Tree Farm License 57

Incremental Silviculture Strategy (Interim)

Iisaak Forest Resources Ltd.

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Forest Renewal BC

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Mr. Larry Sigurdson of the Ministry of Forests, Vancouver Forest Region, managed this project.

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Executive Summary

Purpose: This strategy is intended to help optimize the application of available funding for silviculture activities, over and above those required by law, that will enhance the quality and quantity of future timber and habitat supply on Tree Farm License (TFL) 57.

Objectives:

- Ensure options for future generations
- Enhance wildlife habitat supply and quality
- Restore ecosystem health
- Enhance the future value of wood fiber
- Expedite the transition into second growth
- Maintain and enhance old-growth characteristics
- Enhancing availability of mature stands

Habitat Quality Objectives:

1. Produce large diameter trees (70+ cm dbh) across all species with an emphasis on cedar to promote denning habitat and streamside stability;

2. Promote structurally diverse stands with variable spacing and density to develop canopy gaps, maintain connectivity, restore old growth characteristics, and increase forage species; and

3. Promote bio-diversity through the maintenance of mixed species stands.

Timber Quality Objectives:

Quality Class	% Estimate of Total Harvest	Species	Characteristics
Premium Logs:	10%	Cedar, large timber	60+ cm min. DBH, unpruned
		Cedar, clear, pruned	50+ cm min. DBH, pruned, min. 5 m log
		Cedar, clear, unpruned	Long rotation
	3%	Hemlock, large timber	60+ cm min. DBH, unpruned
		Hemlock, clear, pruned	50+ cm min. DBH, pruned, min. 5 m log
		Hemlock, clear, unpruned	Long rotation
	2%	Balsam, large timber	60+ cm min. DBH, unpruned
		Balsam, clear, unpruned	Long rotation
	<1%	Douglas-fir, large timber	60+ cm min. DBH, unpruned
		Douglas-fir, clear, unpruned	Long rotation
Sawlogs and other high value products:	70%	All species	30+ cm min. DBH

Silviculture Strategies:

1. Ensure all basic silviculture obligations prior to October 1, 1987 are met.
2. Juvenile space pure western redcedar and cedar-hemlock stands to 900 sph. Priority is for stands exceeding 5000 sph.
3. Juvenile space good and medium site (site index of 25 or better at BH 50) western hemlock stands. Priority is for stands exceeding 5000 sph.
4. Prune (to 5.5 meters) pure western redcedar and cedar-hemlock stands to meet timber quality objectives.
5. Prune spaced stands of western hemlock to 5.5 meters using either a single lift or a two-lift regime.
6. Fertilize stands shortly after free growing to expedite greenup.

Incremental Silviculture Program:

Year	Surveys[1]	Space	Prune	2nd lift Pruning	Conifer Release	Fertilize	Hydro-riparian spacing
1	1,600	120	120	20	250	50	50
2	1,600	120	120	20	250	50	50
3	1,050	120	120	20	250	50	50
4	1,050	120	120	20	250	50	50
5	1,050	120	120	140*[2]	250	50	50
Total	6,350	600	600	220	1,250	250	250

Incremental Silviculture Regimes and Investment Priorities:

Regimes	Area (ha/yr)	Quality	Habitat			Direct Jobs PD/ha	Direct Cost ($/ha)		Rank	
			Riparian	Wildlife	Old Growth			High	Med.	Low
Hydro-riparian Spacing	50	0	++	++	++	4.5	2300	✓		
Fertilization	50	0	0	+	+	0.1	380		✓	
Spacing	120	+	0	+	++	4.0	1200	✓		
Pruning	120	++	0	+	0	5.5	1800	✓		
2nd lift pruning	20	++	0	+	0	6.0	2200	✓		
Conifer Release	250	0	0	0	++	3.0	1200	✓		

Employment Opportunities:

Year	Surveys[3]	Space	Prune	2nd lift Pruning	Conifer Release	Hydro-riparian spacing	Fertilize	Total PDs	Silviculture Jobs[4]
1	--	420	720	120	750	225	5	2240	12.4
2	--	420	720	120	750	225	5	2240	12.4
3	--	420	720	120	750	225	5	2240	12.4
4	--	420	720	120	750	225	5	2240	12.4
5	--	420	720	840	750	225	5	2960	16.4
Total	--	1470	3600	1320	3750	1250	25	11920	66.2

[1] Includes prescriptions and planning.
[2] Includes previously pruned area.
[3] Includes prescriptions and planning.
[4] Assumes 180 person-days = 1 job (Source: Jobs and Timber Accord).

1.0 Introduction

Incremental Silviculture Strategies are part of a provincial suite of strategies designed to identify strategic opportunities and guide the optimum allocation of funding for discretionary silviculture activities designed to support the management goals of Timber Supply Areas (TSA's) and Tree Farm Licenses (TFL's) throughout British Columbia. The key principles of incremental Silviculture Strategies include:

1. Because the distant future cannot be foretold, the best and only course of action in managing the timber resource is that which minimizes risk and maintains options.

2. British Columbia's forests are important locally, provincially, nationally and globally and should be managed within this context.

3. Each generation of British Columbians becomes the steward of the province's forest resources and has a moral obligation to preserve this right for future generations (MoF 1998a).

This Incremental Silviculture Strategy has been designed to support the key principles through the identification of silviculture activities, over and above those required by law, that will enhance the quality and quantity of future timber and habitat supply on Tree Farm License (TFL) 57.

TFL 57, operated by Iisaak[5] Forest Resources Ltd. (Iisaak), covers approximately 87,664 hectares within Clayoquot Sound. Due to its unique natural and political history Clayoquot Sound has a high profile locally, nationally and globally. In response to these unique characteristics, Iisaak has developed and implemented a conservation-based approach to forest management within TFL 57. This approach focuses on maintaining and restoring ecosystem structure and function through maximizing the value derived from the timber harvested rather than maximizing the volume of timber harvested. Consequently, this Incremental Silviculture Strategy will address maintaining or increasing the value profile of managed forests; restoration of ecosystem structure and function; enhancement of wildlife habitat; increasing the availability of existing stands within developed drainages; and expediting the transition to harvest emphasis within second growth stands.

This strategy will not directly address potential future declines in available harvest volumes. Nonetheless, we recognize that although the strategies presented in this report are intended to increase timber quality, an associated environmental quality, they will also have an impact on future timber quantity.

[5] Pronounced *E-soc*.

This strategy is based on present information. It is recognized that the suggested treatment regimes may be modified following the completion of TFL 57's first Timber Supply Review in March 2002. These changes will be reflected in Version 2.0 of this Incremental Silviculture Strategy.

1.1 About the Interim Strategy

The terms of a service agreement between the BC Ministry of Forests (MoF) and Iisaak Forest Resources Ltd. (Iisaak) requires Iisaak to develop, and Forest Renewal BC (FRBC) to fund, an Incremental Silviculture Strategy (Type 1 Analysis).

This draft strategy was prepared through the following process:

1. Prior to the workshop session, Iisaak developed a presentation summarizing all available information relevant to an incremental silviculture strategy and identified opportunities to improve the future quality of the timber supply.

2. A workshop was held November 21, 2000 in Port Alberni, attended by Larry Sigurdson (MoF), Dean Stewart (MoF), Dean Fenn (MoF), Brian Retzer (MoELP), and led by Cindy Hazenboom and Greg Rowe of Iisaak Forest Resources Ltd. Participants reviewed, discussed and expanded on the incremental silviculture goals, issues and opportunities identified in the presentation. The outcomes of the workshop session included a better understanding of the potential silviculture regimes (with priority listing), and the identification of gaps within the current inventory information.

3. A Draft 1.0 this Incremental Silviculture Strategy was distributed to workshop participants for review on January 31, 2001.

