest use economics
- Test and evaluate ecoforestry theory and ideas from practitioners

6. REFERENCES:

1. B.C. Ministry of Forests. 1995. Biodiversity Guidebook. For. Prac. Br., Min. For., Victoria, B.C. Forest Practices Code of British Columbia guidebook. (http://www.for.gov.bc.ca/TASB/LEGSREGS/FPC/FPCGUIDE/BIODIV/chap2a.htm#ntv)
2. BC Legislature, 2004. Forest Planning and Practices Regulation, BC Reg. 14/2004. BC Legislature, Victoria, BC.
3. BC Legislature, 2004. Riparian Areas Regulation, BC Reg. 376/2004. Queen's Printer, Victoria, BC.
4. BC Legislature, 1996. Occupiers Liability Act. RCBC Chapter 337. Queen's Printer, Victoria, BC.
5. Bettina von Hoven, 1996 – Dissertation for B.Sc. Geography, University of Plymouth, Plymouth, UK.
6. Camp, Orville. 1984. Forest Farmer's Handbook: A Guide to Natural Selection Forest Management. Sky River Pr., Or.
7. Campbell, R. W., N. K. Dawe, I. McT. Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990a. *The Birds of British Columbia.* Volume One. Nonpasserines: Loons through Waterfowl. Royal British Columbia Museum, Victoria.
   ———.1990b. Volume Two. Nonpasserines: Diurnal Birds of Prey through Woodpeckers. Royal British Columbia Museum, Victoria. Campbell, R.W., N.K. Dawe, I. McT. Cowan, J.M. Cooper, G.W. Kaiser, M.C.E. McNall, G.E.J Smith. 1997. *The Birds of British Columbia.* Volume Three. Passerines: Flycatchers through Vireos. UBC Press, Vancouver.
8. Can. Climate Normals, 1961 – 1990. National Climate Data and Information Archive. Environment Canada. (Website: http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.html)
9. Drengson, A. and T. Taylor. Ecoforestry. New Society Publ., Gabriola Isl., BC. 1997.
10. Drengson, A. and T. Taylor. Wild Foresting. New Society Publ., Gabriola Isl., BC. 2008.
11. Earle, S. 2002. The Geology and Geological History of Vancouver Island. Dep't of Geology, Malaspina College, Nanaimo, BC. *(*via http://www.crd.bc.ca/watersheds/protection/geology-processes/geologicalhistoryVI.htm *)*
12. Electoral Area 'A' Official Community Plan, Bylaw No. 1240, 2001. Regional District of Nanaimo, Nanaimo, BC. *(*http://www.rdn.bc.ca/cms.asp?wpID=402). (Important for Wildwood are Appendix B, and maps 2, 5, and 6)
13. Flynn, S. 1999. Coastal Douglas-fir Ecosystems. B.C. Minist. Environ., Lands and Parks, Wildlife Branch. Victoria, B.C. 6pp.

14. FSC BC guidance - A Companion Document to the FSC- Regional Standards for British Columbia. 2005. FSC Regional Initiative to accompany the FSC regional certification standards for BC. Toronto, Ontario. (http://www.fsccanada.org/docs/1BD8555831CD7ECF.pdf)
15. Green, R.N, and K. Klinka. 1994. A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region. Land Mangement Handbook no. 28. Crown Publ., Victoria, BC.
16. Kotilla, W. 2001 Carnation Creek Community History Project. Restoration of Natural Systems Program Thesis Paper. University of Victoria, Victoria, BC.
17. Loomis, R. 2001. Wildwood, A Forest for the Future. 3rd Ed., Reflections Publ., Gabriola, BC.
18. Maser, C. 1988. The Redesigned Forest. R&E Miles, San Pedro, Ca.
19. McPhee, M., P.Ward, J. Kirkby, L.Wolfe, N. Page, K. Dunster, N. K. Dawe and I. Nykwist. 2000. Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands, 1993 – 1997. Volume 2: Conservation Manual. Technical Report Series No. 345, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia.
20. Regional District of Nanaimo. Land Use and Subdivision Bylaw No. 500, 1987. RDN Planning Dep't, Nanaimo, BC. For Wildwood zoning RU4: see Section 3.4.84, page 3-62. (https://www.onlinebrokerage.cibc.com/Customer/en/IEPage?Page=StockCentrePage#1359)
21. Shipway, David. 2010. Pers. comm. (for figure 1).
22. Stevens, Victoria. 1997. The ecological role of coarse woody debris: an overview of the ecological importance of CWD in B.C. forests. Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 30/1997. (http://www.env.gov.bc.ca/wld/documents/identified/App07-Interim.pdf)
23. Ward, P., G. Radcliffe, J. Kirkby, J. Illingworth, and C. Cadrin. 1998. Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands 1993-1997. Volume 1: Methodology, Ecological Descriptions and Results. Technical Report Series No. 320, Canadian Wildlife Service, Pacific and Yukon Region, B C. *(PDF version of document available on line from Ecocat.)*
24. Wildlife Tree Committee, 2006. Wildlife / Danger Tree Assessor's Course Workbook, Parks and Recreation Site Module. Victoria, BC. (http://www.for.gov.bc.ca/hfp/training/00016/Parks%20handbook%20Feb%202006%20Chapters%201-3.pdf)

7. APPENDICES:

7.1. MANAGEMENT PLAN MAP.

7.2. WILDWOOD ZONING DETAILS

7.3. REGIONAL DISTRICT OF NANAIMO – DEVELOPMENT PERMIT AREAS.

DPAs 5 and 6 apply to Wildwood

7.4. TIMBER CRUISE 2009

7.5. PLANT SURVEY

7.6. FUNGI SURVEY, 2004

7.7. WOODLOT SIMULATION REPORT

.rtf file that summarizes results of the simulation.

7.8. WILDWOOD TIMBER TYPES.

This table summaries species composition, age, volume, site index, and other stand attributes for Wildwood.

7.9. WOODLOT .LOT FILE:

can be used to run the Wildwood simulation on your computer if you have Woodlot for Windows.

7.10. BIODIVERSITY GUIDEBOOK EXCERPTS

Several Tables used to simulate desired forest characteristics for the Woodlot runs.

7.11. COARSE WOODY DEBRIS

This Appendix shows the summary of CWD by decay class from the 2009 survey, and also includes a table showing natural levels of CWD for various NTDs andBiogeoclimatic zones

7.12. NORTH CEDAR FIRE DEPARTMENT FLYER

Has contacts for Improvement District, burning permit windows, emergency process.

7.13. RARE RED / BLUE LISTED PLANT COMMUNITIES IN THE CDFMM,

based on Conservation Data Centre's Species & Ecosystem explorer.

7.14. ACRONYMS USED

7.15. LOG VALUES, VANCOUVER LOG MARKET, OCT.-DEC., 2009