4. A Draft 1.3 of this Incremental Silviculture Strategy was distributed to workshop participants for review on March 23, 2001.

1.2 Acknowledgements

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Dean MGeough, RPF, Silviculture forester

1.3 Higher Level Goals and Objectives

This section documents higher level goals and objectives relevant to the incremental silviculture strategy of Tree Farm License (TFL) 57.

1.4 Provincial Goals and Objectives

The *Incremental Silviculture Strategy For British Columbia (Interim)* states the Ministry of Forests' provincial level strategy. The following goals and objectives of the provincial strategy were considered in the development of the TFL 57 Incremental Silviculture Strategy.

1.4.1 Provincial Goals

Fundamentally, government's goals can be characterized as:

- Sustainable resource use;
- Community stability;
- A strong forest sector (MoF, 1998a).

1.4.2 Provincial Objectives

All Incremental Silviculture strategies must be consistent with higher level plans and the Forest Practices Code. Until provincial targets for timber quality and quantity are established, management unit strategies are to consider the following interim provincial strategic objectives (MoF, 1998a):

Objective 1: Maintain current harvest levels as long as possible without creating disruptive shortfalls in future timber supply.

Objective 2: Create a long-term timber supply capable of supporting a steady long term provincial harvest level similar to current levels.

Objective 3: Minimize the interim shortfall in provincial harvest anticipated before a steady long-term timber supply is achieved.

Objectives 4: Create a long-term timber supply which will enable the timber quality profile of future harvests to be the same or better than the current profile.

It is recognized that not every management unit has the same capability to contribute to the provincial strategy's interim objectives. It is also recognized that these objectives may not be attainable at current funding levels. The purpose of

the objectives is to provide general guidance to the application of discretionary silviculture funds.

1.4.3 Major Silvicultural Strategies

The following major silviculture strategies have been identified by the Ministry of Forests (1998a):

- Increase the use of alternative silviculture strategies and commercial thinning.
- Achieve earlier green-up of harvested areas.
- Increase regenerated stand volumes.
- Eliminate all pre-1982 good and medium site backlog NSR and all 1982 to 1987 backlog NSR.
- Initiate a long rotation quality management program for stands where harvesting must be delayed.

It is recognized that the achievement of working targets will require the implementation of both silviculture and non-silviculture strategies.

1.5 Regional Objectives

Regional Incremental Silviculture objectives have been defined as:

- Ensure a long term sustainable harvest levels which approximate the current harvest value and volume levels and that produces a diversified mix of products necessary to create and maintain sustainable forest employment.
- Balance treatments that enhance growth and yield such as fertilizing, spacing and forest health activities with those that increase the value of the wood such as pruning.
- Utilize incremental Silviculture treatments to contribute to sustainable management of non-timber values at the landscape level.

1.6 Higher Level Plans

Formal higher level plans are strategic plans defined by the Forest Practices Code. Currently there are no approved higher level plans covering the Clayoquot Sound Area.

1.7 Other Plans

The Clayoquot Sound area has many unusual features (both political and natural) that provide a high degree of profile both locally and globally including a recent designation as a UNESCO Biosphere Reserve. As a result, Clayoquot Sound has been treated differently than the rest of Vancouver Island at a strategic planning level. The Commission on Resources and Environment (CORE) process that resulted in the Vancouver Island Land Use Plan does not apply to Clayoquot Sound. Land use in Clayoquot Sound is governed by the 1993 Clayoquot Sound Land Use Decision. This decision has resulted in a number of associated plans, documents and agreements being produced to guide land use including: Interim Measures Agreements, the Central Region Board (CRB), the Reports of the Scientific Panel for Sustainable Forest Practices in Clayoquot Sound, interim watershed plans, Strategic Assessment of Developed Watersheds in Clayoquot Sound, and Weyerhaeuser's Tree Farm License 44 Management Plan.

1.7.1 Interim Measures Agreements

Three "Interim Measures Agreements" between the Hawiih (Hereditary Chiefs) of the Nuu-chah-nulth Central Region Tribes (Ahousaht, Hesquiaht, Tla-o-qui-aht, Toquaht and Ucluelet) and the Province of British Columbia have been signed. These agreements acknowledged that the Ha'wiih of the First Nations have the responsibility to conserve and protect their traditional territories and waters for generations which will follow. Consequently, joint management of the Nuu-chah-nulth traditional territory's lands and resources was granted until the completion of treaty negotiations. The parties agreed that resource conservation would be achieved through the incorporation of the Clayoquot Scientific Panel recommendations and First Nation's traditional ecological knowledge.

Specific resource management objectives listed in the 2000 Interim Measures Extension Agreement include:

- restore and enhance levels of fish and wildlife and damaged stream and forest areas within Clayoquot Sound;
- to assess the implementation of sustainable ecosystem based management in Clayoquot Sound;
- to continue working towards viable, sustainable resource industries including forestry, fisheries, tourism, mariculture and aquaculture;
- continue to work towards local economic initiatives that will enhance community benefits;
- ensure that the visual attractiveness and ecological integrity is given high priority in any proposed plans regarding resource extraction or development in Clayoquot Sound;
- respect and protect aboriginal uses of resources in Clayoquot Sound;
- encourage respect for aboriginal heritage

1.7.2 The Central Region Board

The Central Region Board (CRB) was formed as a result of the 1994 Interim Measures Agreement (IMA) between the Provincial Government and the *Ha'wiih* (Hereditary Chiefs) of the Nuu-chah-nulth people. This board is composed equally of Nuu-chah-nulth and non Nuu-chah-nulth members. The CRB has a number of objectives relating to sustainable resource management, a sustainable forest industry, treaty settlement options, social stability, and economic development in the Clayoquot Sound area. The CRB has a mandate to review and provide recommendations to the government approval agencies on strategic and operational plans, as defined in the Forest Practices Code (FPC) Act. The Objectives of the CRB include:

- Promote sustainability, economic development, and diversification of local communities.
- Provide a viable, sustainable forest industry.
- Respect the Interim Measures Agreements and their implementation.
- Reduce the 70% unemployment levels within the Aboriginal communities.
- Enhance fish and wildlife and restore damaged streams and forest areas.
- Assess compliance with world class forest standards, such as the Scientific Panel recommendations and Forest Practices Code.
- Ensure the maintenance of visual values and ecological integrity is given high priority in any proposed resource extraction or development.
- Work towards reconciliation between environmentalists, labor, industry, First Nations, recreational users, governments, and all others with concerns in Clayoquot Sound.
- Encourage respect for aboriginal heritage.

Iisaak recognizes the CRB as an important part of the referral process for this Incremental Silviculture Strategy.

1.7.3 The Reports of the Scientific Panel for Sustainable Forest Practices in Clayoquot Sound

After years of controversy over the progressive clearcutting of Clayoquot Sound's forests, Premier Harcourt assigned a blue ribbon panel of scientists and aboriginal elders the task of making forest practices in Clayoquot Sound, "not only the best in the province, but the best in the world" (CSSP, 1995). The recommendations of the *Clayoquot Sound Scientific Panel* (CSSP), were adopted by government in 1995.

The CSSP was designed specifically for the ecosystems of Clayoquot Sound and the cultural values of those who reside within it. The recommendations recognize

three broad classes of values: ecological services, such as improving air quality and regulating hydrology; species; and spiritual and cultural values.

The fundamental difference between the CSSP and conventional forest management is the abandonment of clear-cutting and the adoption of a variable retention system (VRS) approach to harvesting timber. The VRS approach allows for timber to be harvested while maintaining the structure and function of the forest ecosystem. This ecosystem- based approach to forest management focuses on the values to be maintained rather than the timber to be removed (CSSP, 1995).

The Ecosystem Management Objectives of the CSSP include:

- Protecting areas and sites significant to First Nations.
- Maintenance of watershed integrity.
- Ensuring managed forests support and maintain biological diversity, structural diversity, and ecological function.
- Maintaining scenic, recreational, and tourism values.
- Providing a sustainable flow of ecosystem products.

1.7.3.1 Interim Watershed Plans

The Clayoquot Sound recommends a comprehensive planning process at the watershed level.

These plans are prepared in accordance with the Criteria for Interim Watershed Planning as developed by the Clayoquot Sound Planning Committee (December 15, 1997). The generation of these plans involves the use of inventory data and GIS approaches developed by the Clayoquot Sound Planning Committee. These plans include reserves to protect hydroriparian resources, sensitive soils, unstable terrain, recreation values, red and blue listed ecosystems and ecosystem representation. Cultural values are dealt with through discussions with First Nations. Wildlife values are managed through site level habitat assessments and plans. Scenic values are identified in accordance with the Clayoquot Sound Scenic Corridors plan.

Currently there are four watershed plans nearing completion. These plans have been referred to both the Central Region Board and to the Clayoquot Sound Technical Planning Committee. Although these plans are not a higher level plan under the FPCBC Act, they are an important part of the CSSP planning framework and will support the development of this strategy through the identification of potential treatment areas.

1.7.4 Strategic Assessment of Developed Watersheds in Clayoquot Sound

A "Strategic Assessment of Developed Watersheds in Clayoquot Sound" was undertaken by Chapman Geoscience Ltd. in 1998 in order to identify harvest opportunities in developed drainages during the period while watershed plans were being completed. This report determined the present status of old growth and protected old growth with respect to Clayoquot Sound Scientific Panel (CSSP) recommendations and considers rate of cut by watershed unit. Chapman's analysis has been used to identify areas where there are opportunities for the achievement of earlier green-up in previously harvested areas.

1.7.5 Management Plan

In July 2000 the Acting Deputy Chief Forester accepted Weyerhaeuser's Tree Farm License 44 Management Plan as the Management Plan in effect for TFL 57 until the completion of Iisaak's first management plan in June 2002.

1.8 Iisaak's Goals and Objectives

Iisaak is a forest services company built on aboriginal values and respect for a wide range of forest values. The company manages Tree Farm License 57 (TFL 57), covering approximately 87,664 hectares within Clayoquot Sound. TFL 57 and its associated Timber Licenses are interdispersed with Tree Farm License 54, the Arrowsmith Timber Supply area, Pacific Rim National Park, Strathcona Provincial Park and other protected areas.

In response to the unique operating environment within Clayoquot Sound, Iisaak has developed a conservation-based approach to forest management. Iisaak defines *conservation-based forestry* (CBF) as practices and operations designed to achieve conservation as a primary management objective. Conservation-based forestry is designed to protect the environment while meeting local and global social and economic needs. Iisaak's conservation-based approach includes the following goals:

- Implementation and monitoring of the Clayoquot Sound Scientific Panel's results;
- Development and maintenance of continuous reserve networks;
- Maintenance of old-growth structure and age distribution through the implementation of variable retention silvicultural systems; and
- Enhancing the value of wood fiber
- Achieving Forest Stewardship Council (FSC) Certification
- Increasing First Nations participation in the forest sector

- Expediting the transition into second growth
- Enhancing availability of mature stands
- Restoring ecosystem health
- Achieving a sustainable rate-of-cut
- Maintaining and enhancing old-growth characteristics
- Developing markets for environmental services
- Protecting and enhancing wildlife habitat
- Fostering community stability
- Ensuring options for future generations

Iisaak's conservation-based ecosystem management approach also includes maximizing product values through salvage and value added manufacturing.

2.0 Inventory Synopsis

Tree Farm License 57 is and the associated timber licenses cover approximately 87,664 hectares within Clayoquot Sound on the west coast of Vancouver Island. The TFL and its associated Timber Licenses are dispersed throughout the Clayoquot Sound area and interdispersed with Tree Farm License 54, the Arrowsmith Timber Supply area, Pacific Rim National Park, Strathcona Provincial Park and other protected areas (Appendix 2).

The diverse ecosystems of Clayoquot Sound have been shaped by both major stand initiating disturbances and minor, within stand disturbances (CSSP, 1995). In combination these disturbance types result in a structurally and biologically diverse environments (CSSP, 1995). TFL 57 is located within Natural Disturbance Type 1 (NDT1) (Province of British Columbia, 1995b). NDT1 is characterized by ecosystems with rare stand initiating events.

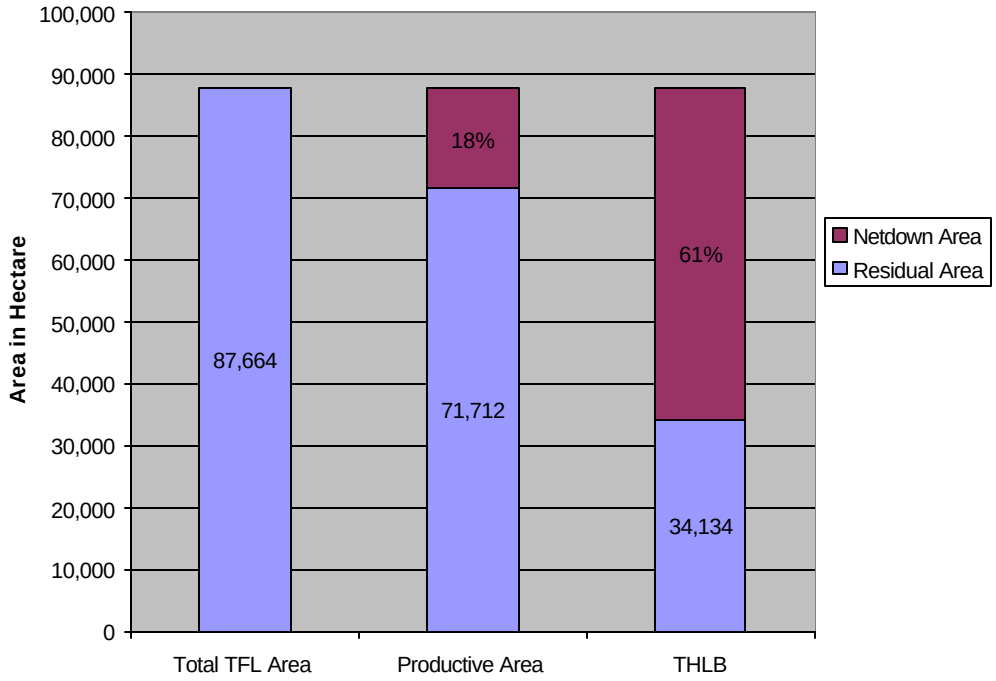
Most of the forested area within TFL 57's timber harvesting landbase (THLB) lies within the Costal Western Hemlock (CWH) biogeoclimatic zone. The CWH includes all forested areas between sea level and 900 meters in elevation. These forests are dominated and by western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuga plicata*). Other species include amabalis fir (*Abies amabalis*), yellow cedar (*Chamycyparis nootkatensis*), Sitka spruce (*Picea sitchensis*), Douglas-fir (*Psuedotsuga menziesii*) and red alder (Alnus rubra bong).

To a lesser degree, the THLB also includes the Mountain Hemlock (MH) biogeoclimatic zone. This ecosystem type occurs between 900 and 1200 meters in elevation. This zone is characterized by the replacement of western hemlock with mountain hemlock (*Tsuga mertensiana*). Amabalis fir, yellow cedar and western redcedar are also common.

2.1 Land Area

As depicted in Figure 1, approximately 71, 712 hectares of the total TFL 57 area is considered productive. The timber harvesting landbase (THLB) was determined by reducing the productive forest area by allowances for Meares Island, sensitive sites, non-timber resources and additional reserves to achieve 40% old growth forest[6] (140 years and older) in each watershed unit. The resultant THLB is approximately 34,134 hectares.

Figure 1 :Tree Farm License (TFL) 57 net down process to determine the timber harvesting landbase (THLB)



At the present time Iisaak is focusing it's timber harvesting and silviculture activities on developed watersheds[7]. Prior to the completion of the watershed planning process the CSSP recommends that harvesting activities be limited to developed watersheds. These areas include approximately 65% of the THLB. The remaining area of TFL 57 is, at the present time, being managed primarily for other resource values as recommended by the CSSP.

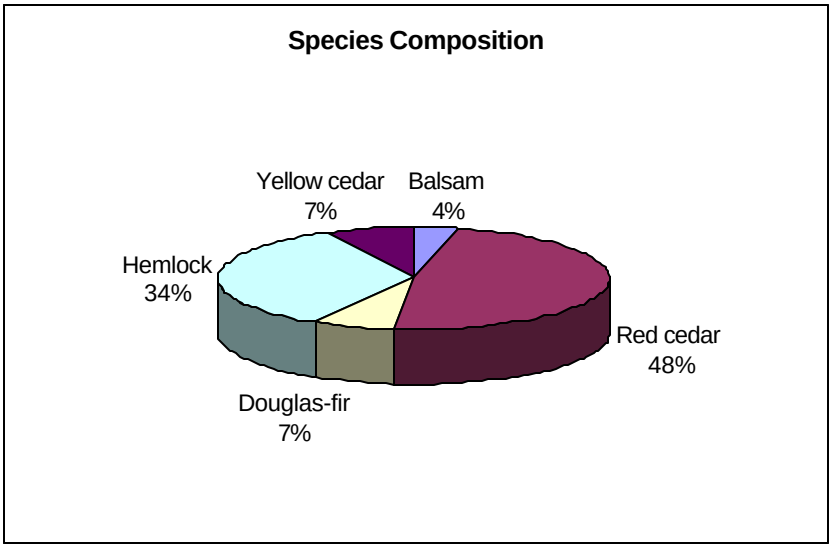
[6] The Clayoquot Sound Scientific Panel requires a minimum of 40% interior old growth within each watershed unit to be reserved.

[7] Watersheds with greater than 2% of their area disturbed by human activity (Chapman, 1998)

2.2 Tree Species Composition

Most of the forested lands within TFL 57 lie within the Coastal Western Hemlock biogeoclimatic zone, with a small component in the Mountain Hemlock zone. Western redcedar accounts for approximately 48% of the species composition followed by western hemlock at 34%.

Figure 2: Species composition within the timber harvesting landbase (THLB) of Tree Farm License (TFL) 57



2.3 Allowable Annual Cut

Past harvesting activities were concentrated during the period between 1960 and 1990. In the 1980's more than 1000 hectares per year was clearcut in Clayoquot Sound (CSSP, 1995). In the 1990's the harvest level dropped to approximately 600 hectares per year (CSSP, 1995). Due to ongoing conflict, harvesting levels have steadily declined over the past decade. Currently, the allowable annual cut (AAC) is a volume target, expressed in cubic meters, set as an upper maximum by the Chief Forester's determination.

2.3.1 Clayoquot Sound Scientific Panel Recommendations

The CSSP recommends a new approach to AAC. The CSSP recommendation 7.1 states:

> *"Adopt an ecosystem approach to planning, in which the primary planning objective is to sustain the natural diversity of the Clayoquot Sound region. The flow of forest products must be determined In a manner consistent with the objectives for ecosystem sustainability. This entails abandoning the specification of AAC as an input to local planning."*

The CSSP also recommends the replacement of AAC with an area based rate-of-cut.

> *The rate-of-cut and allowable annual cut (AAC) are distinct. AAC is expressed as volume and, although currently an input, should be an output of the planning process based on the area that can be cut under rate-of-cut provisions. The determination of AAC also considers operational and social factors, such as access development, employment, and community stability. Rate-of-cut is based on area and is an input to the planning process, constrained by hydrological, fisheries, and other considerations.* (CSSP, 1995)

On July 6, 1995 the Ministry of Forests news release read: "harvesting levels will be based on watershed planning, rather than on a predetermined AAC".

In May 2000, Iisaak proposed replacing the AAC determination as the driver of harvest levels within TFL 57 with an area-based harvest schedule derived from the outcomes of the planning process recommended by the Clayoquot Sound Scientific Panel. This planning process is based on the protection of ecosystem structure and function as well as ensuring protection of social values associated with environmental condition. Iisaak's proposal to reconcile the conventional AAC determination process with the recommendations of the CSSP has been approved for further development by government and is currently being addressed through a Results-based Pilot Project.

2.3.2 Current Administrative Adjustment

The present allowable annual cut[8] (AAC) is based on the analysis used to determine the last AAC for the Clayoquot working circle portion of TFL 44 (documented in the Ministry of Forests Rationale for AAC Determination - Tree Farm License 44, January 1, 1998)[9]. An upper maximum of 123,800 m^3 per year was assigned to TFL 57 based on an analysis of both schedule A and schedule B lands (Table 1)[10]. This analysis included a method to approximate the impact of impact of Clayoquot Sound Scientific Panel Recommendations on the AAC.

The Rationale for AAC Determination, Tree Farm License 44, (MoF, 1998b) states:

> *"The harvest level determined is not a substitute for local planning in Clayoquot Sound, rather it identifies a maximum level of harvesting activity to help provide confirmation of sustainability for harvesting the TFL. The timing and placement of the harvest will be subject to detailed watershed plans which have yet to be developed, as well as the implementation of numerous other recommendations by the Panel."*

It was noted that future AAC determinations could incorporate additional watershed inventory and planning information as it became available. The methodology for this determination included a calculation of average area available for harvesting. It did not produce a harvest schedule of volume per year over a planning horizon or sensitivity analyses commonly used to identify incremental silviculture opportunities and priorities.

Table 1: Summary of administrative adjustment for Tree Farm License 57

Description	AAC (m^3/yr)
Schedule "A" Lands	12 628
Schedule "B" Lands	
▪ SBFEP	8 265
▪ Licensee	102 907
Total TFL AAC	123 800

[8] The current 'AAC was determined through the "Administrative Adjustment" dated January 31, 2000.
[9] The administrative adjustment is not considered a determination under section 8 of the *Forest Act*.
[10] The upper maximum AAC of 123,800 was determined based on a "flatline" calculation which shows no variation over time.

3.0 Harvest Forecast

Over time Iisaak's conservation-based approach will result in structurally diverse forests through the maintenance of uneven age class structures within contiguous old growth. Since the diversity of forest fauna is governed by the species and structural diversity of the vegetation (CSSP, 1995), it is expected that this approach will meet both habitat and timber value objectives.

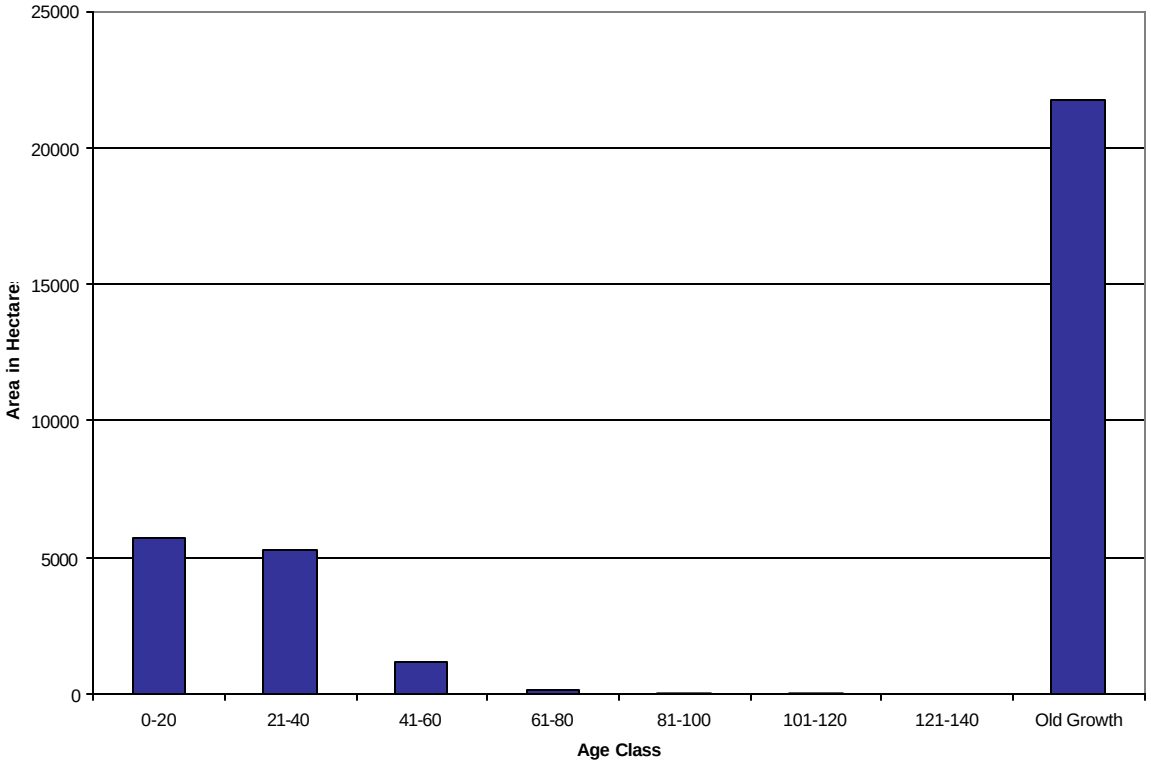
It is expected that the transition into second growth stands will occur in approximately 70 years. Iisaak's goals include expediting the transition process wherever possible. Potentially constraining issues contributing to a timely transition into second growth include the current age class distribution; forest cover; and old growth constraints[11].

[11] No Backlog areas were deliberately omitted from this list since none have been identified.

3.1 Age Class Distribution

On an area basis, the majority of the timber within TFL 57 is older than 140 years[12]. At the present time Iisaak is focusing it's timber harvesting and silviculture activities on previously developed drainages. These areas include approximately 65% of the THLB[13].

Figure 3: Current age class distribution within the timber harvesting landbase (THLB) of Tree Farm License 57



As shown in figure 1, approximately 5100 hectares are 1-20 years old, 4950 hectares are between 21-40 years old and approximately 1000 hectares are 41-60 years old. As a result, a large age class gap exists between 40 and 140 years. Silviculture treatments in these areas will be designed to:

1) Expedite the transition to second growth forests;
2) Increase timber value;
3) Enhance wildlife habitat attributes; and
4) Restore ecosystem structure and function.

[12] This assumption is based on the harvesting history and does not account for natural disturbances resulting in early seral stages.

[13] The remaining area of TFL 57 is, at the present time, being managed primarily for other resource values.

Since many previously harvested areas are within sensitive zones, potential silviculture regimes in these areas will address mutual goals of both habitat enhancement and increasing future timber value.

3.2 Old Growth

Iisaak's conservation-based approach to harvesting creates structural diversity and enhances habitat values. For example, in Iisaak's 2000 operations patch size ranged from 0.03 hectares to 0.7 hectares. The retained trees and forest patches create forest characteristics similar to patterns and remnant structures occurring after natural disturbances. Although trees are removed, old growth structure and function is maintained across the landscape. Iisaak's initial timber supply analysis indicates that the forest management constraints applied to the area will actually significantly increase the proportion forest exhibiting old-growth structure over time.

Since stand initiating events are rare in the wet coastal ecosystems of Clayoquot Sound, the CSSP recommends that a minimum 40% of age class 8 and 9 be maintained within each watershed. The CSSP considered this figure to be the level at which natural ecosystem functioning could be maintained.

Due to heavy harvesting activities this criteria is expected to restrict access to timber within the Kennedy Lake Watershed unit. This is an accessible watershed unit that would provide significant opportunities to expedite the transition into 2nd growth and enhance old growth characteristics including habitat value and supply.

Given the range of age classes, potential treatments include:

1. Commercial thinning in stands between the ages of 40-60 years.

2. Commercial thinning and/or fertilization in stands between 20-40 years.

3. Juvenile spacing and pruning treatments in the 0-20 year age class to facilitate future commercial thinning and/or harvesting.

3.3 Forest Cover

TFL 57 was formally established in June 2000. Prior to the tenure transfer from MacMillan Bloedel (now Weyerhaeuser) forest cover analyses were conducted for the area now included in TFL 57. A forest cover analysis specific to TFL will be included in TFL 57 Management Plan No. 1 to be completed in June 2002.

Past harvesting patterns (progressive clear cutting in many areas) and operational experience indicate that green up ages are more limiting than adjacency, providing the

percent old growth requirement is not limiting. In areas where green up is limiting, the application of fertilizer will achieve earlier green up in progressively clearcut areas will increase the availability of old growth in previously developed drainages. In areas where old growth is limiting harvesting can take place in second growth stands. Consequently, it is imperative for the licensee to expedite the transition into second growth stands.

3.4 Backlog NSR

No backlog areas have been identified.

4.0 Restoration of Ecosystem Structure and Function

Forest management practices in Clayoquot Sound have changed considerably since the introduction of the Forest Practices Code and the CSSP. However, due to the progressive clearcutting of the past, there are many opportunities for activities designed to restore ecosystem structure and functioning, restore riparian areas and enhance wildlife habitat.

4.1 Riparian Restoration

The Forest Practices Code Riparian Area Management Guidebook (Province of British Columbia 1995a) defines riparian habitat as "areas that occur next to the banks of streams, lakes and wetlands and includes both area dominated by continuous high moisture content, and the adjacent upland vegetation that exerts influence on it". The objectives for these areas are :

- Minimize or prevent impacts on stream dynamics, aquatic ecosystems and water quality of all streams lakes and wetlands; and
- Minimize or prevent impacts on the diversity, productivity and sustainability of wildlife habitat and vegetation adjacent to streams, lakes and wetlands with reserve zones where high wildlife values are present.

The Riparian Area Management Guidebook (Province of British Columbia 1995a) that practices within the riparian zones should:

- Reduce the risk of windthrow
- Retain important wildlife attributes (wildlife trees, large trees, nesting sites, structural diversity, coarse woody debris and food sources) characteristic of natural riparian ecosystems.
- Retain sufficient vegetation along streams to provide shade, reduce bank microclimate changes, and maintain natural channel and bank stability, as well as maintain important attributes for wildlife; and

- Retain key wildlife attributes characteristic of natural riparian ecosystems adjacent to lakes and wetlands.

Hydroriparian ecosystems play a critical role in ecological functioning. The CSSP (1995) describes the hydroriparian ecosystem as the "skeleton and circulatory system of the landscape". Healthy riparian areas and streams serve as reservoirs of bio-diversity, animal habitat, corridors, wood products, forage, special forest products, energy, and nutrient capture, filtering and cycling, the input of woody debris and sediments, the provision of favorable micro-site and microclimate conditions, recreation and helping to ensure good water quality conditions (Johnson personal communications, Chan 1997).
Prior to the introduction of the Forest Practices Code and the CSSP logging activities often extended right to the stream edge. This practice has resulted in even aged stands that lack the structural diverity required to support fully functioning hydroriparian ecosystems.

Potential restorative treatments within previously harvested riparian ecosystems include:

- Modified spacing densities to create clumps of trees/shrubs at varying distances. The creation of large gaps in the canopy can enhance and maintain forage species growth.
- Fertilization to promote shrub growth.
- Pruning to promote additional light and extend the time of open canopy.
- Planting/releasing of conifers (cedar preferred) along stream banks for streamside structural stability.
- Spacing to promote deer and elk forage in dense second growth stands, particularly at the periphery of winter range polygons.
- Selective entry into "dysfunctional" riparian management areas (RMAs) where short and long term habitat benefit can be clearly demonstrated.

Riparian restoration prescriptions will be developed in conjunction with up-slope thinning prescriptions. This could present opportunities for selective entry into riparian reserve zones (RRZ) as described above.

Riparian silviculture is very site specific and variable within a relatively small area. Standardized prescriptions that have been developed to address a variety of site-type/variant scenarios available are available from the Habitat branch of the Ministry of Environment Lands and Parks (MELP). Criteria for follow-up monitoring will be based on treatment objectives rather than predetermined statistics.

4.2 Habitat Enhancement

The CSSP (1995) suggests that managing for habitat is a surrogate for protecting and managing species. The structural diversity of old-growth forests, with their abundant coarse woody debris, snags, uneven canopies, gaps, and mix of tree ages, supports ecosystem function and provides habitat for many species of plants, animals, and

microorganisms (CSSP, 1995). The CSSP (1995) emphasizes retaining trees and patches of forest in managed forests to enhance and protect a variety of values and ecosystem components. Since Iisaak's conservation-based approach maintains old growth legacies, coarse woody debris, and promotes structural diversity, habitat enhancement and supply are considered complementary to harvesting activities.

In support of creating old-growth structure and habitat quality and supply silviculture treatments that enhance value (spacing, pruning, fertilization, and commercial thinning) will first be implemented. Structural diversity will be developed at the harvesting stage through the removal of single trees and patches, active wildlife tree recruitment and conservation of coarse woody debris.

Noted exceptions this practice would be in areas that are identified through the watershed planning process as critical to wildlife. In these areas stand treatments could include:

- variable spacing regime (similar to that used in hydroriparian restoration)
- variable density regime (similar to that used in hydroriparian restoration)
- spacing of mixed species
- maintenance of 10-15% red alder.

5.0 Incremental Silviculture Strategy

The following incremental silviculture strategy has been designed to:

- Ensure options for future generations
- Enhance wildlife habitat supply and quality
- Restore ecosystem health
- Enhance the future value of wood fiber
- Expedite the transition into second growth
- Maintain and enhance old-growth characteristics
- Enhancing availability of mature stands

Approximately 48% (Figure 2) of the TFL 57 THLB is composed of western redcedar. Due to the large component of western redcedar within the THLB, this strategy emphasizes enhancing both the future timber value and the habitat value of this species. Large diameter cedar trees provide valuable bear denning habitat and streamside stability in addition to being important contributors to coarse woody debris. Old growth western redcedar also has high timber value due to its aesthetically pleasing qualities and its resistance to decay. Future demand and price for western redcedar is expected to increase due to its unique intrinsic qualities and the lack of dominant competitors in the world market place (Hanldey 1988). With consideration to these factors, silvicultural treatments that enhance old growth characteristics (timber and habitat values) of second growth western redcedar will be prioritized.

5.1 Habitat Quality and Supply Objectives

Habitat quality objectives are to produce:

4. large diameter trees (70+ cm dbh) across all species with an emphasis on cedar to promote denning habitat and streamside stability;

5. structurally diverse stands with variable spacing and density to develop canopy gaps, maintain connectivity, and increase forage species; and

6. mixed species stands to promote bio-diversity (including retaining species such as *Acer*, *Cornus*, *Prunus*, etc. during harvesting.)

5.2 Timber Quality Objectives

Timber quality objectives are to:

1. Produce sawlogs of 30+ cm in diameter across all species.

2. Produce at least 15% premium logs of 50+ cm (pruned) and 60+ cm (unpruned) in diameter across all species.

3. Prescribe all treatments assuming the first entry will occur within the next 100-175 years for pure and mixed stands of amabalis fir, coastal Douglas-fir, western hemlock, and western redcedar. The estimated time to first entry was based on the following considerations:
   - Pure stands are unlikely;
   - Cedar requires approximately 175 years (Handley 1988) for the desired thujaplicin[14] content to develop;
   - it may not be feasible to harvest other species and leave cedar until a subsequent entry.

   Alternately, in mixed stands containing off-site Douglas-fir, gradual species removal can be implemented through commercial thinning entries (McGeough, 2001). This strategy would include the removal of Douglas-fir once it reaches a merchantable size, releasing the hemlock, redcedar and amabalis fir. The western hemlock and amabalis fir can be removed in a subsequent commercial thinning releasing the redcedar and allowing it to develop high quality wood.

   Details around subsequent stand re-entries under variable retention systems will be addressed following the completion of a long-term management plan.

4. Production of clear wood on pure western redcedar stands[15] and pure western hemlock stands over a site index of 25 (BH 50) will be accomplished by:
   - Spacing to final stand density of 400-450 stems per hectare (Oliver et al. 1988)
   - Pruning all stems to a height of 5.5 meters. Stands are to be prioritized to keep the knotty core below 10 cm DBH, and in no instances should pruning proceed when the average DBH is greater than 20 cm (Arrowsmith ISS).

[14] Thujaplicin is an extractive found in the heartwood that makes the wood more decay resistant. At 175 years the thujaplicin level is at approximately 70% of the level found in 400-500 year old cedar.
[15] In order to achieve rapid diameter growth and avoid tapered stems, western red cedar should be grown in even aged pure stands, or with species of similar shade tolerance such as western hemlock (Oliver et al. 1988).

Pruning may occur with two lifts to keep the knotty core around the 10 cm target. The first lift will be to 2.5 m followed by the second lift to 5.5 m.

5. To produce clear wood on selected mixed stands of western hemlock and western redcedar by pruning to 5.5 m. Roadside stands will be the preferred stands for pruning since they have low treatment costs.

5.3 Summary of Objectives by Period

Table 2: Summary of short term, medium term and long term objectives

Short term (1-20 years)	Mid term (21-110 years)	Long term (110+ years)
▪ green up ages ▪ juvenile spacing ▪ pruning ▪ ecological restoration ▪ early phases of second growth transition (CT)	▪ second growth transition ▪ timber quality/value towards the end of the period ▪ second growth transition (CT) ▪ accelerate development of old growth characteristics within second growth stands	▪ timber quality/value ▪ maintain productivity of developed sites ▪ maintain habitat quality and supply

Log product objectives (Table 3) for TFL 57 have been suggested to achieve the premium log grades as they exist today.

Table 3: Log product objectives for Tree Farm License 57

Quality Class	% Estimate of Total Harvest	Species	Characteristics
Premium Logs:	10%	Cedar, large timber	60+ cm min. DBH, unpruned
		Cedar, clear, pruned	50+ cm min. DBH, pruned, min. 5 m log
		Cedar, clear, unpruned	Long rotation
	3%	Hemlock, large timber	60+ cm min. DBH, unpruned
		Hemlock, clear, pruned	50+ cm min. DBH, pruned, min. 5 m log
		Hemlock, clear, unpruned	Long rotation
	2%	Balsam, large timber	60+ cm min. DBH, unpruned
		Balsam, clear, unpruned	Long rotation
	<1%	Douglas-fir, large timber	60+ cm min. DBH, unpruned
		Douglas-fir, clear, unpruned	Long rotation
Sawlogs and other high value products:	70%	All species	30+ cm min. DBH

5.4 Incremental Silviculture History

Table 4: Incremental Silviculture History [16] of Tree Farm License 57

Treatment	TSR1 Status (1998)	
	Incorporated in Timber Supply Analysis	Not Incorporated in Timber Supply Analysis
Backlog	Backlog NSR balance is zero.	
Conifer Release/ Spot fertilization		±200 ha/yr of brushing with spot fertilization has occurred since 1998 for Free Growing purposes.
Conversion/ Conifer Release		±900 ha deciduous converted to conifer forest (past 3 years).
Commercial Thin		0
Space		Average 50 ha/yr current program (1997 – 1999) to improve stand quality and diameters. Target CwHw stands >4500 sph.
Prune		All pruning is done in conjunction with spacing.
Fertilize		50 ha/yr since about 1995; to expedite Free Growing.
Space/Prune		80 ha between 1997-1999. These stands are targeted for 2nd lift pruning under current program.
Space/Fertilize		0
Other – hydroriparian spacing		0

[16] This section was prepared by Dean McGeough, a Silviculture Contractor for Weyerhaeuser Clayoquot Working Circle.

5.5 Potential Treatments

Proposed treatment regimes designed to improve future wood quality and habitat supply from second growth stands within TFL 57 are shown in Table 4. As previously mentioned, long term timber supply will not be addressed specifically in this strategy. It is expected that the future timber supply will increase as a result of the treatment regimes, however, the magnitude of this increase is unknown at this time.

Many of the previously harvested areas within the THLB have been identified as various types of "reserve" zones through the watershed planning process. Table 5 prioritizes these areas for treatments based on their habitat and timber value potential.

Table 5: Silviculture treatment priorities for second growth areas within management zones identified through the watershed planning process

Watershed Planning Factors	**Treatment Priority**		
Reserve Types Within 2nd Growth Stands	**Low**	**Medium**	**High**
Hydroriparian-Marine		Restoration	
Hydroriparian-Stream			Restoration
Red listed ecosystems[17]			Restoration
Blue listed ecosystems[9]		Value	Restoration
Representative ecosystems			Restoration
Visual quality: natural appearing	Value		Restoration
Visual quality: minimal alteration		Value	Restoration
Visual quality: small scale alteration			Value/ Restoration
Recreation Management			Value/ Restoration
Terrain Class 1 to 3, nonvisible			Value/ Restoration

[17] Treatments will only applied in areas that have been previously harvested.

Table 6: Proposed treatment regimes designed to improve future wood quality and habitat supply from second growth stands within Tree Farm License 57

Treatment	Comment/Potential Treatment Regimes	Treatable Area
General	The following treatment regimes may be modified following the completion of TFL 57's first Timber Supply Review in March 2002. These changes will be reflected in Version 2.0 of this Incremental Silviculture Strategy.	
Backlog	Virtually non-existent in TFL 57	
Hydroriparian spacing	Restore wildlife habitat/ fisheries/ biodiversity/ windfirmness and enhancement of old-growth characteristics. Variable spacing density: 450	50 ha/yr
Fertilization	Fertilization at Free Growing, plus one additional application will expedite green-up.	50 ha/yr
	Fertilizer will also be applied at time of planting to decrease time to free growing.	
Juvenile spacing	Juvenile spacing targets will be 900 stems/ha. Stands with 5000+ sph will be given priority. Pruning activities will focus on Cw and CwHw stands. This treatment is expected to increase timber value as well as habitat quality and supply.	100 ha/yr
	Roadside treatments (15m width) for increased values/ low cost harvesting.	20 ha/yr
2nd lift Pruning	The follow-up pruning of stands pruned to 3 m between 1997-1999. The second lift will be to a final height of 5.5 m.	20 ha/yr
Brushing/ Spot fertilization	Brushing and weeding (of salmonberry and red alder) on pre October 1, 1987 and post 1987 harvest areas where the growth potential of the conifers has been reduced. It is understood that this activity will not be funded by FRBC.	100 ha/yr for the next 2 years to gain prompt Free Growing status.
Conifer Release	The removal of off-site Douglas-fir and/or Amabalis fir from Cw/Hw sites to optimize future growth and yield and wood quality on these sites. This treatment will release understory Cw and Hw. Good quality Fd and Ba along with the Cw and Hw can be pruned at the same time.	50 ha/yr
	Large diameter (>10cm dbh) red alder has been identified as a valuable commercial species for value-added manufacturers. It will be selectively removed to support commercial opportunities for red alder.	200 ha/yr
Commercial	Older stands containing merchantable off-site Douglas-	30 ha/yr

Thinning	fir will be thinned – removal of all poor and medium quality Douglas-fir will be favored. Economic feasibility will require strong pulp markets or specialty markets for small diameter fir logs. The understory of Cw and Hw will be released. Target density will be 450 sph. In areas where habitat values are high, a variable density version of commercial thinning may be implemented at the competitive exclusion phase to stimulate the development of diverse and patchy understories that mimic old growth forests. There is the possibility of fertilizer application following thinning. It is recognized that commercial thinning treatments do not qualify for FRBC funding.	

Adaptive management and monitoring will play an important role in gauging the success of the treatments recommended within this strategy. Riparian ecosystem restoration is still undergoing changes in implementation. The proposed 50 ha/yr (Table 5) will be used as a starting point in developing new crews to do the work, and the monitoring agenda. The numbers of ha/yr may increase substantially as the following points are addressed:

1. training and development of skilled crews, and
2. the logistics of access to potential riparian restoration sites is developed.

Other practices recommended in this strategy may also be adjusted to reflect Fist Nations Traditional Ecological Knowledge as well as scientific advances.

5.6 Potential Strategies by Response Time Frame

Table 7: Summary of treatment response time frames

Column Number	Notes
1	The response time frame is the period in which the anticipated result is expected, not the period in which the action must necessarily commence.
2	Strategy numbers correspond with the numbers recorded earlier in "Preliminary Identification of Silviculture Strategies", Appendix 1.
3	Information in this column is largely from the workshop session, combined with information gathered from research papers and articles.
4	Anticipated results are determined using known information from research trials and current known operational results.

Response Time Frame	Potential Strategy / Action	Discussion / Current Status	Anticipated Result
Short Term (1-20 yrs)	1. Implement a range of incremental silviculture treatments to rehabilitate sites planted with off-site species.	1. There are a large number of plantations ranging from 17-54 years in age that were planted with off-site Fd or off-site Ba. Because of the variation in age, species composition, timber quality, and stocking densities on these sites, a variety of silviculture treatments will be necessary to restore future growth and yield of these areas: ⇒ Commercial Thinning	1. All areas planted with off-site species will be converted to an ecologically appropriate species composition and site productivity will be re-established.

Response Time Frame	Potential Strategy / Action	Discussion / Current Status	Anticipated Result
Mid Term (21-110 yrs)	1. Increase conifer growth in backlog areas through brushing and weeding of alder and other competing vegetation, possibly in combination with fertilization (site specific). 2. Implement a range of incremental silviculture treatments to rehabilitate sites planted with off-site species.	1. Plantations in which red alder has become established will require brushing to release the conifer seedlings and increase their growth potential to enable them to reach free growing. 2. There are a large number of plantations ranging from 17-54 years in age that were planted with off-site Fd or off-site Ba. Because of the variation in age, species composition, timber quality, and stocking densities on these sites, a variety of silviculture treatments will be necessary to restore future growth and yield of these areas: ▪ Conifer Release/Pruning/Fertilization ▪ Commercial Thinning ▪ Fill Planting	1. All plantations currently not free growing due to an overstory of alder will be released and returned to productivity. 2. All areas planted with off-site species will be converted to an ecologically appropriate species composition and site productivity will be re-established.

	3. Continue spacing and pruning treatments to increase wood quality of second growth stands.	3. Continued commitment to spacing and pruning will ensure the long-term sustainable supply of high quality Cw and Hw logs from TFL 57. Stands with 5000+ sph will be given priority. Final spacing density will be 900 sph.	3. 15% of long-term sustainable harvest level is to be premium quality logs.
	4. Continue to implement incremental silviculture treatments to increase wildlife habitat supply.	4. Continued hydroriparian spacing in previously clearcut hydroriparian areas will expedite the re-establishment of wildlife habitat attributes in these ecologically significant zones.	4. Ecologically healthy hydroriparian zones.
	5. Implement spacing and pruning treatments to increase wood quality of second growth stands. Specific regimes and densities will be site and species specific.	5. To date only 80 ha have been pruned/spaced in TFL 57. We would like to increase this amount considerably, focusing primarily on Cw dominated stands. Cw has been identified as the preferred species due to its potentially high future demand and value. Pruning/spacing of pure Hw or Hw(Cw) stands will also be considered.	5. The production of high quality Cw and Hw logs in second growth stands.
	6. Implement juvenile spacing treatment regimes (variable spatial layouts) to increase wildlife habitat attributes within hydroriparian areas.	6. Hydroriparian spacing will increase individual stem size (for roosting, nesting, and cavity dwellers), create space between stems for ease of wildlife movement, and the larger stem size will provide a source of large woody debris for stream channel stabilization and structure.	6. Re-establishment of: ⇒ wildlife habitat attributes in hydroriparian areas ⇒ a source of large woody debris for stream channel structure and stabilization .

Response Time Frame	Potential Strategy / Action	Discussion / Current Status	Anticipated Result
Long Term (111+ yrs)	1. Maintain wood quality of regenerated stands	1. Continued commitment to spacing and pruning will ensure the long-term sustainable supply of high quality Cw and Hw logs from TFL 57.	1. 15% of long-term sustainable harvest level is to be premium quality logs.

5.7 Silviculture Regimes and Investment Priorities

7. Ensure all basic silviculture obligations prior to October 1, 1987 are met.
8. Juvenile space pure western redcedar and cedar-hemlock stands to 900 sph. Priority is for stands exceeding 5000 sph.
9. Juvenile space good and medium site (site index of 25 or better at BH 50) western hemlock stands. Priority is for stands exceeding 5000 sph.
10. Prune (to 5.5 meters) pure western redcedar and cedar-hemlock stands to meet timber quality objectives.
11. Prune spaced stands of western hemlock to 5.5 meters using either a single lift or a two-lift regime.
12. Fertilize stands shortly after free growing to expedite greenup.

Table 8: Incremental silviculture regimes suitable for attaining the goals and objectives of the incremental silviculture strategy for Tree Farm License 57

Regimes	Strategy	Opportunity Area (ha/yr)	Quality	Habitat			Direct Silv. Jobs (PD/ha)	Direct Cost ($/ha)		Rank	
				Riparian	Wildlife	Old Growth			High	Med.	Low
Hydro-riparian Spacing	MT 4,6	50	0	++	++	++	4.5	2300	✓		
Fertilization	MT 2	50	0	0	+	+	0.1	380		✓	
Spacing	ST 1 MT 2,3,5 LT 1	120	+	0	+	++	4.0	1200	✓		
Pruning	MT 2,3,5 LT 1	120	++	0	+	0	5.5	1800	✓		
2nd lift pruning	MT 5	20	++	0	+	0	6.0	2200	✓		
Conifer Release	MT 1 MT 2	250	0	0	0	++	3.0	1200	✓		

0 = no effect + = moderate effect ++ = high effect

6.0 Incremental Silviculture Program

The following annual program has been designed to achieve the Silviculture treatment priorities outline in section 7.0.

Table 9: Treatable Areas (ha)

Year	Surveys[18]	Space	Prune	2nd lift Pruning	Conifer Release	Fertilize	Hydro-riparian spacing
1	1,600	120	120	20	250	50	50
2	1,600	120	120	20	250	50	50
3	1,050	120	120	20	250	50	50
4	1,050	120	120	20	250	50	50
5	1,050	120	120	140*[19]	250	50	50
Total	6,350	600	600	220	1,250	250	250

6.1 Cost Projections

Table 10: Funding Projections ($ 000's)

Year	Surveys	Space	Prune	2nd lift Pruning	Conifer Release	Fertilize	Hydro-riparian spacing	Total
1	56	144	216	44	300	19	115	894
2	56	144	216	44	300	19	115	894
3	37	144	216	44	300	19	115	875
4	37	144	216	44	300	19	115	875
5	37	144	216	308	300	19	115	1139
Total	223	720	1,080	484	1,500	95	575	4,677

Table 11: Unit costs of silviculture activities

Activity	**Unit Cost ($/ha)**
Surveys	$35.00
Space	$1200.00
Prune	$1800.00
2nd lift Pruning	$2200.00
Brushing	$1200.00
Conifer Release	$1200.00
Fertilize (post FG)	$380.00
Hydroriparian spacing	$2300.00

[18] Includes prescriptions and planning.
[19] Includes previously pruned area.

6.2 Employment Opportunities

The following are the anticipated employment opportunities associated with the proposed Incremental Silviculture Strategy for TFL 57. It is assumed that the program will be maintained beyond the five year planning horizon of this Incremental Silviculture Strategy.

Table 12: Program Job Outcomes: employment associated with undertaking silviculture activities in person-days (PD).

Year	Surveys[20]	Space	Prune	2nd lift Pruning	Conifer Release	Hydro-riparian spacing	Fertilize	Total PDs	Silviculture Jobs[21]
1	--	420	720	120	750	225	5	2240	12.4
2	--	420	720	120	750	225	5	2240	12.4
3	--	420	720	120	750	225	5	2240	12.4
4	--	420	720	120	750	225	5	2240	12.4
5	--	420	720	840	750	225	5	2960	16.4
Total	--	1470	3600	1320	3750	1250	25	11920	66.2

Table 13: Unit employment requirements

Activity	**PD/ha**
Surveys	0.1
Space	3.5
Prune	6.0
2nd lift Pruning	6.0
Brushing	3.0
Conifer Release	3.0
Fertilize (post FG)	0.1
Hydroriparian spacing	4.5

[20] Includes prescriptions and planning.
[21] Assumes 180 person-days = 1 job (Source: Jobs and Timber Accord).

7.0 Monitoring and Adaptive Management

Iisaak Forest Resources' current monitoring program designed to: monitor the results of the implementation of the Clayoquot Sound Scientific Panel Recommendations; improve our understanding of the mechanisms that create change in forest ecosystems; and determine whether the prescribed standards are effective and appropriate for achieving the intended management objectives.

Since many of the treatments suggested within this strategy are novel, there is significant potential for research designed to improve the management strategies suggested in this strategy through adaptive management practices. The results of the research could then be employed to improve management plans and strategies within TFL 57 and in other areas of the province interested in ecosystem restoration, increasing habitat supply and quality, and enhancing future timber values.

8.0 References

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Appendix 1: Preliminary Identification of Silviculture Strategies

Iisaak identified the following silviculture strategies prior to the workshop session as having the potential to increase future timber quality and wildlife habitat within TFL 57. Each of these strategies was discussed in detail during the workshop session.

Short Term (1 – 20 yrs)

ST 1: Increase conifer growth in backlog areas through brushing and weeding of alder and other weed species, possibly in combination with fertilization (site specific).

ST 2: Implement a range of incremental silviculture treatments to rehabilitate sites planted with off-site species (stand conversion/conifer release/commercial thinning/fertilization).

ST 3: Implement spacing and pruning treatments to increase wood quality of second growth stands.

ST 4: Implement incremental silviculture treatments to increase wildlife habitat supply.

Mid Term (21 – 110 yrs)

MT 1: Continue spacing and pruning treatments to increase wood quality in second growth stands.

MT 2: Continue to implement incremental silviculture treatments to increase wildlife habitat supply.

Long Term (111+ yrs)

LT 1: Increase wood quality of regenerated stands

Appendix 2: Map of Tenures and Parks within Clayoquot Sound